

Abstract Book

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Oral Presentations

Agronomy for Sustainable Development

Agricultural crisis in India, Sustainable Development of Small and Marginal farmers

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There are more than 450 million smallholder farmers around the global level, most of whom have family farms of less than 2 hectares of land. In many regions of the world, smallholders are the main producers. They contribute about 25% of the world's food supply and represent an important part of the solution for achieving a world free from poverty and hunger, major aims of the UN's Sustainable development Goals to achieve by 2030.

Agricultural development is an important component in India. It may be noted that Indian agriculture is the home of small and marginal farmers. Therefore, the future of sustainable agriculture and food security in India depends on the performance of small and marginal farmers.

This paper examines agricultural crisis in India .It discusses about problems of small and marginal farmers in India. This paper suggests measures for sustainable development of small holdings in the country. The study based on secondary data collected from various publications such as. Published reports of the government of India, network data etc.

The structural reforms and stabilization policies introduced in India in 1991 initially focused on industry, tax reforms, foreign trade and investment and capital markets. However, the economic reforms did not concentrate on development of agricultural sector in India.

The share of agriculture and allied activities in the GDP declined from 57.7 percent in 1950 -51 to 15.7 percent in 2008-9. Structural composition of the economy would shift furthermore strongly towards services sector, whose share would expand to 70% by 2040, while that of agricultural sector would drop progressively to much below 6 to 7% and industry sector would contribute to not more than 25% in India.

Small and marginal farmers are facing various problems such as liberalization and globalization effects, no guarantee of output prices, output price fluctuations, risk and vulnerability, climate changes, suicides of farmers, Poorer access to irrigation, lack of

water management in drought prone areas, electricity grids; greater, poor quality of land, lack of alternative agriculture activities, lack of crop insurance, lack of credit facilities, higher prices of inputs etc.

Climate change is a major challenge for agriculture, food security and rural livelihoods for millions of people including the poor in India.

Most of the world's farmers are small holders on less than two hectares of land. For many, the financial risks are high and the returns are low. There is need to achieve goals for sustainable development of small and marginal farmers in India.

As per UN's Sustainable development Goals, it is necessary to ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

Is EU Common Agriculture Policy (CAP) Supporting Other Countries in Achieving the SDGs? Assessing Policy Coherence for Development

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Policy Coherence for Development (PCD) as well as WTO agreements require the Common Agricultural Policy and related policies to consider its impacts on international markets and the (sustainable) development in other countries, where EU consumption and production has strong socio-economic and ecological impacts (cf. footprint). Based on a review of secondary literature on the EU policy impacts on other countries, we assess the level of policy integration and evaluate to what extent it is coherent with the concept of PCD and the recent Sustainable Development Goals (SDGs). Abolishing export subsidies and reducing the distortive effect of domestic support to European farmers has led to a greater market orientation with mixed effects: Higher commodity prices increase the competitiveness of net-producers in poor countries, while they can increase the vulnerability of net consumers. Competitive, middle-income countries are the main beneficiaries from the liberalisation of the European market, while it leads to an "erosion" of special trade preferences and agreements with the poorest countries. Preference erosion and market barriers resulting from high product and production standards require other mechanisms, such as Economic Partnership Agreements (EPAs) or support for capacity building to compensate the losers of liberalisation in order to fight poverty and hunger in the poorest of countries. Increasing European demands for feed supplies, bioenergy, meat and other agricultural products can have significant ecological impacts in countries outside the EU, leading to biodiversity threats, shrinking forests as carbon sinks and other environmental threats, while consuming a limited global biocapacity. Differentiating the climate-vulnerability of countries producing for the EU market, we assess climate impacts of import volumes and revenues of major agricultural

value chains. In the update adjustment of the PCD agenda related to the SDGs, the EU has to develop a CAP as part of a coherent policy mix that acknowledges trade-offs and produces political incentives in a way that helps poor countries to meet the SDGs and reduces the EU's global ecological footprint.

Building Resilience to Climate Change

Anticipate, Absorb, Reshape (A2R): A Baseline Study of Climate Resilience in the Developing World

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The United Nations Climate Resilience Initiative: Anticipate, Absorb, Reshape (A2R) is a global, UN-led, multi-stakeholder initiative that strengthens climate resilience for vulnerable countries and people. Launched in November 2015 during the 21st Conference of Parties of the UN Framework Convention on Climate Change in Paris, this initiative brings together governments, international agencies, regional initiatives, the private sector, civil society and academia. A2R addresses the urgent needs of Least Developed Countries (LDCs), Small Island Developing States (SIDS), Africa and other vulnerable regions. The initiative accelerates action on key aspects of climate resilience under its three pillars:

- Anticipate – Increased capacity to better anticipate and act on climate hazards and stresses through early warning and early action.
- Absorb – Increased capacity to absorb shocks by increasing access to climate risk insurance and social protection systems.
- Reshape – Increased capacity to reshape development pathways by transforming economies to reduce risks and root causes of vulnerabilities and support the sound management of physical infrastructure and ecosystems to foster climate resilience.

One of the A2R Initiative's functions is to analyze progress under the three pillars in the light of already-agreed global goals and targets, including those set out in the 2030 Sustainable Development Agenda, the United Nations Framework Convention for Climate Change (UNFCCC), as well as the Sendai Framework for Disaster Risk Reduction.

This research is a first attempt to establish a baseline. The report seeks to outline the current status of key indicators relevant to the three pillars. It also identifies some of the challenges faced in this analysis and suggests ways of overcoming them, so that we may, in the future, be able to provide a fuller picture of progress on these three key capacities for climate resilience. This study will also inform the A2R Initiative in bringing partners together to fill key gaps in climate resilience action.

The paper begins with an explanation of our methodology, and is organized by the three pillars of A2R. In each section, an overview of each pillar provides a framework for analysis, and a research summary highlights specific challenges encountered during the research process. We then present our findings and a discussion of data gaps.

Regenerative Strategies for Climate Justice

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The starting-point for this paper is a growing concern about the strong and creative tension between what is global and what is local in the context of climate change and food systems. The global face is powerful based on large-scale, resource-intensive, agribusiness enterprises operating globally and seeking to be more so. But a tide is rising, which is reinforcing the local and provoking, a strengthened valuing of the local food systems while enhancing the resilience to climate change. Tragically it is those who have contributed the least to green house gas emissions who are suffering the worst effects of climate change.

This presentation will feature a project in the Koraput district of the state of Orissa, India where 70% of the population is dependent on agriculture in a region where late and erratic Monsoon is impacting the course of farming. Koraput is known for its abundance of paddy fields as well as many varieties of millets, yam, and tuber crops, which are gradually vanishing due to the introduction of cash crops and GM seeds, and the increasing impact of climate change.

The constant change in the environment of tribal communities in the region creates an imperative for constant learning. In this context the paper will analyse a project-based-learning and grass-roots campaign Grow your own Food led by the tribal Women's Federation Orissa Nari Samaj, and the local NGO THREAD, to counteract the so called "Climate-Smart Agriculture" (CSA) techniques. CSA encourages the use of modified seeds, chemical pesticides, and synthetic fertilizers, as well as high-risk technologies such as synthetic biology, and geo-engineering. This imposition of new biotechnology has been particularly damaging for the local growers.

The paper analyses how new climate resilient agriculture approaches combined with traditional ways of food growing and drought tolerant plants are rimproving the productivity of their soils and the nutrition of their meals.

Furthermore the paper describes how the women of Orissa, in the face of looming climate crisis, are tackling climate change in their own dignified manner.

The paper concludes by looking at the role of Education for Sustainable Development in supporting indigenous communities in climate-vulnerable regions to develop locally adapted agro-ecological responses, while attempting to address the deeper structural

changes needed to tackle the root causes of poverty and climate change in the Global South.

Planning for Climate Resilient Barangays in the Philippines: The Case of Barangay Tumana in Marikina City, Metro Manila

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The Philippines is one of the most at risk countries to climate change. It ranks fifth in the list of Global Climate Risk Index (2017) in terms of extreme weather events. This situation plus other human and developmental factors compound the challenge for barangays, the smallest political and administrative units in the country, to build and scale-up resilience.

Strengthening and increasing barangay resilience requires a thorough and systematic analysis of exposure, sensitivity, and adaptive capacity of the unit through evidence-based planning that will render key recommendations and policy options to lessen its vulnerability. This paper presents a case study in the Philippines, specifically in Barangay Tumana in Marikina City, Metro Manila, detailing the systematic examination of the elements that affect its vulnerability. These factors are identified, characterized, and summarized. Barangay Tumana was chosen because it was seen as the most devastated barangay in Marikina City during Typhoon Ondoy (International name: Ketsana) in 2009. However, the population in the barangay has ballooned to 41,809 (NSO, 2010), the second largest in Marikina City. It is in this context that the study takes off, by scientifically analyzing the key hazards and characterizing the elements at risk viz-a-viz the environmental impacts brought about by climate change.

The paper seeks to answer the main research question: What are the exposure, sensitivity and adaptive capacity elements of the communities in Barangay Tumana that contribute to its vulnerability from climate-related hazards? The guiding definition based on United Nations Framework Convention on Climate Change (UNFCCC) is used to frame the process of analysis. In particular, the study inquires about what the biophysical/environmental risks and socio-economic/ demographic character of the communities in Barangay Tumana are, and how these can be addressed through barangay planning, as a strategy to further community resilience.

The study implores various methods of data gathering and analysis. Primary data gathering is conducted through a questionnaire survey to generate empirical data and baseline information on the socio-economic condition of the case study barangay. In addition, Geographic Information System (GIS) is used in processing and analyzing acquired primary and secondary (spatial and non-spatial) data. The key findings from the survey results are supplemented by collection and review of secondary data, as well as, the conduct of key informant interviews with technical LGU barangay personnel and

community stakeholders. An extensive review of critical information of key documents, and conventional literature searches are likewise carried out. A multi-stakeholder validation and consultation are conducted in order to validate the research findings and come-up with strategic and proactive approaches, through mitigation and adaptation strategies, towards building barangay resilience in the context of climate change.

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RegionsAdapt 2016 Data Report: An assessment of risks and actions

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In December 2015, thanks to the initiation of the governments of Catalonia and Rio de Janeiro, RegionsAdapt was launched in Paris, alongside COP21, by 27 founding members and with the Network of Regional Governments for Sustainable Development (nrg4SD) serving as its Secretariat. It became the first global initiative designed to inspire and support regional governments to take concrete action, collaborate and report efforts on climate change adaptation. This global partnership is open to all governments from across the world, situated between the local and the national level, regardless of their size or stage of their climate policy's implementation. The literature has identified three ways in which regional partnerships catalyze innovations in climate adaptation policies. First, innovation is sparked internally with collaboration among partners in common projects and joint working groups. Second, regional partnerships can help by scaling up the regions' activities, then diffusing knowledge and policy innovations externally to decision makers beyond the partnerships. Finally, regional partnerships support national adaptation politics by providing inputs to national adaptation policy formulation. RegionsAdapt aims to serve as a catalyst for all these objectives. As an international cooperation initiative, it encourages members to interact and exchange experiences and best practices, report efforts, as well as seek joint projects and new ways to foster concrete actions. By raising the visibility of regional governments on the international stage, RegionsAdapt can highlight their fundamental role in bridging gaps for the local implementation of national and global decisions. Moreover, taking into account the lessons of regional governments on the ground, initiatives such as RegionsAdapt can

provide the Parties to the UNFCCC with thoughtful recommendations on innovative solutions for adaptation policy design. Altogether, these potential benefits ultimately favor the ability of regional governments in delivering adaptation measures and enhance the adaptability of the communities within their jurisdictions. Once joining RegionsAdapt, governments are essentially agreeing to three commitments: to adopt (or review) a strategic approach to adaptation and prioritize adaptation actions within two years of joining the initiative; to take concrete action on adaptation in at least one of the seven key priority areas that the founding regional governments have mapped; and to report data on the progress of the adaptation actions on an annual basis through the “risks and adaptation” section of CDP’s states and regions platform.

By reporting to RegionsAdapt in 2016, members were able to take part in a community of regional government practitioners publicly disclosing the progress of their adaptation efforts for the first time on a global scale. In January 2017, RegionsAdapt launched its first data report. This document portrays the risk assessment and adaptation responses of 27 regional governments that have fulfilled their commitments and successfully disclosed their adaptive pathways. This group is comprised of 14 governments from the Americas, 7 from Africa, 3 from Asia and Oceania, and 3 from Europe. Additionally, this report provides ten recommendations for the future and encourages their implementation as soon as possible before 2020 to build on the momentum of the Paris Agreement’s entry into force.

Capacity Development for Resilience to Climate Change in the Pacific: The EU-PacTVET project

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The Pacific Island Countries are very vulnerable to climate change due to their geographical location and limited resources. They are also extremely exposed and vulnerable to natural hazards, some of them being expected to worsen because of climate change. Since these countries only account for less than 0.03% of Greenhouse gases, the priority for these countries is to build their resilience to both climate change and disaster risk management. However, capacity development is hampered in the region by the lack of local and regional capacity and expertise, due to the absence of sustainable training programmes and the limited number of institutions to offer them. There is also a lack of national capacity for quality assurance for training. There are many training on climate change and disaster risk management organised in the region but most, if not all, of them are ad hoc, so they are not sustainable and do not provide participants pathways to continue to build their capacity.

To support capacity development in the Technical and Vocational Education and Training (TVET), the EU-PacTVET project conducted a training needs and gaps analysis and based on its results developed regionally accredited TVET qualifications in Resilience, which in the EU-PacTVET context includes climate change and disaster risk management. These qualifications were developed through a consultation process

involving different stakeholders of the ‘Resilience Sector’ in the Pacific. The EU-PacTVET is funded by the EU and covers 15 Pacific ACP countries and is jointly managed by two regional organisations. TVET institutions in the 15 countries covered by the project will be supported by the project to be ready to offer the developed qualification. The support will be based on country demand and may include: development of learning material, provision of teaching material and training of trainers.

In order to support the regular revision and update of these qualification and to support the professionalization of the Resilience Sector’ in the Pacific, the EU-PacTVET project supported the establishment of a regional professional association: the Pacific Regional Federation of Resilience Professionals (PRFRP) which will ensure the sustainability of the project’s outcomes.

Water resources resilience and social perception of water scarcity in Tacloban, Philippines

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On November 8th, 2013, super typhoon Haiyan roared ashore in the Philippines, causing catastrophic destruction and thousands of casualties, with its outrageous proportions being often linked to climate change causes. Being one of the major cities hit by the 6m tsunami-like storm surge, Tacloban City soon became the focus of world media attention and international relief operations. To the present day, the city is undergoing major relocation efforts towards north that will create new residential, institutional and commercial areas on a supposedly storm surge safer zone. However, this new city that will accommodate circa 40% of Tacloban’s population in 2018 is still lacking a solid water supply solution, as several proposals are currently being evaluated. Moreover, existing literature focusing the hydrological pressures for this region, points to an aggravation of the number of hot days and an increase of extreme rainfall events, enhancing the city’s need for adaptation strategies.

The purpose of this research was, therefore, to determine how to enhance the resilience of water supply in Tacloban City, based on a holistic new perspective of resilience which embraced natural water resources, built infrastructure and social aspects. To do so, this region hydrological system was modeled using USEPA’s QSWAT in order to evaluate the impacts of climate change (namely rising temperatures and the variation of rainfall patterns) on the three rivers in which rely the main supply solutions currently considered, Binahaan, Pongso and Cabayugan Rivers - and thus assessing these resources resilience as sources of supply. Two climate scenarios were generated, for 2020 (2007-2035) and 2050 (2036-2065) recurring to the Change Factor Method, and the system response to those was compared to the baseline data’s (1979-2010).

First modeling results evidenced that, regardless of the chosen supply solution, for specific time periods (most severely for the trimester of March to May) the percentage of

days in which the river flows were insufficient to meet the proposed water catchment rates was significant (reaching up to 25%). Outputs also suggest that Binahaan River, where current water catchment is located, may fail in providing sufficient water to the region for future scenarios. However, it should be enhanced that Pongso and Cabayugan Rivers, on northern Leyte, can represent a complementary resilient water source to supply the new resettlement areas.

The interview of key stakeholders and the implementation of community surveys amongst the affected areas have allowed collecting valuable information on social resilience. The interconnection between hydrological results and this social perception was also a focus of this research. If proven valid, final conclusions can help to increase the resilience of other water systems, serving utilities managers and policymakers in diminishing climate-related hazards impacts. Moreover, the novelty of recurring to hydrological modeling as a tool for resilience analysis and its inclusion on a holistic new perspective of resilience, both constitute strong assets of this work.

Global political processes and the multiplier effect of climate (in) justice

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This paper will examine the opportunities and barriers for securing consensus on action-guiding principles and appropriate institutions for activation and enforcement of climate justice rights and responsibilities within the contemporary structure of the global political order. Climate justice, and more specifically, the distributional, rectificatory and epistemic dimensions that inform contemporary conceptualisations of this intellectual construct, require a shared set of principles and an appropriate set of institutions for their activation. The paper begins by describing the moral theoretical terrain of climate justice, before mapping the landscape of agencies, actors, and networks that influence global political processes, and the patterns of interaction and engagement operating within this space. Taking the UN Framework Convention for Climate Change (UNFCCC) and the Conference of Party (COP) as the primary spaces for global negotiation and decision making, and utilising methods of content and discourse analysis, the paper will critically evaluate the Paris COP 21 negotiation process and Outcome Agreement (2016). It will also conduct multi-scalar analysis to evaluate regional commitments and Nationally Determined Contributions (NDCs) as innovative approaches to driving bottom-up consensus on climate justice principles and practices. Utilising a climate justice analytical lens, it will examine the opportunities and barriers for securing consensus and achieving climate justice outcomes within the contemporary global political architecture. It will argue that there is evidence to suggest that there is an emerging consensus concerning matters of distribution for future emissions. Further, that the inclusion of a Loss and Damage clause in the Paris Agreement points to some consensus concerning recognition of harms that are already arising. However, there is a worrying lack of progress on substantive issues of rectificatory justice, and an increasing trend towards epistemic

exclusion of both expert voices and the most climate-vulnerable populations pointing to a possible multiplier effect of emerging climate injustice for these groups.

Agricultural Policy and Transformation Pathway to Sustainable Rice Economy in Nigeria

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The agricultural policy thrust in Nigeria identifies rice as priority crop for economic transformation. However, the sustainability of the production system is of great concern in the era of sustainable production. This concern is born out of the fact that the agricultural sector has been implicated as a driving force in greenhouse gas (GHG) emissions and land use effects. Direct sources of GHG from agricultural production systems are emissions from cultivated and fertilized soils which include carbon dioxide, ammonia and nitrogen oxides. Rice (*Oryza spp*) constitutes a major staple crop (and drainer of foreign exchange) in Nigeria. It also contributes to greenhouse gas emissions through its intensive and high-input production system. Proper identification of the nature and intensity of emission (and sources) could assist in appropriate greenhouse gas emission actions as well as proper estimation and reduction of carbon footprint from rice production systems. Hence, the importance of assessing the nature of deep carbonization that would be required for agricultural transformation pathways in rice production systems and enhance resilience to climate change in Nigeria.

The transformation pathway methodology which seeks to analyse agricultural production systems taking into cognizance climate change and sustainability of the agricultural production systems, was adopted for the study. In this regard, a step-by-step of the analysis of back-casting involved: analysing the present economic and environmental situation of rice production in Nigeria; stating desired future scenario; undertaking feasibility assessment; prescribing a concrete course of action; and elaborating detailed pathways.

The findings yielded a strategic matrix for the transformation of the rice production systems in Nigeria. The transformation pathways have indicators on productivity, biodiversity, climate change scenarios, and nutrient demand. Also, targets, roadblocks and levers for sustainable rice production were presented. These issues are with a view to mitigating greenhouse gas emissions and promoting efficient water management in the rice production system in Nigeria.

Climate resilience by Nucleus of Research in Engineering, Science and Sustainability of Semiarid (NUPECS)

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This research registers the actions of the Nucleus of Research in Engineering, Science and Sustainability of Semiarid (NUPECS). Initiative located in rural area of the city Caiçara do Rio do Vento in Rio Grande do Norte State, Northeast Region, Brazil, 100 km from the capital Natal. In site there is supporting infrastructure as an auditorium, cafeteria and accommodations.

The Nucleus of Research in Engineering, Science and Sustainability of Semiarid (NUPECS) is a project that aims to be a space for the development of sustainability research aimed at living with climate change in semi-arid Northeast. The Nucleus of Research in Engineering, Science and Sustainability of Semiarid (NUPECS) is located in an area living the worst drought of the last century.

Was possible identify different sustainable approaches developed by NUPECS in the Sertão region (kind of desert or Brazilian outback). Some projects under development in NUPECS are: House with PET plastic bottles; House with glass bottles; Center for Education and Sustainable Culture; Experiment in Organic Architecture; Museum Sustainability of Semiarid; Technologies of water storage; Sustainable Technologies in the layout of physical space; Technologies to combat erosion; Eagle Observatory; and The Mars Habitat.

All these topics presents great importance to provide new learnings related with the Sustainable Development Goals (SGD) for students, researchers and teachers who have an interest in Sustainability theme.

What is observed in NUPECS brings learning in the areas of sustainability, education, social technologies, recycling, construction, architecture and rural and ecologic tourism.

More information about the Nucleus of Research in Engineering, Science and Sustainability of Semiarid (NUPECS) can be obtained at:
<http://www.NUPECSufrn.blogspot.com>.

One of the initiatives developed in 2017 is the The 1st International Workshop on Green Construction will address key elements of: construction using PET plastic bottles and glass bottles; Education and Sustainable Culture; Experiments in Organic Architecture; Sustainability in Arid and Semiarid Regions; Technologies of water storage; Sustainable Technologies in the layout of physical space; Technologies to combat erosion; analogies between arid and semiarid regions and Mars. All these topics are of great importance of learning for students, researchers and teachers interested in Sustainability theme.

Considering all the points, registers the importance of registers the initiatives developed in Brazil, based in Nucleus of Research in Engineering, Science and Sustainability of Semiarid (NUPECS) experience.

Conserving Habitats and Biodiversity in Latin America & the Caribbean

Mosaics of Protected Areas: a tool for strengthening biodiversity conservation in Brazil

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Changes in land use and ecosystem fragmentation are the main cause for biodiversity loss in Brazil, and the creation of protected areas (PA) are the instrument to avoid that loss. However, in all of their history, PAs suffer from deficiencies that undermine the achievement of their objectives, such as the lack of material and human resources. Adding to this, we have the conflictual relationship between PA management and local and traditional communities. To solve these problems, the Mosaics of Protected Areas (MAP) were created. They exist to promote an integrated and participative management between close or overlapping protected areas, valuing the territory's social diversity and sustainable development. While the protected areas focus on the biome conservation, mosaics act in territory environmental management. They were created as tools for the integrated management of protected areas with the areas where live those traditional communities as indigenous groups, quilombolas and small property farmers. There are 21 MAP in Brazil, 12 of them in the Atlantic Forest biome. They are managed by councils that congregate government and civil representations. These councils has a presidency or coordination, responsible for leading meetings and activities, and a secretariat, that organizes all materials produced by the council and is responsible for the interinstitutional articulation. Integrated management is the process by which governance proposes to take place in the mosaics and makes them an instrument of participatory management and social control that operates in the territory. In an interview to the members of the presidencies and coordinations of the five mosaics in the state of Rio de Janeiro, the main advantage of mosaics was the strength given to AP and the possibility of working together, and the main challenge was to keep the mosaic in operation, due to the overwork of protected areas managers and lack of funds to fund a professional executive secretariat. These results were similar to the claims made by representatives of mosaics from all over the country at the National Mosaics Workshop, held in May 2016. Mosaics exist to contribute to protected areas in protecting biodiversity. However, it is necessary to have the understanding that without the support of communities and people living in a territory, this task will be much more difficult. Searching for ways to maintain MAP activity should be the council focus. However, this responsibility should not be attributed only to one sector, be it governmental or civil society. As a proposal to strengthen protected areas and bring improvements to biodiversity conservation in Latin America, MAPs are a successful brazilian experience, interesting to be replicated and even improved in other countries, integrating conservation with greater social participation in the territory.

Factors for the analysis of community-based tourism initiatives in Latin America

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There are plenty of regions and localities in Latin America that present exceptional attributes in both natural and social resources. Nevertheless, many of these regions have not managed to achieve sustainable development. The dilemma consists then in how to generate income to communities and developing sustainable strategies that take advantage of the touristic opportunities these regions provide. There are many types of tourism and not all of them have an aim to support and find a balance in between the social, economic and environmental dimensions of sustainable development. In this article community-based tourism (CBT) appears as a solution for this type of communities who want to develop an alternative tourism strategies. This type of tourism allows for a deeper contact with the local communities and more authentic experiences. The growing impetus of CBT as a means of achieving sustainable tourism and a strategy for social development forces us to seek a deeper understanding of this phenomenon. This article tries to fill in this gap by analyzing four cases of CBT in Chile, Mexico, Brazil and Bolivia. to find factors of success and lessons that serve to ensure that CBT truly enhances community development, while protecting the environment and cultural traditions. This study identifies four variables that area pre-requisite for the success of CBT: cohesion grade of the community, the existence of public policies that favor and strengthen the regional or local development of the community, the importance of the cultural affirmation and the involvement of external actors in the implementation of the project. Based on these factors a better understanding of CBT can be achieved, and they can be used to evaluate the social viability of CBT projects.

Curbing Gold Mining in Choco, Colombia

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The Choco Region in Colombia, with a vast tropical rainforest, is one of the most biodiverse spaces in the world today and yet there are constant threats to its existence. It is a red zone and an unsafe region for Colombians who are non-locals due to the presence of the Fuerzas Armadas Revolucionarias de Colombia (FARC), drug lords and other militant groups. It is also the poorest region of the country with a predominantly afro Colombian population. There are high levels of corruption in misappropriation of funds and illegal mining that come at great human costs. Around 80% of the gold produced in Colombia is from illegal mines and the highest concentration of mines is in Choco.

This presentation addresses the means to tackle the multifaceted problem of illegal mining with measures at the national level that would bring benefits to populations living in Choco and the ecosystems they thrive in. While there are plenty of best practices that

could be implemented at the national level, the memo will zoom in on the practices that could offer the most promises for people of low-income who depend on the resource rich land for their subsistence and the practice of mining for their livelihoods.

The best practices suggested in the presentation range from ways to reduce the amount of environmental degradation in the mining areas to addressing the systemic poverty and lack of opportunity of informal workers on mining sites. Cases across the globe are studied and assessed through a social equity lens and through the rubric of relevance to the colombian context in order to determine the optimal options for the Choco region.

The six best practices considered are the following: 1. Create a pathway to legalize small mining communities with less harmful practices to the environment who agree to comply with basic ecological standards. 2. Implement laws to limit contamination levels of mercury in water. 3. Enforce protocols and laws already in place to restore areas devastated by mining to their original state. 4. Use Global Positioning Software (GPS) to detect illegal mining sites. 5. Fund organizations that seek to eradicate the exploitation of low paid workers in the mining industry through formalized employment. 6. Increase taxes on companies for gold mining.

Economics and Demography of Natural Disasters

Economic Effects of Emergency Risk Communication: Evidence from the Fukushima Daiichi Nuclear Disaster

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A tremendous amount of radioactive products were discharged as a result of the accident at the Fukushima nuclear power plant in March 2011, which resulted in radioactive contamination of the plant and surrounding areas. When describing the geographical distribution of radioactive contamination, the government, media, and other organizations largely used administrative boundaries (prefectures, municipalities etc.) or distance from the radiation source as a reference. I examine how this sometimes misleading information about risks, as opposed to the actual risks of radiation, significantly and negatively affected land prices in locations near the plant. I find that the prefecture border effects é but neither the distance effect from the nuclear power plant nor the effect of the actual risk of radiation é are significantly related to a reduction in land price after the accident. This is to say that, even with the absence of the actual risk of radiation, the land price in Fukushima and its three adjacent prefectures has declined more rapidly than that in other prefectures of Japan after the accident. Although health risk information based on prefecture has an obvious advantage of distilling large and complex risk information into a simple one, the government, media, and other organisations need to recognise and carefully examine the potential of misclassifying non-contaminated areas into contaminated prefectures. Doing so will avoid unintentional consequences to the region's economy.

Natural hazard information and migration across cities: Evidence from the anticipated Nankai Trough earthquake

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The Nankai Trough and its underlying fault are the major source of the future devastating earthquake, the Nankai Trough earthquake, in Japan. The Central Disaster Management Council, which is a governmental committee for policy planning on disaster management, released the latest report on the predicted damage from the Nankai Trough earthquake in August 2012. The new report estimated the maximum possible seismic movements and tsunami height for each municipality, which were updated from the previous ones released in 2003. We use a panel of 430 municipalities for the period 2008-2015 to examine the causal impact of the predicted seismic movements and tsunami heights on the net migration across municipalities. Our dataset covers 251 coastal municipalities subject to tsunami predictions as well as 179 inland municipalities which are adjacent to the coastal municipalities. The Difference-in-Differences (DID) estimates indicate that the predicted tsunami height is significantly and negatively associated with the municipality's net migration rate. Our empirical results are robust to the inclusion of various controls such as demographic and socio-economic characteristics, municipality fixed effects, and region-specific time trends. Further empirical analysis shows that the predicted tsunami height has a significantly negative impact on the in-migration into the municipality throughout our sample period, whereas it has only a short-term positive impact on the out-migration. The predicted seismic movements, on the other hand, is significantly and negatively associated with in-migration only for the year immediately after the release of the report. Our empirical findings suggest that, after the dissemination of tsunami predictions, people tend to choose less risky locations, rather than engaging in other disaster-prevention activities. In addition, we found that the negative impact of tsunami heights on the in-migration is weaker in municipalities where public facilities that can serve as disaster relief or evacuation center are concentrated in the densely inhabited district.

Recent Japanese Cases and Problems of Widespread Migration Following Massive Disasters

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The Great East Japan Earthquake and the Fukushima nuclear power plant accident has brought any widespread migration who have to leave far from their familiar residences.

At the same time, the Headquarter of Earthquake Research Promotion has pointed out that the occurrence probability of the anticipated Tokyo metropolitan earthquake and the Nankai Trough massive earthquake is high, and the Cabinet Office has released the damage assessments of those earthquakes, which indicate that the risk that will greatly

exceed the Great East Japan Earthquake. In case of the anticipated Tokyo metropolitan earthquake, 610,000 complete collapse buildings were expected. It will become 1,500,000 households if it converts into the number of households. Although correspondence to the widespread migration is becoming a realistic policy concern, public administration is having difficulties in coordination with related organizations. In addition, widespread migration has been also positioned as one of the adaptation to global warming impact.

This research reports (1) the situation of the widespread migration after the Great East Japan Earthquake by introducing the analysis of large-scale original questionnaire to the migrant from the Futaba district with the Fukushima nuclear plant.

Next, this research shows (2) the original calculations about widespread migration using the official damage assessment by introducing the result of the joint research with Japanese public broadcaster about the temporary housing following the anticipated Tokyo metropolitan earthquake.

In the Great Kanto Earthquake in 1923, about 110,000 residential houses were lost and many demographic shifts from the old eastern area to the new western area where the ground was stabilized happened. In the anticipated Tokyo earthquake, many migration is expected and the most of the migrant will not return to the suffered area. Many housing damage is expected at the eastern Tokyo where the ground is weak, and the fall of land prices and inflow of relative poverties are expected.

At the last, this research examine (3) the institutional problems about widespread migration by using preferable policies which are discussed in hearing investigations at the Kumamoto City Hall and the welfare facilities located near the Fukushima nuclear power plant.

Education for Sustainable Development: An Issue of Consciousness and Values

Determinants of Corporate Social Responsibility Toward Employees: The Case of MNCs' Subsidiaries Operating in Canada

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The 8th Sustainable Development Goal “Decent work and economic growth” put the emphasis on the work place as an important part of the social pillar of sustainability. This goal has potential synergies with other sustainable development goals such as enhancing well-being, gender equality and social justice. Therefore, we have to increase consciousness about the importance of decent work for achieving sustainable development as well as about the impacts of socially irresponsible practices towards employees such as massive layoffs, health and safety issues and discrimination against

women and minorities. Yet, unlike the environmental dimension, the social dimension of sustainability is lacking academic and practitioners' attention. We, scholars, have to shed light on the diversity of the stakeholders concerned with sustainable development and educate and inform about the three pillars of sustainability as well as the synergies occurring among them.

In our paper, we investigate decent work through the determinants of the adoption of Sustainable Work Practices (SWPs) in Multinational Companies (MNCs) which evolve in different contexts where no unified legal framework exists. SWPs ensure that employees' rights and well-being are secured even in the absence of State regulation and legal constraints. Such practices give employees opportunities to learn through training and development and to be involved in the decision-making process through participation mechanisms and trade unions. SWPs form part of the social pillar of Sustainable Work Systems which are defined by Eijnatten (2000:53) as "work systems in which the quality of work (employee health, well-being, and personal development); the quality of the organization and the quality of connections with the environment are constantly kept at the same high levels". Given the importance of such topic and the need to secure decent work, it appears to be crucial to understand the circumstances under which these practices tend to be implemented. In this regard, the question that motivates this paper is the following: What are the conditions under which MNCs' subsidiaries are most likely to adopt SWPs?

This paper is structured as follows. First, it will assess the extent to which MNCs' subsidiaries operating in Canada are adopting these practices. In this study, SWPs refers to the attitude of the management towards unions, job security, policies favoring training and development and policies promoting employees' involvement through participation and communication. Second, analyzing the adoption of SWPs, this paper will consider different explanatory factors reflecting the relationship between the subsidiary and its parent MNC such as subsidiary autonomy (Shirodkar et al., 2016), cultural distance between the country of origin of the MNC and the host country of the subsidiary (Girerd-Potin et al., 2015), competition within the MNC (Campbell, 2007) and the rating of the workforce within the worldwide company (Lee et al., 2016).

Our analysis is mainly based on the INTREPID database containing information on human resource practices and employee relations collected among 208 MNCs' subsidiaries located in Canada. Finally, to test our hypotheses relating to the research question and the different factors of interest in this study, multivariate statistical analysis will be conducted.

"Amazonizing" the SDGs: building a methodology for applying the Sustainable Development Goals with riverine students in the Amazon

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Launched by United Nations in 2015, the Sustainable Development Goals (SDGs) are part of an innovative agenda of global development, which has as one of its main challenges not to leave anyone behind. The purpose of this article is to present a collaboratively constructed methodology between the Sustainable Development Solutions Network Youth Amazonia (SDSN-Youth Amazonia) and Amazonas Sustainable Foundation (FAS) that aimed to discuss with students from riverine localities their views on the 2030 Agenda for the SDGs. Participated in the activity: 30 young people, from 7 to 17 years, from the 5th year of elementary school to the 2nd year of high school, and current students of Conservation and Sustainability Center (CSC) of Rio Negro, Juma, Solimões and Uatumã, all Sustainable Development Reserves (RDS) of Amazonas state.

The action had three objectives: (i) to understand the meaning of each SDG for students living riverine communities, (ii) to jointly construct a intervention agenda in riverine communities, and (iii) to stimulate youth protagonism in these regions. The methodology was understood in three stages. Initially, the CSC's managers promoted a previous mobilization with all the students, at the community level. Next, representative students were chosen to attend a Conference in Manaus, called "Knowledge Exchange", where the representatives discussed their views on the 2030 Agenda and were able to present their views on the topic to the students of the others RDS in plenary. Finally, they participated in a workshop to build small short-term projects in their communities. Among the most frequent questions raised by students are access to inclusive education, generation of income in the community and proper disposal of solid waste at the local level. The activity also allowed to diagnose challenges for the implementation of the agenda in the school context of these areas: the turnover of teachers and mainly, the scarce logistics.

Unlocking the hidden power of worldviews: a new opportunity for the transformative Education for Sustainable Development

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The field of Education for Sustainable Development (ESD) has evolved from an applied science approach with a positivist orientation dominated by the connection between logical knowledge and behavior, to a range of more holistic approaches aimed at the deep transformation of the self by questioning the meaning of human experience. This paper explores the potential for the concept of worldview to help achieve ESD's transformative agenda. We present an empirical study based upon the newly developed Transdisciplinary Framework of Worldviews and Behaviours (TFWB)¹, and explore the implications of a worldviews approach within ESD practice.

A worldview is a complex constellation of meaning from which the wide range of human conduct emerges; it is the uniquely-personal, subjective meaning given to reality, which explains each life experience and prescribes patterns of emotions, thoughts and actions. It is the hierarchical network of significance framing the relationships within ourselves and the environment, from which mental states, attitudes, choices and behaviors are derived.

Therefore, the concept can help to explore how people apprehend and make sense of their own reality, form their unique structures of meaning and choose their way of being, becoming and behaving.

The deep transformation of the self is inherently dependent on the transformation of the worldview, and yet there has been limited exploration of this concept in the ESD context; consequently, we first developed the TFWB as a theoretical explanation of what worldviews are and how they are mentally formed and physically expressed through the wide range of human conduct the body can display. In this paper we build upon the TFWB through an in depth qualitative study of the personal worldview of twenty-five randomly selected adults from Sydney, Australia.

Participants' worldviews were explored in three steps. Initially, they completed an online multiple-choice survey based on Hedlund-de Witt's worldviews typology and questionnaire² focused on the identification of ontological, epistemological, axiological, anthropological and sociological perceptions. Then, they participated in a semi-structured interview where they discussed their responses to the questionnaire, the most significant life experiences they identified as being crucial in the formation of their worldview, and behaviors which they identified as representative expressions of their worldview. Follow-up questions administered two months later provided an opportunity to prompt and capture insights and reflections arising from the experience of the interview.

This empirical research revealed a general struggle among the participants to recognize their own worldview, how it is formed and how it determines the way participants behave. The results also suggest that, for this group at least, traditional education approaches have not played a significant role in addressing these fundamental issues about human identity and existential meanings. Based on these empirical results and the theoretical TFWB, we argue that transformative ESD needs new foundations, based on positioning worldviews at the center of a potential new learning approach. Such approach aims to improve the self-recognition of how and when we sense and apprehend the world, and build meanings; what those meanings are; and how they determine the ways we feel, think and behave.

The theoretical TFWB and the empirical evidence presented here represent the foundations for a new transdisciplinary learning approach that leverages the hidden power of worldviews; potentially useful in encouraging self-observation, reflection, and a potential transformation of meaning making about ourselves, others and the environment. This approach could guide the design of innovative learning experiences that boost introspection and new conceptualizations about how worldviews shape what it means to be human, contributing to the achievement of the ESD's transformative goals.

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2. Hedlund-de Witt, A., et al. 2014, 'Exploring inner and outer worlds: A quantitative study of worldviews, environmental attitudes, and sustainable lifestyles', *Journal of Environmental Psychology*, vol. 37, no. 2014, pp. 40-54.

Franciscanism: A Framework Sustainable Development Education

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The fourth Sustainable Development Goal (SDG) is 'Quality Education', with its objective being to 'ensure inclusive and equitable quality education and promote lifelong educational opportunities for all'. The targets within this goal cover such issues as access to and support of pre-school through secondary school education, achieving gender equality in education, and improving the quality of education facilities. But the target that I wish to focus on is 4.7, which states:

“By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development.”

Embedded in this target is the unspoken assumption that 'all learners' will, through their education, acquire a set of values that can be said to underlie all seventeen SDGs – those that will lead to the creation of a greener, safer, more equitable and overall 'better' world. This, in turn, requires a different way of thinking, or, if you will, a different kind of consciousness.

So it is reasonable to conclude that consciousness and values are very much integral to the education of sustainable development. Consciousness and values also contain elements of spirituality, or the way in which an individual sees himself as fitting in with an 'other' that is greater than himself. Indeed, in Pope Francis' *Laudato Si's* Chapter Six is entitled 'Ecological Education and Spirituality', in which the close links between a 'different way of thinking' and a sustainability-focused education – the confluence of consciousness and values - are described; titles of the sub-chapters include 'Towards a New Lifestyle' and 'Educating for the Covenant Between Humanity and the Environment'.

The messages in *Laudato Si* are based on the philosophy and teachings of St. Francis of Assisi, the patron saint of the environment. These Franciscan Values can be said to transcend religion and, in many respects, align well the overarching objectives of the SDGs. That they also can be used as a foundation for imbuing education for sustainable development with consciousness and values is a logical assumption. The purpose of this paper, then, is to explore how the core elements of Franciscanism and the lessons found in *Laudato Si* can be combined as an effective means to combine consciousness and values in the education of sustainable development, using as an example an institution of

higher learning - St. Francis College in New York, in which the teaching of Franciscan Values is a core element of its mission (and in which the author is a Professor) é is building a sustainable development-oriented curriculum.

A two-pronged approach to increasing levels of consciousness that generate lasting structural change

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Previous research by the same author has shown that poverty in Mexico has not improved significantly over the past decades (53.1% of the population affected by patrimonial poverty in 1992 and 2014, and 21.4% of the population living in nutritional poverty in 1992 vs. 20.6% in 2014) despite government efforts to eradicate poverty in the country. It has also provided evidence that poverty will worsen over the next 32 years with income distribution and GDP growth rates at current levels. Hence, the investigation concluded that the multidimensional approach to poverty, which has been the basis for anti-poverty policies, seems to be necessary but not sufficient to alleviate poverty in Mexico.

Mexico's approach to poverty has been paternalistic and oriented towards the poor themselves: 7.7% of the country's GDP was invested in Social Development in the year 2011 with a strong focus on educational topics; over 5,000 anti-poverty programs are in place, administered by SEDESOL; and the Conditional Cash Transfer program Prospera-Oportunidades has been in place since the late 1990's, setting an example for other countries in the region. Hence, the poverty alleviation efforts of the country have been focused on the micro level, aimed at improving living conditions, health and education of the poor, reflecting the multidimensional view of poverty according to A. Sen's capabilities approach which, as shown previously, has not led to the desired results of eradicating poverty.

This paper therefore focuses on possible solutions that go beyond the micro level approach to combating poverty. Various authors speak of a need for structural change to alleviate poverty and hence a focus on the macro level. But the structure of a country and a society is based on its history, its values, its constitution and its division of power. Social structures and belief systems are not easily changed as they jeopardize the current privileges of the leading group of people or families. The psychological profile of the millennials could potentially serve as an accelerator in the process of creating consciousness as an enabler for structural change.

This paper is based on a two-pronged approach to generating structural change by elevating levels of consciousness and suggests that higher levels of social consciousness can be reached through education on all levels of society: those living in poverty as well as those experiencing all the societal privileges. An increased level of consciousness not only about the world's pressing problems but also about the responsibilities of each and every member of society can potentially lead to structural change and with that to an

increased impact on sustainable development. The research explores strategies for developing a higher level of social consciousness through education at different levels of society and throughout the educational program whether this is short or long. A focus on structural change in addition to developing the lives of the poor on a micro level is a necessity that could prove to be sufficient for ending poverty in all its forms everywhere (SDG #1) by 2050.

Doughnut as a Sustainability Education Tool in Central Asia

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The Concept for Transition of the Republic of Kazakhstan to the Green Economy (2013), which was approved by the decree of the president, promotes visions for a transition towards green growth. The document also calls for an introduction of “green” curricula in elementary schools, but unfortunately without a clear plan. At the moment, there are no established programs that provide insight or structure on sustainability education in Kazakhstan or Central Asia. The question centers around sustainability education designs that would be inclusive, culturally accepted, regionally appropriate, and well understood by children in Central Asia. Most importantly, whether or not interdisciplinary and interactive approaches provide a multi-subject understanding of sustainability among elementary school students in Central Asia. The study aims to explore if an interdisciplinary and dynamic approach to sustainability is a viable tool in Kazakhstan schools while looking at social consciousness, local values, and acceptability of the concept of sustainability.

A series of in-depth interviews, analysis of current curricula, and questionnaires pointed to a variety of institutional barriers that impede implementation of sustainability education, such as: social consciousness and understanding of current environmental issues, lack of investment in sustainability in educator training, shortfalls in interdisciplinary approaches, and local values. The study uses Kate Raworth’s Doughnut Economics as a new sustainability education platform in schools in Kazakhstan and Central Asia. The visual framework of the “Doughnut” brings planetary boundaries together with social boundaries, creating a visual concept for a safe and just space for humanity to thrive between the two boundaries. Moving towards a just space is the toughest and most underlying concept of sustainable development, which demands greater understanding of boundaries, equity of use of natural resources, and greater efficiency to meet human needs. In order to bring these sustainability concepts into the classroom, workshops were created using the “Doughnut” concepts of planetary boundaries and social foundations as the basis for regionally specific designs for classroom tools, specifically playing cards. The workshops were administered to 4th-grade students in a private school in Almaty, Kazakhstan. Pre and post-activity questionnaires and observations were used to gauge student understanding and application of sustainability concepts. The workshops were aimed to not only test the “Doughnut” as a potential platform and tool for sustainability education but also to

explore cultural understandings of sustainability issues, connections to their causes, perceptions of risks and personal agency and responsibility among students in Central Asia.

Sustainability education is a growing concept beyond the West, and it is important that it is developed in an inclusive, socially and culturally considerate, and in a well-connected manner. In my talk, I will briefly outline the concepts of Doughnut Economics, the process of participatory data collection and analysis, supported by slides. I will then demonstrate workshop and playing cards design and some of the problems encountered during the testing process. After that, again using slides, I will outline each of the problems, how they were tackled, and conclude with how Doughnut Economics could be used as a sustainability education platform in Central Asia. I will address some of the important social and cultural misconceptions of sustainability and ways to tackle them in the future for a more successful sustainable development.

Sustainable Development Goals in Conselho Regional de Administração CRA-RN (Brazil): The Promotion of Manager's New Consciousness and Values

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This research is related with exam of the experience of management regional council of Rio Grande do Norte State in Brazil (Conselho Regional de Administração do Rio Grande do Norte – CRA-RN), in terms of adoption of Sustainable Development Goals. Examining the practice of Conselho Regional de Administração do Rio Grande do Norte – CRA-RN can be seen many initiatives related to promote education for Sustainable Development.

In Brazil, the Conselho regional (Regional Council), works as an analogue organization compared to American BAR Association (ABA) and the American Institute of CPA. It is considered that the presence of administrators in many different kinds of organizations represents great impact in society in terms of providing useful services and products and also a large number of jobs and incomes. From this point, it is considered the importance of Conselho de Administração – to promote the Sustainable Development Goals (SGDs). During October-December 2016 was developed the methodology of Sustainable Strategic Planning of Conselho Regional de Administração do Rio Grande do Norte (CRA-RN).

In January 2017 in the activity of elaboration of the Sustainable Strategic Planning of Conselho Regional de Administração do Rio Grande do Norte (CRA-RN) considered the Sustainable Development Goals (SGD).

The Conselho Regional de Administração do Rio Grande do Norte (CRA-RN) adopted

the following indicators of environmental sustainability:

1 - Management of solid waste and promotion of recycling, which has relation with the SGD 15: Life on Land; 2 - Control / reduction of water pollution; 3 - Air pollution control / reduction = decrease in consumption = less carbon generation, which is related to the following SGD 12: Responsible consumption and production; 4 - Control / reduction of energy consumption / energy efficiency.

These were indicators of Social Sustainability considered: 1 - Publication of sustainability report, related to SGD 16; 2 - communication; 3 - Investment in education, related to SGD 4; 4 - Emergency plans for accidents; 5 - External social responsibility programs; 6 - Combating discrimination, which is related to SGD 10; 7 - Corporate governance policy and transparency; 8 - Committees with employee participation; 9 - Code of ethics or code of conduct; and 10- Actions focused on the Quality of Life, which is related to SGD 3.

Are indicators of Economic Sustainability: 1 - Cost reduction; 2 - Quality management, productive efficiency; 3 - Solvency (compliance with economic criteria such as account credibility, profitability, availability of resources); 4 - Prospection of new markets and areas of activity, which is related to SGD 8; 5 - Improvement of infrastructure (physical facilities, materials and equipment) and technologies; 6 - Follow-up of public notices to promote innovation and design and submission of projects; 7 - Incentive and investment in innovative projects (new products, services and organizational processes), which is related to SGD 9; 8 - Cooperation with other companies and organizations representing business representation, which is related to SGD 17; and 9 - Maintenance of updated tax, labor and social security information.

The actions developed by CRA-RN were identified as an example to promote consciousness and values among managers in Brazil. The actions developed were also perceived very innovative, as the promotion of Forums of sustainability, public management; and development and entrepreneurship.

Proposed learning outcomes spaces of deep learning for sustainability

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Curating a learning experience that fosters sustainable behaviours, values and worldviews within participants is a complex exercise. Ideally at some point in the learning journey, individuals will have the ability to (1) understand and reflect on their own worldview, (2) be able to recognise and transcend the unquestioned paradigms that influence their own and societal behaviour, (3) work together with a “diversity of others” dialectically, meaning with respect and criticality, built on a foundation of trust, and (4) have the capacity and confidence to skilfully explore and act upon leverage points for change.

Critical in each of these four steps is the ability to reflect on and explore our consciousness. Our consciousness is a murky space influenced by inseparable and nearly infinite factors. Our consciousness is expressed as values that our actions sometimes align with, and sometimes do not. There are social processes, which continually transfer and embed the ideologies and paradigms of our social, culture, government and family norms within our consciousness. In addition, there are individual factors of genetics, personality, experience, and mental habits. These social and individual characteristics intertwine in complex ways to generate unique personal worldviews.

Currently, our societies have extraordinary momentum towards unfathomably manifestations of unsustainability. The roots causes of unsustainability are many and complex. However, an argument can be made that ultimately unsustainability links back to the societal paradigmatic principles and personal worldviews underlying our ways of being, thinking, and relating to one another.

A commonly criticised paradigm is the Cartesian-Newtonian paradigm. This paradigm can be characterised as viewing reality as simple (hierarchical, reductionist, monist) and fixed (mechanic, static, substance-focused) with a propensity for dualistic (mutually exclusive, binary, opposites, exclusionary) thinking. It is this type of thinking that has caused the extraordinary momentum towards unsustainability, and if learning experiences are developed with these Cartesian-Newtonian principles operating in our subconscious, facilitators will be unsuccessful. Similarly, if the participants of learning experiences are not provided with the skills to explore and transcend (ability to critically reflect on and re-navigate) paradigms and worldviews, we will see less progress towards sustainability.

Crucially, individuals can foster more powerful change if they work collaboratively, in meaningful ways. This can mean: working with people from different disciplines, backgrounds, cultures, religions, ages, sexes, because the challenges that we face are not confined to a single discipline or background. This means identifying and negotiating vastly different ways of (1) communicating, (2) defining and accepting truth, and (3) determining and valuing means and ends towards sustainability. This requires humanistic and transdisciplinary approaches to build skills for developing successful collaboratives.

Finally, the world within which a group of change agents operates is by definition complex and chaotic. The world is not a giant machine to that needs to be studied to figure out where to intervene. On the contrary, it is exploding with interdependent networks and dynamics that will not be influenced by simple solutions to their messy existence. Thus, individuals and collaboratives need the skills to explore these systems and complex spaces, in a way that maintains doubt, until an articulation of the actual problem and solution co-arise. This requires cycles of action, reflection, re-direction and action.

Thus, the curators of learning experiences for sustainability have much to juggle and be aware of: the paradigms, worldviews, dynamics of groups, as well as systems, complexity and praxis skills to explore meaningful leverage points for change. This presentation and

paper will explore what the complexity of this entire process means and how this type of learning experience can be designed for more successful advances towards sustainability.

Individual and Collective Consciousness as the Basis for Sustainable Development

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The world has long been beset by problems. Many, if not all, of the problems we currently face as a species and as a planet stem in large part from the role humanity has played in its interactions with those of our own kind and with our animate and inanimate surroundings. To the extent that our attention is primarily focused on our own personal needs and those of our families, immediate communities, cities, states and nations, the larger-scale health needs of our species and our planet, both in the present and over time, may be ignored or relegated to a secondary status. Our educational systems have to a great extent been focused primarily on imparting information and developing skills directed towards external practical applications, emphasizing the acquisition of facts and modes of thinking that will allow an individual to move about successfully in the world. Often missing in educational settings is an additional emphasis on cultivating an individual's capacity to draw on deeper inner resources that can promote increased stability, flexibility and breadth of appreciation of larger scale societal and environmental needs. One approach to structuring an educational component designed to address these outcomes has been the introduction of meditation programs of various types in school, health care and community settings. Experience with such programs indicates that individuals trained in meditation practices exhibit improved academic and professional performance, reduction in anxiety and inner stress, broader comprehension, and more fluid and productive social interactions. Moreover, data suggest that with at least one type of meditation practice, an influence of positivity and harmony is created that extends into the surrounding society and that can be detectable at large distances, depending on the numbers of people engaged. It is possible that a societal influence of this sort may be mediated at a fundamental level of nature at which the consciousness of individuals is interconnected. Since achievement of the Sustainable Development Goals depends on the quality of consciousness of the individuals that make up society and of the collective consciousness of social and governmental systems at all levels, a consideration of the data and theoretical mechanisms related to these observations, and the potential application of such programs on a broader scale, merits further attention.

Innovation for Education values with the rising complexities

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Education in the digital age, while thriving through the 21st century, pose a unique set of challenges. The rising inequalities, regional imbalances, requires the intervention to tweak into the traditional formats of learning and teaching, in order to ensure learners are

fully engaged, drive their learning and at same time achieve the overall learning objectives for interconnected global challenges. It edge past the realm of emphathetic learning and raise the awareness for developing an innovative approach towards the understanding of interconnectedness of economic, social and environmental issues grappling around the world.

A knowledge sharing platform among practitioners, students, researchers and policy makers to exchange their views and understand the aspect of sustainability and sustainable development may help to develop the understanding around these rising complexities and critical issues. The extracts from the platform would help to expand the knowledge on the subjects and thematic areas of sustainability and sustainable development and help to exchange best examples and policies being implemented in one part of the world to another. The data thus retrieved from extracts would be evaluated across to understand the online behavior of youth. This would help to map the online information with SDG based indicators and develop sustainability based programmes. The values against which the data would be assessed may range from empathy, compassion, inquiry based learning, identity, and how they are directly or indirectly related to cognitive dissonance and it's attributes. This would let us understand how the compartmentalization of thoughts may be improved over the period of time. The mapping would help to analyze the data against various enablers of education. This would open gateways to explore new avenues of education delivery and understand the interconnected complex issues in the world. The parameters of empathy, compassion, cognitive dissonance, identity and critical inquiry can be found for correlation with environment change, disaster risk reduction, social services and community resilience. The matrix thus developed would help to understand the regional imbalances with regard to cognitive development in context to social, economic and environmental elements. This would help to build capacity on generating emphathetic learning on binaries of peace and sustainable development. The regional imbalances would let us develop the benchmarks and revise, evaluate them over the period of time. The design of the programmes would thus let us understand how to embed the education values in order to construct, reconstruct and deconstruct the blocks of cognitive dissonance and ply them with democratic values.

Revisiting Tagore's philosophy of education: A perspective on social sustainability and human development

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A common and longstanding view is that good and systematic education can only be attained formally, through schooling, thus overemphasizing the role of educational institutions. Not only does this burden schools and universities with a broader social function, but it also puts knowledge at the center of classroom learning, which has been treated as a main purpose of education at different levels.

Although SDG 4 articulates, “achieving inclusive and quality education for all reaffirms the belief that education is one of the most powerful and proven vehicles for sustainable development”, we still need to ask the questions how, and what can education really do for sustainable development. Therefore, we propose that education needs a broader definition; it should be considered as deeply related with human development and it should be in service of humanity. Only in this way can we move forward to meaningfully address other challenges, such as poverty, corruption, child labor, pollution, gender issues and so on. While education is not a panacea for solving these problems, it certainly plays a vital and complex role in advancing the development agenda.

As stated perspectives and issues, in this study, we will employ the famous Indian poet and philosopher Rabindranath Tagore’s (1861-1941) ideology of education as a theoretical framework. Tagore did not consider education only as a means of learning knowledge but also as a tool of connecting and developing individuals with humanity at large. He also believed education to be a form of capital as it could transform people into human resources. On the one hand, educational NGOs can help to develop work skills and cultivate social responsibilities of youth in the developing countries; on the other hand, countries in the global South should work collaboratively and try to fully develop their potential in human capacity building; this can be achieved through knowledge and cultural exchange, and from there, education can facilitate the process of self-actualization and enable individuals and communities develop the mindsets, attitudes, and capacities they believe will help them live with dignity in a highly unequal world. Therefore, this study also claims that education should focus on the long-term goals of human development.

The main purpose of the study is to review and analyze the dominant ideology about how education functions in society. As part of the inquiry, we examine the tension between the contemporary educational system and the issues in sustainable development, especially when viewed through Tagore’s ideology of education. The main issues in education stem from a unidimensional understanding of social value and human development. We hope this study can raise awareness of the ongoing conflicts and offer possible solutions through a critical approach.

The rise of the student change-maker in international development: Examining the role of experiential learning through student-run development NGOs on university campuses

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This paper analyses a relatively unexplored recent phenomenon, international development NGOs initiated, lead, staffed and resourced by university students, which

undertake development projects for poverty alleviation in developing countries. Relating directly to the theme, “Education for Sustainable Development: An issue of Consciousness and Values”, this research will discuss what these organisations mean to the student members themselves, what they mean for development volunteering, and what they mean for sustainable development through a case study of a specific student-lead NGO based at Monash University, Australia.

SEED (“Socio-Economic Engagement & Development”) is a Monash University “club” that aims to create impact through microfinance and social enterprise. Currently, SEED has about 500 members, and conducts overseas development activities in Cambodia and Fiji, as well advocating awareness and support of social enterprise activities locally in Melbourne.

In this paper, we propose a theoretical framework for analysing and making sense of student-run organisations in international development. Our theoretical framework aims to draw together three key aspects of student motivation and experience – getting organised independently (theories of development NGOs), working to alleviate poverty and achieve social justice (social entrepreneurship), and learning about applied development through volunteering. Then we explain and analyse the main activities of the organisation, especially as they relate to international development and poverty alleviation. Lastly, we discuss and analyse the challenges and trade-offs ethically and in practice between sustainable development work, student learning (volunteering) and social entrepreneurship.

One of the paper authors is a member of SEED and master of international development graduate; the second author is a Monash academic who has conducted qualitative research with SEED throughout 2017. The paper is based on qualitative research in Australia and Cambodia with SEED members, and several years’ experience of the first author as a member and development volunteer.

Enhancing the Resilience of Livelihoods and Production Systems in the Sahel, Africa

Climate Change, Agricultural Production and Trade in Africa

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Africa’s economy is highly dependent on agriculture that supports nearly 90 percent of its population but a most vulnerable sector to the impacts of climate change. According to IPCC (Intergovernmental Panel on Climate Change) (2013) predictions climate change is forecast to hit Africa heavily, with temperatures rising on the continent more than the global median, extreme weather events becoming more prevalent, and drier areas becoming even drier. Additionally, a critical challenge facing the continent is how to feed an expected population of around 2.4 billion by 2050 which will be double the current population size while simultaneously reducing and responding to climate change. Unless

action is taken now to make agriculture more sustainable, productive and resilient, climate change impacts is projected to seriously compromise food production in countries and regions that are already highly food-insecure. Embedded in these, climate change possess substantial challenges in agricultural production, but also creates opportunities. In this regard trade presents an opportunity in addressing shortfalls from agricultural production and achieving food security. Trade is often built into the economic model which assess climate change and agriculture, but are rarely the focus of such analysis. Despite the considerable opportunities trade creates in moving goods from surplus to deficit area, only a limited number of studies have explicitly investigated the interaction between trade, climate change and agriculture in Africa. Although there is a growing number of studies analyzing how agricultural productions and commodity markets need to be adjusted for promoting inter-regional balance in agricultural production and food security in response to climate change, few of them have had interests for potential adjustments in intra Africa agricultural trade in changing climate. By reviewing different literatures, this paper provides an overview of the climate change, agriculture and trade nexus in Africa and highlights how the trade aspect of the nexus is missing in present literature reviews. It also identifies and puts forth entry points for regional nexus dialogue and further work.

The livestock ‘triple win’: achieving inclusive, climate-resilient economic development in the semi-arid lands of Africa

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Livestock are central to achieving many of the Sustainable Development Goals and climate action targets under the Paris Agreement. Half of the world’s rural poor depend directly on livestock earn a living but growing demand for livestock products in developing counties é where the sector already accounts for 40% agricultural GDP é represents a huge opportunity for climate-resilient, inclusive economic development (SDG8) and job creation along the value chain (SDG9). To achieve this, market participation must be improved for poor smallholders (SDG10), and for women (SDG5). While livestock are responsible for a significant share of greenhouse gas emissions globally, extensive livestock production systems offer huge mitigation potential through carbon sequestration in rangelands (SDG13).

Value Chain Analysis for Resilience in Drylands (VC-ARID) is an innovative approach that considers five specific characteristics of extensive livestock systems: production in semi-arid lands; climate risk; gender; informality; and seasonality. Applied to the beef and cow’s milk value chains of Senegal, VC-ARID aims to identify adaptation options that will connect poor pastoralists to markets (SDG1), support investment planning (SDG8), increase access to resources for women (SDG5), provide financial services (SDG10), promote trade (SDG10), ensure food security (SDG2) and secure provision of important ecosystem services (SDG6, 15 and 13).

Across both livestock value chains for Senegal, there is a disconnect between producers and terminal markets within the Sahel region and beyond. Producers are therefore often subject to inequitable price conditions and transactional costs, resulting in unequal distribution of the added value along the chain. The disconnect shows that there are opportunities for efficiency improvements along the chains by supporting greater vertical integration (e.g. through improved enabling environments), while retaining the important production system characteristics that maintain adaptive capacity.

There is significant potential for upgrading processing to add value and to provide additional socio-economic benefits, including employment opportunities. Vertical transformation in these value chains could address some of the constraints at production and international market levels. For example, by harnessing the opportunities of urban growth, the Senegalese beef value chain could meet increasing demand.

Climate risk and the direct impacts of climate change on the quality and quantity of production and prices is well understood at producer level. However, there is limited knowledge on how to adapt to climate risk beyond coping mechanisms. Mobility across the Sahelian countries remains critical to both managing climate risk and maintaining integrated livestock markets.

In terms of policy, there is also a disconnect for producers with the higher end of the value chain. It is therefore important to analyse the economic opportunities identified along the value chains, including those relating to transformation or improvements in the enabling environment. This will help inform appropriate climate change adaptation and sustainable development policies to support resilience in Senegal and the wider Sahel region.

Farmers Intensification Decision and Sustainability Under Fragile and Unpredictable Environment

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Like Most of the countries in Sub-Saharan Africa, Tanzania have continued facing the challenges of feeding their growing population coupled with increasingly degrading environment and uncertainties resulting from climate change. Based on this revelation, the government of Tanzania and different international and local NGOs are embarked on a strategy that increase in food production and poverty reduction should come from development of the agricultural sector through “sustainable” agricultural intensification in selected targeted clusters of potential agriculture hotspots across the country. One of the major focal area for the Tanzanian government particularly in its bid to transform the area to a sustainable food basket and eradicate poverty is Kilombero valley flood plain wetland(KVFP).

The valley is endowed with a productive natural resource base, fertile land, reliable water availability and extensive pastures to small holder farmers in Kilombero and Ulanga districts.

however, the supply of productive land is increasingly constrained by population pressure, competition from commercial ventures and institutional land tenure restrictions. This forces farmers who intent to increase production quantities to adopt different sustainable agricultural intensification strategies. A range of intensification pathways including use of improved/hybrid seed variety, increase frequency of cropping, small scale irrigation, and agro-chemical use , soil conservation are identified in the area.

Aimed at identifying appropriate pathways to intensification strategies which overlaps with their livelihood strategies by farmers, this study dissects an important question of which strategies do the farmers uptake and how are these decisions made. By combining statistical tools from machine learning [multivariate cluster analysis and Decision tree algorithm]and probabilistic graphical models [Bayesian Belief Network] under uncertainty, we empirically examined the decision making process of farmers in KVFP. Agricultural Sample Surveys and individual interviews with 304 farmers are used to elucidate farmers decision-making architecture and a set of rules governing their strategy.

The preliminary result shows the relative importance of different external factors and regional setting [biophysical characteristics of their farm plot, access to input and output market, credit access, and off-farm livelihood opportunity] and internal characteristics of the farmer [age household size, farmer type, household commercialization index, capital endowment] were found to be the main factors that farmers consider in their choice intensification strategies. In addition, farming practices, intensification strategies in particular, in the floodplain are associated with trade-off between increased food production and sustaining the ecosystem services provided the floodplain.

New Life to Plastic: Reducing the Consumption of Plastic Materials and Turning Urban Waste into Opportunity in African Informal Settlements

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Uncollected solid waste is one of the riskiest factors strikingly affecting Kenya's slums areas and a poor waste disposal triggers negative attitudes, rising uncontrolled waste accumulation. Mismanagement of such waste typically results in pollution of the local environment and in substantial danger to public health and increased child mortality.

The volume of plastic is increasing at unsustainable rates, raising concerns on its negative externalities locally and globally imposed, such as the non-biodegradability of the material, that can contaminate the environment for centuries; difficulty to reuse or recycle the material in local markets; and greenhouse gas emissions daily contributing to global climate change. Every year, 3,966 tons of plastic are collected in the Nairobi's settlement of Kibera, which hardly cover 7 percent of its total amount of material to be disposed of.

Sustainability pathways should concern awareness and sensitization of the population, with a focus on low-income and low-educated groups. The model presented in this paper fosters the creation of a sound material-cycle society through effective use of resources, in order to avoid an improper disposal and an uncontrolled dumping of waste that can contaminate groundwater and soil and attract disease-carrying animals and insects, besides irreversibly affecting human health. It investigates how improper waste practices impact resource availability and flow of materials within Kibera's slums, providing local-based policies to mitigate the adverse effects of human activities on the environment, and a tangible project.

To achieve these goals, the pilot project "New Life to Plastic", centered around a partnership between the non-profit organization Social Innovation Teams based in Milan, the Department of Architecture and Urban Studies of the Polytechnic University of Milan, and the Soweto East Youth organization in Kibera, addresses this issue by introducing a chain of collection points daily managed by a women group. These points are receiving sites, where a target population is spurred to deliver plastic and undifferentiated garbage on payment. Such wastes, along with those collected by informal waste pickers, are brought to the recycling plant and consequently processed.

Early results show the necessity of overcoming existing barriers between local authorities and waste generators, creating a model based on community awareness and participation, and of educating people on the risks posed on human health and climate change. We are currently coping with local challenges, including urban poverty, poor financial resources to implement the project, and carelessness of local communities towards environmentally-friendly and sustainable practices.

Signs of success would encompass social, environmental and economic impacts in the short-run and a proportion of recycled material raised to 20 percent by 2022. Those comprised of: social empowerment of women in the community, through their economic inclusion, technical formation, and environmental education; waste management services enlarged to the slum's areas; reduced consumption of plastic and, therefore, decreased rates of greenhouse gases and toxic emissions; increasing use of second-hand material inputs in place of virgin raw materials; income and job opportunities for waste workers; and safer working conditions, including regular contracts and provision of adequate equipment and vehicles.

A Reflection on the Commitment to Enhancing Resilience of the Livelihoods and Production Systems to Climate Variability and other related risks in Africa

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Agriculture and food security negatively intersect with weather and climate conditions through extreme events such as droughts and heat waves, floods and storms. Adverse weather and climate conditions directly affect agricultural productivity, livelihoods, water security, land use, agricultural marketing systems, market instability, food prices, trade and economic policies; and the impacts fall disproportionately on resource-poor small producers including inter alia smallholder farmers, fishers, livestock herders and forest dependent communities. Nearly 90% of staple food and feed production come from rainfed agriculture including mixed crop-livestock and rangeland-based livestock systems, and lack of investment in this vital production system and its low productivity reinforce each other leading to poverty traps and increased vulnerability of livelihoods to rainfall variability, dry spells and other climate-related risks. The situation is exacerbated in arid and semi-arid climate change hotspots in Africa, wherein agricultural systems are becoming less reliable as ecosystems are degraded and the relevant structures in place to support smallholder farmer's effort are often absent. Smallholder farmers and livestock keepers, whether pastoral herders or 'mixed' crop-livestock farmers, are essential to development destinies in sub-Saharan Africa, where the world's poverty and hunger remain the most concentrated. Supporting small-scale farmers and livestock keepers to adapt to climate and other changes will require judicious policies, appropriate technologies, adequate infrastructure and access to information, all to be provided by countries with an arena of low socio-economic resilience and scarce resources to do so. Silver bullets won't work. Every option enhancing resilience, diversification or risk management in given regions and circumstances may likely fail in others. The context is decisive as local circumstances determine what works and what doesn't. Levels of resilience, diversification and risk management within the smallholder farmers' communities depend not only on agricultural management but also on enabling policy environments, which in turn should be shaped by reliable evidence and adequate indicators. Close links between crop and livestock-focused scientists and policymakers will have to be forged to deal with the uncertainties, trade-offs and synergies arising from implementing various crop and livestock policies suiting various circumstances.

Extreme Events Affecting Life and Livelihood for Small Island States

Water availability, demand and supply model for the Rio Cobre basin of Jamaica - under different climate scenarios. Impact of drought on water resources

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Jamaica, the third largest island of the Caribbean is significantly affected by variability in the climate pattern which has impacted the island's water resources in the past few years. The water resources of the island (surface and groundwater) were severely affected in the years 2010, 2013-2015 following less than normal rainfall and passage of the El Nino

circulation in 2015, leading to severe droughts in the eastern and southern sections of the island (parishes of St Catherine, Kingston and St Andrew, the two heavily populated parishes of the island). Additionally the groundwater resources of these parishes have also been affected by contamination from sewage and salt water intrusion which has led to closure of some of the operational wells, thus leading to additional water stresses for the parishes. Water levels in the two primary reservoirs for the capital city Kingston fell to <30% of its maximum capacity thus leading to severe water lock offs which affected all sectors in the city. This thus necessitated the need for research into finding newer sources of water to combat the issues of recurrent drought due to variability of the weather patterns as well as climate model projections which show a trend of increase in temperature and decrease in daily rainfall for the Caribbean.

The water resources of the island are divided into surface and groundwater resources of which groundwater attributes to >75% of the resources. These are mainly confined in the limestone aquifer which accounts for majority of the aquifer system of the island. The impact of drought in 2010 and 2013, 2015 impacted heavily the Kingston metropolitan area whereby leading to investigations on exploring water resources of adjoining parishes /basins and suggesting possible measures to extract water from other hydrological basins. At present the Kingston basin receives water from the Hope, Yallahs and Rio Cobre river of which the Hope and Yallahs were severely impacted by drought. This thus leaves the Rio Cobre basin of St Catherine which can look into supplying water to offset the deficit of Kingston. The present work involves a detailed analysis of the Rio Cobre basin, its present available resources, demand and supply through a Water Evaluation and Planning model (WEAP). The model will incorporate rainfall, groundwater abstraction rates, intake from river, sectorial demands , supply for the past 25 yrs along with rate of change in population. The model will also work on future water demand using climate model results primarily from the PRECIS SRES scenarios and further extend to the RCP 1.5 and 2 deg C change in temperature scenarios. Such results will aid in better water management and allocation thus finding possible adaptation strategies for drought.

Exploring A2 Futures: Combining modelling and scenarios to assess water availability and adaptation in the Small Island State of Carriacou

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Many of the expected impacts of climate on small island developing states (SIDS) have largely been based on policy rhetoric and local anecdotal information, in the absence of locally relevant research. Consequently, there have been calls to increase academic research on the impact of climate change on SIDS. Recently, these calls have focused on the need to tease out the differential impacts of the suite of climate scenarios developed by the IPCC. These are needed to not only adequately inform local and regional policy but to contribute to the global climate and environmental agenda. Climate projections by themselves do not tell the full story of the future. Equally important, is the need to consider the future societal contexts in order to have a greater understanding of the

complexity of societal interdependencies and uncertainties that would shape the ability to adapt to climate change in the future. This paper seeks to exploit the advantages of using both quantitative modeling and creative qualitative analysis to estimate water availability and to map future development scenarios for the Grenadian island of Carriacou. Drawing on recent research, we report on investigations of the impact of climate on future water resources and availability under various socioeconomic pathways for Carriacou in 2050. An integrated methodological approach was employed combining hydrological modelling using Water Evaluation And Planning System with multiscale foresight scenario analysis. The paper makes three main contributions (i)) developing national level storylines linked to global Shared Socioeconomic Pathways using a multiscale approach (ii) evaluating water availability under climate change using downscaled climate data and (iii) merging the model outputs and scenario storylines to assess potential adaptation options. Currently four distinct socioeconomic scenarios under the SRES A2 climate projection have been developed. For each of the scenarios adaptation options have been identified based on the societal context and availability of water. We find that across the socioeconomic scenarios there are similar and overlapping adaptation options that could address water scarcity conditions e.g. forms of rainwater harvesting. However, the governance arrangements differ, suggesting that some adaptation options are more robust across scenarios, hence influencing their potential for implementation. The approach provides a better understanding of the differential societal impacts of various adaptations. So rather than considering options that only respond to physical conditions adaptation options are filtered by considerations of acceptability and institutional capacity to implement. The study offers a science based nuanced approach to estimating the impact of climate change in islands such as those in the Caribbean. To further the contribution of studies to inform policy, we propose future research by extending the approach to use downscaled climate data from the global Representative Concentration Pathways (RCPs) to examine the applicability of adaptation options across both climate and socioeconomic scenarios. Other proposed work includes examining in greater detail the potential difference between a global rise of 1.5°C as against 2.0°C.

Observed socioeconomic and climate-related uncertainty events on smallholders salt producers in Indonesia

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Salt farming in Indonesia is mostly rural phenomenon where salt producers use traditional methods for its harvesting. Overall in Indonesia and specifically in Sampang district, salt farmers face poor socioeconomic and severe environmental conditions during salt mining resulting in leaving most of these farmers in a siege-like situation. Hence, in this paper, we tend to investigate the degree of socioeconomic and climate-related risks faced by farmers during salt production in villages of Sampang district of Indonesia. Household survey, key informant interviews, focused group discussions and participatory observatory methods were applied for data collection. Results of uncertainty matrix show that salt producers in Sampang not only face the climate-related uncertainty,

but also face the structural dimensions like changing government regulations, market liberalization and the capitalistic of global economy. This study also indicated that the rest of salt producers had undertaken various practices in response to uncertainty events, such as changes in their salt production method, build social network, stocking up on salt production and diversification of source of income. Although they have some practices to response the uncertainty events, these practices faced constrains due to sustainable-salt-production. The reasons for those constrains are outlined.

A Spatially Explicit and Dynamic Approach to Flood Risk Assessment in South-East Westmoreland, Jamaica

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South-East Westmoreland, Jamaica has significant historical, archaeological and ecological characteristics. Encompassing the remains of indigenous peoples, lush mangroves, dense vegetation and a refuelling point for Dutch and British pirates - it has today been transformed into an area with major economic activities such as fishing, farming and tourism. The area however is prone to tropical cyclones which give rise to flooding and storm surges. Of special note is the 1979 flood event in Western Jamaica, which caused significant damage to terrain, disruption to transportation systems and devastation to lives and property.

Eight hundred and sixty five millimeters (865mm) of rain, fell over a ten hour period on already saturated soil. This rainfall compounded with high ground water levels and high soil moisture content led to overland and debris flows extending from the mountains to the coast. This led to significant scouring of bridges and river beds, the filling of natural depressions and landslides, with serious damage to agricultural crops, houses, bridges and roads. Many persons were marooned, or trapped in their communities, unable to evacuate.

This flood caused 40 deaths (31 persons from the parish of Westmoreland alone) and economic losses of US \$27 Million for Western Jamaica.

Still today, there are limited rainfall gauges and no flood gauges or early warning systems, as well as, no flood plain maps for rivers in this area.

With a 50 year return period, any recurrence of this flood event in 2016 could be worse than in 1979. The overall aim of this research is thus to construct a dynamical simulation of the 1979 flooding event assessing the vulnerability of stakeholders to flood risk; based on geographical considerations, flood characteristics and the movement patterns of residents in the community of Cave, South-East Westmoreland.

This research represents a first diagnostic attempt in understanding the 1979 flood event, superimposed unto a 2016 landscape, and analyzed through the use of Agent-Based

Models (ABMs) and Geographic Information Systems (GIS). A Flood Model is integrated with human movement data under the framework of a Coupled Human and Natural System, to determine the residents likely to be stuck, injured, killed or safe.

Preliminary results from the Cave ABM reveal that loss of life takes place on each of the three days sampled, with a Friday flood having the most fatalities i.e. 18 persons. Additionally, the most persons injured are 7 persons on a Saturday, as well as 17 persons who are stuck in the community of Cave. It is expected that the results from this research will guide community stakeholders in establishing hazard mitigation plans, and enable local authorities to plan effectively as it relates to the identification of shelters, evacuation, early warning systems and land-use planning in South East Westmoreland.

Hydro-meteorological hazards in Small Island Developing States of the Caribbean - case study from Jamaica

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Jamaica, the third largest island in the Caribbean is vulnerable to flood and landslides resulting from short duration high intensity rainfall. These negatively impact livelihoods with high levels of damage to property, civil infrastructure, agriculture and also loss of life. Several factors influence flooding and landslides, inclusive of geology, geomorphology, topography, hydrology, land-use and high rainfall. In Jamaica, much of the high rainfall occurs in the second half of the year and is associated with tropical cyclones. Flood frequencies have increased during the last half of the 20th century and

start of the 21st century which also correlate to an increase in the frequency of tropical cyclones affecting the island for the same time span. Climate change models predict that within the Caribbean basin, the intensity of tropical cyclones and the rainfall associated with them will increase. This may affect the frequency and severity of floods and landslides in Jamaica as well as other SIDS of the Caribbean with similar topography and physiography.

The present paper focusses on some case studies of flood and landslide risk in selected watersheds in Jamaica. The work also focusses on development of an island wide flood hazard map for riverine flooding using a combination of Principal Component Analysis, Logistic Regression, and Frequency Distribution models based on multi-criteria analysis. The Logistic Regression model correctly classified 86.8% of the flood events and 74.6% of non-flood event (overall 81%), indicating a satisfactory model to predict the flood event in the island. The resulting spatial flood hazard prediction map of Jamaica as produced was classified as: very low, low, medium, high, and of very high hazard potential. Study also focusses on development of hydrological models for simulation of discharges from extreme events (tropical storm Nicole, Gustav) as well as for different climate (A1, A2 and B2) scenarios. With development of climate models and the new RCP scenarios, studies are being conducted to investigate how flood hazard is affected by increases in global mean temperature to 1.5 °C and 2.0 °C respectively. These scenarios are important because they are the targets adopted by the United Nations in the Paris Agreement in 2015. The members of AOSIS have indicated that holding global temperature increases down to 1.5°C is vital for the survival of SIDS. The present work will include rainfall data from the RCP 4.5 scenario for Jamaica, downscaled to the watershed (Hope, Yallahs, Negril) levels to create flood hazard maps for a 1.5°C and 2.0°C rise in global mean temperature. Results from this research are invaluable towards informed planning and adaptation strategies in the region.

As like floods, landslides continue to impact the island and cause damage to life and property. This is more common in the eastern part of the island which are generally triggered by earthquakes or tropical rainfall. The landslide inventory map prepared for Caribbean Disaster Mitigation Project records around 2500 landslides in the eastern parishes including Kingston, St. Andrew, St. Mary and Portland. Highly fractured bedrocks of Moore Town Shales and Richmond Siltstone and Shale formations of Portland in steeply sloped topography provide critical conditions conducive to landslides. These parishes are also prone to several shallow earthquakes annually generally ranging in magnitude 3.0 to 4.0. Additionally eastern part of Jamaica receives on average 500 cm of rainfall annually with Portland receiving highest amount of rainfall than any other parish. This study investigated the probability of landslide occurrence with respect to the geological and hydro-meteorological condition. The amount of accumulation, duration and intensity of rainfall i.e, rainfall thresholds can be estimated using historical records and statistical methods where one can study rainfall events that have resulted in landslides. Records of historical landslides were obtained from previous literature, reports, newspaper entries, and from local community. The corresponding storms based rainfall data were obtained from Met office of Jamaica for the same time period. The accumulation, duration, intensity of rainfall for the landslide

producing events was collected. The rainfall-landslide threshold was calculated based on the correlation between number of landslide events and rainfall parameters. The result is an important basis which helps understand the rainfall conditions that has the potential to trigger landslides in the eastern part of Jamaica.

Fostering Equity and Social Inclusion in Cities

Sustainable Mobility: Metrorail Commuters in the Western Cape

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There are many reasons why public transport in general, and trains in particular, are central to developing sustainable cities. They have a reduced carbon footprint, alleviate road congestion, and provide increased safety for passengers. In theory, they are convenient, accessible, and affordable, and they often form the core of sustainable mobility policies. Many African cities, however, are characterized by inequality, poverty, and exclusion, and train systems are poorly developed and maintained - if present at all. How does sustainable mobility apply to such contexts? In this study, we analyse the perspectives and imaginaries of Metrorail users in the Western Cape of South Africa, drawing on the Motility framework. Based on 30 interviews with Metrorail users, we explore how they experience access to mobility systems. We outline various interrelated service, infrastructure, and human-related challenges associated with accessing mobility options to examine how these contribute to shaping the boundaries of exclusion and mobility. By exploring how perspectives and imaginaries on mobility options in general, and trains in particular, connect to notions of sustainable mobility, we challenge well-established theories embedded in this field. In doing so, we aim to contribute to context-specific and culture-relevant research on sustainable mobility in Africa.

Assessing Equitable Access to Urban Forest Benefits: The Experience of Knoxville

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Extensive research has been conducted on the ecosystem services that urban trees provide and how they can mitigate climate change. Considerable attention has also been paid in recognizing the social values people place on the benefits provided by urban forests. Socioeconomic processes like stratification can affect how urban trees are distributed among neighborhoods within urban areas especially the American South and Appalachia, regions characterized by historical segregation and high poverty rates respectively. Recent research has focused on how the distribution of trees in the urban landscape is associations with income, race, ethnicity, and education.

Studies have found significant differences in urban canopy cover, with communities typified by people of color and low incomes generally have the least canopy coverage. However, few studies have assessed other aspects of urban forest inequalities such as the health of the urban forest or the vulnerability of the forest to climate change. Often this requires an analysis that records attributes of each individual tree. As a result, many cities including Knoxville have inventoried their urban tree populations to implement better practices

Can today's heavily developed U.S. cities use tree planting initiatives to increase equity in access to urban forest benefits? Which trees should cities plant and where should they plant them? With data becoming increasingly available, these questions are timely as many U.S. cities pledge to increase urban canopy cover as part of larger climate change mitigation strategies.

This case study characterizes the socioeconomic drivers of current urban tree cover and quality in Knoxville, Tennessee by and further explores the adaptability of the urban forest to climate change. Three main objectives are: 1. Determine the current health and percent canopy coverage of Knoxville's urban trees, 2. Examine how well the urban forest can adapt to climate change by 2050 and 3. Identify any socioeconomic disparities existing among census tracts. Results are compared by census tract and certain neighborhoods are highlighted. Results suggest that current canopy coverage is biased towards more educated, high income and majority white census tracts. However, there were no significant differences in tree health. Our findings indicate that few census tracts are prepared for the effects of climate change on the urban forest, but proper and maintenance and proactive tree planting efforts can overcome many disparities if equity is prioritized.

Combating Gentrification Pressures in Inner Cities: A Case Study of Localized Affordable Rent-Determination in Malaysia

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This paper highlights the benefits of a Community Development Fund (CDF) in alleviating the pressures of social displacements in top-down urban regeneration development. The scale of big urban regeneration projects and the scale of displaced communities are different. The former is at a national/ state or city level whilst the latter can be at the scale of neighbourhoods. Therefore, a grass-root developmental grants programme - 'Community Development Fund' (CDF) - can complement wider urban regeneration strategies. Both methods working in tandem is critical towards inclusive city development.

A case study in George Town World Heritage Site (GTWHS), Penang on the 'localised' rent determination by both tenants and owners away from the general 'market' trend of

rapid rent escalation in the area is presented. The area was experiencing many challenges, namely:

- **Displacement and Loss of Residential Population:**

Prior to its inscription in mid-2008, GTWHS had a total of 18,660 residents. By the end of 2009, this number had almost halved to only 10,159 residents. The population of GTWHS had continued to decline, albeit at a slower rate. Between 2009 and 2013, it is estimated that as many as 591 households left GTWHS.

- **The Challenges of Gentrification in the World Heritage site and declining Housing Affordability due to Rental and Property Price Increases:**

Unfettered gentrification creates displacement of the original communities and their multicultural lifestyles. The sale of buildings from one owner to another has contributed to rents becoming more expensive for the existing renting population (tenants make up 60 percent of the residential population).

The Hock Teck Initiative or the ‘Pilot Project’, the first recipient of the CDF initiative, was designed to empower tenants to negotiate for their tenancy rights by proving that they are willing to shoulder some financial burden towards the upgrading of their homes. The financial investments made to the upgrading of their rented homes renders the tenants to become stakeholders of the re-development project.

The Pilot Project had the objective of preventing the eviction of tenants from their houses. A new funding mechanism was created where the combination of a matching grant to property owners and a collective loan to the tenants gave rise to a new method of providing affordable renting at a fixed price. It was also sustainable because the mutually agreed rent-price addressed both parties’ financial burdens, even though it was below the market rate. The inherent problems of city level rent control were prevented in this localised initiative. Therefore, the CDF has managed to institutionalize at the neighbourhood level, a process that promotes rent determination and stabilization that is both inclusive and sustainable.

Inclusive Urban Development: narrative of urban cleaners community in Bangladesh

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Bangladesh owned one of the thousands year old urban civilization. Pundra nagar, (Pundra City) is an archeological place that had planned sewerage and drainage system. History revealed that slaves were deployed for cleaning sewerage and drainage in the ancient cities of Ganges civilization. Today's cleaners still bears that inhuman status with having very lacked in social and economic rights.

This study report was prepared based on Qualitative Research where some applied anthropology tools were used for collecting data. We used Focus Group Discussions, Group discussions and some Interviews of research participants and stakeholder.

Findings revealed that majority cleaners were born in cleaners households. There were some cleaners who were pushed in urban centres due to poverty and found no alternative but that unskilled work. Some of them have regular employment but wage rate is low considering their hazardous job to bear the minimum daily food consumption. There is no any governance for those who are employed as self employment so standardization of their wages, compliances and skills enhancing are neglected very much. Socially they are treated as polluted community so they are not allowed to enter at even cheap restaurants. Their children can't play at same time in aa playground when children of mainstream community play! Some development projects have been implemented in some towns which revealed that inclusiveness is possible that increased their empowerment with increased their income and other social rights.

Policy makers including development practitioners opined that appropriate social policy with timely implications are required where available best practices and supplement with continuous applied ethnographic change data are recommended in designing inclusive urban development strategy for the community like cleaners who are treated as caste in Bangladesh and South Asian regions.

Fostering Equity and Social Inclusion in Cities as a strategic policy for poverty reduction and sustainable development: The Sub-Saharan Africa Region's Experience

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The positive association of cities development, citizen's participation and economic growth is well known. In fact, cities provide concentrations of population from which industrial labor is drawn; they also contain a greater variety of skills and resources than do rural areas. More importantly, cities promote values favorable to participation, entrepreneurship and industrial growth which also tend to favor a propensity to analyze traditional institutions and innovations (Adelman, Morris 1973) Similarly, the twin

concept of equity and social inclusion in governance, especially city governance is conceptualized by the contemporary social scholars in terms of the processes, that is policies and conditions that contribute to observed inequities, and a normative, values-based concept (O'Hara et al., 2006) characterized by a widely shared social experience and active participation, by a broad equality of opportunities and life chances for individuals and by the achievement of a basic level of well-being for all citizens (Sen 2001:74).

A nexus therefore exists between these two conceptualizations, cities development and social inclusion policy and that is the people that participate in the economic growth of their societies. Therefore, fostering Equity and Social inclusion in cities is an essential economic tool for poverty reduction and sustainable development.

Meanwhile, the concept of equity and social inclusion was a product of the formal concept of social exclusion policy which originated and gained prominence in France in the 1970s when large segments of the population were excluded from the labor market which led to homelessness, alarming increases in child poverty, and elevated rates of family breakdown as the outcomes (Shields et al., 2006).

This differentiation of social inclusion in terms of processes and social exclusion in terms of outcomes is consistent with the emerging consensus in recent literature that the analysis of social exclusion should include not only the outcomes but the processes that produce inequities (Patyckuk & Hyman, 2009). Thus, it is important to consider “how policies/actions address the complex and dynamic relational processes that generate social exclusion and ultimately impact on individual and general population well-being” (Popay et al., 2006).

It should be noted however, that social exclusion policy in the past was majorly based on the notion of economic participation. But in the new globalization era, social inclusion frameworks have been expanded to adopt eight elements or dimensions: cultural, economic, functional, participatory, physical, political, relational and structural with elements of exclusion encompassing constructs such as disadvantage, poverty, disability, marginalization, barriers, denial of human rights, isolation and discrimination (Shookner 2000), (Health Canada 2002)

The objective of this paper is to examine the validity of the equity and inclusion policy of social inclusion in cities governance as an economic tool for poverty reduction and sustainable development in sub-Africa region vis-a-vis her peculiar characteristics as a region comprising of developing nations. Whether to be or not to be and addressing the issues and challenges confronting the region citizen's participation in cities governance with a view to finding solutions to them to achieve poverty reduction and sustainable development.

Bicycle Equity in Brazil: Access to safe cycling routes across neighbourhoods in Rio de Janeiro and Curitiba

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In many cities across Latin America, rapid motorization and population growth have resulted in unprecedented urban transportation challenges, with lower income populations disproportionately facing constraints to mobility as well as externalities like air pollution, traffic collisions, and the impacts of climate change. The construction of bicycle lane networks has been identified as an effective tool for increasing citizen's mobility and accessibility as well as combatting the effects of motorization, but in cities where bicycle lane networks exist, it is not known if they have benefitted different income groups equally. This paper assesses the extent to which bicycle lane provisioning has been equitable among neighbourhoods in Rio de Janeiro and Curitiba. Both cities were found to have more than twice the supply of bicycle lanes in the wealthiest quintile than the lowest-income quintile relative to area and population. A network analysis using a Level of Traffic Stress classification to categorize roads found that wealthier areas have more commercial areas accessible along safer cycling routes. Implications for cycling policy and future research are discussed.

Gender and Sustainable Development

Governance and Production Chains To Build Gender Equity

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According to research carried out by the Historical Memory Center, women have been victims of crimes and all kinds of human rights violations because of the armed conflict. The figures from the Single Victims Registry as of March 31, 2013 show that during from 1985 to 2012: "2,420,887 women have been victims of forced displacement, 1,431 are victims of sexual violence, 2,601 of forced disappearance, 12,624 of homicide, 592 of mines Anti-personnel, 1,697 of illicit recruitment and 5,873 of kidnapping "(Historical Memory Center, 2013). On the other hand, the Consultancy for Human Rights and Displacement comment that the inequality faced by women in terms of access to property "of the displaced population in 2011, 26 of every 100 said to be female proprietors; 9 out of 100 said they had joint degrees. The 70% registered as occupants of wastelands are men, 9% are women and 21% have joint occupation "(CODHES, 2015).

Rural Women affront many types of discriminatios associated with formal education and property. Notheless there are two mains factors: the first is they can not access a credits and financing because they do not have property. In the second instance, women are excluded because of the patriarchal cultural violence that legitimizes the power of masculinity and in fact relegates women to care activities and, consequently, restricts them to other types of jobs that are culturally developed by the mens

The article presents as thesis the importance of rural women and Solidarity Economy as a fundamental pillar for the participation and inclusion of women in value chains. This participation allows building and rebuilding the social fabric in a territory, especially in territories affected by the violence and by the armed conflict. As proposed by Sen (1999) to include women in social processes for income growth is part of the Smart Economy. The benefits of having added value and consolidating productive alliances with companies from the public and private sectors, invite us to think that these processes have very positive implications, in themselves and in the people who care, specially in the health of Early childhood.

Two case studies are presented in the Nariño-Colombia, where the high capacity of women to build better agricultural development options and to achieve economic independence is demonstrated, since it reduces domestic violence, broadens opportunities and strengthens them in processes Associative and personal formation in their life project. I conclude that the empowerment of rural women is related to their economic welfare through associative groups may be an option that should be implemented to reduce the inequalities that women face in their daily lives. These proposals need to be supported by the local, regional and national Governance.

The hypothesis of the article is developed in the following points: 1) Context of the field and conditions of rural women in Colombia, 2) Theoretical Framework Economy- Rural Sociology and Management for field compression, 3) Case analysis: a) Group women of Jurado (Pasto, Nariño, Colombia and b) Group women of Pupiales (Nariño, Colombia), and 4) conclusions.

Analysing the socio-economic impact land rehabilitation has on female-headed households in Baringo County, Kenya.

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The study aims to assess how the process of rehabilitating land and using it as arable and productive pasture fields results in women's empowerment within pastoralist and agro-pastoralist societies in Baringo County, Kenya. Specifically, female-headed households (FHHs) were examined in comparison with male-headed households (MHHs), in order to assess the socio-economic nuances of the impact of land rehabilitation on different households. The study examines concepts such as empowerment, vulnerability, power and agency in the context of land rehabilitation in arid and semi-arid environments from a gendered perspective. Empowerment as a concept was examined in relation to the multi-dimensional social process it embodies, therefore women's empowerment, in this context, was assessed through three sub-definitions of empowerment, namely; economic empowerment, decision-making powers and processes and finally an assessment was made on the labour patterns and work burdens that arose from women's involvement in managing grass-fields. This involved analysing whether women involvement in grass-

field and income-generating activities resulting in access to and control over income sources.

Three different household types (de jure FHHs, de facto FHHs and MHHs) were examined from two ethnic pastoralist groups, namely the Tugens and the Njemps, around the Lake Baringo area. The research applied a mix methods approach, using quantitative data already collected from the Rehabilitation of Arid Environments (RAE) Organisation, working to restore degraded land in the area, and both qualitative and quantitative data gathered from the field. Qualitative data was gathered through semi-structured interviews and key informant interviews over the summer of 2016.

The study is ongoing, however it hypothesises that there are distinct differences in the impact of land rehabilitation and pasture development on the various households, with de jure FHHs benefitting the most, yet remaining the most vulnerable and women within MHHs starting from a more secure vantage point, yet benefitting less in terms of power and agency compared to FHHs. Land rehabilitation and pasture development may present an empowering mechanism for women and improves their power and agency, especially those most vulnerable, such as de jure FHHs, however access to and control over resources are largely determined by men. It represents only the beginning of the empowerment process and ties into larger societal changes linked with modernisation and globalisation.

Gender and Sustainable Development

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Gender-related constraints have high cost to society in terms of untapped potential in achieving poverty eradication, health, education, food and nutrition security, environmental and energy sustainability, and economic growth. There is strong evidence that closing gender gap accelerates progress towards the achievement of Sustainable Development Goals (SDGs). Moreover, women have a critical role to play in the achievement of the SDGs – both as a solution and as an objective. Therefore, the 2030 Agenda has set the Goal 5 “Achieve Gender Equality and Empower All Women and Girls” with the aim to support the global development efforts over the next fifteen years. By directly empowering women and by bringing a gender perspective to all development work, it contributes to building a more equitable, sustainable future for all.

While there has been some progress in towards better gender equality, there is much more to be done in abolishing gender discrimination. Urgent actions are needed to empower women and girls, ensuring that they have equal opportunities to benefit from development, and removing the barriers that prevent them from being full participants in

all spheres of society. The SDG Fund in this regard promotes gender equality as a multi-dimensional issue which needs to be addressed by a range of solutions and actors to move forward towards the achievement of the SDGs. The goal of this paper is to show the experience of the SDG Fund to accelerate progress towards the SDGs through the women's empowerment. The methodology of this paper is based on qualitative analysis of innovative on-going joint programmes of the SDG Fund in more than 20 countries. The SDG Fund brings together UN agencies, national governments, academia, civil society and business to work together to promote gender equality and accelerate sustainable development.

Preliminary results from monitoring report confirm the positive and impact-oriented experience of the SDG Fund to promote the gender equality. The SDG Fund has adopted a dual strategy for advancing gender equality to support both gender-targeted programmes in more than 20 countries, while simultaneously mainstreaming gender as a cross-cutting priority. For instance, joint programmes in Bangladesh, Ethiopia and occupied Palestinian territories specifically target women as their main beneficiaries and mainstream gender into national policies. Other SDG Fund' programmes promote women's participation in economic development and support women's empowerment, for example, joint programmes in Honduras, Mozambique and Peru. Preliminary results clearly demonstrate that development can never be attained without the empowerment of women and girls. Moreover, the achievement of gender equality and sustainable development also depends on the means of implementation, including financing, investment, trade, technology transfer, capacity development, and international development cooperation.

Development of National Monitoring and Evaluation System Framework for Gender Equality and Women's Empowerment in Zimbabwe

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The Government of Zimbabwe in 2015 launched the National Monitoring and Evaluation (M&E) Policy through the Office of the President and Cabinet (OPC). One of the requirements within this policy is for all sectors to develop M&E systems to monitor and evaluate all programmes and activities within their sectors. The Ministry of Women Affairs, Gender and Community Development (MWAGCD) with the support of The United Nations Entity for Gender Equality and the Empowerment of Women (UNWOMEN) in Zimbabwe through the Joint Programme on Gender Equality (JPGE), under the National Accountability Pillar, is spearheading the development of the first National M&E Framework for Gender Equality and Women Empowerment (GEWE). The GEWE M&E Framework will improve the collection and dissemination of sex disaggregated data to support evidence based advocacy for gender equality and women's rights and contribute to the localisation of gender-related SDGs targets and indicators in national plans. Zimbabwe has selected SDG 5 as one of its key priority areas.

Objectives of GEWE M&E Framework

- To improve accountability in the implementation of GEWE commitments in Zimbabwe.
- To strengthen the MWAGCD role in coordinating Gender mainstreaming in all line Ministries of Government.

Methodology

The GEWE M&E Framework was developed through a participatory process which involved line ministries, the Office of the President and Cabinet, bilateral and multi-lateral Development Partners, UN agencies and Civil Society Organisations. All line ministries were invited to a methodology workshop where the approaches for national and sub-national stakeholder consultations and drafting of the Framework were discussed and agreed. Each line ministry was given the opportunity and resources to convene workshops of their gender committees to brainstorm on core indicators to track performance in their sectors with respect to gender equality and women's empowerment. Provincial and district stakeholders were consulted and validation meetings were held with various government and non-government stakeholders.

Results

The current framework developed is aligned to international instruments such as CEDAW, Beijing platform for action and to the targets and indicators in the SDGs. The GEWE M&E Framework articulates the results framework and core indicators for tracking and assessing GEWE results from development initiatives at national and sub-national level, together with M&E outputs, users and uses, institutional arrangement for implementation of the GEWE M&E Framework, a knowledge management system, an assessment of capacity development needs, an M&E calendar, estimates of resources required to set up the institutional mechanism and implementation of activities and production of the M&E outputs.

The architecture of the GEWE M&E Framework follows guidance from the National M&E Policy and is results based. It uses the input-output-outcome-impact theory of change concept in defining the results for the GEWE sector in Zimbabwe. Each line ministry has indicators that it will track.

Comprehensive Sexual Health Education in Zambia as a Modality for Sustainable Development and Gender Empowerment

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In September 2015, the United Nations unveiled the 2030 Agenda for Sustainable Development, which underscored the compulsory need for member states to work in concert towards the various Sustainable Development Goals (SDGs) to universally

enhance lives. These 17 SDGs are a set of intersectoral and interdisciplinary targets with corresponding indicators to measure desired outcomes. Here, we designed a comprehensive sexual health education curriculum to buttress SDG #3 “Good Health & Well-being”, SDG #4 “Quality Education”, and SDG#5 “Gender Equality” for Zambian stakeholders.

Currently, HIV/AIDS is still widespread throughout the Republic of Zambia with 12.9% prevalence among adults aged 15-49. Notwithstanding more than 90% of adults report having heard of HIV/AIDS, only 35% have comprehensive knowledge of the disease. Our sexual health curriculum was designed for stakeholders within the Republic of Zambia to address several needs of the community, in addition to traditional goals of sex education whilst espousing gender empowerment strategies for young women and girls by belaboring the inherent rights guaranteed by the United Nations Declaration of Human Rights as well as the Zambian Constitution.

Goals of the curriculum are to lower the prevalence and transmission of HIV and other STIs; to prevent and reduce unplanned pregnancies, sexual assault, and rape; to increase HIV and STI knowledge; and to increase literacy concerning safe sex and healthy relationships. As we developed the curriculum for the Zambian community, we leveraged cultural competencies during the content planning via consultations with stakeholders concerning distinct cultural characteristics, including laws related to same-sex relationships, and religion.

The resulting curriculum was entitled L.i F.E., Life and Family Education, a holistic, comprehensive sex education and relationship curriculum. The curriculum is comprised of eight lessons, covering health education, healthy relationship skills, and empowerment in addition to the classical sex education topics of anatomy, puberty, conception, and contraception.

Our program evaluation plan is currently underway, and includes pilot testing the curriculum in Zambia followed by focus groups, and a sexual health literacy evaluation administered pre and post curriculum. Modifications to the curriculum shall be informed by the results of the evaluation plan.

Using evidence to promote women-owned small and medium enterprises

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Small and medium-sized enterprises (SMEs) are the backbone of most economies and have a key role in the path towards socially inclusive economic growth. They are crucial to the development of strong, dynamic economies, and a significant source of job creation and social mobility. For many women in developing countries, entrepreneurship represents a promising career choice that enables them to play an active leadership role in economic activities. Also, women-owned SMEs are more likely to hire women for key roles and financially empowered women are more likely to invest in their families and

communities. Despite this, only one third of the world's formal enterprises are owned by women. Women-owned enterprises are more likely to be small, informal and concentrated in certain low value-added industries.

SMEs in developing countries face important barriers that limit their ability to grow and create jobs, such as limited access to finance, poor managerial skills and lack of access to markets. For women entrepreneurs, these constraints are proportionately greater due to unique gender biases and cultural challenges. Governments, nonprofits, and other institutions spend billions of dollars towards programs aimed at unlocking the potential of women-owned SMEs with the aim of achieving the sustainable development goal of gender equality. But high-quality research on "what works" is very limited, leaving decision makers without clear guidance on how best to support women-owned enterprises. There is a pressing need to identify effective solutions to help steer investments to the areas where they will have the greatest impact.

The Small & Medium Enterprise Program at Innovations for Poverty Action is a coordinated research effort that brings together policymakers and researchers to rigorously test innovative solutions to the most binding constraints to SME growth in developing countries. By working with governments, nonprofits, donors, multilateral organizations, and the private sector, the SME Program promotes the use of evidence in the design of SME development programs and policies. In this talk, we propose to share our experience partnering with financial institutions, governments and nonprofits in the design and rigorous testing of innovative solutions to the constraints faced by women-owned SMEs in developing countries. We will provide an overview of the key problems around access to finance, human capital and markets and examine how these constraints interact with gender biases and the specific industries in which women entrepreneurs are concentrated. The presentation will be targeted to a broad audience and have a special focus on how institutions can use randomized evaluations to develop innovative solutions and learn the most effective ways to bring them to practice.

Women's Empowerment and Its Impact on Women's Role in Adaptation to Climate Change

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Indonesia is a home for one of the largest rainforest in the world, with thousands of animal and plants live in it, and millions of people depend their livelihood on it. However, Indonesia is also one of ten biggest emitter of greenhouse gases which most of them are resulted from forest fires (UNFCCC, 2017; WRI, 2017). Therefore, Indonesia is extremely vulnerable to climate change, especially people who live in remotely rural area. Not only vulnerable to climate-change-related impact, but also because of the low socio-economic capacity of rural people, especially the poor. Exposed to sea level rise, high tide, or extreme weather, community often does not have adequate resources to adapt to climate change, and to find innovative solutions and alternative livelihoods.

Indonesia pursue sustainable development from the periphery, by empowering villages to strengthen its economic potential and basic services, including its ability to adapt to climate change (Bappenas, 2015). In 2014, Indonesia enacted Village Law that allows the villagers to decide their own development activities. Based on the law, the national and local government entitle to provide village grant up to \$ 75,000 to each village each year. The grant can be used for any development activities, agreed by the community, to address their local problem, including to initiate adaptation and mitigation efforts (The RCA team, 2016).

Various pilot projects to mainstream adaptation and mitigation efforts in village law have been carried out with tremendous support from various development agencies. Such projects including trainings for community in renewable energy, assistance to deploy micro-hydro power, as well as exploring opportunity in low carbon economy through preceded programs of village law, PNPM, of which the principles and mechanisms are followed by the Village Law.

However, it is still questionable whether women and men receive equal benefits form such efforts, as climate change bring different impact to women and men. Availability of natural resources affects more to women, as they tend to depend more on it for their daily live to fulfil their livelihood and food security (Brockhaus & Djoudi, 2011). It is also questionable whether the available adaptation efforts to climate change taking into account views of women on what they need to adapt to climate-related changes that maybe occurred to their family, and whether women are involved in decision making process in the use of village fund; involved in trainings related to green economy or adaptation to climate change activities; which in the end will receive equal benefits with men.

This paper examines the impacts of women's empowerment initiatives in the involvement of women in the village development, and in addressing women's needs to adapt to climate change. It does so by analyzing study cases in two different regions in Indonesia, Java and Sulawesi, looking at the perceptions of and actual practice of women's empowerment and participation in village development agenda, including the adaptation to the climate change.

The findings were then analyzed using the women's empowerment framework by Sara Longwe (March et al., 1999), which argues that women's development will be achieved through five levels of empowerment, which are welfare, access, conscientisation, participation and control. It finds that women' empowerment is slowly progressing, pushed by affirmative actions from PNPM. However, the strong perception of the people on differentiation of women's and men's role in development strongly affects the achievement of women's empowerment. The level of empowerment effects women's control over decision making on adaptation to climate change activities outside domestic issues, such as the management of natural resources and land rehabilitation.

Nevertheless, as the paper capture women's substantial role in making decision on household issues related to education, health and immediate needs of the family, the paper concludes by suggesting that women are the potential agent of change in the effort of villages to adapt to climate change, especially to safeguard their family. It is acknowledged, however, that limitation of women's involvement in village's issues outside household may exclude women and children from the benefit of adaptation to climate change programs, especially if it is related to power over the management of natural resources and land ownership.

What Women Want: An Analysis of Discourses Surrounding Education Access for Underserved Populations

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This presentation will examine the discourses of underserved women working to access higher education, in comparison to the discourses of formal efforts to provide education access via the United Nations' Sustainable Development Agenda. It will analyze applications to an international scholarship program alongside an annual report regarding Sustainable Development Goal #4 pertaining to education access. Examples of advocacy for women's education at the local, national and international levels will be included. These discourses will be examined in contrast and comparison to the actual voices of underserved women around the world - highlighting differences between what is being advocated for and what is actually needed (as perceived by these individuals). A critical analysis of discourse surrounding (and within) the applications, the annual report, and the scholarship program will provide insight into ways in which efforts to provide access to higher education may be improved.

Strengthening Entrepreneurship Programs Countering Gender Based Violence Through Monitoring & Evalutaion in South Africa

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South Africa has one of the highest rates of Gender Based Violence (GBV) in the world and is known for its especially infamous crimes of sexual nature. Over 40% of men report in research interviews having been physically violent to a partner and 40-50% of women report having been victims. These figures do not capture most of the violence that goes unreported. Despite having one of the most comprehensive laws to address Gender Based Violence, GBV remains a huge challenge and multiple stakeholders are working towards finding sustainable solutions. Gender Links, is one such Southern Africa based organization committed towards eliminating GBV within the region.

This research will be focus on the second phase of the 'End Violence, Empower Women' training program conducted by Gender Links in Gauteng Province, South Africa. The

training employs a holistic approach towards GBV and explores the documented relationship between economic dependence and GBV. Women often endure violence because they lack the economic freedom to make decisions such as walking away from abusive relationships. Similarly, a single source of income in a household, especially where strained, can lead to increased instances of GBV as friction over money is commonplace. The program will work to empower young women who are survivors of GBV by providing training in: life skills, digital literacy and entrepreneurship skills. The goal is to ensure that these young women have agency to make more informed decisions, to stop GBV before it occurs and to sharpen their entrepreneurship flair, such that they are able to open new businesses and increase the functional capacity of existing ones. This has the further potential to create new sources of livelihoods for these women. The training will be conducted through Centers of Excellence (COE) within four municipal councils in Gauteng Province. COEs are partnerships between Gender Links and local governments established in 2007 across 430 municipalities in the Southern Africa Development Community (SADC) region. Gender Links works with these local governments to promote gender mainstreaming in councils' agendas as councils have been identified as potential drivers of change due to their proximity to citizens as direct representatives of state services

The researcher's main role will be to assist in the program administering, capturing, analyzing and presenting of monitoring and evaluation tools and data in the implementation stages. The objective is to strengthen the program efficiency and effectiveness by assessing: the value and quality of training, ease and usefulness of content as well as participants attitudes and overall satisfaction with the program, which will in turn contribute to Gender Links overall objective of eliminating GBV. The research will also try to assess best practices among the different councils to see what can be replicated in future. Final monitoring and evaluation data will provide further documentation of the evidence between economic dependence and combating GBV. The methodology will involve a combination of quantitative methods and qualitative methods such as interviews, focus groups, appreciative inquiry and ethnographic observations. The duration of the project is between 15 May -July 2017.

Connecting Scientific Understanding of Gender Issues with SDG Targets and their Intervention Measures, for all SDGs

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This contribution to ICSD builds on the recommendations of the global Gender Summit community of scientists, gender scholars and policy makers in five global regions: Europe, North America, Africa, Asia Pacific, and Latin America.

Fewer than 10% of the SDG targets refer to the different needs of women and men and of girls and boys. Our aim is to start the process of connecting scientific understanding of gender issues across the relevant fields with the implementation strategies and measures that can be used to deliver the aspirations of all 17 SDGs.

The scientific evidence make is clear that gender inequality issues, created through biological and socio-cultural differences between women and men, are intrinsically intertwined with poverty, hunger, health and wellbeing, maternal death, climate change adaptation, energy, environment, economic growth, and peaceful societies.

We must ask, therefore, when planning interventions to achieve the SDGs: Will these interventions work equally for women? Will they work equally for men? We must use the best scientific evidence when formulating solutions to ensure this, and to address the wider societal and environmental challenges.

The following three examples explain our mission:

In SDG 2: Zero Hunger the targets include the special nutritional needs of adolescent girls, the role of women as food producers, and the importance of genetic diversity of seeds and plants. Their implementation could be enhanced through scientific understanding of sexual reproduction and maturation of plants and animals grown for food. For instance, in some fish species the male grows bigger (e.g. tilapia, popular in Africa) and in others the female (e.g. turbot, widely eaten in Europe). Measures to improve fish farming could also provide opportunity to enhance the role of women in aquacultures.

Similarly, production of food crops that rely on animal pollination would benefit from measures building on sex-conscious research showing that availability of pollinators improves yields and quality of crops, thus requiring less land and fertilizer to produce the same results. Understanding how bees are attracted to male and female flowers, and when a plant's fertility is highest, could also help enhance pollination success, and promote smart beekeeping to improve the livelihoods of smallholder farmers, many of whom are women.

In SDG 3: Good Health and Wellbeing, the scientific evidence showing how sex-gender differences impact on health outcomes is widely available, but many important issues still need investigation, such as the impact of adolescent pregnancy on maternal cognitive development, and the socio- economic implications for these mothers, their families and society.

In SDG 10: Reduced Inequalities, implementation measures will benefit from better understanding of how intra-household gender relationships control resource allocation, especially with regard to girls' education, their future, and their mothers' ability to participate in income-generating activities.

Our presentation will show how to achieve cross cutting benefits, which link aspirations of different SDGs, by integrating considerations of gender when designing and implementing interventions to achieve SDG targets.

'My mom is a hero': A clock wise analysis of women's role in poverty alleviation through an indigenous community entrepreneurship program

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The study tried to observe the women's role in community development especially for an indigenous society. Using Indonesia's perspective, the study deployed nine tribes to provide explanations on two folds questions: how indigenous society sees women's role in community economy and what are the antecedents for this noble idea. In order to maintain the objectivity of the findings, the study used a clock wise perspective among four actors. The first is analyzing the real actress. One focus group discussion among experts and two rounds of Delphi technique had been performed. Second is by observing the opinion from their husband's side. This is done to test the gender equality matters. The third actor is their kids. The study also observed how the children see their mommy as the main actress in the society. Series of in-depth interview from the two previous actors has been conducted. The fourth actor is relating to the stakeholder. A list of questionnaire had been distributed to test the model empirically using structural equation model. As conclusions, the study witnessed how indigenous women were taught to be heirs of the Heaven since their childhood. This is the greatest motivation for them to serves the society. A strong religious background had revived them to bear the responsibility in developing their civilization. Once they faced the real poverty issues, then community entrepreneurship would be the most feasible way-out. Our observations had justified how they inspired the community to (1) portray the dreams, (2) work together to achieve the dreams and (3) duplicate the model to inspire others. We witness a multi-facet of social learning theory, sociology-cultural theory, social network theory, self-motivation, individual aspect, demographic and external factors had played an important role in preserving their motivations to be a hero. Moreover, they also constantly improved their quality with strong knowledge in order to achieve a better performance for the common good of the society. Compared to men, indigenous women found to have better resilience in dealing with critical social issues. Through their motherhood senses, this study concluded that they have the ability to struggle for the best not only for their family but also for the whole society. Thus, it is clearly portrayed that my mom is the real hero.

Sustainable Development Goal 5 - Achieve gender equality and empower all women and girls

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Gender inequality is an acute and persistent problem, especially in developing countries. This paper argues that gender discrimination is an inefficient practice. We model gender discrimination as the complete exclusion of females from the labor market or as the

exclusion of females from managerial positions. Against the backdrop of the 2030 UN Agenda for Sustainable Development, this paper analyzes the measurement issues in gender-based indices constructed by the United Nations Development Programme (UNDP) and suggests alternatives for choice of variables, functional form, and weights. While the UNDP Gender Inequality Index (GII) conceptually reflects the loss in achievement due to inequality between men and women in three dimensions, health, empowerment, and labor force participation, we argue that the assumptions and the choice of variables to capture these dimensions remain inadequate and erroneous, resulting in only the partial capture of gender inequalities. Since the dimensions used for the GII are different from those in the UNDP's Human Development Index (HDI), we cannot say that a higher value in the GII represents a loss in the HDI due to gender inequalities. The technical obscurity remains how to interpret GII by combining women-specific indicators with indicators that are disaggregated for both men and women. The GII is a partial construct, as it does not capture many significant dimensions of gender inequality. Though this requires a data revolution, we tried to reconstruct the GII in the context of Asia-Pacific using three scenarios: (1) improving the set of variables incorporating unpaid care work, pay gaps, intrahousehold decision making, exposure to knowledge networks, and feminization of governance at local levels; (2) constructing a decomposed index to specify the direction of gender gaps; and (3) compiling an alternative index using Principal Components Index for assigning weights. The choice of countries under the three scenarios is constrained by data paucity. The results reveal that the UNDP GII overestimates the gap between the two genders, and that using women-specific indicators leads to a fallacious estimation of gender inequality. The estimates are illustrative. The implication of the results broadly suggests a return to the UNDP Gender Development Index for capturing gender development, with an improvised set of choices and variables.

Engaging Men and Promoting Equitable Household Decision-Making in Agriculture and Livelihoods Projects

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Achieving gender equality and empowering women and girls are fundamental goals in development (SDG 5) and investing in gender responsive programming is a crucial priority for development organizations wanting to positively impact poor households and communities. Catholic Relief Services (CRS) has launched a Global Gender Learning Agenda (GGLA) with the aims to identify major programmatic and knowledge gaps related to gender; build the evidence base for what works in meeting the diverse needs of the most vulnerable populations, especially women and girls; and achieve greater

programmatic impact abroad and influence in the wider development community. Faithful to its identity as a learning organization and recognizing the importance of shared learning with University partners, CRS has sought the collaboration of the University of Florida (Faculty and graduate students associated with the MDP program) to advance its learning agenda. The present work is an output of this collaborative effort.

This study pertains to one of CRS signature programming areas – agriculture and livelihoods development interventions – and consists of two parts. The first is a review of the existing literature on two thematic areas of the Global Learning Agenda: i) household decision-making, including the factors that increase a women’s role or couple’s joint decision-making; ii) engagement of men and boys in empowering women in agriculture, focusing on facilitating and hindering factors affecting the involvement of men and boys in strategic areas of CRS programming, and in empowering women. The second part of the study analyzes documentation related to 17 CRS agriculture and livelihoods projects to examine ways in which they address the two learning areas. Five of these projects were selected for follow-up reviews through skype interviews with project teams in the field to more deeply analyze project achievements and challenges. The report concludes by identifying gaps in the evidence base and suggesting ways to move forward to strengthen CRS gender programming. Recommendations include ways to more explicitly integrate gender activities from the start of the project, particularly those addressing gender norms that influence roles, responsibilities and time use in households; as well as more effective strategies for monitoring and evaluating gender impact.

The purpose of this presentation is also to open a dialogue about the modality of, and the potential for, more effective collaboration between development research and practice. This appears the more urgent given increasing pressure from donors to strengthen the evidence base of what works in development, and to demonstrate effectiveness of existing programming. The ICSDP conference represents an ideal setting for a productive exchange about successful experiences, as well as difficulties faced by partnerships between academia and development organizations.

Gender Equality: Rhetoric and Reality

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Two years into the SDGs, we have heard much about inclusivity, particularly as it relates to women and girls. Yet, has this rhetoric and political commitment translated into outcomes?

Using a methodology that maps OECD Development Assistance Committee (DAC) purpose codes to the SDGs, we have retrospectively tracked the total amount of official development assistance (ODA) towards each SDG during the MDG era (2000-2015). This provides us with a baseline level of financing to the SDGs, that can help identify funding gaps as we think about mobilizing more resources in the future. Focusing on

SDG 5 é gender equality é we will look at the entire chain of priorities (inputs), investments (outputs) and effectiveness (outcomes) to answer the following questions:

Priorities: Are international and national priorities aligned in favor of SDG 5? We will look at this from the top-down and bottom-up perspective. For large international donors, we will look at their expressed priorities and rhetoric vis-ö-vis gender equality through their strategy documents, key legislations, and commitments at high-level forums. For leaders in low- and middle-income countries, we will leverage our 2017 Listening to Leaders Survey that captures the views of nearly 4,000 leaders in 126 low- and middle-income countries regarding their top three priorities among the 17 SDGs. Respondents include leaders in the government, private sector, development partner organizations and domestic CSOs.

Investments: Are investments aligned with the above revealed priorities? We will explore historical trends in bilateral and multilateral ODA for gender equality during the MDG era and present the baseline level of financing in 2015 as we embarked on the SDGs agenda. We will also look at the largest and smallest providers of aid for SDG 5.

Effectiveness: How do investments in SDG 5 translate into outcomes that advance gender equality and reduce discrimination? Focusing on a few indicators that measure progress in gender equality or women’s opportunities (for instance, proportion of seats held by women in national parliaments), we will analyze the effectiveness of ODA dollars. We will compare progress on different aspects of SDG 5 across countries for every aid dollar spent towards SDG 5 and highlight examples of leaders and laggards in this area.

Based on the analytical insights on the above questions, we will derive policy implications and recommendations for international and domestic actors in terms of advocating for prioritizing SDG 5, identifying gaps in financing for SDG 5 and highlighting lessons learned from successful case studies.

“The Invisible Ring” - A process documentation and analysis of formation of women’s groups for mainstreaming gender into a marginalized community

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Formation of Women’s groups for women’s empowerment is a common approach used by many development programmes. The women’s groups are used as tools for the mainstreaming process. It has been used over the years in development programmes, yet, it is evident that the effectiveness of these approaches can vary from community to community based on the different cultures and context even within the same country. It is often easy to replicate the same model through a blanket approach in a different context from the original and expect the same result but in reality the result may be a failure. This can be observed only in the long run, since, behavior change cannot be observed

effectively in the short run. It is due to this reason the following approach was built through a strategic approach to achieve the expected results. It is presented in this paper as a lesson learnt to help in future programme design efforts.

This paper is written with the purpose of understanding a process and the stages of formation of women's groups to facilitate gender mainstreaming in a marginalized community in the hill country of Sri Lanka.

The process explained below is based on a programme conducted by the author and team in World University Service of Canada (WUSC), Plantation Communities Project II (PCPC II) in Kandy Sri Lanka during the period from 2008 to end 2010. The Project phased out from the community and was officially closed in 2014. The communities involved are; the Indian origin plantation resident community in Sri Lanka, who were settled in the hill country in the 1800's during the British rule, and the traditional village community in villages adjoining the plantations, which were compressed and restructured over time after the establishment of plantations.

The above approach for gender mainstreaming was through the formation and strengthening of Women's groups. These groups which were formed and strengthened to develop ground level women were used as a tool to promote gender equality of the project. This approach was used in about 40 locations selected under the project in the plantation sector and in about 20 locations of the adjoining villages of the plantations.

The implementation was done through trained community mobilizers from local partner organizations. The methodology presented here is based on the four key types of approaches used during project implementation. They are; Overview of the 18 month strategy to promote gender equality in the community (Approach 1), Overview of the 12 month strategy of mainstreaming women's leadership (Approach 2), Overview of mainstreaming gender in other activities using the women's groups (Approach 3) and Overview of the monitoring process (Approach 4).

This approach can be specifically recommended for projects promoting gender equality in a transitional resettled or non-traditional community. The principle approach may need to be accommodated with context specific changes in order to replicate in different social and geographical locations.

Menstruation, Sanitation, Participation: Advancing gender justice through participatory approaches to sanitation

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While there has been growing understanding of the gendered aspects of poverty and development over the past few decades, there has been surprisingly little attention paid to women and girls' experiences of the biological necessity and socially constructed meanings of menstruation (Chandra-Mouli and Patel, 2017). This has changed in recent years with an increasing focus on menstrual hygiene management (MHM), particularly in

the water, sanitation and hygiene (WASH) sector (Muralidharan, Patil and Patnaik, 2015). While this is a vital area of work, the discourse emerging from the male-dominated WASH sector tends to medicalise menstruation, treating women as targets of development, rather than agential actors deserving of dignity (Lahiri-Dutt, 2015).

By taking an intersectional, feminist approach, my work disrupts the essentializing perspectives that are common in the WASH and public health sectors, and recognises that menstruation is accompanied by socially and historically constructed meanings and implications that are deeply embedded in the political and economic context of a society.

This research will consist of a grounded inductive approach into the ways that menstruation affects women and girls' lives in informal settlements in Jhansi City, India. This is part of PRIA's wider project "Engaged Citizens, Responsive City" which aims to strengthen the capacities of civil society of the urban poor to participate in the planning and monitoring of sanitation services (PRIA, 2017). By using a mixed methods approach consisting of a literature review and discourse analysis, a questionnaire, and semi-structured interviews with community members and individual experts, my work will provide a deeper understanding of the practices and perceptions surrounding menstruation in the Indian context.

The presentation I will prepare during this time will therefore discuss the challenges of addressing the specific needs of menstruating people when utilizing a participatory approach to sanitation within the Indian context, as well as the opportunities such an approach offers.

Governance of Energy Transformations: Key to Sustainable Electric Systems

Good Governance for PPPs for the Transformation of the Energy System in West Africa

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In order to build concrete pathways to energy transformation and implement sustainable electric systems, good governance is especially in developing countries a crucial condition as well as the key driver to attract long-lasting investment flows from both the public and the private sectors. Ensuring institutional stability and financial transparency remains one of the biggest challenges for developing countries' governments: the lack of these conditions paralyses both the deployment of public funds for infrastructure development and the attractiveness of private sector investments, either by domestic or foreign investors.

When it comes to green investments in developing countries, obstacles become even higher due to various factors, among others the perception of sustainability policies as a

trade-off for rapid economic growth, and the reluctance of private actors to invest on projects with long-term horizons, higher risks and lack of public guarantees by national institutions. On the other hand, the global call for a forward-looking approach on the development of policies stimulating energy access included in the 2030 Agenda for Sustainable Development - and in particular SDG 7 calling for universal access to affordable, reliable, sustainable and modern energy and SDG 16 calling for accountable and inclusive institutions at all levels – can be seen as the leverage to identify new and innovative solutions.

If supported by good governance and a sound legal and regulatory framework, Public and Private Partnerships (PPPs) represent the key instrument for the transition to a low-carbon energy system. With a focus on investing on sustainable electric systems in developing countries, PPPs represent an effective financial tool able to combine inadequate public budget with the needed private funding, allowing for risk sharing, a lower overall capital cost and blended return for investors. Moreover, the joint ownership with large international firms can help develop local private sector capabilities and boost its business associated with green energy transformation.

During the G20 Summit in Hangzhou in September 2016 the institutional commitment to improve universal access to affordable, reliable, clean, sustainable and modern energy services was strongly reiterated, with a particular focus on the importance of electricity access in Sub-Saharan Africa (where more than 600 million people still live with no electricity access, IEA, 2014). Against this background, the paper will focus on the drivers and challenges of energy transformation in Africa, and in particular in West Africa which is registering one of the highest growth rates (+6% in 2014, African Economic Outlook 2015) and one of the highest rate of electricity access (47% in 2012, IRENA 2015) within the African continent. These positive economic trends play a crucial role to attract private investments able to scale up green finance for sustainable electric infrastructure in the region, if supported by PPPs, coherent regulatory framework and public guarantees by sound and transparent institutions.

Achieving a smooth transition to low-carbon electricity production

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Respecting the 1.5-2°C target on the increase in global temperatures, as agreed during the Paris Conference in 2015, will require a large-scale transition to low-carbon forms of electricity production. A large proportion of fossil fuels will have to be left in the ground, becoming ‘stranded’, and long-lived capital stocks that require fossil fuels to operate, such as fossil-burning power plants, might become idle. This structural shift is likely to have deep implications on involved companies and the market valuation of their financial assets, with repercussion on financial investors holding the assets and potential disruptive systemic effects. A coordinated set of policies needs to be designed in order to address in

an integrated manner the financial risks raised by the transition to low-carbon electricity production.

This paper develops a multi-sector macroeconomic model aimed at offering a comprehensive representation of the links between electricity production and the financial system. Our model employs a Stock-Flow Consistent (SFC) methodology, which makes extensive use of double entry accounting, depicting each sector as a set of interacting assets and liabilities. This allows us to grasp the complexity of financial interactions and their impact on the rest of the socioeconomic system. The economy is populated by the following sectors: households (who are also the financial investors), firms producing the consumption good, firms producing the investment good, firms producing electricity, banks, and the government. We also distinguish between a ‘low-carbon’ and a ‘high-carbon’ investment good, characterised by different emission intensities, capital productivity and access to finance. This capital stock is then employed by firms in the energy sector to produce low-carbon or high-carbon electricity, which in turn is a fundamental input factor in the production of other goods. We allow capital productivity to be a function of the relative diffusion of each type of capital to capture elements of technological and institutional lock-in.

We then use the model to study two main issues related to the transition to low-carbon electric systems. First, we explore what the role of the financial system could be in facilitating, or hindering, the transition. In particular, we study how financial market sentiments might affect the shape of the transition by allowing investors to develop varying degrees of ‘apathetic’ expectations around the development of the low-carbon sector and limited perceptions regarding its actual size. We show that higher levels of ‘climate apathy’ extend the length of the transition period, possibly to the point of preventing it to happen, and produce larger amounts of both physical and financial stranded assets. Second, we study the most effective policy strategy to achieve a smooth, rapid transition to low-carbon forms of electricity production. Our methodological approach will allow us to develop an integrated assessment of a wider range of options than usual, including fiscal policy, macroprudential regulation and monetary policy. We show how the degree of alignment between financial actors’ expectations and the implemented public policies affects macroeconomic and financial stability, as well as the smoothness, speed, and effectiveness of the transition of the electric system.

The Effects of Energy Theft on Climate Change and its Possible Prevention Using Smart Meters: Case Study Nigeria

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It has been indirectly re-echoed that electricity consumption is positively related to the growth of a nation and is therefore a key factor in everyday life that has formed the backbone of Industrialisation. With the ever increasing need for electricity, power theft increases like a plague. 70% of the Green House Gas (GHG) emissions come from fossil fuel combustion from electricity generation. Despite efforts to curtail GHG emissions,

energy theft dwarfs these efforts in the developing economies. The ability to effectively generate electricity by power generation bodies gets stalled when in the process of distribution, energy theft occurs. Invariably this accounts for unnecessary blackouts thereby encouraging users to opt for alternative sources of electricity in the form of diesel and petrol generators increasing GHG emissions. Nigeria continues to wallow in the doldrums of inadequate generation, supply and distribution of power. A major contributing factor to the ineffectiveness of Nigeria's power network is electricity theft. Many consumers have resorted to electricity theft and tampering of electricity devices leading to unreliability, overloading of power lines and increased billing on the part of legal consumers. Here, the generation, transmission and distribution sub-sectors face their own share of challenges. The issues of non-metering, estimated billing, overbilling and electricity theft have virtually driven the distribution subsector of the Nigerian power sector to a halt. Furthermore, sharp practices such as meter tampering and by-passing of meters have reduced revenue to distribution companies thereby stalling the development of the power sector. Most climate discussions have been on how to reduce GHG emissions, however, seldom has one looked at the effects of energy theft. Using Smart Meters (SM) a solution is proposed to reduce energy theft by constantly monitoring the electricity grid and remotely isolating points of theft. The SMs are expected to be resident on each transformer, distribution pole as well as the consumer's premises. The readings are then sent to the distribution company's database for analysis through a communication network and remotely cut-off problem areas if detected. This system would increase overall returns to the distribution company, improve transparency in the metering process thereby improving performance which would directly amount to the reduction of GHG emissions.

Barriers and drivers of retrofit: using transitions theory and agent-based modelling to drive energy efficiency in UK housing

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As the world looks ahead to 2050, energy transitions continue to occupy a prominent position on global sustainability agendas. The management of these transitions must be supported by robust research programmes, applying socio-technical understanding to critically evaluate the diffusion of sustainable energy technologies. This project researches the energy transition of the UK residential sector, using transition theory to explain and model the process of retrofitting domestic buildings.

Energy use in the UK residential sector accounts for approx. 30% of the country's total energy consumption and is second only to the transport sector in its contribution to national GHG emissions. The broad political interest in improving domestic energy efficiency is manifested through exertion of the Energy Company Obligation (ECO), the UK's major policy for incentivising housing retrofit. However, the ECO and many other UK domestic energy programmes have faced challenges over the years, often resulting in policy failure, ongoing low building energy performance and continued fuel poverty in 10% of households.

This research uses a socio-technical systems approach and the Technological Innovation Systems (TIS) transition framework to assess the barriers and drivers for the diffusion of retrofit measures in domestic UK buildings. Barriers and drivers pertaining to individual groups of agents (e.g. tenants, public authorities, energy suppliers etc.) are identified and characterised alongside inter-agent relationships and agent norms and perceptions, using a mix of stakeholder analysis, semi-structured user and expert interviews and small-scale trials of retrofit measures. A trial conducted in London's East Village area tested the above mixed-methods approach to assess the norms, perceptions and relationships of "early-adopter" tenants, and the barriers and drivers to their adoption of smart heating controls. The results offered insight into agents' decision-making processes and their perception of smart energy technologies, as well as their preferences and salient needs with regards to heating. Furthermore, the trial deepened our current understanding of the relationship between tenants and the agencies delivering these smart energy measures, including trust in and expectations of the retrofit supply chain.

The above approach is used to assess the diffusion of 9 different retrofit measures into UK domestic buildings, accounting for the barriers and drivers experienced by 10 key agent groups. For the end-user groups (tenants and homeowners), an agent-based model will be developed to simulate the uptake of these 9 technologies and estimate the resulting emissions reduction. The research will also test the application of random networks and cellular automata to simulate the transfer of retrofit-related information to and between end-users.

This project's assessment of the diffusion of retrofit contributes to a better understanding of how agents in the residential sector respond to and invest in energy efficiency technologies. The findings from this research can assist the formulation of appropriate policy frameworks, ensuring that retrofit measures are introduced through sustainable incentive programmes which overcome existing barriers and build on existing drivers. Ultimately, these well-designed policies can ensure that retrofit measures become embedded in the residential built environment, and contribute effectively to the sustainability transition of the UK energy system.

Sectoral systems of innovation: A case study of solar photovoltaics

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Despite the dissimilar forms of energy abiding in each renewable resource, all can be converted into electricity, which is the most convenient energy vector. As electricity is easily transformed (into other forms such as light and heat), conveniently transmitted and stored, and widely considered as a fundamental enabler of modern society. Notwithstanding the beneficiary, all renewables accounted for about 20% of the estimated global final energy consumption in 2015 and less than 2% was from the modern technologies namely wind turbine or solar photovoltaics. Hence, the mechanism

to promote renewable technology adoption is ultimately crucial to secure sustainable energy futures.

Amongst alternatives, solar energy provides great potentials thanks to its abundance and predictability. And a single-step conversion from sunlight to electricity by means of solar photovoltaics (PV) has gained the highest market growth rate accelerated by rapid technological learning rate and thus cost reduction. Yet, in comparison to conventional power generation systems, PV market adoption is still very reticent and concentrated particularly on the silicon-based PV. The barriers of PV deployment typically revolve around the issues of technological challenges and non-technological aspects i.e. public policy and economics. Though the in-depth é yet disintegrated é analysis was conducted by experts in the respective fields to highlight some issues, the lack of all-encompassing perspective is where this research aimed to fulfil.

A methodological framework of sectoral systems of innovation is incorporated to identify three elements (namely knowledge and technology, actors and networks, and institutions) and to gain a better understanding of PV industry structure, dynamics, and transformation. Case study approach is applied for two distinct concepts:

Macroscopic level: As a market of PV modules engages market players from all over the world, initial policy-induced market growth in Europe in 1990s promoted not only mass-production industry but also process innovation in Asia. To identify relationships and emerging themes, a comparative review - from archives, field observations and informant interviews - in five theoretical sampling countries (Germany, China, Malaysia, Thailand, and India) were executed. The policy shifting is amongst outstanding themes in which government largely changes from governance through rules to governance through goals, and private sector plays an increasing important role in PV market. In terms of market intervention policy, tariff regression and eventually the phase-out, and the innovative financial mechanisms are promoted. In term of PV system installation, the trend shifts from centralised grid-connected system to distributed system (e.g. rooftop, self-consumption, off-grid/standalone system).

Microscopic level: Based on a unique case feature (over-dominant utility-scaled PV installation pattern), a richly observed single case is conducted to capture the nature of institutional setting which has profound impacts through policy planning and interventions. As examined in Thailand, technological exploitation has utterly been given priority, and probably at the expense of technological exploration. Hence, approaches to secure both technological diffusion and innovation are to be synthesised. One possible conclusion may be grounded on innovation catching-up strategies emphasising crucial role of institutional instruments, especially for the latecomer countries, as well as the balancing in policy between technological exploitation and exploration.

Distributed Solar Generation - A viable solution to a three headed problem: Climate change, energy dependency and subsidy reduction

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In 2013 Mexico undertook one of the most ambitious energy reforms in the last century. The reform opened up the electricity, oil and gas sectors to private investment under differentiated approaches after a 75-year monopoly by the state owned companies. In the case of oil and gas, the whole value chain has been opened up for private investment, while in the case of electricity, private investment has been fully allowed in power generation, and partially allowed in transmission and commercialization, the latter components remaining part of the Government's Federal Electricity Commission (CFE).

It is worth highlighting that, while the energy reform was heavily centered in oil and gas one important ingredient in the constitutional change was a set obligation in clean energy which makes compulsory the compliance with a certain percentage of clean energy within the electricity mix. The constitutional mandate was further detailed in the secondary laws comprising the Electricity Industry Law (EIL), passed by Congress in August 2014, and the Energy Transition Law ETL, passed by Congress on December 2015. The latter being the most significant contribution to a decarbonized electricity grid.

Despite the benefits entailed in the legal framework, currently Mexico spends well over a 101,000 million pesos every year subsidizing electricity for the residential sector. This has made Mexico into the only OCDE country to spend a large amount of its government's budget into subsidizing electricity for the residential sector and has since become a significant amount of the government's yearly budget. The "Solar Bonus" program, is a scheme devised by ICM that aims to refocus the present residential electricity subsidy towards providing part of the funds to residential households to install solar rooftops. The rationale behind the scheme is that homes with a solar rooftop will no longer require a subsidy and, furthermore, will supply clean energy to the grid at a cost lower than CFE's unsubsidized electricity prices to other sectors. ICM has developed a model that lets the user understand the long term implications and analyze the economic, social and climatic benefits of the program.

The goal of this paper (presentation) is to understand the implications of the residential electricity subsidy. The model shows that a reinvestment program that considers a yearly discount in domestic user's electricity tariffs and a reallocation of the avoided subsidy into a joint public/private fund to incorporate solar rooftops in 70% of the domestic users will produce social and economic benefits for the state and domestic users but will also be a key component in meeting the energy transition goals and the mitigation targets for the electricity sector. The Solar Bonus model offers a clear and structured process on how to:

- Foster transparency and accountability in government spending;
- Foster renewable energy through decentralized means in developing countries;
- Democratize and reduce energy poverty;

- Increase ambition and support for climate change goals, and;
- Reduce heavy dependence on imported oil, gas and other fossil fuels.

Green Growth: How Can We All Profit from the Low Carbon Transition?

Positioning countries in Southeast Asia and the Pacific Islands for success in the transition towards a sustainable, equitable, net zero emissions world

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Developing countries have much to gain, and potentially much to lose, in the world's rapid transition towards net zero emissions.

The Paris Agreement commits the world to limiting global temperature rise to well below 2 degrees Celsius, and aiming for 1.5 degrees. This means achieving global net zero emissions by the second half of this century.

As the developed world adapts, replacing emissions intensive infrastructure, technologies and practices with low or zero emissions alternatives, the developing world has the opportunity to 'leapfrog' directly to low emissions solutions, positioning themselves well in a world where carbon emissions will increasingly face a real or implied carbon price. With substantial climate finance available to support these investments, and when deployed in a manner consistent with long-term low emissions sustainable development planning, developing countries in southeast Asia and the Pacific Islands can position themselves for successful and inclusive green growth.

Yet the predominant paradigm suggests that rapid economic development can only be achieved through substantial growth in emissions, and this is reflected in the commitments of most developing countries to the Paris Agreement. Nationally Determined Contributions (NDCs) reflect a reduced growth rate of emissions, but an overall increase in emissions to 2030 and beyond. In some instances, countries have identified investment in lower emissions fossil-fuel technologies as a mechanism for achieving NDCs; in other words, technologies that are inconsistent with decarbonization. As the work of the global Deep Decarbonization Pathways Project shows, the technologies already exist to decarbonize the world's energy systems, implying therefore that it is possible to 'leapfrog' emissions-intensive technologies, avoiding lock-in and costly emissions reductions in future. A failure to make choices that are compatible with a deep decarbonization trajectory could place developing countries at continued economic disadvantage in a rapidly decarbonizing world, and undermine efforts to achieve other Sustainable Development Goals (SDGs).

When also considered in light of the mounting costs that developing countries face in dealing with increasingly frequent and severe climate-related natural disasters - some of the most vulnerable island nations are already experiencing a persistent state of disaster recovery - it becomes clear that developing countries cannot afford to 'back the wrong horse' in the climate race. While adapting to climate change impacts is critical, it must be considered in the context of long term green growth and achievement of SDGs.

Building on the work of the Deep Decarbonization Pathways Project (where ClimateWorks Australia co-led the Australian analysis), the 'Pathways to Low Emissions Development' project will support developing countries in Southeast Asia and the Pacific Islands to develop and implement long term, low emissions development pathways that are consistent with the UN Paris Climate Agreement, improve alignment of climate mitigation and adaptation outcomes with other SDGs, identify and address barriers to implementation, and support the 'bundling up' of projects to improve access to climate finance.

In doing so, it will demonstrate a flexible approach that positions developing countries for success in the transition to a sustainable, equitable, net zero emissions world.

The role of central banks in supporting green growth

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There is now a widespread consensus that the transition a low-carbon society would be compatible with, and possibly a precondition for, a flourishing economic system. However, two main obstacles might prevent this 'green growth' scenario to take place. First, despite the recent upward trend in low-carbon investments, several estimates concur in considering the current figures insufficient. This is due to their unattractive risk/return profile, high initial capital costs, market illiquidity and elevated financing costs. Second, the transition, while necessary, might generate economic losses and financial instability, through a number of interconnected channels. Large productive sectors - e.g. coal, oil and gas companies, producers of fossil-fuelled electricity, the automobile industry - are expected to gradually disappear or entirely reinvent themselves. This will affect the banks holding the debt of fossil-dependent sectors and the investors holding their financial assets, potentially creating a cascade effect throughout the financial system. If left unmanaged, the transition could therefore have deep negative implications on the economy.

The main proposed policy instrument to address these issues is the implementation of a 'carbon price', through either the introduction of a tax on the carbon content of goods and services, or the creation of a cap-and-trade system of emission allowances. The introduction of carbon pricing tools until now has been timid at the international level, and not always effective. However, even when present, carbon pricing may not be

enough. This is due to additional market failures present in the financial system that, especially under circumstances of deep macroeconomic stress, may lead investors not to react as expected to price signals and banks not to lend even in the presence of potential profitable investments. This calls for the implementation of additional policies specifically aimed at the financial system.

This paper reviews and critically discuss the potential role played by central banks in supporting the low-carbon transition. Many central banks and other public institutions have already started to recognise the relevance of the topic, pushing for a more transparent and standardised disclosure of information related to emissions and climate-related risks by companies and financial investors. Some of them have begun to develop methodologies to stress-test their banking system against climate-related risks. Alternative options include aligning macroprudential regulation and monetary policies to green growth objectives. For instance, the financial regulator could differentiate the liquidity and capital requirements that banks need to respect depending on the carbon intensity of their lending portfolio. Or central banks, already currently involved in large-scale programmes of financial asset purchase, could reorient their purchasing strategy towards assets whose proceedings would then be used to finance low-carbon investment (e.g. 'green bonds' issued by national or international development banks).

The paper also explores the differences between high-income and emerging economies, whose distinct central banking mandates and operative frameworks are likely to have different implications on the effectiveness of such policies. I review and discuss the available case studies of central banks in emerging economies proactively intervening in support of the low-carbon transition (e.g. China, Bangladesh, Lebanon).

Achieving a profitable low carbon transition: Learning from an entrepreneurial approach

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The cities of the world are growing at a rapid pace and as hubs of economic development, production, and consumption, cities must effectively navigate low-carbon transitions if the world is to mitigate the effects of climate change within the internationally agreed timeframe. Much of the technology needed to enable this low carbon transition has existed for decades, however progress has remained slow due to complex challenges within cities that cannot be overcome with traditional approaches.

This paper will present the case that the approach taken by entrepreneurs, who operate in fast-paced and uncertain conditions, could be invaluable in informing low-carbon energy transitions at a city, national and regional level. Given that that an entrepreneur's approach is driven by a profit motive, this approach may lend itself to ensuring that the low carbon transition achieves strong economic outcomes. Some schools of thought

suggest that the capacity and responsibility to address climate change lies with governments through policy, while others suggest individual entrepreneurs are key to accelerating climate efforts, with a tendency to rely on such individuals rather than learning from and applying their approach. This paper presents a middle ground where policy makers, researchers, business, and civil organisations seek to learn from an entrepreneurial approach in order to accelerate the worlds low carbon transition.

This paper will present an overview of key entrepreneurial approaches suited to accelerating the low carbon transition with a focus on urban infrastructure. Guidance will also be provided on how such an approach can be applied at a macro-level while also strategically supporting emerging bottom-up innovations occurring at the micro-level which play an important role in transitioning systems.

Carbon Structural Adjustment: The key to profiting from the low carbon transition

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Given the imperative to respond to climate change by achieving changes to the operation of economies around the world in the coming decades, attention is now being given to possible strategic approaches, including the emerging field of 'Green Growth' strategies. This paper begins by considering lessons from green growth strategies aimed at developing countries that may inform efforts to achieve a low carbon transition. The paper then investigates structural adjustment programs as a potential framework to extend green growth methodologies to achieve profitable low carbon transitions, and discusses the concept of 'Carbon Structural Adjustment'. The paper concludes by presenting a road map for the development of carbon structural adjustment strategies aimed at key structural areas of the economy, implemented through strong actor and stakeholder engagement. Understanding that current progress is slower than required the paper calls for consideration of methods to increase the 'willingness to adjust' structures within society to achieve a low carbon transition.

Downshifting in the Fast Lane: A post-Keynesian Model of a Consumer-led Transition

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If the world's countries seriously tackle the climate targets agreed in Paris, their citizens are likely to experience substantial changes in production, consumption and employment. Such changes will disrupt the everyday experiences to which those citizens have adapted their economic conventions, behaviors, and rules. Neoclassical economic theory, with its assumption of a well-defined long-run equilibrium and rational expectations, is ill-

equipped to analyze such a transition. By contrast, post-Keynesian economic theory seeks to represent economic behavior in the face of fundamental uncertainty. This presentation describes a long-run post-Keynesian model that is being built to better understand the potential implications of a major transition on macroeconomic stability and employment.

The model is under ongoing development but already shows interesting behavior. It assumes that firms and consumers adjust their behavior gradually in light of experience. It is a demand-led model in which firms have considerable freedom to administer prices, while consumers are unable to change consumption rapidly due to, for example, employment, health or educational status, housing and mode of transportation. Firms continually seek input-saving technological improvements that, in the aggregate, tie technological progress to firms' cost structure. Together with firm pricing strategies, the productivities of different inputs determine the functional income distribution. Saving and investment, and production and purchase of consumption goods, are undertaken by different economic actors, driven by income and capacity utilization, with the possibility that productive capacity exceeds, or falls short of, effective demand. As with other post-Keynesian models, insufficient effective demand can result in unemployment and below-normal utilization of productive capital, even for extended periods.

We report on progress toward calibrating the model against US data and show that it produces business cycles and "long waves" driven by technological change. We then present preliminary results for a "downshifting" scenario in which consumers voluntarily curtail certain types of consumption. We discuss the implications of downshifting for stability, growth, and employment.

Innovation for Economic and Environment Health: Achieving Corporate Carbon Neutrality

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In the transition to capital intensive economy, the large fraction of industrialization is pivoted mainly on generating profits with little attention to binaries of environment and social. The absence of sustainability standards, policies and promoting bodies have failed to articulate a common framework on economic, social and environmental conditions along the corporate value chain in Indian diaspora. This disconnect is the crux of the problem. Thus it's critical to identify the inter-linkages that influence trade-offs and synergies across the sustainability dimensions.

The first phenomenon would be to understand the encapsulation process over the Institutional behavioral approaches to corporate governance and Innovation. Indian corporate sector is struggling with innovation and undertaking risk has placed an extreme level of pressure on existing way business models are in operation. This paper would tend to explore in understanding the mental disposition. The emphasis would also be to identify shift in the problematic chart of perceiving sustainability as a competitive

advantage than as liability. This would tend to explore the behavior anomalies and their connect with new-found behavioral ascendancy towards reshaping the business models.

The second phenomenon would be to explore how the embedding of compliance through Integrated Management Information System along the value chain would necessarily assist to set benchmarks for monitoring and evaluation of low carbon emissions. The approach extend to go beyond understanding the correlation among the key components of the binary values of 'included' versus 'excluded' alongside key business enablers.

The third phenomena would be to understand how the support to design the Sector based and Goal Based strategies could assist in assessing Sustainability Risks & Mitigation frameworks for environment sustainability. The dynamic model for sustainability framework would help to map the indicators through corporate enablers leading to sustainability matrix. This exercise would assist to identify specific areas in the corporate life cycle requiring more attention. The following incised steps may help to identify:

1. Internal and External environment programmes those are meant to be implemented;
2. Assessment of Sustainability risks and challenges along value chain;
3. Corporate Returns on Environmental Investment and the impacts accrued;
4. Identify and assess appropriate objectives and thereby the relevant performance indicators and targets to be achieved that can lead to real output and in alignment with broad objectives for achieving national targets;
5. Result based SDG policy for corporates.

The paper would tend to assemble research at grappling the interconnection and degree of component harmonization among sustainability pillars in corporate life cycle, and their role in transition to low carbon economy. The linear and non-linear relation between intertwined factors along value chain through discussed phenomenons, to be examined and it's impacts assessed for de-coupling natural resources to streamline sustainability in business life cycle.

Green growth in Asia

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The low carbon transition presents an enormous opportunity for growth and development around the world. Green growth can reboot innovation, manufacturing, and trade in developed and developing countries alike. In this paper, we highlight how green growth is the 'only' feasible form of growth going forward, evaluate the size of the global green economy today and its future potential, with special focus on Asia, and outline policies that can enable the low carbon transition.

Green growth recognises the role of natural capital as a long-term productive asset. Conventional growth has depleted natural assets leading to an increase in air pollution, the desertification of once fertile agricultural lands and the collapse of natural food systems such as fisheries, which has caused instability and conflict in parts of the world. The economy depends on the natural environment for the provision of raw materials and ecosystem services such as fresh air, clean water, flood defence and food. To achieve equitable and sustainable development, it is imperative to view natural capital not only as a short-term input but also as a long-term asset that sustains life and enables economic progress.

Using patent and trade data, we analyse the potential of Asian economies to capture value from the design and export of low carbon technologies. We classify ‘green sectors’ for all major segments of the economy including energy, buildings and transport. For each green sector we calculate two indicators associated with economic potential. The first indicator measures specialization in innovation while the second measures revealed comparative advantage. We discover that Asia, as a whole, has an innovation specialization and comparative advantage in climate change mitigation technologies, with particular strengths in efficient lighting, photovoltaics and energy storage technologies. This indicates that Asia is likely to profit from the global low carbon transition.

Within Asia, there are country-level disparities. While some Asian countries have achieved impressive scale in the deployment of climate change mitigation technologies (China), others are frontier innovators (South Korea and Japan). Much of Developing Asia (India, China, Vietnam, and the Philippines), while not currently engaged in high levels of frontier innovation, has a comparative advantage in key low-carbon technologies. For example, India has a comparative advantage in smart grids and wind, while the Philippines has it in efficient lighting and photovoltaics. Other countries, such as Indonesia, have developed neither an innovation nor export specialization in climate change mitigation technologies, and have room for improvement. Overall, Developing Asia (all countries excluding Japan and South Korea) account for 22 percent of global patents in climate compatible technologies and 35 percent of exports.

With enhanced regional trade and knowledge-sharing, we show that Asian countries can further grow their low carbon economies to the collective benefit of their citizens, the environment, local businesses and the global economy. Our country-level analysis gives insight into the strengths and weaknesses of Asian economies across green technologies which can help governments and businesses prioritize investment across green sectors.

Health and Sustainable Development

Climate Variability and Diarrhea Diseases: Evidence from Outpatient Data from Uganda

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SDGs 3 and 13 are dedicated to health and climate change, respectively. The relationship between the two is gaining increasing importance, albeit scanty empirical research about the same. The research gap is even more pronounced in developing countries, partly due to data unavailability. We apply econometric techniques on outpatient and climate data to investigate the effect of extreme rainfall and temperature on the incidence of diarrhea, dysentery and intestinal worms in Uganda. The key novelty of our approach is the use of mobile phone technology to ameliorate the data limitation idiosyncratic of many developing countries. Given the unavailability of soft copy records on disease incidence in the study districts, we took photos of hard copy archives which we digitized to constitute our database. The associated benefit is the use of actual disease diagnosis rather than self-reported illnesses from household surveys as is the case with most empirical studies on the topic. Regression results indicate that outpatient visits related to acute diarrhea, dysentery and intestinal worms tend to increase during months when rainfall figures are 20% lower than the month-specific 87-year average. In other words, these disease cases tend to increase in months with rainfall figures deviating significantly from the long-term average for the respective months. We presume that the pathway to the observed effect is the reduced availability of safe drinking water during extremely dry months which forces residents to resort to unprotected springs and ponds as alternative sources. Our presumption was corroborated by focus group discussions conducted in the study area during the data collection period. The results carry key policy implications; first, by directing policy attention to promoting access to clean water and sanitation facilities directly linked to diarrheal diseases. Secondly, since a large proportion of Ugandans are not covered by private and public health insurance schemes, exposure to climate-related health shocks is likely to increase their out-of-pocket health expenditures. This would necessitate reinvigorating health care financing to reduce the financial burden in terms of out-of-pocket expenditures to which households and individuals are exposed. Finally, the results carry a policy message regarding the need to include climate information in the Integrated Disease Surveillance and Response (IDRS) aimed to increase the sustainability and resilience of healthcare systems in the country and beyond.

Health in the sustainable development goals - Ready for a paradigm shift: Issues and Challenges

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The Millennium Development Goals (MDGs) galvanized attention, resources and accountability on a small number of health concerns of low- and middle-income countries with unprecedented results. The international community is presently developing a set of Sustainable Development Goals as the successor framework to the MDGs. This review examines the evidence base for the current health-related proposals in relation to disease burden and the technical and political feasibility of interventions to achieve the targets. In contrast to the MDGs, the proposed health agenda aspires to be universally applicable to

all countries and is appropriately broad in encompassing both communicable and non-communicable diseases as well as emerging burdens from, among other things, road traffic accidents and pollution.

We argue that success in realizing the agenda requires a paradigm shift in the way we address global health to surmount five challenges: 1) ensuring leadership for inter sectoral coherence and coordination on the structural (including social, economic, political and legal) drivers of health; 2) shifting the focus from treatment to prevention through locally-led, politically-smart approaches to a far broader agenda; 3) identifying effective means to tackle the commercial determinants of ill-health; 4) further integrating rights-based approaches; and 5) enhancing civic engagement and ensuring accountability. We are concerned that neither the international community nor the global health community truly appreciates the extent of the shift required to implement this health agenda which is a critical determinant of sustainable development.

Acute respiratory infections related to air pollution in the city of Bamenda North West region of Cameroon

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Background: Household air pollution is today an urgent public health emergency. It is responsible for the death of over 4 million people each year. Household air pollution constitutes a major risk factor to acute respiratory infections (ARI). In Cameroon 7,000 deaths yearly are associated with air pollution. Cameroon in 2014 the Bamenda Health District placed, ARIs amongst priority public health interventions this study was aimed at determining what environmental risk factors were associated to ARI and how did seasonality influenced ARI outcomes. Methods: We carried a cross-sectional descriptive 201 participants were recruited. Data were collected using a standardized questionnaire and patients followed to their homes to evaluate their housing conditions. Epi-info 7.2 was used for data enter and statistical analysis. Unconditional logistic regression was conducted to estimate associations and determine significance. (a $p < 0.05$ was considered cut-off value). Results: More than 71% of the patients principally used one or more solid fuel types (OR (odds ratio) 1.44: confidence interval (CI), 1.21 - 1.92: $p: 0.03$). Indoor cooking exposed people 3.62 times to ARIs (OR 3.62, CI 1.45 é 4.90: $p: 0.00$). Environmental burning exposed 1.91 more to ARI (OR: 1.91, CI [1.03 é 3.55]: $p: 0.03$) compared to non-exposed. WHO recommends maintaining Particulate Matter (PM 2.5) levels to about 10 micrograms per cubic meter. In Cameroon it is 6.5 times greater (65 $\mu\text{g}/\text{m}^3$ PM2.5) and 13.2 times in Bamenda (132 $\mu\text{g}/\text{m}^3$). Conclusions: Our results confirm the adverse effects of household combustion on ARI occurrence. Solid fuels principally used for cooking releases PM of various dimensions to the atmosphere and is associated with increased morbidity from ARI. More than 80% of people living in urban areas are exposed to air quality levels that exceed the World Health Organization recommended limits.

The WHO's Global Clinical Practice Network for Global Mental Health: A Vehicle for Advancing the Sustainable Development Goals

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Enhancing global mental health is key to advancing the Sustainable Development goals. Ensuring healthy lives and wellbeing is defined as one of the developmental priorities and, indeed, there can be no health without mental health. Poor mental health detrimentally impacts an individual's quality of life, their functioning, level of (dis)ability, life satisfaction and overall wellbeing. Moreover, mental health conditions are highly co-morbid with non-mental health conditions such as cardiovascular disease, diabetes and HIV/AIDS; if left untreated, co-occurring mental illness can exacerbate the health and societal impacts of these conditions. Mental health also cuts across a number of additional global development goals: 1.) Promoting economic growth and productive employment. The economic burden of untreated mental illness worldwide is substantial. Mental illness is one of the largest causes of disability in adults ages 25 to 60 and, thus, has tremendous impact on an affected individual's ability to contribute to society, and their economic productivity. 2.) Reducing inequality. Those with mental illness are often isolated from the community and may not have, or be denied, access to a range of rights, including the right to healthcare, employment and housing. 3.) Justice and human rights. Access to quality, effective mental health care is a human right, and those with mental illness may be at elevated risk for human rights violations. 4.) Strengthening global partnerships. Advancing mental health, globally, aligns with this goal as it necessitates a multidisciplinary, collaborative approach to health and development. In line with this, the World Health Organization (WHO) has established one of the largest, most diverse international networks for advancing mental health: the Global Clinical Practice Network (GCPN; Reed et al., 2015). The GCPN includes over 13,000 mental health professionals from 152 countries, with 40% of clinicians from low- and middle-income countries, who are bringing together global knowledge and local expertise to advance mental health world wide. We will present on the various collaborative training, research and clinical capacity-building initiatives through which the GCPN will enhance mental health care locally and globally. Through its impact on mental health care, the GCPN serves as an important vehicle for advancing the global development agenda.

The Role of a Critical Mass in Healthcare and Scientific Capacity Building for Non-Communicable Diseases in South Africa and Uganda.

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This paper aims to analyse the rise of non-communicable diseases (NCDs) in South Africa and Uganda, and to explore evidence-based solutions focusing on improving the quality, access and delivery of healthcare provision. The escalating rate of NCDs urgently requires innovative policies and plans to address the changing demands of public health,

while catering to the unique health needs of developing countries. There is an imperative need to strengthen countries' health systems by bolstering and supporting national institutions, universities and hospitals, which will address local healthcare challenges through local knowledge and resources, and ensure that capacity is built to overcome these challenges. These institutions, universities and hospitals will in turn create a critical mass of qualified doctors, scientists, nurses and healthcare workers at all levels of the healthcare system, and hence, directly impact the communities they serve.

Through evidence acquired from in-depth interviews and discussions with African scientists, doctors, nurses, healthcare workers and technicians in these two countries, this paper aims to analyse how sustainable and cost-effective research and healthcare capacity can be developed for NCDs by addressing the existing problems and constraints. This can be achieved through improvement in five key multi-sectoral areas which entail; locally trained and qualified individuals in the field; strengthening physical and communications infrastructure; increasing funding; providing an enabling environment for scientific research; and enhancing community awareness.

These five factors vital for the creation of a critical mass are inextricably linked with country specific, social, political and economic factors, which either hinder or influence this process, and need to be addressed for recommendations to be effective and successful. The recommendations presented in this paper conduct an in-depth analysis of each of the five key areas, and how they should be implemented and led by national governments and local funding bodies, with international donors assisting governments through financial and institutional support. Lastly, this cross-country comparison highlighted the intrinsic commonalities which make the aforementioned recommendations applicable to other developing countries facing similar healthcare challenges.

Exploring the barriers to improving Health Management Information System reporting in the Sidama Zone, Southern Ethiopia: Focus on Maternal Health Reporting. A qualitative study.

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This research paper was prepared as part of the field practicum for the Dublin M.Sc. in Development Practice programme. The fieldwork took place in the Sidama Zone of the Southern Nations, Nationalities and People's Region (SNNPR) of Ethiopia from June-July 2017. The research is focused on exploring what barriers are in existence that are blocking improvements in the health management information system (HMIS), particularly for reporting on maternal health.

Health information systems form a key block of health systems worldwide. They provide the data necessary for effective monitoring, evaluation and evidence-based decision-making processes. However, past studies have found that HMIS' in developing countries

often suffer from impediments, such as a lack of resources (both human and material), unsustainable design and insufficient training. These factors can negatively impact data quality, including accuracy, completeness and timeliness. In previous studies focused in the SNNPR, gaps in data quality have been present, which pose difficulties for effective health reporting. This is of particular difficulty for maternal health indicators, which already face difficulties in the sampled region. The PRISM (Performance of Routine Health Information Systems) developed by Aqil et al. was used as a guiding theoretical framework. This involved examining three components of the HMIS: technical (design, complexity); organisational (training, supervision); and behavioural (motivation, confidence).

The research was primarily qualitative in nature and complimented by secondary quantitative data, taking place in 3 districts of the Sidama Zone. Purposive sampling was employed to select the participants and regions. Semi-structured, key informant interviews (n=17) and focus group discussions (n=3) were conducted and secondary quantitative data collected to analyse health information from sampled health facilities (n=9). Participants came from different health cadres, from health extension workers to zonal health officials. A grounded theory approach was used, whereby data was collected and reviewed until theoretical saturation was achieved. Primary qualitative data was coded and analyzing using NVivo, and secondary quantitative data analysed using Microsoft Excel.

The study's preliminary results have found several barriers to improving HMIS reporting on organisational, behavioural and technical levels. One of the largest issues, discussed almost universally among participants, was a lack of training. Other problems included a shortage of HMIS recording materials, high work burden, a lack of e-health, language barriers, and the persistence of false or 'exaggerated' reports. These events culminate to create problems in data accuracy, timeliness and completeness and negatively affect service delivery. The provincial and regional health bureau should ingrain on-the-job training and supervision to increase user competence and reduce work burden. Furthermore, ownership and the importance of the HMIS should be highlighted to workers to foster communication and reduce problems like material shortages and false reporting. Higher-cost initiatives, like introducing e-health, may provide resource constraints but are worth consideration. The importance of the HMIS in health systems is undeniable, thus necessary steps should be taken to reduce the current barriers in place that are hampering its performance.

Effects of Climate Change on Ciguatera Fish Poisoning, and Social-Ecological Resilience: Case Study of French Polynesia

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Ciguatera fish poisoning (CFP), arising from ciguatoxins (CTXs) produced by harmful algae blooms, is one of the most common food-borne illnesses, with annual incidences up to 500,000 worldwide. The causal toxins, the CTXs, bio-accumulate through the food chain from small herbivorous fish feeding on the coral reefs into larger-sized carnivorous fish that prey upon them. Humans get infected by consuming these contaminated fish, with symptoms such as nausea, vomiting, diarrhea, tingling, and muscle pain, lasting from several weeks to several months.

Though once endemic only to small islands in tropical and subtropical areas, ciguatera has increasingly become a global human health issue. Climate change as well as its related events have been commonly hypothesized to lead to a wider presence of harmful algal blooms, hence higher risk of the disease.

Existing studies assessing the relationship between climate change and CFP are very limited. Most of them are focused on the Caribbean, and have failed to control for external factors affecting CFP incidences, such as tourism and international trade. French Polynesia is the most ideal for being selected as a case study because, (1) ciguatera is highly endemic to French Polynesia, with an average incidence rate of 16.5/10,000 people in the last decade, and despite being underreported universally, CFP cases in French Polynesia are more likely to be reported and diagnosed; (2) People mainly consume fish caught locally. This can exclude most external factors mentioned above.

Utilizing the epidemiological data from 2007 to 2016, and climate data obtained from Climate Data Library, we performed a time-series analysis to assess the relationships between the monthly CFP incidence and climate-related indicators including sea surface temperature (SST), rainfall, and cyclones in French Polynesia. Results reveal the positive associations between the monthly CFP incidence, and SST, SST anomaly index, and cyclones. Outbreaks of CFP tend to occur with a time lag of two years, meaning that changes in climate conditions may affect the number of CFP incidences in French Polynesia after 24 months.

However, the public health impact of CFP is underestimated due to under-reporting, under-diagnosis, and lack of public awareness of the disease. With the burden of climate change, CFP is projected to pose significant threats to more and more previously non-endemic communities. Efforts should be concentrated on monitoring and control at national and international levels, raising awareness about public health implications of

CFP, and implementation of food safety risk assessments in affected regions. Moreover, additional long-term prospective studies, relying on complementary disciplines, are needed in order to confirm and complete our findings. They would require a detailed follow-up of meteorological, epidemiological, ecological and sociological data at a global scale.

Health Economics

The Measure of Market Structure and The Quality of Healthcare in Hospital Markets, Ibadan, Nigeria

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In Nigeria, hospitals are confronted with challenges of inadequate funding, lack of proper supervision and noncompetitive nature that threatens their existence. The situations amount to inadequate provision of healthcare by the government, increased household health expenditures and lower quality of healthcare. Many studies have examined quality of healthcare among hospitals, but study that examine the hospital market structure, which has implication on quality of healthcare has not received much attention in Nigeria. Therefore, this study, examined the effect of measure of hospital market structure on the quality of the healthcare produce within the hospital markets in Ibadan metropolis. The predicted Herfindal Hirschman Index (HHI) obtained from the hospital choice model was employed as a measure of market structure. The values of HHI were disaggregated into four categories, which correspond to the most, more, less and least competitive markets. Quality of healthcare was measured by different hospital's inputs, number of full time resident doctors and house officers, number of registered nurses, hospital beds and staff- nurse ratio. Given the continuous nature of dependent variables, Ordinary Least Square (OLS) was used to examine the effect of hospital market structure's measure on the quality of the healthcare. Analysis was conducted at the global, mixed and private market levels based on the hospital ownership structure. Data were drawn from the census of secondary hospitals in Ibadan and a survey of patients that attended these hospitals. Questionnaires were administered to patients drawn from 127 out of 185 available hospitals. Purposive sampling was adopted to select 6 patients aged 18-60 in each hospital making 761 patients in all. The findings show that the quality of healthcare is higher in most and more competitive markets than in less and least competitive market as hospitals increase the number of full time resident doctors, house officers and hospital beds to provide higher quality healthcare in most and more competitive markets. Therefore a policy that will encourage investment in the healthcare sector and allow entrance of new hospitals so as to promote competitive behavior among hospitals was recommended.

Health Shocks and Household Consumption Smoothing: Evidence from Nigeria

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Poverty coupled with absent or poorly developed risk-sharing institutions make consumption smoothing in the face of health shocks an important issue in developing countries such as Nigeria. Health shocks can affect the household economy through a substantial increase in medical spending, reduction in labour hours and/or loss of income. These effects are more severe on households in the developing countries, because they are poor and unable to access formal insurance markets. Nigeria provides an ideal context in which to study the consequences of health shocks in a low-income economy with limited social safety nets. The country's health financing is mainly private, with individuals paying approximately 75% of all health costs, most of which is out of pocket (95%). Less than 10% of the population is covered by formal health insurance, and even those who are covered face high out-of-pocket expenses for many health services.

In order to cope in the face of health shocks, households without formal health insurance may turn to the second-best options. They can rely on depleting assets, borrowing, or assistance from relatives or friends. However, these options can be ineffective, and households can face significant declines in non-medical consumption, or reduce investments in human capital. This article investigates the effects of health shocks on households' resources and consumption in Nigeria, and determines the coping mechanisms employed by households to mitigate the impact of health shocks and assesses the effect of health shocks on the likelihood of using the various coping mechanisms.

Based on the inter-temporal consumption model with income uncertainty, this paper investigates the economic costs of health shocks and coping mechanisms for households in Nigeria using households panel data from the General Households Survey (GHS) for 2010-11 and 2012-13, and applies fixed effect regression model with robust standard error to assess the impact of death of a household member and severe illness that incapacitates a household member from carrying out normal activities of daily living.

The study reveals that health shocks significantly reduced worked hours in the households. Severe illness and death of any household members are negatively and significantly associated with household income, suggesting household cannot adequately compensate lost in income and lost worked hours in the face of health shocks. The regression results reject the hypothesis of consumption smoothing for nonfood items in the event of death of any household member. However, findings cannot precisely reject the hypothesis of full consumption insurance against the illness or death of any household member in the case of food consumption. It finds that households facing severe illness are more likely to deplete assets, while those faced with death of a member tend to borrow money to finance health expenses. These show that neither the households

themselves nor the available risk sharing mechanisms are able to fully insure the consumption of food and non-food consumption items against health shocks.

There is a need to improve on the existing risk sharing arrangements and develop community based health insurance schemes that is accessible and affordable to poor households.

The Joint Demand for Alcohol, Cigarette and Marijuana in Ibadan, Nigeria: A Three-Hurdle Approach

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Alcohol, cigarette and marijuana consumption is prevalent among youths and could lead to addiction and abuse. The consumption of these three goods imposes significant costs on the society through its negative impact on health, crime, health expenditure and productivity. Evidence from past studies had shown that some alcohol users and cigarette smokers had tried marijuana. However, the optimal consumption of alcohol, cigarette and marijuana and their interdependence raise critical questions on whether alcohol, cigarette and marijuana are complements or substitutes. While studies have independently examined the demand for alcohol, cigarette and marijuana, their joint demand has received little attention. This study, therefore, examined the joint demand for alcohol, cigarette and marijuana in Ibadan metropolis, Nigeria.

The study was anchored on Deaton and Muellbauer's Almost Ideal Demand System (AIDS) Theory. It adopted correlational research design. Motor parks, market places and beer parlours across Ibadan North and Ibadan West Local Government Areas were selected based on relative prevalence of alcohol, cigarette and marijuana consumption in Ibadan metropolis. Thereafter, a purposive sampling technique was used to administer a structured questionnaire and select 251 respondents. The questionnaire focused on socio-economic characteristics (age, sex, education and marital status) and other variables (such as price of alcohol, cigarette and marijuana, participation, budget share and quitting) were used. Estimation procedure utilised a sequential three stage hurdles model of consumer decisions: decision to consume alcohol, cigarette or marijuana; budget share of the consumer; and decision to quit consumption. While the first and third hurdles were estimated using the probit technique, the second hurdle was estimated using Ordinary Least Square (OLS) method. Statistical significance was at $p \leq 0.05$.

The mean age of the respondents was 30; Males were 80.1%, 88.0% had formal education and 55.8% were single. There was significant positive relationship between own prices and demand for alcohol (0.31), cigarette (0.87) and marijuana (0.95). Hence, alcohol, cigarette and marijuana were ostentatious goods. There was significant positive relationship between alcohol, cigarette and marijuana demand with their respective budget share at (0.32), (0.0003) and (0.0004). Cigarette and marijuana were substitutes (0.26), alcohol and cigarette demand as well as alcohol and marijuana demand was

independently demanded as there was no significant relationship among them. Furthermore, there is a higher probability that as individual gets older, they are likely to quit drinking alcohol (0.003) and cigarette smoking (0.01) probably due to the adverse effect on their health status. However, getting older does not significantly affect decision to quit marijuana use (-0.42). The consumption of alcohol, cigarette and marijuana were not complementary in Ibadan metropolis. Therefore, rather than adopting a joint approach, prevention programmes should target users of the three substances separately.

Trend of dengue cases in Sri Lanka: An empirical investigation in Doluwa MOH area

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Introduction

Dengue is now endemic in more than 100 countries. The cases of dengue related diseases have dramatically increased in Sri Lanka over the last few decades, and also there was an explosive increase in geographic distribution of dengue after 1950s in the country. Reasons such as uncontrolled urbanization, rapid population movement, inadequate water, bad waste management as well as unsustainable vector control programs have already been identified. Limited researches have been done to estimate the cost in prevention and treatment for dengue in Sri Lanka and there is no research done to estimate the cost in prevention and treatment dengue in Kandy district. Estimation of the costs of dengue has many dimensions which include information on the economic benefits of dengue control, prevention intervention and information on cost-effectiveness and budget impact analysis. Health cost of dengue prevention activities in Colombo district reached a total of LKR 127 million. The above review of the previous studies shows that most studies have considered the different aspects on spreading of dengue in different countries and estimates the cost for dengue.

Objectives of the study

The goal of this study is to investigate the trend of dengue cases in Sri Lanka and measure the cost of prevention of dengue fever in Doluwa MOH area. Other than that there are other objectives also and they are, to analyse the trend of dengue cases in Sri Lanka and to measure the cost of dengue control activation implemented by Doluwa M.O.H team. This study will investigate these issues by using secondary data covering all GS divisions in Doluwa M.O.H. area in Kandy district.

Methodology

This study employs a descriptive method of study in order to analyze the trend of dengue cases in Sri Lanka. Measuring the cost of dengue control activities implemented by Doluwa MOH team is examined through collecting secondary data from the MOH office Doluwa. Data collection is based on 6 years and a year wise comparison is conducted.

On the other hand measuring the cost of treatment on the dengue patients in Doluwa MOH area is also examined by collecting secondary data from past 6 years from MOH office Doluwa. The total cost for treatment is calculated by direct and indirect cost. Direct cost is based on the expenditure done on treating the patient whereas the indirect cost is based on the loss of working days. “Cost of illness approach” is used to find the cost of prevention of DF as well as the cost of treatment on patients.

Results and Discussion

The total cases of dengue have increased throughout the years. Here the highest average number in period between 2011 and 2016 is from the Western province. This can be seen as a result of Western province being the most urbanized and industrialized province when compared to others. The highest average of dengue cases reports in July 5173 of average precisely. The lowest average is shown in the month of April which is 1952. These results are due to the climatic changes in Sri Lanka. It was estimated the cost of dengue treatment for the patients who suffered from dengue in Doluwa MOH area in year 2012 was 259,584 LKR. The highest cost for dengue treatment was in 2011 which cost up to 634,627LKR.

Conclusion and Policy recommendation

The results of this analysis show that during the last few years, suspected dengue cases have been increased in Sri Lanka. Simultaneously, the cost of treatment and prevention is also increasing. This situation shows the important of regular removal of possible mosquito breeding sites from the environment. Prevention programmes will continue with the assistance of public health officers, police and military personnel. Not only residences but also the offices both public and private will be thoroughly inspected and legal actions would be taken against offenders. This type of policy measures can reduce the reported dengue cases in Sri Lanka in the future.

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Indicators, Feedback Loops, and Impact Evaluation for the SDGs

Evaluating partial satisfaction of multiple SDGs

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The 2030 Sustainable Development Agenda again actualizes the need to think about how goals as diverse as extreme poverty eradication, universal secondary education, reduced maternal mortality and climate change mitigation fit together. This poses several challenges. First, these goals concern objectives measured on different scales, often as “shortfalls” (Herlitz & Horan 2017). For example, household income must be at least US\$1.25 (2005 purchasing power parity (PPP)); maternal deaths should be at most 70 deaths per 100,000 live births, etc. How might one aggregate diverse objectives like these? Second, some of these goals are strongly intertwined (Nilson, Griggs & Visbeck 2016, ICSU 2016). For instance, ending hunger in Sub-Saharan Africa interacts positively with poverty eradication, health promotion and universal education. Yet, food production requires a stable climate and interacts with climate change mitigation in several ways. How might one account for these effects? In this paper, I develop a framework for thinking about, and evaluating the goodness of, outcomes when there are multiple objectives that depend on each other, and present a way of evaluating non-ideal outcomes by partitioning the evaluation process.

A popular approach to measuring development is to combine normalized indicators in different dimensions into a single composite index (Deaton 2011). Such indices require weighting of different dimensions that enables trade-offs between these dimensions (Alkire, Ballon & Foster et al. 2015). I reject this approach for the SDGs on three grounds: 1) Normalization techniques involve implicit biases and commonly-used aggregation functions are often arbitrary (Sen 1999, Broome 2002). 2) Composite indicators require universal regularity in the relationships between goals. However, interactions between SDGs are often contextual (Nilson, Griggs & Visbeck 2016). 3) Trading-off different goals allow for the possibility that a tremendously good result in some goals outweighs a catastrophic result in others. This is undesirable, particularly if there are “tipping points” in ecological systems.

Rather than searching for a single composite indicator, I propose we address how well multiple objectives have been met in a multi-step process by partitioning the evaluation (Ross 2015, Sen 1997). The basic assumption of this approach is that for certain goals, there are critical levels below which no matter how well we do in other goals, this doesn't outweigh the shortfall in the goal in question (Arrhenius & Rabinowicz 2015). Critical levels can be justified in two main ways. First, there are some outcomes we want to avoid at all cost. For example, improving energy access by using coal is of little value if we accelerate climate change and acidify the oceans. Second, there are some outcomes we want to prioritize because they facilitate/enable other goals. For example, educating girls in LDCs would reduce maternal mortality and help eradicate poverty. By first examining outcomes to avoid and outcomes which facilitate other goals, we can work our way up, excluding outcomes, prioritizing important goals and ways to achieve those goals. This

evaluation process is more practical than the alternatives, takes irregularities into account, and respects contextual interaction between goals.

What Makes Monitoring Useful? - Lessons Learnt for a Global Monitoring Framework for the Sustainable Development Goals

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In this paper, I present the empirical findings of one of my case studies é global monitoring of the Millennium Development Goals (MDGs) and their “successor” goals, the Sustainable Development Goals (SDGs). My dissertation answers the following question:

What has been learnt (or not) from the experience with previous Global Monitoring Mechanisms (GMMs) for the institutional design of two recently established GMMs é namely those of the Paris Agreement and of the Sustainable Development Goals?

The case study discussed in this paper focuses on the lessons learnt from the monitoring framework of the MDGs. Its main contribution lies in a better understanding of the debates and challenges around the monitoring of the SDGs. This study explores:

1. the perceptions different stakeholders have regarding the usefulness of the “predecessor” of the SDG monitoring, namely the MDG monitoring framework;
2. how these usefulness perceptions are reflected in the set-up of global monitoring of the SDGs under the High-level Political Forum on Sustainable Development (HLPF);
3. what these usefulness perceptions can tell us about the quality of institutional change and whether institutional learning has taken place; and
4. tentative explanations of why the new global SDG monitoring framework has been designed this way.

The empirical data is derived from interviews with key stakeholders, field observations of the SDG negotiations and existing evaluations of the monitoring framework of the MDGs. Building on this material, the paper maps and discusses the collected usefulness perceptions on the MDG monitoring. The analysis focuses on dimensions of institutional design, such as indicators of the GMM, which are considered as relevant to categorize and assess the usefulness perceptions. Moreover, the paper demonstrates how usefulness perceptions and lessons learnt from them are reflected in the institutional design of the new SDG monitoring architecture. On this basis, I make a critical assessment of the institutional design of the SDG monitoring and offer some tentative explanations as to why the SDG monitoring looks the way it does. In doing so, this study adds to the ongoing political and academic debates on “good” institutional design and the effective monitoring of the SDGs.

Why we have to ask the question "Who cares?"

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With the adoption of the 17 Global Goals in 2015, national leaders not only set extremely ambitious targets but also created theoretical pressure for themselves to take action and measure progress over the following 15 years. That's the good news. The bad news is that just setting such goals did not impact countries' priorities since governments keep on "doing business as usual". SDGs are basically unknown outside of the UN insider circles. With the exception of climate change, governments focus their time and resources on "more important" pressing issues, e.g., terrorism, economic growth, refugee crises, and continued presence in power (with SDGs one can't win elections).

Most countries will of course perform their "duties" on reporting how they are doing in reaching the goals. They will present numbers and continue their "commitment" to the Global Goals. These reports come with a few caveats though, because some targets (i) simply can't be measured, (ii) are utopian, (iii) are not concrete enough, and (iv) have to rely on estimated or even fake data. Developing yet another set of indicators/indices instead of trying to use existing ones (economic and social, e.g., GDP, SPI, OECD, HDI) will not increase progress, as the issues above are not addressed. Many governments prioritize GDP growth over all other socioeconomic indicators, which is somewhat short-sighted. However, the importance of economic growth is significantly underrepresented in discussions about implementing the SDGs in the last 18 months.

Even if statistics show progress, such progress is often due to regular economic development (e.g., the Millennium Goal "Reduce by half the proportion of people who suffer from hunger" was mainly achieved due to economic growth in China) or ongoing activities that countries do anyway, and not because of the world having agreed on 17 SDGs. It's a simple formula; achieving 100% of any goal has three components:

- X% due to activities a country does anyway
- Y% due to extra efforts because SDGs are seen as worth investing in
- Z% the rest, which is huge.

Is there a chance to close the "Z gap"? Missing resources and people's (natural) reluctance to support using available resources for "other than personally relevant" causes are a high hurdle. History suggests that only incentives and/or market mechanisms can achieve results beyond common trajectories. Incentives are based on positive or negative drivers. Positive drivers cost a lot of money, which is not available. Negative drivers are a result of major catastrophes, which we do not hope for.

The intent of this paper is to (i) research examples that used market mechanisms and achieved outstanding progress as well as (ii) explore opportunities to find more market mechanisms that can help close the "Z gap", thus making the realization of the Global

Goals possible. Looking towards 2050 doesn't matter much if the 2030 Global Goals are more or less a typo in history, with 3020 Goals being a more accurate description.

Sets of Sustainable Development Indicators in Vietnam: Status and Solutions

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There are some sets of sustainable development indicators (SDI) at different levels in Vietnam. Actually, building and applying SDIs have faced different difficulties and this has led to reduce their values. Solutions to improve SDIs have being proposed and completed. The paper aims to review advantages, disadvantages of SDIs in Vietnam and propose recommendations on building and effectively applying SDIs in practice in Vietnam. Two national SDIs, one regional SDI, one local SDI and some provincial SDIs were analyzed. The common limitation of Government promulgated SDIs is not feasible as they are applied in practice. The main reasons are (1) a procedure which was used to build SDIs had not taken into consideration sufficiently on data available, (2) application of the same target values for different regions which has not reflected status of sustainable development of each regions, and (3) handing over usage of SDIs for stakeholders. Proposed solutions are building a pilot SDIs of some specific regions in Vietnam based on UN's guideline 2007 and calculating practical values of SDIs for pilot regions, subsequently recommending relevant authorities in Vietnam to change or adjust promulgated SDIs.

Review of sustainability indicators: the area of tension between existing Sustainability Strategies at the Level of the European Union, the National and Regional Level of the Federal Republic of Germany and the Sustainable Development Goals

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According to the good governance criteria for advanced control and monitoring on the other hand. Indicators are an essential instrument for sustainable analyses and political

decision-making. This paper focuses on existing indicators from sustainability strategies, respectively indicators and progress reports, used in the European Union, the Federal Republic of Germany and its federal states, taking the SDG-indicators provided by the UN also into account.

In total 342 indicators were identified in the 16 analyzed sustainability documents and assigned to the 17 SDGs. The wide range of identified indicators shows the variety and the heterogeneous use of indicator systems. The review of the identified indicators demonstrates that a selection of appropriate indicators must be taken, which meets the specifics of a nation or a region, ensures a proper mapping of the SDGs and finally corresponds to the following key points: predictability and data availability, quality criteria, terminated and quantified objectives, SMART criteria, relevance and robustness, interactions, political communicability, vertical integration and coherence. These conditions are discussed using selected indicators and SDGs as an example, focusing the challenges of the sub-national level. The paper draws the area of tension and develops initial recommendations for the improving of the vertical integration of indicator systems within the framework of sustainability strategies at national and subnational levels.

Developing integrated pathways to prove the feasibility of achieving the SDGs and long-term sustainability transformation: The World in 2050 Framework

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The World in 2050 (TWI2050) is a global research initiative launched by the International Institute for Applied Systems Analysis (IIASA), the Sustainable Development Solutions Network (SDSN), and the Stockholm Resilience Center (SRC). The initiative brings together a network of leading modeling and analytical teams, policymakers, and organizations from around the world to collaborate in demonstrating the feasibility of the transformational change needed to achieve the United Nations' 2030 Agenda. The key question is: How can all 17 SDGs be achieved holistically?

What is lacking, but urgently required, is an assessment of the viability of achieving these multiple social-economic-environmental-goals simultaneously using integrative and systemic methodological approaches. This is necessary to answer questions such as: How do we meet the hunger, poverty, energy, growth goals while meeting global environmental goals? What are the synergies and trade-offs?

This presentation will focus on the methodological framework of the TWI2050 initiative: The initiative differs from standard integrated assessment models (IAMs) by asking a normative, goal-based question, without being policy-prescriptive. Rather than examining various future scenarios, the initiative will focus on describing potential sustainable development pathways that comply with two identified target spaces. The SDGs define the first target space for 2030 via representative indicators, which can be covered by IAMs. The second target space focuses on long-term sustainability by 2050 and beyond to take account of longer-term earth system processes and advances in human development. By ‘back-casting’ from desired development outcomes, TWI2050 aims to identify alternative sustainability development pathways and how they differ in their implementation attributes. In addition, these alternative pathways will shed light on crucial bifurcation points in development trajectories, which help understand the differences between policy choices (e.g. demand-side vs supply side policy measures in the energy sector). Initially, TWI2050 will extend a socio-economic pathway developed by the climate research community for the Intergovernmental Panel on Climate Change as this work already covers several of the SDG indicators (e.g. SDG13). However, several indicators are lacking or fail to achieve the SDG target value in this pathway (e.g. SDG target 1.1 on absolute poverty) which emphasizes the need for integrated pathways.

Current analytical and quantitative modeling capabilities fall short of being able to capture all 17 SDGs and their 169 targets. Instead, TWI2050 will use a flexible hybrid approach of linking the quantitative modeling approaches in an integrated framework, but not necessarily in a single integrated mathematical model, that a more holistic and qualitative treatment of all SDGs is possible. This will also be supported by a qualitative narrative. The initiative will connect modeling groups with social scientists to TWI2050 aims to bridge that divide in a novel and constructive manner, facilitate community building and advance IAMs. The framework will facilitate intercomparison of results of potential co-benefits and/or trade-offs of addressing multiple SDGs at the same time. We anticipate that these analyses will provide critical information for policy and investment decisions during implementation of the UN 2030 Agenda.

Indigenous Ways of Knowing and Approaches to Sustainable Development

Local Paths to Sustainable Development: The Contribution of Indigenous Governance for local development, The case of Oget among the Qebena, Southern Ethiopia

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Drawing on insights from social development theory, the role and potential of indigenous governance for local development in particular and sustainable development in general is examined for the Qebena, an ethnic group in southern Ethiopia, who are known for their

well-established traditional institution, Oget, used to set and enforce norms and rules governing aspects of life ranging from simple socio-economic relations between individuals to wider community, local and regional issues. In recent years, indigenous institutions have been attracting the attentions of development researchers, policy makers and practitioners for their role in the face of ever increasing crisis situations. Even though there are a number of indigenous institutions in Ethiopia, their contribution to economic development as part of the larger agenda of rebuilding their communities and the nation has not been adequately studied. Qualitative research methodology was applied to describe the role and potential of this institution. The findings reveal that the Qebena use their indigenous institution of governance for claiming their right, for mobilizing the community for development projects especially in the expansion of public service delivery, participating in policy implementation, and settlement of conflict and adjudication of disputes through institutional arrangements outside formal legal structures. In general, the study attested that the indigenous institution of Qebena has a great role and potential in maintaining social order and enhancing local economic, social, political and cultural life of the people.

Considering Maya Identity in Economic Development Models in Southern Belize: an Interdisciplinary Approach

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Indigenous Mopan and Q'eqchi' Maya communities in southern Belize have sustained livelihoods in the lowland rainforests of southern Belize for many hundreds of years. Amidst changing climate, diminishing forest resources, and internationally-highlighted socio-political struggles, these communities continue their traditional agricultural practices, using systems of reciprocal labor and collective land management. While governmental and non-governmental organizations have encouraged economic development, promoting the adoption of cash crops as an example, these traditional systems persist. This paper offers an interdisciplinary approach to exploring these traditional systems and, ultimately, their value for community health and well-being in the context of sustainable development. Using ethnographic data from seven local communities coupled with a social anthropological framework, embodied ecological heritage, which links traditional ecological practices and health, the authors present an economic model exploring the value of Maya identity as a variable. They argue that standard economic models fail in sustainable development efforts because they lack the more detailed consideration of indigenous values, the relationship of those values to livelihoods and, ultimately, their nuanced connection to health and happiness through an intersection of social and physical mechanisms. They propose a new paradigm for economic development where Maya values and identity are key variables for decision-making in economic models and where the social benefits of traditional practices and collective decision-making are explicitly captured. Forefronting indigenous knowledge

and practice, they develop a model of economic development and show that traditional farming systems are a rational livelihood strategy, even in the face of an increasing visibility of wage-labor opportunities, because the private and social benefits derived from traditional practices more than outweigh the private benefits of increased market consumption. Traditional practices, in this analysis, have the potential to enhance our understanding of resilience of these communities in the face of climate change and internationally-driven resource extraction. The authors demonstrate that Maya values and identity must be considered, and can provide an essential alternative economic view, if sustainable development models are to be used to inform programs and policies in the region and, potentially, in indigenous communities in similar ecosystems around the world.

Indigenous Law: A new perspective for consolidating cross-cultural sustainable development

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Indigenous Law: A new perspective for consolidating cross-cultural sustainable development

Indigenous historical knowledge entails a series of areas in which law and the administration of justice inside the community plays a fundamental role for the consolidation of their relationships.

Ecuador is the third country with the highest indigenous population in South America. However, historically, the State has not attended the indigenous population most basic necessities in order to preserve their cultural and anthropological essence. In 2008, a new Constitution was established and one of its main axis was the official recognition of the Indigenous Justice as the base for the consolidation of the sense of community inside these social groups.

Indigenous justice, as a system that functions parallel to the State Justice order, has generated a new opportunity for the development of the sense of community, the recognition of their social values from the State and, supremely, has established a new standard of pluralism inside a rigid institution such as the administration of justice which has always corresponded to the State.

Moreover, this constitutional recognition has helped the Ecuadorian non-indigenous population understand how multiculturalism implies the acceptance of multiple structures for conflict resolution.

The exposition proposed for the 5th ICSD will briefly approach the Ecuadorian experience on the recognition of indigenous justice through these points:

1. What is exactly indigenous justice? What areas of social interaction are covered?

2. Why is the settlement of indigenous justice fundamental for the existence and sustainability of indigenous communities?
3. How the Ecuadorian State has implemented measures to establish a parallel justice system?
4. What are the key challenges that Ecuador faces to consolidate this process?
5. How is the implementation and recognition of indigenous justice essential for local sustainable development?

The main purpose of this presentation is to share the Ecuadorian experience on recognizing indigenous justice. Also, the objective of this presentation is to raise the debate on how the recognition and development of indigenous justice is fundamental for their self and common development which has direct relation with sustainability.

Developing a Framework for a Mayan Economy

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The Maya people in Belize's Toledo District aspire to develop a "Mayan Economy," one based on the cultural heritage of the Maya people, their traditional knowledge, and respect for the environment. This paper will document the efforts of a team of master-level students in Development Practice (MDP) to foster the development of the "Mayan Economy" concept through engagement and inquiry.

Mayan rights to their land and natural resources in the Toledo District were recognized in 2015, the culmination of a 30-year legal dispute. Nevertheless, the Belizean government continues to advocate for development of natural resource-rich Maya lands in a way that is patterned on exploitation of natural resources, development often done unsustainably and with irrevocable changes to land use, land cover, and livelihoods. Our project aims to highlight key features of the Mayan vision for an economy and, if applicable, areas where this vision differs from other economic development strategies.

Our team will work with the Maya Leaders Alliance (MLA), community leaders (alcaldes) and individuals from the community to cooperatively develop the Mayan Economy concept. In preparation, we have conducted a literature review to learn about and analyze Indigenous Economy models, Indigenous Education, Gender and Indigenous identity, and Belizean history. We also sent surveys to community leaders (via MLA) to learn more about agricultural practices in the region and the impact of climate change. On arrival, we will work with a selection of the 39 communities within Toledo District. Initially, our focus will be on knowing the place and people. To accomplish this, we will conduct informal interviews in communities to learn more about their lives. We will utilize the Sondeo method, which promotes rapid, collaborative learning through informal interviews (or conversations) over a period of several days. It is adaptive in that it allows for the group to reframe inquiry at the end of each day in response to new information. Gradually we will transition to focused conversations about the Mayan Economy

concept. We want to learn what values Mayan people want presented in the Mayan Economy concept. This phase will include interviews and focus groups with community leaders and key stakeholders. Throughout, we will offer community sessions to encourage engagement. We will also regularly present findings and interpretations to ensure that the developing concept reflects and remains true to their values.

Our hope is that these efforts will lead to a more clear and cohesive vision for the Mayan Economy, one that has been co-created through engagement with members of the various communities and the larger Mayan Community. We also hope to identify specific recommendations for paths forward. A collaborative approach, an enhanced vision, and clearer paths forward should help protect land rights and resources of the Maya in Belize's Toledo District and will also provide a strong position from which to negotiate the relationship with the Belizean government. Our paper and presentation at the ICSD will summarize this process, highlight specific recommendations that emerge from it, and detail our team's reflections.

Developing Indigenous Paralegal Training Programs to Promote Sustainable Development on the Amazon River

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As part of a research project funded by the University of Florida Biological Institute and the Amazon Dams Network, this article will provide an overview of indigenous paralegal programs throughout the world in an effort to compile best practices and recommendations for the creation of a paralegal training program in Brazil. Specifically, the paralegal training program is designed to empower indigenous communities along the Amazon River who are impacted by the pending construction of numerous hydroelectric dams on the Amazon. In addition to training and empowering indigenous communities to fight for their legal rights, a key pillar of the program aims to have indigenous Traditional Ecological Knowledge (TEK) incorporated into domestic Brazilian law.

The training program will play a critical role in the sustainable development of the Amazon region as it will promote indigenous equality and empowerment, provide education for indigenous and scientific communities, and promote the sustainable use of water resources. This issue is particularly relevant in Brazil, as 75% of all power is sourced from hydroelectric plants, and this number is expected to grow in direct response to the continuing development on the Amazon.

This article will define the role of indigenous paralegals, also known as community-based paralegals or "barefoot lawyers", and the different responsibilities that an indigenous paralegal is expected to perform in various regions and cultures. Specific case studies from different countries will be analyzed, including programs that have been implemented in Mozambique, the Philippines, and Ecuador. The viability of legally requiring the incorporation of TEK in domestic law will also be examined. Finally, this

article will act as a quasi-manual and educational starting point for any project that aims to train indigenous paralegals by raising key preliminary questions that must be answered before a program can begin, as well as provide a universal roadmap that can be applied during the planning and development stage of a proposed indigenous paralegal training program.

Traditional Knowledge and Sustainable Rural Development: on the Revitalization of Laochi in Shaanxi Province, China

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Laochi (涝池) is a flood pond constructed based on traditional knowledge of rainwater collection and waterlogging prevention. It used to be common in villages all over the Guanzhong region, China. However, since the late 1980s, with rapid rural modernization, it has been either transformed into landfill site or abandoned. Considering the deteriorating water ecology and environment as well as risk of flooding and drought in rural areas, the Provincial Government of Shaanxi Province has initiated the revitalization of laochi since 2016, a priority in its implementation of the National 13th Five-Year Plan. This research argues that the revitalization of laochi contributes to sustainable rural development in the Guanzhong region, especially under the discourse of the New Rural Construction policy. To investigate the relationship between laochi revitalization and sustainable rural development, it first of all undertakes a literature review of academic articles related to traditional knowledge and revitalization of laochi. The literature review tries to reveal the traditional knowledge system as laochi embodies, argues the topicality of traditional knowledge, and discusses revitalization principles. Then, the research interviews key stakeholders of related public institutions, studies laochi construction plans and guidelines, and carries out field studies of the pilot projects in Meixian County and Qishan County. Based on the analyses of public documents, interviews, and the visual observations collected from field work, the research explores how policies and concepts are translated into practice, and critically analyzes laochi reconstruction and related landscape regeneration. Finally, the research summarizes good practices and problems of the revitalization of laochi and offers suggestions for future research. It is found that the traditional knowledge embodied in laochi has been inherited and improved in laochi revitalization, through which rural landscape is regenerated, laochi's functions are contemporized and innovated, and sustainable rural development is promoted.

Inuit ways of knowing, the Cooperative business model and a new community development model

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The purpose of this study is to understand and utilize the perspective Quajimajatuqangit or Inuit Traditional Knowledge to inform and create a new model of community economic development. Using Quajimajatuqangit as frame of reference has the potential to act as overlay to assist and improve Co-operative enterprises and community growth to address the negative effects on socio economic markers that are more acutely felt across Canada's Arctic landscape. Creating a new community and shared traditional story based knowledge model for development practitioners will expand understanding of Inuit and Northern economic culture. This study will use surveys gathered during three separate trips to the Canadian Arctic (to a wide range of communities) allowing for a strata analysis across a relatively static homogenous environment. The project will also record stories for the purposes knowledge synthesis and sharing. The goal is community based and the project design is to benefit the communities were the stories originate from and will reflect their perspectives, wants and needs which can improve policy decisions. The surveys, interviews and literature review, based in Indigenous Research Methods, will assist program and community planners to better adapt and create models that seek to traditional approaches in order to build a more inclusive social economy including the adaptation of Co-op model for Indigenous communities. Analyzing what social entrepreneurship looks like, as it applies to the social economic revitalization of the Arctic, will aid in our understanding of it's meaning in the present conditions.

Approaches to Sustainable Economic Development in Nisichawayasihk Cree Nation

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Sustainable development is a concept that is deeply relevant and ingrained in many Indigenous people's lives, and the Indigenous people of Northern Manitoba are practicing sustainable development through integrating cultural practices with economic practices. Nisichawayasihk Cree Nation (NCN) is located in Northern Manitoba 800 kilometers north of the capital city, Winnipeg. NCN experienced a history of colonialism, oppression, and marginalization, and this has caused challenges for the individuals living in the community. Issues such as low income, poor housing, poor health, and language loss are present today in NCN. Additionally, due to the northern location of the community economic development has been challenging. However the community is now implementing a unique hybrid economy approach that is bringing growth and hope to the community. The case study of NCN shows how Indigenous Knowledge, and worldviews are being used in a hybrid form to create sustainable development.

The hybrid economy approach is the multi sector approach theorized by John Altman of Australia that posits the market, the state, and the traditional sector should complement and work together to create economic growth. The market sector is generally thought of in relation to firms and industry, and the buying and selling of goods. The state sector is the sector that provides government services, funding, and health care. The customary or traditional sector refers to economic activities that are rooted in cultural traditions and

beliefs. A main goal of the hybrid approach is that an individual that is not receiving a living wage from traditional cultural practices would be able to supplement their livelihoods with market opportunities or state subsidies.

In NCN the way they are embodying this hybrid approach is through programs such as the Nelson House Trappers Association. This program encourages individuals in the community to practice traditional hunting practices, while helping to market the products for resale, as well as providing subsidies to the trappers. NCN has four programs of this nature relating to different cultural activities, but they also recognize that the economic growth of the community is not all possible from traditional practices, and thus has also chosen to partner in a 1.4 billion-dollar low flooding- low impact hydro-dam. In addition to this the community also owns a hotel, a grocery store, a building supply company, and a trades training center that is acting as a labor market intermediary to train individuals for available job opportunities. These examples show how NCN is integrating their culture with economic opportunities for the betterment of their community. While NCN engages in the market and state economies they do so with an Indigenous worldview and goal of creating growth that will be beneficial for generations to come. The paper and presentation for this conference will be highlighting the ways that NCN is using Indigenous knowledge and worldviews to further their economic growth in a sustainable way.

New Technologies and Solutions for Development Practice

Technology for change: Sustainable Development in Rural India through CGNetSwara

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The correlation between technology, sustainable development, socio-economic issues have assumed significance in the changing global world. In the new millennium, there is no denying the fact that information and communication technologies play a key role in the growth of a country. There is substantial evidence that technology has power to harbor progress as it affects many dimensions of societal and economic aspects like education, health, quality of life. It is pertinent to develop an understanding about the methods and techniques in which technology can be utilized to respond to the emerging paradigms of development in a responsible manner. Recent findings show that ICT, which includes the traditional media comprising of radio television, press and the new computer based technology, plays a vital role in advancing economic growth and

reducing poverty. ICT can be used to directly influence the productivity, cost effectiveness and competitiveness in industries. On the other hand, the results for not being able to recognize the benefits of ICT can also be devastating. It can be inferred that without a strategic integrated approach it will be intricate to take advantage of the potential ICT driving the socioeconomic development. Originally built by Massachusetts Institute of Technology and funded by Gates Foundation, UN Democracy Fund and others, CGNetSwara as an online website was created with the goal of bringing development through mobile phones and interactive voice recording. CGNetswara and Radio Bulloo has huge implications for creating awareness, improving governance and spurring development not only in rural India but in other developing countries which are affected by poverty and poor social indicators. Communication convergence with its potential for extensive interactive communication resources holds promise for India. If used in tune with the development concerns of majority of the people to provide them with essential information regarding their daily lives, technology can contribute greatly to economic progress and sustainable development in countries like India. This paper focuses on the on the role and extent of information and communication technology (ICT) in socio economic development, highlighting the utilization of technology for sustained development, the reach of technology, the access to it in terms of use and consumption and the potential of technology as an enabler in the developing world. It will also look at the policy perspectives in dealing with socio-political and techno-economic aspects in building ICT policies for development.

The Purposeship Principles Standard: A Guide for Purpose-Driven, Cross-Sector Relationships

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Cross-sector collaboration has become one of the most widely celebrated mechanisms for delivering sustainable development because it enables groups to pool targeted resources and maximize success. However, a majority of these relationships are being conducted through the model of partnerships in which internal challenges impede the ability to achieve intended impacts. Surprisingly, these challenges are not often a lack of resources or solutions, but rather concern the operational and relational aspects of bringing together diverse constituents.

The partnership model has been the most commonly adopted structure for facilitating cross-sector relationships. Despite the benefits described above, there are some critical differences in approach, language, and culture that complicate the foundation of trust that is required for partnership. In general, partnerships are project-oriented and focused on short-term deliverables. They are often geared toward the attainment of predetermined goals and lead to narrow and time-bound relationships. Given that systemic change has rarely appeared as a result of this approach, it seems as though a narrow focus on the goal is subordinating the relationships required to achieve it. Is it possible that the development community is too focused on the ends and not enough on the means?

The most successful relationships are those that are based in trust. The barriers to building trust in partnerships include the difficulty of merging the motives, languages, and cultures of diverse sectors; the issue of competition among parties with differing views; the complications in agreeing on management and measurement strategies; and the perennial obstacles of politics. Ironically, partnerships attempt to address these relational challenges with operational adjustments and procedures, which often fail in tackling the root problem.

This leads us to some key questions: How is trust in cross-sector collaboration built and maintained? What does it take to bring together diverse groups to effectively deliver sustainable development? How might these groups work together to provide the critical resources needed to meet development goals? And how might these groups work together to transform organizational behavior and address institutional justice in the process?

To answer these questions, a team of three sustainability professionals from Spain, U.S.A and Brazil developed an alternative model for cross-sector collaboration called Purposeship. Purposeship is a model for cross-sector collaboration in which agents embrace the Principles of Adaptability, Utility, and Mutuality in order to achieve a Shared Purpose. Based in principles versus procedures and inspired by the dynamics of the relationships found in nature, Purposeship is more responsive to the challenges of cross-sector collaboration, more effective for sustainable development, and more conducive to the growth of all parties involved. Purposeship enables organizations to sharpen their engagement strategy, access key actors, maximize success, mitigate risks, and contribute to the institutional transformation of how others are addressing social and environmental issues.

This model asserts that the intentional, conscious, and even uncertain journey toward solving a problem is more important than the assumptive strategies of traditional partnerships. This is precisely because it recognizes that pre-determined solutions run against the course of nature itself, which is in constant motion.

Purposeship fully embraces the concept of Collective Impact developed by John Kania and Mark Kramer, in which agents first agree on a common understanding of the problem, identify common indicators to hold themselves accountable to, and then enable the process itself to reveal emergent solutions. Purposeship extends the notion of Collective Impact back to the agents themselves. Drawing much of its inspiration from nature, the model asserts that all those that are part of a purpose driven alliance should be positively impacted from the experience „ just like any healthy relationship. In practice, this means that each agent has the duty and the responsibility to share, promote, and enhance beneficial outcomes for other agents in addition to the fulfillment of the shared purpose. In this sense, this model requires a commitment in which all agents work toward beneficial impacts for the purpose as well as for the other agents involved.

The Purpose Principles Standard is a guide for cross-sector relationships developed by Paloma Andrés, Kelly Behrend and Andrea Mara Hanai. In the end, we learned that the

purpose-driven journey may be flexible, adaptable, and often unpredictable, but most importantly, we realized that it must be shared.

Bringing Earthbags To The People-A New, Democratic Approach To Sustainable Building

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In developing regions the prevailing building regime is becoming increasingly toxic to the environment. In place of flimsy clay, stone or straw rural villagers now build their homes and schools out of cement, bricks, steel and timber, usually processed in centralized factories and then transported by truck from city to village. Manufacture and use of these materials consumes precious fuel and natural resources, and pollutes our air and water.

Sustainable Earthbag technology, in contrast, builds safe, appealing and cost-effective structures out of ordinary soil obtained from the worksite. Generally considered the most promising of the sustainable building techniques, its benefits include:

- Fewer Materials and Less Pollution-Building with soil means fewer factories, reduced need for fuel and transport and less depletion of scarce natural resources
- Safety-Earthbag technology is stronger than more traditional building techniques
- Ease of Construction- Earthbag technology is easily learned by rural villagers, and requires only the simplest of tools
- Cost- Earthbag structures cost less than traditional structures

Despite widespread support among environmental groups and eco-builders, however, this and other sustainable building methods have remained on the fringes, shunned by governments and barely known to everyday building professionals and the general public. The promise of sustainable building on a large scale remains unfulfilled.

This paradigm is changing in Nepal, where a catastrophic 2015 earthquake flattened much of the housing stock. There Good Earth Nepal, a non-profit organization, employs a three-tiered approach aimed at establishing Earthbag technology as an everyday construction option for ordinary families, and as a critical tool in that country's push towards a more sustainable building future.

The first tier of the approach addresses the traditionally uneasy relationship between sustainable builders and government officials. For decades, governments have been unwilling to approve Earthbag technology, or to grant required licenses and permits to aspiring sustainable builders. This reality is reflected in a dearth of mainstream Earthbag structures worldwide.

In Nepal, things are different now. After a year and a half of lobbying and dozens of meetings with government engineers Earthbag technology has, finally, been accepted at the federal level. For the first time ever a sovereign country (population 28,000,000) has adopted Earthbag construction as a standard and recommended building technique.

Earthbag designs are being distributed to 3,000 Nepal Reconstruction Authority engineers, and Earthbag technology is now an official building option for rural villagers receiving reconstruction aid. Similar efforts are underway in India.

Training programs have long been a staple of sustainable building groups, in Nepal and elsewhere. But most have been directed at students, enthusiasts and part-timers, not everyday professional builders. Uniquely, Good Earth Nepal training programs now target the developing world's growing cadre of young engineers and builders, hungry for sustainable building solutions. These professional programs, taught in the classroom and in the field, put Earthbag technology on a par with more traditional construction methods, and will soon make sustainable building a part of everyday building culture.

Historically, Earthbag initiatives in Nepal and other developing regions have been limited to foreign aid projects, and reflected Western tastes and values. Resulting structures have often been regarded as curiosities by local residents, and, perversely, stifled the attainment of sustainable development goals through widespread Earthbag building.

Creation of grassroots support for Earthbags thus constitutes the third tier of Good Earth Nepal's approach. With close supervision and training rural villagers are now learning to build their own Earthbag homes and schools, and liking them.

Genuine, indigenous support for Earthbags is growing, strengthening individual communities and creating a cleaner, more livable planet for all.

Blockchain and SDG finance

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DAOACT is a decentralised autonomous organisation (DAO) that supports the “enabling elements” of citizen engagement - conditions that affect the ability of state and citizens to engage in systems of social accountability.

DAOACT seeks to boost these enabling elements and associated conditions in support of citizen action. The societal problem being addressed is social accountability, which is the extent and capability of citizens to hold the state accountable and make it responsive to their needs.

There is always a power imbalance between citizen action and state action. This can manifest itself as bureaucratic inertia (nothing happens), or, in worst case scenarios, repercussions and reprisals against those who dare to speak truth to power.

DAOACT aggregates citizen force by pooling modest donations (for example, one million people pay \$1) within an immutable block chain, powered by software that releases funds only to causes that the citizens themselves vote for.

Think of a community fighting plans for an open cast coal mine, where there is certainty that its pollution will kill. In Wales, for example, they have fought in court and with the help of National campaigners' organized significant opposition, but finding resources to sustain these activities is impossible.

If DAOACT, say, in Britain, had a million members who selected climate change as a topic of concern, then the power imbalance between citizen and state action could shift dramatically. The DAOACT platform would allow a concerned, local community to raise thousands and scale protests in a matter of days.

This is why DAOACT is needed. It creates a sea change in how citizen action is initiated and executed, empowering citizens to better hold their governments accountable and make them responsive to their needs.

But DAOACT - a "decentralized autonomous organization" with automated organizational governance and decision-making - must be seen as a truly global development project. It is a housewife in Arizona supporting a woman in Chile who was arrested for campaigning against a polluting company. It is a guy in Australia voting to help a campaigner in Asia who is exposing illegal loggers in pristine rainforests.

DAOACT is power in numbers and across borders. It is successfully achieving all 17 Sustainable Development Goals through a new paradigm of global unity and coordination on a massive scale. This is only possible through the responsiveness afforded by decentralization, the efficiency of smart contracts, and the trust provided by autonomous governance.

EXAMPLE: Maria Dzuba's daughter is disabled and confined to a wheelchair for mobility. She was raised in an apartment in a state-maintained building in the Moscow Sky region of Minsk, Belarus. The elevator, for which maintenance is the responsibility of local government, broke, and the government declined to repair it. No suitable alternative was offered to Maria. The decision to repair seemed to rest on issues of budget.

Availing of a state-citizen interface offered through Belarus law 300-3 18.6.2011, Maria wants to gather a significant number of signatures in support of her petition to the local government to revisit its decision regarding the elevator in her building, which is essential to her standard of living, and that of her daughter, Lera. The law stipulates that 30 supporting signatures in an open letter addressed to the government represents a

public letter. Maria thinks that if she gains 2000 signatures reflecting broad support from her local community, and the broader mobility impaired community in Belarus, that her letter will receive a positive outcome.

In order to mobilize this number of people, she will incur travel costs, phone costs, and possible costs associated with other necessary publicity. She wishes to raise \$200, which is approximately equivalent to her monthly income. She submits her case on the new platform DAOACT, and members that have registered as interested in Sustainable Development Goals 10 or 11 worldwide and in Belarus are notified about her proposal. When the five day voting period is complete, two thirds of this part of DAOACT's community had reacted to her proposal with the necessary quorum (60%) voting in favor of her proposal.

The impact of a sustainable blockchain transportation logistic platform system on disaster relief response and supply chain management

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The Bahamas are extremely vulnerable to recurring hurricanes capable of reaching a category 5 intensity. With a long history of extreme events as such, disaster relief supply chain preparedness plays a crucial role in building sustainable resilience in the economic development and ensuring effective response during and after a disaster. This study assesses the impact of using a blockchain cloud logistic platform preparedness tool enhanced by a transportation management system (TMS) on 1) humanitarian operational costs that account for up to 80% of the total funds spent in national disaster response, 2) on response timeliness and effectiveness, 3) on supplies and equipment transportation, 4) interagency cooperation and 5) on the economic development of different industry sectors.

Hurricane Joaquin of 2015 is used as a case study being one of the most devastating Bahamian storms on record causing substantial infrastructure damage valued at \$200 million which had substantial impact on the overall humanitarian relief response and hit-area economy. The role of the digital supply chain TMS platform tool on response- and cost-effectiveness is investigated quantitatively using an economic impact correlation analysis of key disaster response and logistics performance indicators extracted retrospectively from the EM-DAT disaster database and Bahamas National Emergency Management Agency (NEMA) during and after Joaquin. These data were simulated within the transportation logistics system for measuring the impact of using digital cloud supply chain TMS platform database during and after the disaster.

The economic impact and key performance scores indicate that disaster relief supply chain preparedness through the use of digital cloud supply chain TMS platforms can significantly improve relief response effectiveness and economic development resilience

through increased logistics transparency, transportation security, network data accuracy with supply chain channels flow adaptability increased by 50%, 75% and 90%, respectively; effectiveness of coordination between NGOs, government and private-sector is enhanced by 80%; while response implementation time, duplication, unpredictability, scarcity, oversupply and cost are significantly reduced by 80%, 50%, 30%, 80%, 80%, and 50% respectively. Furthermore, the agriculture, fishing and tourism industry sectors were shown to be able to mitigate the economic impact of the hurricane by an average of 50% through supply chain disaster preparedness enhancing business continuity and opportunities to participate in the response effort.

The results of this study demonstrate that the support of disaster relief supply chain through cloud TMS technology enhances multi-stakeholder preparedness at the local and national levels through the digital integration of cost-effective freight matching process that addresses transport challenges and capacity constraints usually faced during and after a disaster. This technology and integrated process control maximizes cost reduction and response time through providing greater access, accuracy, legitimacy, predictability, accountability and transparency across the supply chain's critical touch points; all of which are required for ensuring overall disaster relief response effectiveness while supporting economic stability. This optimization transportation technology tool supports sustainable development through reducing transportation vehicles and miles within the national and global contexts, automating process for reducing reliance on paper and modeling carbon footprints reduction with accuracy.

Going beyond rhetoric in building multi-actor environments at universities

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Sustainable Development Goals (SDG) represent an ambitious and universal commitment whose implementation requires important doses of political, technological and organizational innovation. The need of fostering the collaborative action of all kind of actors ébe public, private and social- through public-private-partnerships (PPPs) has been stressed insistently in all the declarations, reports, and recommendations that have paved the way to the 2030 Agenda. In fact, the Goal 17 calls for revitalizing the global partnership for sustainable development

As it happens with many of the generic calls to action that conform the “rhetoric” of the international development speech, not many objections can confront this statement. But the way from the wishes to the ground and the day-to-day of organizations is not an easy journey. The majority of practitioners involved in multi-actor partnerships for sustainable development recognize its complexity and limitations.

Universities have characteristics -neutrality, rigor, legitimacy and long-term focus- that allow them to be ideal spaces to promote, design and facilitate this kind of multi-actor partnerships to deal with wicked sustainable issues.

We present a case experience that illustrates how this function can be put into practice : “Alianza Shire” is a pioneer partnership, promoted and managed by an University, to improve energy supply in refugee camps involving three private technological companies, one UN agency, one official governmental agency specialized in Humanitarian Aid, and an international NGO. <http://www.itd.upm.es/alianzashire/>

The Innovation on Technology for Human Development Centre of the Universidad Politécnica de Madrid (itdUPM) is the brokering institution that creates and manage the enabling space where all the partners coordinates and work together.

Partnership’s brokers, facilitators, intermediaries or integrators, either individuals or organisations, play a crucial role in boosting, creating, managing and monitoring the joint work. They can facilitate consensus, integrate different points of view and form a ‘complete picture’ out of diverse visions of each Partnership member.

Facilitators have the contextual, multidisplinary and technical knowledge, but also the required capacities and skills such as strategic thinking, diplomacy connectivity and empathy. Their role is also strengthened by a careful use of correct methodologies and tools to assure a flexible process and knowledge management.

In this case study, the University is an independent and neutral intermediary. The rest of the members confer legitimacy and recognition upon the University because it guarantees sustainability, promotes innovation both in structures and systems. Furthermore, the University has a remarkable capacity to systematise the learning process and to improve the knowledge management within the Partnership.

This partnership has recently been selected by the United Nations Economic Commissions for Europe (UNECE) as the best case study, because it has “showed that PPPs can be done in fragile states, that can combine public & private, UN & academia”.

It is also to be noticed that impact indicators of the projects led by “Alianza Shire” in Ethiopia will be presented, demonstrating measurable achievements of this partnership.

Preparing for a World of 8 Billion: A Non-Zero-Sum Initiative

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Executive Summary

There is perhaps no greater and more enduring problem facing our world today than our ability to satisfy basic human needs for the world's changing population. Our success in doing so depends on our ability to collaborate to put high-quality metrics into the hands of decision-makers.

Do we know what will it take to sustain a global population of 8 billion people and beyond? No, we don't.

Project 8 is enabling a new critical collaboration built around data. It is building a global, digital information community to bring people and data together.

What problem(s) are we helping to solve?

We can achieve a sustainable future for a world with 8, if we can develop a way to put high-quality metrics into the hands of decision-makers, whether they be leaders in government agencies, NGOs, foundations non-profit agencies, academia or business.

Today, data to measure sustainable development goals are highly fragmented; variable and very hard to access.

What is the proposed solution?

We believe that those charged with planning for world's future must first understand human need, across both immediate aid programs and longer-term sustainable development solutions.

For these reasons and more, global leaders have been calling for new systems of global data sharing, including a "World Statistics Cloud", as part of a broader data revolution. Most public sector organizations are increasingly mandated to open up their data. They are also encouraged to use new sources of data not only in producing official statistics, but also as a tool for a more meaningful and transparent monitoring of the SDGs.

Indeed that is what we have built.

Project 8 is a global, digital information community where people come together on a single cloud based platform to share, compare, analyze and discuss data and perspectives on the evolving demand for basic human needs. It is providing a trusted environment for users to interact with data and one another.

In what ways Project 8 novel or unique?

Collaboration: We got support and collaboration from leading global organizations: UN Foundation; Nielsen; The Conference Board; Salesforce; US Department of State (Office of Food Security); Accenture; DELL Boomi.

Users: We now have more than 200 users from public and private sector organizations from around the world.

Data: We have millions of rows of data from public and private sector sources. And we continue to add more.

What would we like to present at ICSD?

We have one of the first viable global big data platform that is up and running bringing data as well as people together on a single platform to be able to start understanding future human need and measure SDGs.

We will introduce the platform and talk about its salient features. We will also have 1-2 user case studies.

Corporate Social Responsibility (CSR): Application of sustainability concepts to big tech

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This paper provides an overview of the development of corporate social responsibility (CSR), comparing and contrasting its applications to environmental harms and social harms. In just a few decades, our information gathering and communications has become increasingly centralized to just a few corporations, most notably Facebook and Google. Technology critics and scholars from a wide range of disciplines, have sounded the alarms of the negative social impacts resulting from purely profit driven decisions from “big tech.” The recent 2016 U.S. presidential election drew greater scrutiny in the “hands off” role Facebook and Google played in addressing misinformation, or information shared their platforms that was demonstrably untrue. We may be in a moment of awakening in which technology companies recognize their wide reaching social impacts, both positive and negative. Building upon the tradition of CSR for environmental harms, this paper explores the following questions: How have the power dynamics between the technology corporations, the state, and the citizen changed since widespread access to the internet? What social and civic imperatives does “big tech” have now, if any? How do values and morals factor into the decisions made by “big tech? What applications does CSR have for moderating the effects of technology companies on 21st century governance?

Poverty Eradication, Social Protection, and Equality in the SDGs

Participatory Planning of Housing and Community Development

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Taken together, the 17 Sustainable Development Goals (SDGs) - contained in U.N. Resolution 70/1 involving the 194 member states and civil society in its deliberation - seek an encouraging level of development of humanity's social and environmental existence. They establish a framework through 2030 that can assist nations and communities of the world in plotting what could amount to transformative, prosperous, and sustainable achievements.

How can this potential development unfold and be long-lasting? What approaches should we catalyse so that sustainable projects result and generate the human development benefits the world's local publics want and need?

As a starting point, most societies have internalized an enduring premise through experiences, particularly since World War II, of social development and reconstruction interventions: people accept and support decisions that they had a part in making. We have learned this critical principle as we have analysed human behaviour in our own and other cultures over centuries, and we find this essential premise in texts of philosophy and spirituality of civilizations over millennia. Indeed, this precept is no longer astounding, and is as true as ever.

Morocco, for example, has a progressive national municipal charter that is intended to promote inclusive participation. Each municipality is required by law to create multi-year community development plans driven by popular participation. If nations of the world do not imbed in their national policies the essential requirement of inclusion in the creation and determination of sustainable development projects, how can we then expect to achieve SDGs when the public is not encouraged to be involved in the determination and design of initiatives?

However, we have also dishearteningly learned in Morocco's case that laws and policies are not enough for the fulfilment of widespread participatory development actions. In fact, the example of Morocco, critically underscores that we must also experientially learn methods (by applying them in reality) of community democratic planning of projects in order for these processes to genuinely take place. We must train our teachers, our youth and retirees, members of civil society and the business community, locally elected officials, women and men, those who have and those who have less, to not only participate in identifying sustainable projects, but also facilitate the dialogue needed in order for all people to come together, speak, argue, reconcile, and achieve consensus with one another. Policies that promote participation coupled with learning by doing is a needed combination that can lead to local community movements toward accomplishing SDGs.

Plans of development action that directly embody the spoken will of people naturally gain their partnership, energy, and dedication. After all, decisions people contribute to rendering, generally reflect the participants' aspirations and interests. Thus, people's active participation in creating the projects that fulfil the SDGs is ultimately the essential basis upon which the SDGs could come into fruition, expand, and uplift our society and world. The question then becomes: how do we set in motion across lands participatory democratic meetings of local communities of people so that they identify, prioritize, and implement sustainable development projects?

However, even after codifying national policies and building capacities, these two essential components are still not enough for the tangible realization of SDGs. What would become of the designed participatory and sustainable projects without finance to achieve implementation? Even when communities are in a position to provide some work in-kind to help establish their development projects, materials to construct must still be bought, seeds to plant must still be purchased, capital must still be secured in order to enable production.

Addressing the distribution of public funds and obscene levels of inequality are inevitable parts of the solution, but sitting on our hands until that illusive day arrives is not an option, and not necessary. There are no pre-conditions to sustainable development, other than people's own desire and the freedom to assemble.

In Morocco, there is what could become a self-reliant pathway to generate the new revenue needed in order to invest in projects that can achieve the economic, health, environmental, and indirect political impacts of SDGs. The needed finance can be generated by establishing the entire agricultural value chain, from nurseries to market, including growing hundreds of millions of diverse fruit trees that are indigenous to Morocco.

Rural Livelihoods Diversification: A Case Study of Dairy Farming and Wool Spinning Enterprises in Padampur, Nepal

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From national conservation laws to community-based anti-poaching efforts, the Nepali people have demonstrated a strong commitment to protecting the wildlife in Chitwan National Park. It is home to rare plants and endangered species and it serves as protected breeding grounds to aid in their recovery. It is based on these efforts that Chitwan can sustain its environmental pristine becoming an international symbol of environmental protection and one of the world's most popular tourism destinations.

The consequences of tourism, however, are two-fold: Revenues are heavily concentrated in Sauraha thus excluding the surrounding communities from the economic and cultural benefits of tourism. Furthermore, the increased tourist traffic in Sauraha means more

vehicles and the construction of accommodation services which could disrupt the local wildlife and threaten the sustainability of the environment upon which the locals' livelihoods depend on.

The goal for our project is to provide actionable insight to local level stakeholders to help determine the financial, social, and ecological viability of expanding the tourism markets to these excluded communities, thus creating a more equal distribution of tourism revenues, and alleviating the pressure on the local wildlife near Sauraha. In addition, we will conduct community-based participatory field studies to explore ways in which ecotourism could benefit both the locals and the environment.

Our research methodology involves qualitative and quantitative techniques in data collection including interviews, surveys, and focus groups with community members and tourists as well as academics. Our findings will present policy recommendations which aim to improve livelihoods in the vicinity of Chitwan National Park. Hence, The challenge will be to attract tourists through the creation of new tourist activities while simultaneously promoting conservation and sustainability for threatened or endangered wildlife species such as one-horned rhinoceroses, tigers, and gharial crocodiles.

Global Inequality and Transboundary Pollution

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Global inequality has been a major point of concern at almost every international conference related to climate change issues. In this paper, we have explored some conditions under which reducing global inequality is likely to produce a mitigating effect on the path of the future trans-boundary pollution stock. The response of the path of the international transboundary pollution stock to a reduction in global inequality is analyzed through three interrelated approaches: A Ratio rich-poor approach, an average endowment approach, and a bi-dimensional measure approach.

From the ratio rich-poor approach, a reduction in global inequality from richly-endowed countries in favor of poorly-endowed countries would have a mitigating effect on the path of the trans-boundary pollution stock if the relative number of richly endowed countries in the subgroup of high-tech countries is greater than the relative number of richly-endowed countries in the subgroup of low-tech countries.

From the average endowment approach, a reduction in global inequality would have a mitigating effect on the path of the transboundary pollution stock if the subgroup of high-technology countries is on average richer than the subgroup of low-technology countries after a reduction in global inequality.

From the bi-dimensional measure approach, the response of the transboundary pollution stock path to a reduction in global inequality results from the combined action of two opposite forces. The mitigating force can be associated with a bi-dimensional measure of both richly-endowed/high- technology countries and poorly-endowed/low-technology countries. The aggravating force can be associated with a bi-dimensional measure of both richly-endowed/low-technology countries and poorly-endowed/high-technology countries.

From an applied policy perspective, these results provide a guidance tool that are useful in designing international and implementing redistributive policies aimed at mitigating the climate change problem.

Sustainable Development Goals for Peace: Greece as a case study

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This paper focuses on five case studies (Myanmar, Greece, Burkina Faso, Guatemala, and Lebanon) to highlight the links between peace and sustainable development, collects and shares best practices on how to implement the 2030 SDG Agenda in various national contexts, and make recommendations on how to achieve targets related to peace in particular. For the first time in its seventy-year history, the UN has an agreed agenda that integrates peace and sustainable development. The 2030 Agenda requests the UN and member states to work beyond traditional silos. The International Peace Institute, in collaboration with Concordia and Fafo, will conduct policy research to support in the implementation of the SDGs in different local contexts. It will support communication efforts to increase awareness and ownership of the SDGs at different levels of engagement (youth, women, minorities, private sector), and it will create partnerships with member states and organizations that share similar objectives. More specifically, the SDGs4Peace will identify implementation strategies that can have political “buy-in” to support the achievement of goals and targets, related to peace. It will hold round-tables focused on targets that cannot be achieved solely at the national level but which require regional, global cooperation such as targets related to climate change, migration, and organized crime. Lastly, it will suggest policy recommendations that will facilitate the achievement of the SDGs particularly on the targets related to peace. As scheduled, in 2019, the UN General Assembly will hold a Summit on the SDGs. In preparation to this Summit, we will prepare a comprehensive policy paper in advance of the High-Level Segment of the General Assembly (UNGA72) in 2017. A policy forum will be held and issue briefs will be circulated for each case study before the next UNGA72 in 2017.

Education as Enabling Right: The Need to Incorporate Data on Forcibly Displaced Women’s Access to Education in the GEM Reports

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This presentation argues for a change in policy regarding what is to be reported in the annual Global Education Monitoring (GEM) Report published by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Using Datnow and Park's Co-Constructionist framework, the presentation looks at the multiple, overlapping contexts within which the GEM Report is developed and notes the critical absence (policy of omission) of reporting on a significant underserved population; forcibly displaced (adult) women. It argues that the inclusion of reporting on this particular population will better enable UNESCO to achieve its educational goals. As these women are increasingly becoming the heads of their households, they are finding themselves in the position of providing for their families (both immediate and extended). As these women received access to education, they are better able to provide financially for their families, secure access to greater healthcare, advocate for better environmental and political situations for their families, promote conflict resolution and access to justice, and develop a virtuous cycle of increased education for their children - both male and female. In short, the education of this underserved population will lead to the achievement of the other Sustainable Development Goals.

Poverty Eradication and Social Protection: A Study of Women Self-Help Groups Movement in Tamil Nadu

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The main objective of this research paper is to analyze how women self-help groups movements has helped to eradicate poverty among women in Tamil Nadu, a South Indian state. Obviously, majority of women in India lack assets that help to achieve their empowerment and well being. Economic empowerment through self-employment and entrepreneurial development seems to be the solution for poverty eradication. Therefore, the Government of India has provided several development schemes for women and one such scheme is poverty eradication through self-help groups.

Self - Help Groups in Tamil Nadu

Self-help group (SHG) is a group of 12 to 20 women of the same socioeconomic background who come forward voluntarily to work together for their own upliftment. The unique feature of the SHG is its ability to inculcate among its members the viable habits of thrift, savings and banking.

Emergence of self-help groups in Tamil Nadu during 1980's was quite new to the people. At that time it was known as Mahalir Sangam (women association) or Mahalir Kuzhu (women group). It was only after the establishment of Tamil Nadu Corporation for Development of Women (TNCDW) in 1983; SHG concept got more meaningful direction with the priority to be used for the development of women. These groups were introduced in Tamil Nadu through IFAD (International Fund for Agricultural Development Scheme) scheme in 1989. These SHGs were instrumental in assimilation

and dissemination of knowledge about health, nutrition, literacy, women's rights, child care education, and adoption of new agriculture practices and paved the way for increased participation of women in decision making processes in households, community and local democratic set up besides helping to prepare women to take up leadership positions.

In order to enable all poor women living below poverty line to join and benefit from the self- help group movement, the group formation is undertaken with a special focus on NREGS (National Rural Employment Guarantee Scheme) women workers, urban slum dwellers and in village panchayat where SHG coverage is still inadequate..

The study has found that almost nearly 10 million women have been mobilized as members in the movement that means almost 10 million families have been alleviated from poverty and have been encouraged to engage in self employment and income generation activities of their choice. It must also be understood that if poverty eradicated automatically development in a sustainable way would emerge in due course of time.

Internal Displacement and the 2030 Agenda for Sustainable Development: Issues and Challenges

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Conflict, disaster and developmental activities displace millions of the world's most vulnerable people from their homes every year. Today, the global population of internally displaced persons (IDPs) has reached more than forty million and this number is rapidly increasing day by day. The State has the primary responsibility for the protection of these people. But due to the failure of the States to protect the interest of these people, the responsibility to protect IDPs has shifted to the international community. Unlike the refugees who benefit from the international convention (1951 Refugee Convention) and international institution (Office of the United Nations High Commissioner for Refugees), the IDPs neither have separate international convention nor international institution to address their problems. Apart from the 1998 UN Guiding Principles on Internal Displacement, there is no special attention from the international communities to address the problems of these people. At the regional level, the African and Asian regions are hosting large number of IDPs. But as compared to the African region, Asian region is lagging behind in providing effective assistance and protection to IDPs. In the African region, the African Union adopted the African Union Convention for the Protection and Assistance to Internally Displaced Persons as a binding legislation, but unfortunately the Asian region which is also hosting large number of IDPs does not have legal instruments for addressing the problems of IDPs. In fact, the Asian region is also lacking in having any regional human rights mechanisms. Hence, this paper argues that the 2030 agenda which seeks to leave no one behind has to solve the complex problem of internal displacement as well. This paper suggests that the international community needs to include IDPs in the implementation of agenda of 2030 otherwise it would be a disservice to one of the most vulnerable group.

Queering the Sustainable Development Goals : exploring the relationships between gender, sexuality & poverty

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The commitment to "leave no one behind" has been a key feature of the approval and the current implementation of the United Nations Sustainable Development Goals (SDGs).

However, despite a target which aimed to all groups, SDGs remain suspiciously silent when it comes to sexual orientation, gender identity & expression, and sex characteristics. Islamic States and conservative christian groups decided to 'sanitize' any reference regarding equality, education and health that could be interpreted to include LGBTQI rights.

We believe that SDGs still offer a window of opportunity to include the periphery of sexualities in the current work of U.N. agencies, States, donors, business and civil society. However, working methodologies really need to change in order to include everyone in the Agenda 2030. For instance, dealing with maternal health we need to change the entry points from HIV and human rights based approaches to economic logics regarding data, evidence, participation, partnerships and funding.

Effect of Microfinance Institutions on Rural Households Well-being in Oyo State: A Case Study of IFAD/RUFIN Supported Project

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In many developing countries, including Africa, the rural people often lack access to financial support because of inadequate infrastructure and pro-urban banking systems. This situation may be overcome where microfinance systems are introduced. A system of microfinance usually signifies a financial arrangement designed to help the rural poor transform their economic condition. Micro financing can also be viewed as a means to transform rural economic, environmental and social development by empowering communities to find their own solutions to their developmental needs. The proposed study will assess the role played by the Rural Finance Building (RUFIN) programme in the capacity building of microfinance systems in Nigeria and the Village Saving and Credit Group with a view to delivering credit to rural groups and also to measure the impact it had on the indirect beneficiaries' socio-economic well-being. The study provides analysis of the patterns of empowerment using the sustainable livelihood framework to measure the impact of the micro finance on the beneficiaries in three local government areas of

Oyo State over a six-year period of the intervention. Data were collected through interviews and administration of structured questionnaires. The data were analyzed using descriptive and inferential statistical techniques. Preliminary findings reveals the significant effect of microfinancing on the well-being of beneficiary rural people compared with the non-beneficiaries. The study will also profiles and recommends the changes needed in micro finance schemes, including access by women.

Assessment of Impact of the Sorghum for Multiple Uses(Smu)Value Chain Project on Small Holder Farmers in Kenya

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Kenya is a food deficit country even in a bumper harvest year. The challenge of food, nutrition and income security is more highly felt among communities living in the rural areas. About 80% of Kenya's land area is classified as arid and semi-arid and is considered unfavorable for rain fed agricultural production. The resultant challenges of food and income security has made Kenya to remain on the global hunger index. The intermittent drought has resulted in a significant portion of the population regularly starving and heavily dependent on food aid. This brings out the need for climate smart agriculture, and sorghum has been identified as one of the climate smart crops with broad adaptation and resilience. Sorghum also has a high nutrition value.

To improve the livelihoods of poor rural smallholder farming household in the arid and semi-arid lands in Kenya and Tanzania, the 'Sorghum for Multiple Uses (SMU) value chain' project started in 2011 with the development of sorghum cultivars which are adapted to biotic and abiotic stresses.

With the support of International Fund for Agricultural Development(IFAD), International Crops Research Institute for the Semi-Arid Tropics(ICRISAT) and Africa Harvest International Biotech Foundation(AH) Kenya, developed and implementation "Commercially Sustainable Sorghum for Multiple Uses Value Chain Project" between 2011 and 2015 in the drought prone, poverty stricken and food insecure areas of Kenya and Tanzania. The SMU project was implemented through five output components comprising baseline, sorghum value chain upgrading, sorghum cultivars development, partnerships and capacity building.

The objective of the SMU project was to support the development and adaptation of agricultural rural innovations in sorghum value chains that would reduce food insecurity and increase the income of the small holder farmer household. The benefits derivable include capacity building in sorghum production systems, value addition and products enterprises development, participation in selection of preferred varieties and hybrids for recommendations to seed companies during variety releases, improved access to seeds of improved sorghum varieties and enhanced linkage to market.

This research seeks to assess the impact of the project on the food security and income of the beneficiary small holder farmers' household in project sites in Kenya which are highly susceptible to sharp weather-related fluctuations. The research findings would reveal both the strength and areas of weakness in the value chain and knowledge gained will form the basis for recommendations on how to maintain or further strengthen the value chain for sustainable Sorghum production in Kenya.

Borrowing Constraints and Temporary Withdrawal from School: Empirical Evidence from Malawi

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This paper explores the relationship between borrowing constraints and parents' schooling decisions for their children using the data from Malawi 2013 The Living Standards Measurement Study (LSMS) conducted by the World Bank. According to Jacoby's (1994) theoretical model, parents are assumed to decide if their children should continue their education based on whether it maximizes the total utility of the household. When a household is able to borrow as much as it wants, education investment decisions are determined solely by the rates of return. However, if a child belongs to a borrowing-constrained household, the proxy variables of household income and assets will affect the child's schooling, which reflects the hypothesis that the separation between consumption and human capital investment decisions breaks down under borrowing constraints.

In order to investigate this relationship, this paper uses a sample of 4,325 children between the ages of six and thirteen in Malawi who are currently enrolled in school. In the first part of this paper, the sample of children is split into 'constrained' and 'non-constrained' groups based on the direct method of identifying borrowing constraints using the responses to qualitative questions about household's loan applications and rejections. Following Jappelli (1990), children are classified as the borrowing-constrained group if they belong to households which had a loan application rejected or did not attempt to apply for a loan because they believed their application would be rejected. This paper finds that the inseparability of consumption and schooling decisions under borrowing constraints is more clearly identified when using the direct method of identifying borrowing constraints, which indicates that the direct method separates the sample more precisely into 'borrowing-constrained' and 'non-constrained' groups. This paper also finds that if a household owns an enterprise or the number of pre-school age younger siblings increases, the children's probability of temporary withdrawal increases in borrowing-constrained household because the opportunity cost of schooling increases in the presence of borrowing constraints.

Based on the direct method of identifying borrowing constraints, the second part of the paper investigates the effect of borrowing constraints on households' schooling decisions using the full sample. Taking into account the endogeneity problem by using a recursive

simultaneous bivariate probit model, this paper finds that the households' borrowing constraint itself significantly increases the probability of children's temporary withdrawal.

The empirical results suggest that offering scholarships or implementing a student loan policy would be beneficial for reducing the children's probability of falling behind for those belong to borrowing constrained households, but such policy would not be effective for children from non-constrained households. In this sense, a more precise approach for the identification of borrowing constraints is required to carefully select those who should receive the benefits of the policy.

Effects of Conditional Cash Transfers anti-poverty programs as long term incentives for the use of public services in health and education by the beneficiaries. An empirical approximation based on panel data for the Mexican example of Prospera é Oportunidades (2002-2012)

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One of the key challenges that countries in the world are faced with today is to “end poverty in all its forms everywhere”. Globally, extreme poverty decreased by more than 50%, from 1,900 to 836 million people, between 1990 and 2015. Despite this fact, there are still too many people living on a daily income below US\$1,90 that are faced with the challenge of satisfying even their most basic needs. Therefore, the first Sustainable Development Goal (SDG) (“Goal 1: End poverty in all its forms everywhere”), is one of the key commitments of 193 countries that signed the United Nations 2030 Agenda for Sustainable Development in the year 2015.

The above mentioned is reflected in various government interventions for social protection that are designed to alleviate poverty. Focalized attention programs have been implemented in Latin America over more than two decades. A specific example is Prospera-Oportunidades that has been operating in Mexico since the late 1990s.

This type of program is focused on the State providing social protection services to poor families through direct cash transfers. These are often conditioned to complying with certain activities related to the use of public services in education and health services.

After more than two decades of application, these conditional cash transfer programs (CCT) have turned into an innovative multidimensional effort to combat poverty in a sole governmental intervention. Program evaluations provide evidence of its positive impact on the accumulation of human capital by the program beneficiaries whose opportunities of accessing better alternatives of social inclusion increase as a result.

Yet, there is much debate about the conditionality of direct cash transfers in anti-poverty programs. One of the key arguments is based on the modification of the long term use of such health and education services by the participating families.

This investigation analyzes the effectiveness of the conditionality in direct cash transfers as a long term incentive for the use of public services é health and education é by the families that benefit from Prospera-Oportunidades. A longitudinal analysis is conducted based on panel data from the MxFLS (Mexican Family Life Survey) collected in three rounds: 2002, 2005-2009 and 2009-2012.

The findings provide evidence and contribute to the debate whether CCTs can lead to changes in the behavior of its beneficiaries and increase the demand of public services even though these effects tend to be short term. Long term, these programs can inflict additional costs for the participants (such as time dedicated to working). If the preferences of the poor are not aligned with the solicited requirements, their improvements in well-being tend to diminish and it is difficult for some of the families (usually those most in need and with specific socio-demographic characteristics) to maintain those gains.

No one left behind: a review of disability inclusive development efforts at the World Bank

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To achieve the Sustainable Development Goals (SDGs) in a way that "no one is left behind," AidData has been working to better understand the disability inclusive development efforts of development agencies. A new study „ published in the Knowledge Management for Development Journal by a research team that includes AidData Program Manager Jacob Sims „ pilots a methodology to monitor the inclusion of people with disabilities in the development efforts of the World Bank, and aligns its findings against progress toward the SDGs by asking two questions:

Are active World Bank projects inclusive of persons with disabilities?

What areas of development and which SDGs do disability-inclusive projects focus on?

The purpose of this "No One Left Behind" study is to assess the inclusion of people with disabilities by international development cooperation organizations, specifically their inclusion as target beneficiaries in the active project portfolio of a multilateral development agency. Due to its strong disability inclusive development agenda and commitment to data transparency, the World Bank was chosen as the first agency for focus. Greater understanding of the disability inclusive development projects of a major organization like the World Bank will provide policymakers with insight into the current state of inclusive development for people with disabilities.

While disability inclusive projects were found to make up only a small percentage of the overall active World Bank portfolio (2.0%), the researchers' preliminary analysis indicates an investment focus in several areas, such as social protection systems and measures, technical assistance and partnerships, education, health, and affordable housing. The article closes by considering implications for future efforts to track the inclusiveness of development finance as the international community moves forward in implementing the SDGs.

Estimating Baseline Aid to the Sustainable Development Goals

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The Sustainable Development Goals (SDGs) are poised to substantially influence the next 15 years of development finance and will require the international community to mobilize an additional 1.5 trillion USD per year to meet financing goals. Although tracking and analyzing funding for the SDGs will be central to measuring progress, aid reporting systems do not currently capture information on the distribution of financing for the SDGs. For this reason, AidData is developing a standardized coding schema to systematically track the total resource envelope of financing going towards each of the 17 sustainable development goals and targets.

AidData's SDG coding methodology is based on text analysis of development project descriptions. This methodology builds on previous coding schemas developed at AidData through which student researchers assigned codes based on project activities and purposes to over 800,000 project descriptions, providing more granular data that built on OECD Creditor Reporting System (CRS) categories.

AidData is currently developing and testing a comprehensive methodology to directly code project descriptions to the SDG goals and targets. This new coding system will not only allow us to track financing by goal and target but also see who funds what and identify how effectively dollars translate into results. Furthermore, we will be able to use this methodology to move beyond a focus on Official Development Assistance (ODA) to see the role that domestic resources, philanthropy, the private sector, and South-South cooperation play in financing for sustainable development.

Sustainable Blue Growth

An Analysis of Livelihoods of Fishing Communities of Coastal Maharashtra and the Impact of Sea Surface Temperature Variability on Fish Catch.

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An Analysis of Livelihoods of Fishing Communities of Coastal Maharashtra and the Impact of Sea Surface Temperature Variability on Fish Catch.

Increasing mean sea surface temperature (SST) over the last few decades has and will continue to impact marine fish population, their reproduction and migration. As a result, fish catch at various fishing grounds across the globe will be adversely affected. Fish catch in India plateaued in the mid-1990s due a number of reasons which include unregulated fishing, overfishing, pollution and habitat destruction. Climate change may magnify the problem to a much greater extent.

To understand the impact of SST variability on fisheries, we analyse the trend in SST data along the coast of Maharashtra (a state in India) from 1982 to 2015, as well as the fish catch during the period. While the total fish catch of the state has been increasing, the increase is not seen across all the districts. Only two districts out of a total of thirty six districts have experienced an increase in fish catch. The increase in catch is not a result of healthy fish stocks, but is a consequence of population growth, surge in number of fishing vessels, advancement of fishing gear technology and increased trawl effort.

We conclude that SST variability does have an impact on the total fish catch of Maharashtra. Higher SST results in dwindling of population of eight out of the twelve important fish species found in the region. Reduced catch may have devastating consequences for the coastal communities of Maharashtra, many of whom depend on fisheries as their only source of livelihood and sustenance.

To assess the impact climate variability has on different socio-economic strata we have undertaken a pilot study of fishing villages in Maharashtra. On the basis of household survey of these villages, this study discusses the ownership pattern of fishing vessels, navigation instrument and gears, loan system, vessel renting and profit sharing pattern and livelihood of fishermen of Uran and Saswane villages of Raigad district of Maharashtra.

We observe that small country boats are being replaced by bigger mechanized boats to be able fish deeper and further, thus intensifying habitat destruction. This study links how anthropogenic climate variability combined with poor regulation and perverse policies is increasing income disparity among fishing communities and pushing the vulnerable bottom quartile income group towards a state of despair.

Sustainable Coastal-Marine Livelihoods in Indonesia: A Mangrove Management Case Study

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Tropical coastal-marine ecosystems (mangrove and seagrass) are dynamic systems made up of living and non-living components that interact with each other. Well-managed and

healthy ecosystems provide many essential services, such as for fisheries, tourism, and protection of beaches and coastlines from storm surges or waves. They also regulate our global climate by storing and sequestering greenhouse gases (e.g. CO₂) using photosynthesis process, known as the Blue Carbon. The significant role of coastal-marine ecosystems in climate change mitigation and adaptation as well as their support to livelihoods are also recognized in various international declarations (e.g. the Manado Declaration for Oceans), conventions (e.g. UNFCCC and CBD) and science-policy platforms (IPCC). These ecosystem services are expected to improve coastal community livelihoods in a sustainable way.

This presentation will show the results of existing initiatives, programs and government policies as the driver of sustainable coastal-marine ecosystem based management by utilizing economic values associated with coastal livelihoods (tourism, fisheries-home industry) in Indonesia.

Can blue growth be 'unsustainable' for Small Island States? Focus on Grenada and SDG 14

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Exclusive economic zones (EEZs) offer small island states (SISs) with a Blue Economy option for their economic growth and development. However, Blue Economy Plans can be extravagant; can crowd out funding for other, possibly more urgent, policy initiatives; and can be focused on the existing neo-liberal approach to economic growth. In this regard, this paper postulates that some blue growth plans can be unsustainable for SISs. Grenada, a small island state in the Caribbean, has a land area of 344 sq. km, but with an EEZ of about 26,000 sq. km. The country has seized the opportunity to embark on a blue growth plan, which includes nine "development incentive zones". Although the plan is well intended and is premised on the idea of integrated coastal zone management planning (ICZMP), the plan may lead to an unsustainable development pathway for Grenada. The paper first argues that blue growth from a neo-liberal economic perspective can be unsustainable and suggests that the alternative concept proposed by ecological economics should lead to the desired state of island sustainability. With this perspective, [blue] growth will be tempered by the socio-ecological system. The paper further argues that the sustainable development goals (SDGs), and specifically SDG 14 that relates to the blue economy, can serve as a dashboard for gauging the trajectory towards island sustainability. However, a critical view of the plan reveals possible trade-offs among the targets set for achieving this goal and hence island sustainability. For example, SDG target 14.7, meant to increase the economic benefits to small island developing states [f] from the sustainable use of marine resources [f], including through tourism [f] is heavily emphasized in the plan. Eight out of the nine zones include the construction and operation of marinas, resorts, boutique hotels and other commercial activities related to coastal tourism. Another zone, specifically focuses on fisheries and aquaculture, and include the creation of fishing fleet marinas, which can be viewed as the intent to increase the exploitation of the dwindling supply of fisheries. This sends a signal of a possible

trade-off in meeting SDG 14.4, which calls for in part, ...effectively regulating, harvesting and ending over-fishing. Another trade-off between SDG target 14.5- to conserve at least 10% of coastal and marine areas, and SDG target 14.1 - which calls for the prevention and significant reduction of marine pollution of all kinds, including land-based activities can be demonstrated. Therefore, meeting the targets of SDG 14 as an indicator of moving toward island sustainability can be jeopardized in the current context of Grenada's Blue Growth Plan. In this regard, blue growth planners for small island states, should take cognizance of the scale and location of these infrastructure and the constraints that the social-ecological system puts on such development. This can lead to the minimization or more importantly the avoidance of trade-offs among the SDG targets, while also circumventing the perils of island unsustainability that can be associated with the extremities of some blue growth plans.

Sustainable Consumption and Production

Sustainable consumption: How materialism and trust play a role on collaborative non-ownership consumption

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The constant evolution of society and the necessity of sustainable development in the 21st century have brought changes that influence the way people see the world and, consequently, their forms of behavior and consumption. Recently, old consumer practices have been highlighted and reinvented and, amongst those emergent practices, collaborative consumption has emerged from sharing practices, commercial loans, rents and exchanges through information and communication technologies as an alternative to purchase. Within the many practices of collaborative consumption, there are numerous alternatives to product ownership through sharing, swapping, trading, or short-term collaborative renting (Botsman & Rogers 2011), named collaborative non-ownership consumption practices (Lawson, 2011, Habibi, Kim & Laroche, 2016). This perspective of consumption is important to improve the utility of goods by sharing them with others and can cause a reduction of the use of natural resources, a decrease of the production of waste and increase people's access to goods.

This research focuses on collaborative consumption through the sharing of tangible assets in online platforms, where unknown people use the online platform as a means to access goods without owning them. From this perspective, when we consider the tangibility of goods, the materialism can cause an impact on collaborative non-ownership consumption because of the need "own to be" (Belk, 1985). Other possible influences on collaborative consumption could be trust (Lamberton & Rose, 2012, Botsman & Rogers, 2011). Thus, it is worth highlighting the importance of trust both in technology sharing platforms and

between strangers for this business model to succeed. Thus, this research aims to analyze the influence of materialism and trust in the attitude and behavioral intentions of collaborative non-ownership consumption on online platforms. For this, we set specific objectives: (i) to analyze the relationship between attitude and behavioral intention of collaborative non-ownership consumption through online platforms; (ii) to analyze the influence of materialism on attitudes of collaborative non-ownership consumption through online platforms; and (iii) to analyze the influence of trust in the relationship between attitudes and behavioral intentions of collaborative non-ownership consumption through online platforms.

We first developed a model to show how materialism could affect the people's attitude, how that attitude could influence the behavioral intention of the people and how trust in strangers and trust in platforms could influence the relationship between attitude and intention as moderators of this relationship. We applied a survey to some sample of business students from universities of Fortaleza. We used descriptive statistics, exploratory factor analysis, confirmatory factor analysis and structural equation modeling. Our most relevant findings are materialism has a positive effect on attitude toward sharing products on online platforms; and trust in strangers has a strong direct positive effect on behavioral intention toward collaborative non-ownership consumption but without being a moderator of the relationship between attitude and intention as the thought.

An Empirical Exploration and Typology of Corporate Sustainability

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The relationship between business and society is evolving. On the one hand, social, environmental, and long-term economic issues subsumed under the UN 2030 Agenda for Sustainable Development are inspiring intergovernmental organizations, governments, NGOs, NPOs, foundations, and civic society to legislate and regulate corporate behavior toward a greater concern for the wellbeing of groups, regions, or entire societies. On the other, a growing trend toward protectionism, nationalism, and populism may be the consequence or expression of dissatisfaction with the perceived dissociation of the private sector toward society. As a form of self-regulation, corporate responsibility deals with the complex responsibilities businesses have toward society. However, it tends to be hampered by its emphasis on theology and philosophy-based business ethics, which are difficult to integrate into day-to-day business operations or to translate them between cultures. In this presentation, we argue that corporate sustainability could be a more useful concept to help improve on how academics and the private sector understand the links between business and society, and translate the interdependence between business and society from one culture to another. For this purpose, we empirically analyzed the relevant academic literature on corporate sustainability, using Content Configuration Analysis. Our analyses revealed three conceptual types and nine subtypes of corporate sustainability. Based on their assessment, we suggest conceptual preferences and a definition of corporate responsibility, which fulfil criteria that may render the concept

more useful to global political and socioeconomic negotiations among stakeholder groups.

Consumption patterns and the transition to a low-carbon economy in 2050 - The case for Brazil

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The Paris Agreement goals determine countries should seek to stabilize their emissions at levels consistent with a temperature increase of well below 2°C compared to pre-industrial levels by the middle of the century, ideally at 1.5°C. According to the UNEP's Emissions Gap Report, such an aim means global per capita GHG emissions varying between 2.4 and 0.8 tCO₂e in 2050, without taking into account burden-sharing aspects, say between developing and developed countries.

However, current ongoing efforts, established in the countries' Nationally Determined Contributions (NDCs) under the scope of the Paris Agreement are insufficient to reach such goals: if fully complied with, global emissions would still lead to a 3°C temperature increase.

This study analyses two exploratory emissions scenarios for the whole Brazilian economy up to 2050, with a special focus on household income and consumption aspects. In the first scenario, the Brazilian NDC is put in place up to 2030, leading to an emissions reduction of 43% compared to 2005 levels. With no extra official mitigation efforts from 2030 on, emissions resume and grow up to 2050.

The second scenario seeks to reach a level of emissions consistent with 1.5°C goals, that is, 0.8 tCO₂e per capita in 2050. We explore and discuss how changing consumption patterns and greater ecological awareness can help meet these goals, with a special focus on energy consumption, and how they relate to Sustainable Development Goals (SDGs). In this scenario, households pursue a more environmentally friendly behavior: healthier diets, with reduced meat consumption; prioritizing public and non-motorized transportation, instead of private cars; a broadened lifespan of goods such as clothes and appliances, and a more sound consumption of electricity within the household. In a general way, this leads to a less energy-intensive and dematerialized lifestyle, in which personal and cultural services are favored.

The methodological framework used in this study is a hybrid general computable equilibrium model, the IMACLIM-BR. It is developed to assess the macroeconomic and social implications of climate policies in the medium and long term in a comparative statics fashion. It combines top-down and bottom-up approaches using a double accounting system in which both physical and economic flows are balanced.

The model comprises six energy sectors (Biomass, Oil, Coal, Natural Gas, Electricity and Petroleum Products), seven industrial sectors (Pulp and Paper, Steel, Non-ferrous Metals, Cement, Chemical Products, Mining and Other Industrial Sectors), apart from the Agriculture and Livestock, Transport and Services sectors, and represents the Brazilian economy for a 45-year period, from 2005 to 2050. The household sector is divided in ten income deciles, with household consumption and income levels calibrated using national household surveys.

The model's input-output framework allows for a comprehensive understanding of the effects of changing consumption in sectors demand level, prices, job creation and their feedback effects on governmental budget and households income and consumption possibilities, GHG emissions, and so on.

An Assessment of No-Deforestation Commitments in the Brazilian Amazon: The case of soy and cattle in Mato Grosso

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Changes to forest ecosystems owing to commercial practices and land use change, is recognized as one of the biggest contributors to climate change globally, and Brazil in particular. In 2015 alone, 46 percent of the country's carbon emissions were traced back to deforestation and degradation. These changes are owing not only to forest related crops, but also to agricultural commodities that convert forest lands for global food production. As the world population is expected to reach 9.7 billion by 2050, a key challenge arises: how can the world's population be fed, without further depleting natural resources?

Owing to regulatory frameworks that have been criticized for their inadequate enforcement, increasingly activists are turning to the private sector to take action. As a result of these efforts, companies now face multiple intervention options ranging from certification schemes, group pledges, industry association self-regulation approaches, partnerships, roundtables, multi-stakeholder initiatives, and reporting frameworks. The most recent of these trends has focused on engaging companies to make deforestation-free commitments in their supply chains. In other words, to pledge to only purchase commodities whose production was not involved with deforestation.

As a result, there is now a fragmentation of approaches companies might consider in tackling deforestation. This environment has been criticized for lacking coherence for firms considering their private sector sustainability strategies.

The purpose of this research is to understand better how companies choose their options in this environment, and the implication of these findings for fostering responsible production and consumption, and climate friendly stewardship. This research is organized

around the following questions: What are companies committing to in the first place? Do companies have a coherent sustainability strategy to deal with deforestation? Are the strategies contradictory or complementary? Are these strategies likely to be durable? Is there a likelihood that they will lead to meaningful climate reductions?

While most current studies focus on a single aspect of this scenario, we see the need to take a step back and analyze these company level commitments from a broader perspective. By doing this, this study aims to understand what are the key implications, challenges and opportunities to achieve sustainable supply chains in the hopes of creating some coherence in this fragmented, and confusing scenario.

To do this, I focused on the six major companies operating and sourcing soy and cattle from the Brazilian Amazon, focusing on the state of Mato Grosso. First, I look at the various no-deforestation commitments companies are making, and the definitions they use. I then show the multiple intervention options companies face to tackle deforestation, and which company-level strategies they opted for, looking at possible patterns that emerge from this analysis. I then move on to understand what are the implications of such strategies for forest and landscape challenges, and possible opportunities for the future.

Are consumer preferences for sustainability in the textile industry in alignment with best practice approaches to sustainable supply chain management?

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The concept of sustainability has moved into the centre of any discussion on consumption and production, and this trend has been further promoted by the global agreement on the sustainability development goals. The concept of sustainability traditionally comprises environmental, social and economic issues. While environmental aspects refer to the responsible use of natural resources including water, soils and biodiversity, social aspects cover fair, safe and equitable working conditions and the prohibition of child labour, and economic aspects relate to efficient processes or fair prices.

In the textile industry, the cultural dimension of sustainability is an important topic as it likely affects consumers' behaviour and willingness to pay. The sector accounts for a large global growth rate over time and is characterized by unsustainable production and consumption. The textile industry is frequently in the media because of the unsustainable use of natural resources, poor working conditions of seasonal workers in the food production or in the textile sector. Furthermore, the amounts of waste products in the food and textile sectors are significant. As a response, the use of labels has increased tremendously within this sector. Labels aim at increasing the sustainability of the whole value chain from production to consumption. Labelling is a market-based approach which provides incentives to producers to implement specific sustainability standards which are highly valued by the consumers who are willing to pay a price premium for the labelled

product. The labelling process is generally monitored by independent third parties to ensure the trustworthiness of the labels. However, evidence is missing on the consumers' awareness and willingness to pay for the more sustainably produced labelled textile products.

Labelling in the textile industry aims at contributing to increased sustainability. Important questions in this context are: to what extent consumers are aware of sustainability issues, and whether they are willing to pay a price premium for it. How do the consumers' perceptions differ by country? The research presents evidence from consumer surveys in different countries will help to advance the concept of sustainability by incorporating insights on cultural aspects.

The presentation aims

1. to advance the concept of sustainability by incorporating the cultural dimension;
2. to identify the determinants of sustainable labelling and their impact on consumer behaviour.

Through international consumer surveys the researcher analyzed in her research project how values and life orientations related to sustainability are influenced by the different national contexts and thus influence buying behavior clothing. It was examined what "sustainability" really means to consumers in different institutional environments. The findings would be a valuable contribution to the 5th ICSD. The findings of the consumer surveys regarding the priorities of sustainability standards in actual buying decisions are then compared to approaches to sustainability of different companies in the clothing industry. In case studies of different best practice companies within the clothing sector similarities and differences in their motivation and mode of policy implementation along their supply chains are identified. Those findings regarding the companies' approaches to sustainability are compared to consumer expectations with regard to social and environmental policies along textile supply chains.

The presentation outlines the status quo of consumer priorities for distinct sustainability policies and their implementation along supply chains; what are the implications of culture and lifestyle on these priorities? Further, different company approaches to sustainability in the textile industry are being outlined.

Therefore the presentation would shed light on:

Are the consumer priorities regarding sustainability mirrored in companies' approaches to social and environmental policies supply chain policies?

Can mining countries take advantage of their mining revenues? A question of abundance, concentration and institutions

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This paper shows that the effect of a natural resource boom in mining countries is conditional on revenue concentration within the mining sector and that a “resource curse” can be generated by a combination of weak institutions and a high degree of concentration. Previous literature has suggested that resource booms can promote growth but private incentives for rent-seeking can turn them into a curse if institutions are not strong enough. This is particularly the case for mining commodities which seem to be more susceptible to rent appropriation. We further develop this hypothesis by arguing that private incentives also differ depending on whether a given amount of revenues is diversified across different commodities or concentrated in a few of them because diversification would imply higher appropriation costs and make rent-seeking less profitable. Our empirical findings suggest that an increase of 1 percentage point in mining revenues measured at the beginning of the 2000s commodity boom could enhance growth by 0.024 percentage points for a country such as Australia but that the effect is weaker and not significant for a more concentrated country such as Chile, producing a 0.007 percentage point effect. On the other hand, the same shock reduces growth by a significant -0.025 percentage points for Tanzania where concentration is high and institutions weak. A similar resource curse is found for other African economies with similar features to Tanzania such as Uganda, Cameroon, Zimbabwe and Guinea. This is an extremely worrying issue, as these countries heavily rely on mining resources to achieve economic development in the future, but have had a negative impact from the last commodity boom. Methodologically, we employ the generalized method of moments (GMM) approach for estimation and the delta method to evaluate the marginal effect of mining revenues at different levels of within-sector concentration and institutional quality. Our database comprises 131 countries for 1991-2015 and SITC-4 level of export disaggregation to measure within-sector concentration using a GINI index. We also address widespread endogeneity criticism of traditional resource abundance measures by constructing a mining commodity price index as a more exogenous source of variation in revenues.

Sustainability performance of Italian textile product

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Companies are more and more interested in the improvement of sustainability performance of products, services and processes. For this reason, appropriate and suitable assessment tools supporting the transition to a green economy are highly necessary. Currently, there are a number of methods and approaches for assessing products' environmental impact and improving their performances; among these, the Life Cycle Thinking (LCT) approach emerged as the most comprehensive and effective to reach sustainability goals.

Indeed, the LCT approach aims to reduce a product's resource use and emissions to the environment and it can be used as well to improve its socio-economic performance through its whole life cycle. Life Cycle Assessment (LCA), Life Cycle Costing (LCC) and Social Life Cycle Assessment (S-LCA) are undoubtedly the most appreciated to assist product-related decision-making activities, from the extraction and processing of raw materials, manufacturing, distribution, use, reuse, maintenance, recycling and final disposal. LCA is already an internationally standardized tool (ISO 14040, 2006), on the contrary LCC and S-LCA still lack of international standardization (even if guidelines and general frameworks are available). The S-LCA is still in the experimental stages for many aspects of its methodological structure and its practical implementation.

This study presents an application of LCA and S-LCA to a textile product. The S-LCA is implemented according to the guidelines from UNEP/SETAC (2009). The main goal is to assess and present the sustainability values of a textile product produced in a particular region, where the presence of this textile industry represents the main source of employment. In the implementation, particular attention is paid to identifying the positive impacts and to highlighting the strengths and weaknesses of the methodology when applied in this specific sector. The functional unit of the study is a cape knitted in a soft blend of wool and cashmere produced by a textile company located in Sicily (Italy). The system boundary of the study includes all phases from cradle-to-gate, from raw material production through fabric/accessory production to the manufacturing process of the product itself at San Lorenzo Group. Background and foreground processes are taken into account using primary and secondary data. The analysis carried out on the functional unit of the study allowed us to assess environmental and social performance related to the specific textile product, but also to outline the general behaviour of the company. The case study allows understanding pro and cons of a combined LCA and S-LCA to a textile product in a regional context.

Sustainable Development Challenges in Urban Areas (Climate, Water, Natural Resources, Transportation, etc.)

My city, my food: Examining the potential impact of the MyCiTi bus system on food security in Khayelitsha, Cape Town, South Africa.

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Transportation, food security, and technology are key to the sustainable development of today's cities, but few studies have been done on the intersection these issues, especially in sub-Saharan Africa. My paper addresses the intersection of transportation, food security, and technology with a special focus on Cape Town's MyCiTi bus system. By examining this transit system, I argue that the city has the potential to address the serious urban challenge of food insecurity in the city's Khayelitsha township, but so far its technological features have hampered the township's food security and thus its economic sustainability. Khayelitsha faces alarming levels of poverty and food insecurity, exacerbated by its far distance from the city center (Battersby, 2011). MyCiTi recently added routes to Khayelitsha to correct for the past spatial inequalities of apartheid, and even boasts a fare card that can act as a debit card for a small fee, thus offering customers a way to purchase food through their fares (Gauthier and Weinstock, 2010; MyCiTi, 2016). Armed with the weapons of potential spatial and economic access, MyCiTi could improve the state of food security in Khayelitsha. However, MyCiTi's technological system does not meet the needs of many of its customers: the township's food retail environment is dominated by the informal sector, rendering the debit card feature useless. Informal traders do not accept debit cards; with few fee-free fare outlets available in the township, residents in Khayelitsha are stuck with expensive transit and little access to healthy food. For Cape Town to achieve the Sustainable Development Goals, it is vital that the city make note of the realities of its various locales and incorporate such insights into its system design. Without reform, Khayelitsha residents will continue to face a double urban challenge: high transport costs and high food insecurity. Other cities around the world can learn from Cape Town's successes and challenges for their own pursuits of the Sustainable Development Goals.

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Challenges to accomplish carbon neutrality in the Helsinki Metropolitan Area by 2050

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Cities are key actors in global and country level climate mitigation efforts. Many cities around the world are committed to significantly reducing greenhouse gas (GHG) emissions through climate strategies including carbon neutrality. The City of Helsinki and the Helsinki Metropolitan area (Helsinki, Vantaa, Espoo, and Kauniainen) intend to become carbon neutral by 2050. However, accomplishing this goal poses a core set of challenges. Political issues within the city government, poor co-operation among the cities, and the slow development of carbon reduction actions in two or three metropolitan cities are the dominant challenges for the achievement of carbon neutral goal. The cities are usually weakened due to the limited power to raise the revenues to finance infrastructures investments and programmatic actions for climate change adaptations and mitigations. They also face limitations on the consistency and comparability of energy and emissions data due to jurisdictional and administrative boundaries. Helsinki Metropolitan area is comprised of four municipalities creating challenges in agreeing upon integrated approaches to climate mitigation agendas to combat climate change and implement carbon neutral target by 2050. We extracted several sectorial and citywide carbon emissions and emission production rates (MtCO_{2e}, KgCO_{2e}/inhabitant) from the online databases, re-calculated them, and constructed tables and graphs to show the development of emission reductions in each city in the Helsinki Metropolitan area. Then, we studied various factors that intervene on the development of emission reduction actions and implementation of climate strategies through interview methods. We also interviewed several energy and climate experts from various environmental institutions and city officials to recognize the challenges for carbon neutral targets. Cities in Helsinki Metropolitan area produce 43.8 % emissions from DH, 26.9 % emissions from transport, 12.5 % emissions from electricity consumption, and 12.9 % emissions from electricity and separate heating from their total emissions production. Thus, reducing emissions from these sectors is vital. Robust implementation measures to include energy transition to clean energy development, awareness programs, and citizen engagements to climate actions are vital to achieving the carbon neutral target by 2050. Strong political commitments from central government and city councils in Helsinki area is required to collaborative climate actions to accomplish the carbon neutral target.

How Best to Measure Progress Toward Sustainability in Cities: Ranking Lists vs Sustainability Plans

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Arcadis, a global design and consultancy firm which has as part of its practice master planning and sustainable urban development, has created an annual Sustainable Cities Index in which it ranks global cities on three dimensions of sustainability é People, Planet and Profit. Only two reports have been produced, the first in 2015 with 50 cities and the second in 2016, with 100 cities. Not surprisingly, the highest ranking cities in both reports are from advanced economies, and the lowest ranking cities are from less advanced economies or in areas such as India and China in which large urban areas are struggling with the environmental consequences of rapid growth. Interestingly, the top-ranked city in 2016, Zurich, Switzerland, did not appear in the 2015 list.

Because the context in which ranking lists such as this one and the stated plans and efforts (and metrics) used by the cities themselves to become more sustainable can differ, it probably is not wise to interpret the list as the final measure of a city's sustainability, nor as a measure of how successful the city is in meeting SDG 11. For example, just this April National Geographic published a case study describing how Dubai was rapidly becoming one of the greenest cities in the world (<http://www.nationalgeographic.com/environment/urban-expeditions/green-buildings/dubai-ecological-footprint-sustainable-urban-city/>), while the Arcadis 2016 list had Dubai ranked 52nd and 33rd in 2015. Consider, too, the following changes from 2015 to 2016: Frankfurt dropped from 1st to 5th; London dropped from 2nd to 5th, Singapore jumped from 10th to 2nd, and the remainder of the top 10 in 2016 (Zurich, 1; Stockholm, 3; Vienna, 4; Hamburg, 8; Prague, 9; and Munich, 10) were not even on the 2015 list. Copenhagen, Amsterdam, Rotterdam, Berlin, Hong Kong and Madrid é all of which were in the top 10 in 2015, dropped out of the top 10 in 2016. Some of the changes can be explained by going from 50 to 100 cities, but the change in ranking should not be interpreted as the cities becoming less sustainable. And it also is fair to question just what those dimensions of people, planet and profit really mean. To really evaluate what is happening in a given city, therefore, one needs both to get behind the numbers used to generate the ranking list and investigate what actions the city is taking with respect to sustainability.

The purpose of this paper is two-fold. First, it will critically analyze the Arcadis Sustainable Cities Index, comparing what it uses in its metrics to the targets and measures in SDG 11. Second, the sustainability action plans created by up to two cities chosen from the top 10, middle 10 and bottom 10 in the 2016 Arcadis list will be analyzed to see how those plans, particularly the measurement of their progress, compares to the metrics used by Arcadis, as well as to SDG 11 targets and measures. The result should provide a more nuanced interpretation of what it means to describe a city as 'sustainable'.

Global Sustainability Risk to India

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Global sustainability risk management extends beyond India's borders and will have severe impact if not planned for accordingly. According to the World Economic Forum (2016), "A global risk is an uncertain event or condition that, if it occurs, can cause significant negative impact for several countries or industries within the next ten years." The sustainable development risks include: ageing population, climate change, natural disasters, polarization of societies, rise of chronic diseases, rise of cyber dependency, rising geographic mobility, wealth disparity, shifts in power, and urbanization. It is a dichotomy to see that India is ranked 6th in countries impacted by terrorism as stated by the Institute for Economics and Peace (2015) while supporting the 55th largest economy according to the World Economic Forum (2016). In support of these facts, this paper focuses on three primary sectors of the Indian economy, agriculture, water, and the

service sector as well as three of its significant sub-categories of informational technology (IT), financial services, and tourism, and some of the global risks that have impacted these sectors as measured by the contribution to gross domestic product (GDP). This paper explores the positive and negative aspects of global economic risks and sustainability from terrorism and natural disasters and the ways in which these risks have been accepted, avoided, mitigated or transferred in India. The paper also forecasts, through its models, what one might expect to see in the identified sectors over the next decade. Specifically agriculture and water are highlighted since they are extremely vulnerable to change in today's India.

A Decision-Making Matrix for Nature-Based Solutions: A tool for identifying urban climate change mitigation and adaptation co-benefits

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As efforts continue to improve the quality of life and wellbeing of the inhabitants of the world's rapidly expanding urban areas policy-makers are faced with complex questions while attempting to determine the best path towards sustainable development. Not the least of these challenges being the various and multifaceted consequences of climate change. Among the many consequences of climate change are new or enhanced challenges to public health services and infrastructure that require creative means of mitigation and adaptation. Efforts to incorporate nature-based solutions, such as naturally inspired flood defenses, into climate change mitigation and adaptation provide the opportunity for significant co-benefits between natural hazard risk reduction and human health more broadly. Additionally, the use of nature-based solutions within urban areas can help communities work towards reaching many of the sustainable development goals through the realization of co-benefits such as sustainable food production, source water protection, recreational spaces, and enhancing local biodiversity. Identifying applicable usage of nature-based solutions should be made a priority area for effective climate change mitigation and adaptation efforts to ensure sustainable growth and prosperity in complex and dynamic urban areas. This paper puts forward a decision-making matrix to aid policy-makers in identifying potential co-benefits of mitigation and adaptation through nature-based solutions. This tool has been developed through an analysis of the academic and gray literature covering nature-based solutions. Particular attention is paid to potential nature-based solutions and co-benefits that have either proven to be or have demonstrated potential to be translatable and achievable in various development and cultural contexts. It is hoped that this tool can be used to aid policy-makers in supporting decisions to adopt nature-based solutions within their communities in efforts to address the challenges facing urban areas. Furthermore, this approach uncovers distinct and similar actions demonstrating the potential for greater international collaboration for cities to learn, innovate, and experiment to confront a climatically altered future.

A Comprehensive Strategy for Effective Urban Sustainable Development

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Pursuant to the historic December 2015 United Nations Global Climate Change Agreement in Paris, the serious responsibility for Green Growth and Building Resilience to Climate Change lies with the URBAN WORLD, where nearly three quarters of the earth's population will be residing by 2050 or before. Therefore, this presentation will focus on a TRIAD approach for Urban Sustainable Development that links the successful strategies of Effective Urban Leadership, Innovative Clean/Green Technologies, and Creative Socio/Economic Mechanisms for the quantifiable benefits to the current and future generations. Specific examples of such Case studies and Success Stories will be provided from around the world local communities - which can be easily replicated by other similar urban areas, resulting in Carbon Neutral and Prosperous Cities that can successfully combat the anticipated 2030/2050 Tipping Point of Global Climate Change scourge/disaster.

An Integrated Strategy for Sustainable Development, Global Climate Change, and Indigenous Renewable Energy Resources

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As a result of the historic December 2015 United Nations Global Climate Change agreement in Paris, France, nearly 200 nations of the world have committed to Urgent and Aggressive Action Plans to combat the anticipated disastrous impacts of climate change by 2030, particularly on the people, infrastructure, flora, and fauna in the fast-developing Urban regions. Therefore, this Presentation provides an Effective Urban Case Study Strategy Summary for Adaptation, Mitigation, Protection, and Resilience to extreme climate events & variations, using local community and grass-roots Energy, Clean/Green Technologies, and Urban Governance Leadership skills. This successful strategy can easily be replicated by other Urban Communities within the United States and abroad with minor modifications. It is assumed that all sectors of the local economy - Public, Private, Non-Profit, Academic, and Philanthropic - will continue to individually and collectively participate in this critical mission to protect and enhance the very survival of our humanity on planet earth. This effective strategy is consistent with the 2015 United Nations Sustainable Development Goals (SDGs) vis-ö-vis International Commitments as well as Obligations for the Future Generations to come.

The Role of Aided Design Software on Environmental and Urban Design Method Transitions

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Over the last decades, the uncontrolled urbanization as well as global warming effects have led to a greater awareness of the urgency to address climate change issues. The emergence of sustainable development has transformed and renewed urban design principles and practices. Whether it be about energy performances of buildings, rainwater management or pollution control, making the sustainable city requires new technical skills and new forms of cooperation. In order to address these issues, software have become more and more important in urban design practices.

Some reflections have already pointed out the transformation of the cognitive process of creation and the risk of standardization due to the adoption of software in architecture. But few papers have analyzed the importance of software as a way to address environmental issues in urban design. The purpose of this paper is then to understand the role of software on the sustainability transition of urban design. More precisely we aim at understanding the factors which enable or inhibit adoption of sustainability-oriented technologies in urban design. Through the example of a software for a sustainable rainwater management practices in urban design, we would like to raise some questions: how do the actors involved in urban design mobilize software in the realization of sustainability transitions? How do software impact the relations between the different actors involved in urban design?

In this way, this research is inspired by the transition studies and the multi-level perspective which is a fruitful framework for analyzing the socio-technical innovations. Hence, transition is considered as changes from one sociotechnical regime to another. It results from the interactions between 3 levels: niche-innovations (micro), sociotechnical regimes (meso) and sociotechnical landscape (macro). In this paper, we focus on the micro level of transition for a better understanding of the concerns about sustainability-oriented software. It is based on semi-structured interviews with architects, urban designers and engineers.

In a paradoxical way, software appear, on one hand, as a resource, giving new skills and new opportunities and, on the other hand, as a constraint for different reasons that we'll present in that paper. Besides, the interviews also point out some fears about the recomposition of the field of urban design which is at play in the sustainability transition. That especially points out the uncertainty of professional identities in this context and the relations of power that also drive the sociotechnical transition. This paper finally claims for a better understanding of the interactions between the different actors involved in sustainable innovations in urban design, in order to clarify the complexities of transitions which are unfolding at the macro level.

Vision development towards a Sustainable North Rhine-Westphalia 2030 in science-practice-dialogue. Approach, results and lessons learnt from the sustainable strategy formulation process in the federal state of NRW

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Sustainable development is a complex and uncertain endeavor that requires fundamental system changes and long-term guidance. It is a cross-cutting task that can only be achieved by coordinated strategies at global, national, regional and local levels.

In Germany, federal states play a vital role in managing transitions towards sustainable development, i.a. because of their proximity to cities and regions. The federal state of North Rhine-Westphalia (NRW) is the most populous state of Germany (17,7 million) with 396 municipalities including 28 cities with more than 100.000 inhabitants. In June 2016, NRW adopted its first sustainability strategy as the eleventh of sixteen federal states in Germany.

The development of the “Sustainability Strategy NRW” was accompanied by a research project of the Wuppertal Institute (WI). In one work package, a vision was developed for a “Sustainable NRW 2030” that draws a positive image of a sustainable NRW in 2030. The vision contains both: A narrative vision text describing a desirable sustainable NRW in 2030 and target and indicator proposals for making the vision measurable and manageable. Vision development and target formulation are important strategic instruments for sustainable development.

The vision was developed in a participatory approach in three iterative dialogue rounds with stakeholders from science (social and economic sustainability experts) and practice (civil society, leading representatives from all NRW ministries). As a result of the iterative loops, the length and contents of the vision considerably changed four times.

The targets incorporated in the vision were proposed based on existing political targets (e.g. at NRW state level or in a city) or on scientific analyses. One target proposed was an ambitious “4x25% modal split” for sustainable mobility, meaning that by 2030, only 25% of trips shall be made by car (compared to 58% today) and another 25% each by environmentally friendly modes of transport: walking, cycling, public transport. The target was proposed based on existing targets in NRW at subordinated level: Both the City of Essen and the Ruhr Region have set the 4x25% modal split target for their city (until 2035) and region (no target year).

In the end, the state of NRW used some parts of the vision developed in the research project for its own vision in the Sustainability Strategy NRW. In fact, 65% of the “state-vision” are sentences taken from the “WI-vision”, most times word-by-word. Furthermore, some of the WI-targets are now part of the Sustainability Strategy NRW in identically the same way or similarly. The vision also contains a modal split target that is similar to the target proposed (60% of all inner city trips by foot and bike by 2030).

Thus, the paper demonstrates that science can have a direct impact on policies for sustainable development. A state sustainability strategy, vision and targets also touch sustainable development in cities, as they provide common goals and guidance for where to develop regarding pressing sustainability challenges like climate, water, natural

resources and transportation. A state strategy can help to coordinate and align actions in urban areas like NRW.

Localization of SDG's through Disaggregation of KPI's

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The Sustainable Development Goals (SDGs) set forth a formidable task for the global community on international sustainable development for next 15 years. Comprised of 17 goals with 169 targets and an unknown number of indicators, disaggregation is one element of an approach to localize the SDGs. Localization is vital for the transition to Agenda 2030 and the SDGs for the global community. Lessons learned from the MDGs, rapid urbanization, and lobbying by various constituencies provided the justification for an “urban” SDG. The importance of SDG 11 is noted in the UN Chronicle: “it will be under the auspices of cities where we will succeed or fail in achieving our goals of poverty eradication, equality, climate change reduction, and ensuring healthy lives.” Much of the discussion thus far has been on the “why” an urban SDG is important but not much has been said on “how” to achieve the targets by subnational actors. In addition, the horizontal variations between and within countries should be taken into account when considering pragmatic solutions. The example of disaggregating SDG 11 and 6 demonstrates how the process to identify opportunities for subnational interventions that can achieve multiple targets and indicators. At what level of government will depend on context. In some cases where they have autonomy, subnational actors can work independently on indicators, but in most countries the purpose is to push central actors and donors to help identify a productive role for subnational governments. Although some limitations were identified, disaggregation also demonstrated that cross-cutting SDGs, like SDG 11, are more than a collection of sector-specific targets and indicators. The examples presented here are only illustrative--future research to support the development of an analytical framework that elucidates how to disaggregate and localize the SDGs would be a valuable tool for national and local governments, implementing partners and other interested parties to appropriately develop activities that properly address defining and meeting SDG indicators, improve cooperation among all involved, and limit redundancy.

Localizing Climate Change Adaptation and Mitigation into Urban Sustainable Development: Low Carbon and Climate Resilient Quezon City, Philippines

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One of the impacts of Climate Change (CC) includes an increase in the frequency and severity of hydro-meteorological events. Some types of extreme weather and climate

events have already increased in frequency or magnitude, and this trend is expected to continue over coming decades. Thus, the common concerns climate risk management have is the increased frequency and/or intensity of climate-related hazards (such as storms, floods, droughts, and landslides). In fact, the extreme weather event Super Typhoon Haiyan was one of the most intense tropical cyclones on record, which devastated portions of Southeast Asia, particularly the Philippines on November 8, 2013. Fundamentally, CC is altering the face of climate related disaster risk in most of the cities in the world, not only through increase in weather-related risks, sea-level rise, and mean average temperature increase, but also through faster pace of urban development. Cities have evidently distorted from the natural environment being replaced by buildings, roads, and other infrastructures. Such massive changes in the environment are obviously altering the ecology of cities. To prevent these kinds of CC catastrophic impacts and to make future low carbon and sustainable cities, the Quezon City Government (QCG) initiated a mandatory project (Phase I), a significant step towards creating low carbon and climate resilient city. The main objective of the project is to build a science and policy interface through Quezon City Climate Change Action Plan towards sustainable development of the City. It is done by assessing CC phenomena (Extreme weather, increasing average mean temperature and changing precipitation pattern) impact on five urban development sectors that include social, economic, environmental, land use/infrastructure and institutional intersecting with the climate change priority areas initially with water sufficiency, food security, and sustainable energy in the Philippine context. The participatory process and Geographic Information System were used as an essential part of the methodology to collect pertinent data, analyze City relative vulnerability, climate hazard exposure, risk, and adaptive capacity. The analyses revealed among others are projected causalities, economic losses per capita, infection rate, and scope of green house gases emission by 2030 and 2050. The scientific output of this project provided decision makers, direct and indirect stakeholders an opportunity to prepare the said action plan that consist of urban sectors and CC priority areas cross cutting Projects Programs and Activities (PPAs) with its corresponding budget and time frame. Certainly, the implementation of the action plan will gear the future development of QCG towards low carbon and CC resilient city. The research methodology and action plan template of this project is flexible and fashioned on sound scientific knowledge toward enhancing key areas needed to create resilient societies and to establish globally effective tools as foundations to support achieving imminent of the Paris Agreement and the Sustainable Development Goals up to 2050.

Sustainable Vision for Cities and Regencies in Indonesia

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In 2035, Indonesia's urbanization rate is expected to reach 66.6%. Four provinces on the Island of Java such as Jakarta and Yogyakarta Special Region, West Java, and Banten will reach above 80% rate. Such condition can actually improve the efficiency of cities in the use of resources and create products and services; however, if cities are not properly

planned and built, this rapid rate of urbanization can put pressure on water supply, sewage systems, public health and other sectors.

In addition, the impacts of climate change will also become a major threat to urban development. Cities and regions are the center of human activities that emit huge amount of greenhouse gases (GHGs) emissions. In Indonesia, activities in cities contribute to enormous emissions. As an example, in 2005, Jakarta emitted 35.09 million tons of CO₂e, compared to 2.1 billion tons of CO₂e throughout Indonesia.

The growth of urban areas in Indonesia is very rapid. By 2020, the country is expected to have added 20 metropolitans, 50 cities above 500 thousand inhabitants, and more than 100 small towns. These small towns have the potential to store carbon, but are high in emitting GHGs due to limited technological and mature planning and integrated applications.

The rate of population growth in urban areas has reached 2.75% per year, greater than the national population growth rate of 1.17% per year.

Many urban communities in Indonesia have felt some of the impacts of climate change. Some of these impacts are irreversible. Cities in Indonesia are particularly vulnerable to the effects of climate change, mostly due to the following:

- Indonesia has more than 13,000 islands and most provincial capitals and nearly 65% of Indonesians live in coastal areas.
- Most economic activities and assets; social infrastructure; and government facilities, are in cities.

There is a clear need to shift from business as usual practices to a more sustainable and climate resilience future. The national government has integrated these principles into the development planning both in medium and long-term. Some mayors and regents also step up to lead the way for a sustainable cities and regencies. Nevertheless, challenges remain, such as the availability of baseline data, capacity building, and institutional barriers.

Climate actions and the path for a sustainable future should be carefully and comprehensively planned for long-term perspectives because once cities are built, the infrastructures and the land-use patterns will be locked for decades.

Sustainable Use of Water Resources

The Contribution of Mining to Clean Water and Sanitation (SDG 6): Case Studies from South Africa

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Meeting the United Nation's Sustainable Development Goals (SDGs) by 2030 will require commitment of, and collaboration between, all sectors and stakeholders, including governments, non-governmental organizations, the private sector and communities. One of the sectors of key relevance to many developing countries, is that of mining. Although mining has the potential to make a significant contribution to sustainable development in mineral resource-rich countries, it can also lead to degradation of the surrounding environment and impact negatively on the health and well-being of local communities. It was in this context that the World Economic Forum (WEF) published an atlas in 2016 ², which maps the relationship between mining and the SDGs, and highlights opportunities for mining companies to make positive contributions towards achieving these goals.

In accordance with this atlas, an SDG of particular relevance to the mining sector is that of Clean Water and Sanitation (SDG 6). This is because mining operations can impose long-term, and sometimes permanent, impacts on the availability and quality of local water resources, and consequently on the quality of life and traditional livelihoods of surrounding communities who depend on local water resources for domestic use, agriculture and livestock farming. These risks can, furthermore, translate to very real tensions and conflicts between mines and external stakeholders (communities, governments and other industries), particularly where mineral resources occur in water-stressed, environmentally sensitive or culturally sensitive areas. The mining atlas outlines many opportunities for the mining industry to contribute to adequate access to clean water and sanitation, by reducing its own water footprint and by increasing the local supply of water and sanitation through the sharing of water infrastructure and expertise with local governments and communities.

This paper presents two case studies which highlight how mining operations are contributing to the provision of clean water in water-stressed areas in South Africa through reduced wastage, promotion of process water re-use and recycling, and the use of non-potable, secondary resources in their operations as far as possible. Furthermore, by entering into partnerships with local governments these operations are directly contributing to the provision of clean and adequate water to local communities, and the development and implementation of integrated water resource management plans on a regional scale.

Improving drinking water security (SDG 6.1) in Bangladesh through data reconciliation, handpump data loggers, and institutional design

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This study explores the contingencies of the data revolution on the complexities of institutional design, specifically to evaluate new data technologies applications for the drinking water sector. Recent assessments of national and global information systems show a mismatch between the demand and supply of water-related data sets, specifically

for the delivery of safe drinking water, the management of complex river systems and the availability of robust rainfall series. This study suggests a framework to link traditional approaches of data inventories with five components related to information system design and the demands of public and private actors. Each component is aligned with an existing, or proposed, tool and method by development practitioners. We seek to demonstrate an approach which explicitly links the assessment of decision-making processes within polycentric systems of governance to the innovations of the data revolution.

This approach is applied to the context of Bangladesh, a country that claimed early achievement of the MDG goal to increase access to improved drinking water sources. Bangladesh provides a context with a unique confluence of multiple water-related risks and vulnerabilities and an explicit political commitment from the Prime Minister to address these challenges across the SDG 6 targets. Based on a desk assessment and interviews with key government policy makers, service delivery agencies and United Nations country program teams, this paper evaluates the potential for data reconciliation technologies to help streamline and digitize the administrative processes within the existing water governance institutions.

Data reconciliation technologies now offer methods to increase the accessibility of existing data, repurpose information for multiple uses, and change the value proposition if the information to multiple levels of decision-makers. This paper seeks to discuss how existing data sources from the water management sector in Bangladesh could be utilized to provide additional measurements related to the SDG 6.1. Data is being generated daily across various functions and levels of government and private sector actors with the potential to aggregate into a structured data base. This has been piloted in India administrative data from both public and private sector groundwater drilling records, regional government engineering reports, public water utility records, government laboratory water quality tests, and non-governmental organizations project investment records. There is also a range of hydro-climatic data from diverse sensor systems that are reportedly not aggregated into national data sets, we identify these for national partners but do not focus on them within the report.

The paper concludes with a second example of recent innovations with handpump data loggers in Bangladesh. The simple technology provides an opportunity to address the multipronged risks undermining safe and reliable water in public facilities like schools and publicly provided deep tubewells. These technologies could enhance global reporting and measurement, improve delivery of services, especially to the most vulnerable, and have accidental impacts on accountability and decision-making within the service delivery and regulatory systems.

Mining and Communities: Turning risks into opportunities through shared approaches to sustainable water management

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Access to clean water and sanitation is one of the grand challenges of sustainable development, and a focus of UN Sustainable Development Goal (SDG) #6. With growing global demand, clean water is becoming an increasingly scarce resource. One result is that access to water is a frequent trigger of tension between mining companies and communities.

Around two thirds of the world's largest mines are in countries experiencing high water stress. The point of intersection between community and company demands for water therefore creates the potential for conflict. Yet it also creates an opportunity for mining companies to make a significant contribution to sustainable development.

Mining companies are increasingly recognizing that water is more than a commodity to be bought and sold. It is a strategic asset. The result of this new way of thinking has been an increase in collaborative partnerships between mining companies, communities, government agencies, and other water users, to support collective water solutions. The objective of these partnerships is the shared and sustainable use of water resources.

This paper examines the rationale and outcomes of collaborative partnerships undertaken by mining companies and communities in resource-rich areas of water scarcity. While acknowledging the diversity of perspectives on the value of water, the paper seeks to consider how disparate views can be reconciled to secure sustainable outcomes. Detailed case studies from the Gobi Desert of Mongolia and from the Arequipa region of Peru are used to explore the requirements necessary to establish initiatives that deliver equitable benefits to both business and society.

It will be argued that when mining companies take a long-term, strategic approach to their corporate social responsibilities, it is possible to establish frameworks for the sustainable use of resources and advance progress on the SDGs.

The Arts as a Tool to Raise Awareness of the SDGs

Dance and mixed media performance for building scientific understanding and environmental respect

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Humans generally retain information better through visual intake than auditory. Why then are scientific concepts so often communicated through words? The use of art, specifically visual or performing arts, can help people remember concepts and the importance of the natural environment. Historically, art has been successfully to expose social science phenomenon, political motivations, and to build community. It's time we use art to

expose more physical science discoveries and as a discourse about the environment that unifies.

Not only do we want audiences to remember our discoveries, we want to create transformation. This science has a goal: protect natural resources and enable people to live comfortably and long-term in their environments. Having a purpose means the communicator desires changed actions. Change does not come easily, whether for an individual driving less or a politician prioritizing carbon emission policy over economic development opportunity. Personally, I act primarily on what I feel even if I also rationalize. For example, I recently started eating less meat. My “reason” was environmental. I had known for years that methane produced by cows affects the atmosphere, yet took no action. Then I calculated my water footprint and related two bites of meat to a day of painstaking reduction in water use and experiences with water shortage. I felt those impacts deeply, related that to my environmental impact as I ate a burger, and changed. When I travel for research on water, I act diligently because I can relate to stories of people observing their land changed. I think of my rural homeland I visit every summer, and my sadness over even small anthropogenic changes. Stories, feelings, and experiences of nature motivate action. Yet we are in NYC, with global population shifting to urban centers, where it’s challenging to encourage reflection and feelings regarding the environment. For creatively communicating the physical world, I propose that dance is especially apt. I have had success in projects and explorations which I would present with short video excerpts and few seconds of inviting the audience to participate in guided movements.

I have experienced dance as an effective communicator, but I recognize that all people are different. I used my engineering to design a study of a performance in the summer of 2017. In it, audience members’ reactions will be filmed and the audience will complete a survey right after the performance and one month later. The performance will include dance, visual art, theater, poetry, live music, video, and mixed media (projected image behind dancers with live music also playing). Each medium will be based on at least one fact related to environmental change, will draw inspiration from an aspect of the natural world that is wonderful or admirable, and each artist will identify possible actions that an audience member could take as a result of seeing their performance. These, however, will not be communicated explicitly to the audience. The research questions being addressed by the surveys, and analysis of the video, include:

- Q1. Which artistic medium produced greatest physical or emotional feeling?
- Q2. Which inspired the most personal reflection and thought?
- Q3. For which medium was the knowledge or experience gained also retained over time?
- Q4. Which media motivated action or lifestyle change?
- Q5. Which inspired conversation related to the environment in the days following the performance?

The results of the study will be presented with a conclusion on how dance and other art mediums can not only raise awareness but also help achieve the SDGs.

The Role of Natural Resources in Peace-Building

Building trust and collaborating with others: challenges for a sustainable peace in Caquetà, Colombia

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After 54 years of intern conflict, last December, Colombia signed a peace agreement between the national Government and Fuerzas Armadas Revolucionarias de Colombia (Farc). The implementation of the peace accords requires unusual levels of participation and consultation with local communities, as decisions over development and growth will have to originate from the bottom up. A new post é conflict scenario will impact the way different stakeholders interact, plan, decide, implement and measure impacts and results that affect communities.

From May to August 2017, I conducted my field practicum in one of the most affected regions by the war called Caquetà (Colombia) with a national NGO, Fondo Acci"n (FA). The objective was to ascertain what dimensions of community capacity building have materialized (and in what way) through Paisajes Conectados, a program that FA has implemented in the region since 2013 to promote alternative, environmentally-sound, low-carbon economic options, food sovereignty and sustainable livelihoods for rural communities. During the field practicum, I used documentation review, semi-structured interviews, focus groups, social mapping, and spider web representation as the core of the methodology.

For the field practicum, I understood that community capacity is composed of the tangible and intangible outcomes that the members of a community have achieved because of strengthening of the community's abilities to define, assess, analyze, and act on any important matter for them. Moreover, nine dimensions allow to measure capacity building in a community (Participation, Leadership, Organizational structures, Problem Assessment, Resource mobilization, 'Asking Why,' Link with others, Role of outside agents, Program Management) according to Marion Gibbon, Ronald Labonte and Glenn Laverack (2002). These dimensions allow to identify what skills, resources, and knowledge communities have; none dimension is more important than the other.

Considering the post-conflict scenario in the country and the challenges it entails, the field practicum recommendations will allow local government, Fondo Acci"n, former Farc members and communities to identify the strengths and weaknesses of the community capacity building in the region to design and implement more participative, holistic and integral public policies for peace-building phase.

Blood and Soil: The Dynamic Relationship between Natural Resources and Social Conflict

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Despite increasing urbanization worldwide, human populations continue to depend heavily on the natural resources which surround them. Understanding this interaction between societies and natural resources is critical for the health and stability of a population. Strained resources due to desertification, droughts, floods, or other natural disasters can exacerbate existing tensions and inequalities existing within a community. In times of decreased access to resources, such as food, conflict can arise around issues of politics, migration, or economic inequality. This capacity of resources to bring about conflict from underlying social tensions is a crucial process to understand when concerned with the potential contribution of natural resources in peace-building efforts. As such, this study seeks to identify the links between resources and conflict while grounded in the understanding that conflict events at times of strained resources often indicate an interaction between resource access and existing social stressors.

Specifically, I draw upon data from the Social Conflict Analysis Database, which documents social conflict in Africa, Mexico, Central America, and the Caribbean including strikes, riots, protests, government violence, and communal violence. By mapping conflict data over weather patterns, food supply, political representation, migration patterns, and neighboring violence, this study connects natural and social characteristics of a region with violence within the area. This level of analysis allows for tests and data usage that span national borders highlighting the transnational aspects of climate change effects on resources, building upon studies which have connected specific resource access to varying levels of violence. By understanding the ways that resources like food and water can contribute to or detract from violent conflict, we can better determine intervention strategies to prevent further conflict, as it has the feedback effect of often further limiting access to resources. With climate change predicted to continue affecting rainfall and crop yields, particularly in Africa, analyzing the way that these processes interact with existing institutions and affects conflict will be increasingly critical.

The Role of Universities in the Implementation of the SDGs

Towards the implementation of SDGs in Jalisco, Mexico: The University of Guadalajara Green Campus Initiative.

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Mexico's higher education system has an enormous potential to make a significant contribution towards the achievement of the Sustainable Development Goals. In this paper I develop a case study of University of Guadalajara's (UdG) green campus initiative. In particular, this case study sheds light about the opportunity areas that should be accelerated throughout UdG in order to align its own demands and strategic goals with the Sustainable Development Goals. More generally, I explore the potential to scale up key findings from UdG's green campus initiative to the context of Mexico's public universities national subsystem which, despite its complexity, offers a vast array of intervention instruments and networks to ignite sound sustainability management policies.

UdG's mission has always been implicitly towards goal four: quality education. More recently, UdG launched two initiatives with direct impacts in two additional SDG goals: responsible production and consumption and climate action through a low carbon energy transition program. De facto, however, UdG tangentially fosters at least other five Sustainable Development Goals, namely, goals 1, 3, 5, 8 and 9.

So far, UdG's implicit contributions to other SDGs lacks a sound framework that sets up a monitoring and evaluation cross-cutting system. Seen as an opportunity area, this paper proposes a monitoring and evaluation system towards the sustainable development goals for UdG at the design level. In order to construct this platform, current strategic plans and other planning instruments are combined with the array of indicators that have been and proposed by the SDSN.

At the core of the M & E system lies the challenge of how to articulate sustainable development and sustainable development goals as a set of guidelines and indicators that cross-cut UdG's curriculum at the macro level, and provides flexible mechanisms that enable the absorption of specificities and local needs that each of the 18 campuses has in mind. In this sense, two main pathways need to be polished to achieve much higher sustainability impacts in the long term: i) the outreach university component of regional campuses and their relationships with local and regional municipalities and ii) the introduction of cross-cutting and new sustainable development programs both at the undergraduate and graduate level.

Development of a Platform for Sustainable Development in Africa through Minerals and Metals

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Minerals and metals fundamentally underpin every aspect of modern society with no carbon-neutral economy possible without mining. However, the global mining industry is facing increasingly complex, multi-faceted internal and external challenges which require innovative, integrated and interdisciplinary approaches to address them. In its Scoping paper on Mining and Metals in a Sustainable World, the World Economic Forum (2014) emphasises, amongst other things, the need for appropriate research and development of

technologies to operate in a clean and safe environment in frontiers previously considered inaccessible. It also recognizes that the skills and capabilities needed to operate in a sustainable world are different to those required currently, and need to be cultivated. The United Nations' Global Sustainable Development Goals (SDGs), accepted in September 2015 (United Nations, 2015) provide the structure by which to understand, frame and address these challenges.

The Minerals to Metals (MtM) Initiative was established in the Department of Chemical Engineering at the University of Cape Town (UCT) in May 2007 with the aim of integrating and expanding capacity in minerals beneficiation research. MtM has a problem-oriented approach developing solutions focused on enhanced value addition and resource productivity through the conversion of minerals to metals in a manner congruent with providing a sustainable future for African people and their environment. This is achieved through three inter-connected activity areas, viz., research, education and engagement, which are aligned with UCT's mission 'to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society'.

The continually evolving research program is underpinned by a number of industry-based projects and case studies which together explore the sustainability challenges facing the minerals sector from both a systemic and fundamental perspective. The research is aimed simultaneously at reducing the environmental and social impacts of mineral beneficiation operations, developing safe and sustainable operational practice and increasing the amount of mineral or metal extracted from each ore body beneficiated. Technology choices are developed and evaluated not only in terms of the conventional economic returns, but also with regard to their impact on the natural and human environments, which allows stakeholders to make more holistically informed decisions.

In 2014, in order to provide an inter-disciplinary postgraduate qualification that highlights the critical factors of sustainable development in the context of mining and minerals processing in Africa the research-based master of philosophy programme specialising in sustainable mineral resource development was inaugurated. In three years since 2014, fifty-four students from six countries have registered for the MPhil, with courses delivered at four university campuses in Southern Africa, thus pioneering the new frontiers of trans-disciplinary research and development of leadership capacity.

The Minerals to Metals Initiative provides a platform for sustainable development through minerals and metals and continues to play a pivotal role for UCT, South Africa, Africa and the world.

University Entrepreneurship: Legislation and Public Policies. Study of KTOs at Mexican Universities, and a Proposal for the Promotion and Fostering of Protected Technological Innovation for the Strengthening of Competitiveness and Economic Development of the Country

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Research on university entrepreneurship is recent (with little more than 26 years of existence). The refereed literature has been studied by authors such as Rothaermel. The countries that have contributed fundamentally to this subject are: United States, United Kingdom and Sweden. Mexico does not appear with relevant contributions.

This work is based on the literature referenced by Rothaermel and his collaborators, incorporating some other significant researchers. In the case of Mexico, sources such as legislation and public policies implemented in the last two six-year periods, are used.

Mexican universities (public and private) have poor entrepreneurial activity in their different dimensions: patenting, licensing of intellectual property rights, creation of incubators, science and business parks, creation of new companies, etc., to the detriment of competitiveness and of the country's economic development. What would be the appropriate legislation, as well as the right public policies to promote Mexican university entrepreneurship, in such a way that it contributes to the promotion and fostering of protected technological innovation for the strengthening of competitiveness and economic development of the country?

The response and its proposal are in line with the SDGs Objective 9 of the agenda 2030: Industry, innovation and infrastructure. It involves collaboration between governments, civil society, the private sector and other entities, such as universities. This research focuses on their role in the implementation of Objective 9. The University-Company linkage is definitive, so that the country's legislation and public policies have undergone recent modifications in order to strengthen this interaction. With this, a positive impact and achievement of the following goals of Goal 9 are expected: a) "To increase scientific research and improve the technological capacity of the industrial sectors ..., inter alia by encouraging innovation ... Expenditure on research and development ... "; b) "To Support the development of national technologies, research and innovation ..., ensuring a supportive policy environment ..."

This research carries out: a) A theoretical analysis on the importance of technological innovation, technology transfer, and industrial property, and the role played by the State in promoting these processes in Mexico as a means to increase the competitiveness of its companies and their insertion in the international economy; b) the evaluation of the functioning in Mexico of the systems created by the State to promote and control technological innovation, transfer of technologies and industrial property, and the incidence of these systems in public and private universities that have Knowledge Transfer Offices (KTOs) certified by the FINNOVA Programme (SE-CONACYT). The information obtained has been published on the websites of universities.

What do the Sustainable Development Goals mean for research?

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The Institute for Sustainable Futures, University of Technology Sydney, Australia, is a transdisciplinary research institute with a mission to create change towards sustainable futures. As the Institute celebrates its 20th anniversary in 2017, we reflect on our evolving responses to the question, “How do you achieve sustainable futures?” and our learnings about the importance of the connectivity, complexity and inclusivity in research to achieve the Sustainable Development Goals.

We will share our experiences in conducting research for sustainable development, across faculties and disciplines, collaborating with other universities and in partnering with a wide range of stakeholders across the globe. Our paper presents a mapping exercise demonstrating how our research relates to the SDGs. Reflecting on the contemporary opportunities and challenges facing the academic and development sectors, we also articulate a work-in-progress model for universities seeking to implement the SDGs through research.

Across research, policy-maker and practitioner communities, there is some trepidation that the number and breadth of the SDGs and targets will hinder effective implementation and measurement. In response, we posit that a clear starting point and organising structure for research organisations is to recognize and focus on the following three dimensions of sustainable development:

- > Connectivity - The SDGs explicitly address interactions within and between environmental, economic, financial, social, legal and political systems [1][2]. The implication for research is that it is critical to integrate knowledge across disparate disciplines and take a systems perspective.
- > Complexity - Due to the uncertain, dynamic, non-linear nature of the above systems, global sustainable development challenges have the characteristics of “wicked problems” [3][4]. Traditional models of risk analysis are no longer sufficient, creating a need across disciplines to focus on pathways and transitions, not just current state or end-points, and for methods and practices to address system flexibility, adaptability and resilience.
- > Inclusivity - Social equity and social justice are at the core of the SDGs. There is an opportunity for researchers across disciplines to understand and embrace concepts of voice, representativeness, participatory democracy and indigenous knowledge [5]. Truly collaborative research activity with multiple sectors beyond academia poses deep challenges, but is required to implement the SDGs.

We will share case studies, challenges and learnings from our experiences in:

1. Creating a transdisciplinary research institute (and recently, a Transdisciplinary Faculty) to cut through the constraints of traditionally ‘siloes’ research - incorporating and advancing knowledge in the social sciences, natural sciences,

- engineering, law, architecture, planning, economics, business and finance, health sciences, and public policy [6].
2. Partnering with governments, businesses, community, industry and non-governmental organisations to co-develop and co-implement research.
 3. Futures studies.
 4. Measuring research impact for sustainable development, including transforming conventional academic metrics.
 5. Transdisciplinary postgraduate research for sustainable development.

This paper will provide unique insights based on experience over 20 years into opportunities and responsibilities for universities supporting implementation of the SDGs.

[1] <https://www.ecologyandsociety.org/vol14/iss2/art32/>

[2] <http://dx.doi.org/10.5751/ES-07082-190449>

[3] <https://doi.org/10.1016/j.futures.2014.02.002>

[4] <http://dx.doi.org/10.5751/ES-05330-180231>

[5] <http://hdl.handle.net/10453/18956>

[6] <https://www.routledge.com/Transdisciplinary-Research-and-Practice-for-Sustainability-Outcomes/Fam-Palmer-Riedy-Mitchell/p/book/9781138119703>

Challenges on establishing a sustainable development program at Université Alioune Diop de Bambey, Senegal

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Situated in rural areas, in an environment characterized by relatively high poverty and deteriorating ecosystems, l'Université Alioune Diop wants to fully contribute to the economic and social development of its country and its surroundings, the Diourbel region. To this end, emphasis was placed on sustainability with the creation of a sustainable development department and the launch of a bachelor's degree in sustainable development and environmental management. This cross-disciplinary training focuses on the three fundamental pillars of sustainable development: economic efficiency, social equity and environmental quality. In addition to this training offer, UADB set up a gait that supports integration, implementation and achievement of the Sustainable Development Goals (SDGs), taking into account local perspectives. In that regard, two workshops focusing on an integrated approach of the SDGs were organized in partnership

with Université Laval de Québec. These workshops were consisted of a simple, pragmatic, participatory and accessible approach that made it easier to land SDGs and facilitated their comprehension, appropriation and implementation. Through these workshops, participants had to understand and integrate SDGs in order to diagnose local problems and propose adequate solutions, with an open-mind and a collegial approach. These workshops permitted to mobilize collective knowledge around sustainability issues from the actors of the community, to discuss open-mindedly on various subjects related to SDGs targets and to establish regional priorities around these issues, highlighting the role of UADB as an active actor of sustainable development in its region and its country.

This communication will present the different phases of these workshops' implementation, focusing on the methodology adopted, difficulties encountered and provisional results.

Gender Sensitivity or Gender Content?: Gender Mainstreaming Curricula and Promoting SDG 5 at a Tanzanian Teachers College

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Although conceived of as enlightened spaces of learning and progress, universities worldwide remain sites at which gendered marginalization, discrimination, and violence thrive (Simpson & Fitzgerald 2014; Boyle et al. 2017; Mama & Barnes, 2007). In spite of this, universities are sites of professionalization and critical thinking, providing an interesting space for the Sustainable Development Goals (SDGs): on the one hand, the SDGs can be fostered and taught; on the other hand, universities can practice the SDGs from within, reaping benefits for students and staff alike. In the case of SDG 5—gender equality and female empowerment—there is much progress to be made from within. Since the 1990s, gender mainstreaming (GM) has been used internationally as a tool for promoting gender equality, taking into account women and men's experiences and positionality when designing policy, as well as analyzing the effects that policies subsequently have on various genders. Not only has GM been used in national and international policy discourse, but it also constitutes a framework with which academics have studied gender and higher education, pairing it nicely with SDG 5.

In the context of Tanzania, challenges to equality and empowerment in higher education include lack of parity in the ratio of female and male students, particularly in the sciences, as well as imbalance among academic staff members. More qualitative issues including unequal student participation, lack of safe accommodation, and sexual harassment/exploitation also persist. Although universities inherit challenges from the primary and secondary levels, they nonetheless have a responsibility in redressing and eliminating inequalities. As long as universities remain such problematic spaces, the transformative power of higher education is limited.

The Tanzanian teachers college about which this study is concerned boasts a Gender Policy with a number of goals, including gender mainstreaming its curricula. The policy's goals include "providing guidelines that will enable the college to mainstream gender in the curricula programs and projects to ensure they are gender sensitive" as well as "reviewing all the curricula for gender responsiveness." Using qualitative data from focus group discussions and semi-structured one-to-one interviews with a total of 17 academic staff members, this paper explores stakeholders' perceptions of this policy goal. More specifically, this research interrogates the meaning of gender mainstreaming curricula, exploring perceptions to both gender sensitive/responsive curricula as well as curricula containing gender content. This study's results—as well as close examination of existing literature—show that there are important distinctions between these two forms of gender mainstreaming curricula. These results illustrate that in order to promote gender equality in higher learning institutions, there must be increased research and policy specificity regarding gender mainstreaming curricula.

Citations:

Boyle Kaitlin M., Ashley Barr & Jody Clay-Warner. 2017. "The Effects of Feminist Mobilization and Women's Status on Universities' Reporting of Rape." *Journal of School Violence* 16(3): 317-330, DOI: 10.1080/15388220.2017.1318580.

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University of São Paulo Environmental Policies: Challenges and Achievements

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The University of São Paulo (USP) is the largest and one of the most prestigious universities in South America with an academic population of nearly 150,000 people (127,000 students, 17,000 staff members and 6,000 teachers). USP has 14 campuses all over the State of São Paulo and an annual budget of US\$ 1.4 billion, totally funded by the State of São Paulo, Brazil. Almost twenty years ago, USP started to take action towards sustainability and reduction of its environmental impacts. As the Superintendence of Environmental Management was created in 2012 to expand these initiatives and to promote environmental education inside the University, it became necessary to define environmental policies for all campuses prior to the establishment of specific indicators and targets, considering the differences between campuses located in rural and urban areas. Such policies aim to facilitate the implementation of some Sustainable Development Goals in the academic environment, specially regarding sustainable management of water, waste and sanitation; reduction of campuses' greenhouse gas emissions; protection and restoration of campuses' ecological

reserves and wildlife; and projects for enabling greater integration of academic community and for making campuses more inclusive. Since 2014, USP initiated a comprehensive Sustainability Management Plan, coordinated by the Superintendence of Environmental Management (SGA). This plan was divided in four phases:

- 1) Definition of 12 Environmental Policies for the University (November 2015);
- 2) Definition of Management Plans with indicators and goals (June 2016);
- 3) Elaboration of Sustainability Masterplans with 11 thematic chapters for each campus (July 2017);
- 4) Elaboration of Specific Sustainability Programs for each Faculty or Department (December 2017).

The execution of such Sustainability Management Plan is still in progress and its completion is expected for December 2017. It is an ambitious goal that involved almost 1,000 people in the process. This paper intends to present the methodologies developed to achieve the sustainability goals of the University of São Paulo and the results already achieved.

Universities and Clean Cities: Building Synergies and Partnerships for Sustainable Waste Management

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Achieving sustainable development goals entails shared responsibilities (inter-sector partnerships) and synergistic frameworks (integration of knowledge/expertise). While universities are well positioned to take a lead in developing Clean and Green cities, their active role has not yet been felt. This study explored opportunities and constraints for Academia-Public-Private Partnerships (APPP) on sustainable municipal waste management in Uganda. It was premised that universities could bridge municipalities' inadequate human and financial resources for waste management by developing; 1) socioeconomic incentives for community engagement in municipal waste management; 2) technical capacity and business models for attracting private sector investment in municipal waste recycling and; 3) streamlined institutional frameworks and; 4) supportive policy framework on waste recycling. The study investigated drivers and barriers for universities partnerships with public and private sectors on municipal waste management. Methods/approaches: Quantitative and qualitative data was collected through questionnaires, in-depth interviews, literature reviews, documents analysis, focus group discussions, participant observations and content analysis (of interactive television/radio debates and social-media interactions) and documentation of experimental trials. Respondents from the following agencies were engaged during the data collection processes; Kampala Capital City Authority; Municipalities, National Planning Authority, National Environment Management Authority (NEMA); Industries and business units in municipalities, Ministries of Energy, Environment, Forestry, Universities, Civil Society Organizations (NGOs/CBOs) and research institutions. Preliminary findings reveal that while relevant knowledge exist, waste recycling and reuse have not up-scaled significantly to impact on municipal sanitation. This is partly because of; a) Low levels of public awareness of prospects of waste-recycling; b)

Inadequate technical and entrepreneurial skills at grassroots levels; c) lack of requisite start-up and scale-up capital for waste recycling projects; d) Non-streamlined policy environment and; e) absence of national institutional frameworks on waste management. While there are opportunities for the academia, public and private sectors to pool technical, human and financial resources for joint ventures on waste management, inter-sector linkages have not been developed. To begin with, universities' research agenda is occasionally dictated more by external donor interests than local challenges. Over-dependence on donor funding means that local industry, business and other sectors rarely support or get supported by university research. Driven by desire to publish in prestigious international journals, faculty research is more academic than applied and hardly address practical local challenges. Other factors include; a) incompatible work cultures between universities Faculty on one hand; practitioners in public and private sectors on the other; b) academic orientation of university activities (characterized by theories and jargon) occasionally repel public and private agencies (who focus on practicality and relevancy); c) inertia; rigid and conservative university structures stagnate prompt decision making; d) Rigid disciplinary boundaries within departments and faculties that fragment knowledge; e) 'Ivory Tower' confinements which limit the scope of universities operations; a typical university community is a closed club of professors and students living in relative isolation and consequently lacking appreciation of local issues and challenges.

Opportunities/best practice: Ndejje University, a Ugandan private chartered university has pioneered a scheme referred to as Academia-Public-Private-Partnership (APPP) on municipal waste management. The three phased scheme comprises of;

1) Multidisciplinary team building: for integrating fields that relate with waste recycling. These include

a. Engineering; generating bio-energy from organic wastes for powering municipal greening initiatives (irrigation) and wastewater treatment;

b. Agriculture; producing bio-char and compost for municipal greening initiatives;

c. Business/management; socioeconomic incentives, business models and entrepreneurship skills for up-scaling municipal waste recycling and;

d. Social sciences, ICT & education; popularizing waste recycling and reuse.

2) Joint ventures with public-private-sector agencies: Conducting participatory needs assessments involving faculties and public-private-sector agencies; joint project planning, implementation, monitoring and evaluation. Workshops have so far been conducted with 5 municipalities, 4 central government agencies and 9 private sector agencies. This phase was occasioned by a corporate dinner for the launching of the first Academia-Public-private partnership on 17th February 2017, graced by the president of Uganda.

3) Dissemination and capacity building initiatives; use of user-friendly multimedia platforms to inform grassroots communities; imparting technical, financial and managerial skills in communities and educational institutions. This phase was occasioned by the first international scientific conference on bio-waste recycling in Uganda on 26th - 28th September 2016 opened by Minister of Energy/mineral resources and closed by Minister of Water and Environment. <http://www.ndejjeuniversityconf.ac.ug/>

Global Learning for Global Results

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NAFSA: Association of International Educators, is the world's largest association dedicated to international education. With 10,000 members in 150 countries, we work to promote the development of global competencies in students and professionals around the world. Our work supports universities, educators, and professionals in fostering understanding and respect among people of diverse backgrounds and perspectives. It is essential that students become both cross-culturally proficient and globally aware. To tackle the global problems that the Sustainable Development Agenda seeks to address, students must understand the ways in which these problems are interconnected. They must also feel empowered to take responsibility for implementing solutions that will help achieve the Sustainable Development Goals.

This presentation will provide strategies and best practices for helping universities to prepare students with the cross-cultural and global competencies needed to implement these solutions. These competencies include:

- Global Self-Awareness;
- Perspective Taking;
- Cultural Diversity;
- Personal and Social Responsibility;
- Understanding of Global Systems; and
- Application of Knowledge to Contemporary Global Contexts (in Locally-Appropriate Ways).*

Strategies for the development of supportive international partnerships will be shared. The presentation will also offer best practices for integration into the curriculum. Examples from professional programs in:

- Science, Technology, Engineering, and Mathematics;
- Medicine, Public Health, Health Sciences;
- Education;
- Law; and
- Business

will be shared along with cross-disciplinary examples. Strategies for ethically and responsibly engaging globally with local communities to further these goals will also be examined.

Through partnerships with universities, professional schools and organizations around the

world, NAFSA has developed strategies and best practices to promote the development of these crucial competencies in students across the university curriculum. This presentation will highlight these and provide resources for participants to learn more.

*Reference: American Association of Colleges & Universities Global Learning VALUE Rubric: <https://www.aacu.org/value/rubrics/global-learning>

UPM campus as a test bed for public policies and social innovation

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The Innovation and Technology for Development Centre at the Technical University of Madrid (itdUPM) is a collaborative network composed of 217 affiliates, including UPM faculty members, researchers, staff and students, as well as external professionals and entities with a common interest in promoting action research for sustainable development.

Since 2012 the organisational design of itdUPM has undergone an evolutionary learning process in which special attention has been given to five issues that appeared as critical organisational design factors for building an effective collaborative environment. These are: (i) a horizontal networked structure; (ii) a leadership style able to pilot the process; (iii) incentives that align participants; (iv) a cultural environment able to deal with several simultaneous identities; and (v) a virtual and physical interactive space that enables and fosters a sense of purpose and community as well as an open culture of trust.

One example of the itdUPM dynamics is the refurbishing of the main building, located in the heart of the main university campus (International Excellence Campus Moncloa) that now not only serves as the headquarters of the itdUPM but also as an open demonstration space devoted to spread technologies and innovations for sustainability.

Concepts and prototypes for urban agriculture, water recycling, decentralised energy systems and experimental systems real-time measurements, among others, are being tested there. In parallel, scientific and dissemination activities take place inside the building. itdUPM research, training and advocacy activities are designed and implemented through co-creation and co-production methodologies. This is fostering a more open and collaborative culture among architects, agronomists, water engineers, other experts and students.

This experience illustrates the role of the campus as a test bed of technological and social innovations that could later be escalated to the broader context. itdUPM's interdisciplinary ecosystem is propitious to co-creation of innovative technical and organizational solutions to address Sustainable Development Goals both at the UPM Campus and in the broader society. The suggested model can inspire other universities, especially those where a disciplinary culture is prevalent and resources are limited.

ISCN-GULF report “Educating for Sustainability” includes this case study that rely upon open, participative models that involve a diversity of members of the educational community and society working together proactively to address sustainability challenges through technology-based social impact.

Universities can be the Social Innovation Engines that End Energy Poverty

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Ending energy poverty by ensuring universal access to affordable and clean energy (SDG 7) is the quintessential sustainable development challenge—foundational to achieving both economic empowerment and environmental sustainability on a global scale. Providing affordable and clean energy to communities facing energy poverty delivers significant benefits to key development metrics in the areas of health, education, gender equality, water and agriculture.

Much attention, especially at the level of the UN, focuses on policy and finance barriers facing renewable energy projects in emerging economies. Two challenges that do not receive as much attention but are, nevertheless, critical to achieving universal energy access are: a) the need for social and technological innovation on a massive (yet diffuse) scale to meet diverse market needs, and b) the need to train, develop and empower a generation of entrepreneurs and change-agents who will deliver clean energy to the one billion people on the planet that currently live without electricity.

Both of these challenges—innovation in off-grid energy and human capital development—can be addressed by research institutions and universities.

The first challenge relates to the need for solutions borne out of social innovation, which is conceptually unique from traditional technological innovation by way of its interdisciplinarity and complex social objectives. This process requires deep understanding of the problem and the complex landscape of actors, interests and resources involved in order for successful solutions to be developed. Universities are well-suited to engage in social innovation for universal energy access by drawing on the expertise of a variety of disciplines and conducting action-driven transdisciplinary research.

A critical need is to build bridges between the thousands of villages, towns and cities that face energy poverty every day and the research institutions with the resources and ingenuity to help develop cutting edge solutions. Through partnership with social enterprises and local partners, students can become the transmitters of knowledge between the field and the lab, developing their own intuition and knowledge about social innovation processes along the way. Such an approach can drive the development of the next generation of innovators, entrepreneurs and scientists that will participate in the budding energy access sector and help it to flourish.

At the University of Waterloo we have launched a global collaboration—the Affordable

Energy for Humanity Initiative (AE4H)—to develop solutions to energy poverty with a focus on innovation and capacity-building. Comprising a diverse set of partners including enterprises that operate in locales from Haiti to Zambia to Bangladesh, and some of the world’s leading energy research labs from Cambridge to Berkeley to Karlsruhe, our aim is to mobilize knowledge and resources on a global scale and thereby bring an unprecedented opportunity for innovation on energy access. Through doing so, we will empower Universities to become the social innovation engines that are needed to deliver on SDG 7.

Engaging college students in the transition to sustainability through design-based approaches

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In the current context, it is increasingly important to invest in fostering a culture of sustainability among young people, developing processes and interaction strategies to create ‘contexts for change’. Engaging young people in efforts around cultural and social forms of sustainability generate positive outcomes to both youth development and community change, allowing them to develop an optimistic and proactive outlook on the future. The transition towards a sustainable living is happening through a process of social learning, hence the social responsibility of all institutions to promote the culture of sustainability beginning with the local contexts and challenges. Universities have a very important role in this process: sustainable education in college campi has the potential to achieve long term results by promoting the development of awareness and skills for young engagement, in order to face the complex challenges, nowadays and in the future. The education for a sustainable living is fundamental in the “whole person” education é therefore the opportunities to experience social engagement and mobilization in the context of Higher Education shows excellent results, especially in young-led programs and projects that stimulate youth expression and autonomy. In the search of ways to support the process of bridging the value-action gap in sustainability and promote youth engagement among college students, it is fundamental to promote the development of a set of key competencies, in order to enable an active and reflective participation and increase consciousness and practice around sustainable development goals. This research aims to study how the integration of design thinking and participatory design applied to education experiences can promote engagement in sustainability and pro-environmental behavior among young students. The field of Design shows itself as valuable to develop alternative strategies to deal with change and complexity, offering a range of potentialities and interfaces for innovative action in the context of the transition towards a sustainable culture and lifestyle. The potential of Design to support the culture of sustainability among youth, bridging the value-action gap and developing sustainable competencies is investigated. The research uses a qualitative multi-method approach. This paper summarizes the findings of the exploratory phase consisting in literature review, context analysis, and ethnographic observation and pilot application of participatory design activities in undergraduate courses. The results presented include guidelines for strategies to promote the culture of sustainability among youth. The

guidelines reinforce the importance of understanding the values and challenges of youth development, broadening and deepening the concept of sustainability, taking it closer to youth life's reality, investing in building contexts for transformation, stimulating empowerment and the development of autonomy, seeking possible languages and communication approaches and using mediation strategies to facilitate change processes conducted by young people themselves. Preliminary findings also show that design-based participatory approaches integrated in educational settings offer excellent opportunities to positive intervention to both engage youth in sustainability and support their positive development.

Pacific Institute for Climate Solutions: British Columbia's Universities Collaborate on Climate Change Solutions

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In 2007, one decade ago, the Province of British Columbia (BC), Canada announced its commitment to develop a policy framework for climate change mitigation and to reduce greenhouse gas emissions, province-wide. The announcement and subsequent policy and strategies positioned the government as a leader in climate policy amongst other jurisdictions throughout North America. Its cutting edge Climate Action Plan outlined four key areas of action, including legislated greenhouse gas reduction targets; comprehensive economic policy; investment in impacts and adaptation research; and, citizen-wide education and outreach. As part of this Plan, under its commitment to investment in research, education and outreach, BC's Ministry of Environment established an endowment to support the creation of the Pacific Institute for Climate Solutions (PICS). PICS is a partnership amongst BC's largest, most research intensive universities, University of Victoria, University of British Columbia, University of Northern British Columbia and Simon Fraser University. It contributes climate change research to inform and shape climate change policies and actions on mitigation and adaptation with a focus on BC, Canada and beyond.

This paper/presentation provides an overview of the province's key action areas on climate change. It outlines how the climate action taken by the provincial government since 2007 has fostered the emergence of new local government climate change research, planning and activities. The paper/presentation also highlights interesting challenges to the strategies that were originally unforeseen, such as a change in governing party leadership, opportunities around a growing shale gas industry, and evolving public concern and complexity around maintaining climate change leadership in light of emerging federal commitment and policy frameworks. It explains how PICS is assisting the province in meeting multi-faceted climate change challenges through a range of solutions-oriented research initiatives, including five major policy-relevant projects, known as the "Big Five." These five projects began 2015 and will run until 2020. They cover research in areas related to BC's largest greenhouse gas emissions sectors, and include:

Energy Efficiency in the Built Environment. This project determines sustainable pathways to improved building energy performance and net-positive energy buildings, exploring the roles of district energy systems and bioenergy, as well as best practices for increasing building inhabitants' support for, and engagement with, energy efficiency measures. Financing, tax and utility-based energy-efficiency incentives area analyzed, all with a means to provide practical solutions that can be implemented by building industry professionals and stakeholders.

Forest Carbon Management. This project will design, evaluate and recommend potential climate change mitigation strategies aimed at reducing GHG emissions and increasing sinks through forest management, afforestation, forest conservation and the use of harvested wood products that can both store carbon and displace emissions-intensive materials such as concrete and steel, and displace fossil fuels used in heating and transportation.

Natural Gas Development. BC has an abundance of shale gas reserves currently earmarked for the development of a new liquefied natural gas (LNG) export market, yet there are many questions about how the scale and nature of development affects resource rents, GHG emissions, water supply and quality, and communities. This project aims to address this information gap.

Low Carbon Pathways to 2060 explores the costs and benefits of a range of electrical grid integration options for Canada, initially between British Columbia (BC) and Alberta (AB), but eventually nation-wide and into western North America. Researchers explore costs, reliability and emissions of an expanded BC-AB grid interconnection and investigate the impact of large-scale energy systems across Canada under various carbon policies and global growth scenarios.

Transportation Futures for BC will identify viable pathways for developing low-or-zero emission pathways for sustainable air, land and domestic marine transportation, as well as the potential for high-tech renewable energy use and generation, and adoption and distribution of alternative fuels, such as hydrogen, compressed, liquefied and renewable natural gas across multimodal transportation systems.

Finally, the paper and presentation shows how PICS' research supports implementation of sustainable development (SDG) goal 13: Taking urgent action to combat climate change and its impacts; target 13.2: Integrate climate change measures into national policies, strategies and planning; and, target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Universities as Transformative Locations for Sustainable Approaches to Science: Network of Early-Career Sustainable Scientists and Engineers' Sustainable Universities Programme

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Universities have a key role to play in activities and actions on global development and sustainability through their role in; educating future leaders, fostering research to provide evidence-based solutions and acting as role models within society. Sustainability initiatives initially focused on estates management, however, more recently education and research for sustainable development has risen up the agenda [1]. This requires sustainability to be embedded across the curricula and enable students to develop skills in complexity, collaboration and interdisciplinarity. Working with early-career scientists will be crucial to achieving this.

The Network of Early-Career Sustainable Scientists and Engineers (NESSE) is a global interdisciplinary network of early-career scientists who are using their knowledge and skills to build a sustainable and prosperous future for all. It was set-up because of the importance of early-career scientists to a sustainable future. They are often directly responsible for developing and implementing new ideas, testing new research approaches and teaching undergraduate and graduate students. However, early-career scientists are infrequently included in university management process and global science discussions. NESSE believes that through a bottom-up approach, early-career scientists can play a transformative role in supporting the development of a sustainable culture for education and research at universities and gain the skills to be leaders for sustainable development in their future careers.

NESSE's Sustainable Universities Programme is providing our members around the world with the skills to develop a sustainable science culture within their communities. It will contribute to the development of universities as transformative locations for testing and embedding sustainable approaches to science and technology by a) championing pioneering approaches by universities that are embedding sustainability throughout education and research, b) developing cultures for sustainable development at universities by creating a network of early-career interdisciplinary sustainable science networks at universities [2] and c) support students and early-career scientists to identify career paths that meet their sustainable science objectives. This type of bottom-up, 'grassroots' approach has been proposed as a key role for university's involvement in sustainable development [3]. We will use data collected from early-career local sustainable science networks, as a basis for the implementation and continued evaluation of these objectives.

At ICDS NESSE will highlight the activities of the Sustainable Universities Programme, including examples from local groups and discuss what more can be done to engage early-career scientists at universities to develop a sustainable science culture.

[1] Initiatives include the 'Green Guide for Universities', the Green Gown Awards, the International Sustainable Campus Network, the Association for the Advancement of

Sustainability in Higher Education, Decade of Education for Sustainable Development and the Higher Education and Research for Sustainable Development (HESD) global portal.

[2] <http://www.sustainablescientists.org/groups/active-groups/>

[3] D. Ferrer-Balas et al. / Journal of Cleaner Production 17 (2009) 1075-1085

Rethinking the University Teaching: The Changing Role of the University Teacher for Attainment of SDGs

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The academic world is facing enormous challenges in meeting global tasks associated with Sustainable Development Goals (SDGs). The seventeen (17) tasks are expected to be the focus of the University curricula for attainment of the goals by 2030. The University is expected to provide an organizational structure that would facilitate the attainment of the goals. The University teaching is one the mechanisms that would promote knowledge, skills, values and attitudes for the attainment of the goals. The university teaching processes are however didactic, rather than negotiated; the methods are mainly lecture, one -to-many, instead of interactive. The teaching sequence is regimented, rather than diversified with interactive resource materials. The assessment follows pre-determined standard answers, instead of open-ended responses with supportive, innovative and creative and creative ideas.. All these culminate in the university teaching not being able to develop students' potentials, increase their competencies and understanding needed for knowledge-based economy to shape the global economy. The 17. SDGs have presented a challenge that has given the university education room for a re-think and consequently changing the roles for the teacher. This paper therefore will seek the views of 250 University teachers from five universities in the South-East and South-South of Nigeria. Four research questions based on how to integrate the SDGS in the university curricula; the appropriate methods to use in teaching; the availability and use of the required resource materials; and the assessment techniques will guide the study. The descriptive survey will use a 4-point scaled questionnaire containing 25 structured items to collect relevant data that will be analyzed through mean scores. Any item that has a mean score of 2.50 and above will be regarded as a positive response; and any item with a mean score below 2.50 as negative. Based on the findings, some recommendations will be made to universities, not only in the zones involved in the survey, but in Nigeria as a whole, for the attainment of the 17 SDGs by 2030. Life in Nigeria by 2050 will leverage on the attainment of the goals with a lot of economic, social and environmental gains.

Tools & Technology to Improve Health in Rural Areas

Towards Universal Energy Access: Technology and Tools in Rural Uganda, Improving Health and Tracking Impacts

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This paper describes how a solar education, outreach and donation program targeting prioritized marginalized communities in rural Uganda is addressing health and safety concerns in off-grid populations. It will include findings from an on-going Health and Technology Impact Study in rural Uganda that looks at how healthcare delivery, quality of care, and reporting rates change after the installation of a solar system at rural off-grid healthcare facilities. 8 off-grid healthcare facilities will be discussed. It will also discuss changes in the reported rates of burns, respiratory health, and perceptions of fire safety among targeted solar light recipients in the catchment areas.

Through an Outreach, Educational and Engagement approach incorporating state-of-the-art technology and embedded community liaisons, Let There Be Light International (LTBLI) impacts health delivery and community health outcomes and promotes sustainable development in under-served, low-resource areas. The tools and technology supporting these efforts include solar electric lighting systems, pico lights, and a robust off-line data collection tool. Pre- and Post- implementation surveys collect demographic and lighting needs data on the district and regional levels, as well as on the individual and household level. Let There Be Light International (LTBLI) engages in three primary activities in its efforts to improve health in rural areas in sub-Saharan Africa.

- 1) Partnering with regional health ministers and NGO partners, LTBLI solar electrifies prioritized rural off-grid health clinics in Uganda. No targeted clinics are scheduled for electrification through government or other programs, and the regional health ministry has committed to system upkeep and scheduled battery replacements. 14 Health Centers have received solar systems, impacting the healthcare and healthcare delivery of 200,000 people in the 14 catchment areas. Preliminary findings indicate the following: hours of operation increase an average of 80%; attended birth rates increase 100%; retention rates of staff increase; the rate of on-time reporting increases.
- 2) Partnering with local NGOs and key community stakeholders, LTBLI donates pico lights to vetted at-risk individuals unable to participate in market-based sustainable lighting solutions due to disability, age, chronic illness, caretaking obligations, and/or geography. Primary recipients are the Elderly, Handicapped Children and Adults, Persons Living with HIV/AIDS, Orphans, and New Mothers. 4,000 lights have been distributed, impacting the health and safety of more than 20,000 people.
- 3) LTBLI conducts educational outreach sessions at rural health clinics to educate providers, patients, and perspective beneficiaries about the health, safety and environmental dangers of using kerosene and candles for lighting. LTBLI's local health educator demonstrates how to use a solar light and explains the health and safety benefits.

LTBLI creates outreach and educational content for display at health centers in rural areas and works with local health care providers to understand the benefits of incorporating an energy-access perspective into current programming especially in sectors addressing the health and safety of women and girls. 1,500 people have attended trainings.

Note: LTBLI is technology agnostic and not aligned with any manufacturer of solar products.

Interventions using Community-led total sanitation approach (CLTS) in developing countries: an analysis of practical experience

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Around 2,4 billion people in developing countries still lack access to improved sanitation facilities and almost one billion practice open defecation (OD). A lot of work thus needs to be done towards the Sustainable Development Goal of ensuring access to safe sanitation for all by 2030. In the past decades, development community experimented with different approaches for increasing latrine use and coverage. Approaches which focus on the demand-side of sanitation and change in sanitation behavior have supplemented and lately often replaced more traditional provision of sanitation infrastructure. In recent years, Community-Led Total Sanitation (CLTS) has become a particularly popular approach, and is used by various national governments and international organizations like UNICEF alike. During CLTS intervention, rural communities are at first facilitated to conduct self-appraisal of their defecation practices, and by using various participatory techniques new social norms around social unacceptability of OD are created. The ultimate goal is to ignite community action to achieve open defecation free status and completely eliminate OD, without providing any external subsidies to individual households. CLTS is often perceived as a revolutionary approach, and it has proven to be effective in abolishing OD. But at the same time, it was accused of using unethical practices violating basic human rights, and its sustainability and actual health benefits have been questioned. This research assesses opinions and experiences of CLTS implementers obtained via in-depth interviews with 19 practitioners from 14 developing countries. Interviews were analyzed using qualitative research methods and evaluated in context of current theoretical knowledge regarding hygiene and sanitation. Extra attention was paid to modifications of CLTS for different local contexts and to context specific obstacles faced by practitioners. We found that despite controversies and accusations practitioners consider CLTS an effective tool for improving sanitation and are satisfied with its application. They are mostly aware of its limitations and possibilities of misuse resulting in human rights violations, though some had objected these claims. It is also common, in various scope and nature, to modify CLTS, as only a minority of interviewed practitioners applied CLTS in its pure form. The urge for modifications strongly resonated in practitioner's calls for constant improvements of the approach in respect to various local social and natural environments.

Strikingly, we also found that practitioners endorse modifications and improvements which go against core principles of CLTS, such as provision of individual household subsidies, technical assistance, or provision of sanitation hardware and latrine designs. This may be due to somewhat unrealistic expectations of CLTS.

Reaching The Rural Poor Through Ehealth-Enhanced Community Health Workers (Chws)

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Introduction

By mobilising cutting-edge science and technology, Millennium Promise Alliance Inc. (MPA) rolled out eHealth interventions in rural Ghana to expand Universal Health Coverage (UHC) for effective local development in the context of the Sustainable Development Goal 3. The interventions leveraged innovations in ICT to address gaps in community health information system.

Ghana has a favourable eHealth environment with 128% mobile penetration rate. Despite the existence of eHealth policies and strategies, however, there has not been a rapid uptake and scale up of ehealth in the country, particularly at the community level.

Ghana's District Health Information Management System II (DHIMS 2) designed to facilitate electronic data capture and utilisation has largely been limited to the facility level. Additionally, data storage and use is largely based on aggregated data which does not foster continuity of care.

To fill this gap, MPA-Ghana introduced eHealth interventions including Telemedicine and a Community-based electronic Tracker (CeTracker) application to:

1. provide decision support at the household level during each household (HH) visit
2. provide real time data about the disease burden, outcomes and performance of health workers
3. provide surveillance data for notifiable and emerging diseases and promote the continuity of healthcare
4. enhance promotive and preventive care including nutrition and reproductive, maternal and child health

Methodology

The development of the eHealth system started with the introduction of Community Health Workers (CHWs) who were identified in their resident communities, trained, equipped and incentivised to deliver basic health care services to prevent diseases, promote healthy lifestyles, improve primary healthcare services at the household level as

part of strengthening Ghana's Community-based Health Planning and Services (CHPS) strategy. eHealth Technical Assistants (eTAs) were also recruited to support the eHealth work of CHWs.

To support the collection and use of transactional data at the household (HH) and community levels, MPA facilitated the development of a Community-based electronic Tracker (CeTracker) application system. The system provides an algorithm decision making support for CHWs to provide basic health care services to households. CHWs are able to electronically register households, follow-up on pregnant women and children under five, provide alerts on defaulters of immunisation and antenatal visits for improved health.

Additionally, CHWs and other frontline staff are connected to a telemedicine system, which is a structured consultation platform that offers timely intervention for emergency cases and answers important questions from all levels of healthcare for rapid and accurate diagnosis, thereby reducing deaths caused by unnecessary delays and lack of access through teleconsultation.

Results

MPA in collaboration with the Government of Ghana and other stakeholders successfully trained and equipped 700 CHWs, 28 eTAs and 267 CHOs (CHW supervisors) with mHealth tools to provide health services to 364,000 population size of 7 districts in Ashanti region. The initiative has strengthened the overall health information system for improved health.

Conclusion

By leveraging on Ghana's 128% mobile penetration rate, MPA introduced mHealth Tools and linked frontline health workers with a telemedicine system that is extending the reach of rural healthcare especially among vulnerable populations.

An Assessment of Radio-Based Education about Female Genital Cutting and Health and Human Rights Issues in Douentza, Mali

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Introduction: Mali ranks 179 out of 188 countries on the Human Development Index, and its health and literacy indicators are correspondingly low. The under-five mortality rate is 122.7 per 1,000 live births and maternal complications are cited as the cause of death for 1 in 28 women. As of 2013, the rate of female genital mutilation/cutting (FGM/C)—widely regarded as a violation of the fundamental human rights of women and children—was 89%. According to UNICEF, in 2015 the adult literacy rate in Mali was 33.6%, with a moderate difference in literacy rates between males and females.

Given the country's low literacy rate, the spread of information in written form—whether digitally or in print—is difficult. According to research regarding mass communication in Mali, radio provides an efficient, alternative means of spreading information within the country and serves as “an attractive medium in reaching groups for whom there are significant social and structural impediments to accessing education, particularly women, rural residents, and the elderly.”

In 2014, an interdisciplinary team of Northwestern Access to Health Project (NAHP) faculty and graduate students partnered with local organizations in Douentza, a remote town in the Mopti region of central Mali, to create a public health album of six songs. The album provided health information on FGM/C, as well as malaria, HIV/AIDS, the importance of enrolling girls in school, breastfeeding, and sanitation. The album songs were broadcast frequently on the local station, Rural Radio Daande Douentza. In 2015, a study was carried out to assess the impact of this album. The study aimed to understand self-reported knowledge about six health and human rights topics following identified exposure to the radio-based educational programming. The study also sought to explore the use of radio and music as a means of health and human rights education and also specifically to explore attitudes and self-efficacy regarding FGM/C.

Methods: A mixed-methods assessment was conducted with 149 individuals across 10 villages in Douentza Cercle. Analyses focused on the association of radio listening habits, age, sex, ethnicity and education with a public health knowledge score.

Results: Over 90% of respondents reported daily radio listening, with many listening five or more hours per day. Potential risks of FGM/C cited by participants included death (59%), difficulty in childbirth (48%), sterility (34%), and fistula (33%); when asked about their level of control over FGM/C, 28% stated they would never cut their daughters.

Being a listener for 1-5 hours per day was associated with a 11.5% higher score of “public health knowledge” compared to those listening only a little or not at all ($p < 0.01$). Education (marginal versus no formal education) was associated with 7.6% increased score ($p < 0.01$).

Conclusion: Radio appears to be a significant part of community members' daily routines in central Mali. It further appears to be a valuable tool and accessible technology to transmit information in the region, particularly for lower literacy individuals.

Barriers to the enrollment of Midwives to the eLearning program in Uganda

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Background: The Nursing Council in Uganda adopted the distance education learning programme after realizing that by using only the existing capacity for residential training it would take about 20 years to upgrade 1,000 midwives to a diploma level.

Objectives: This study was aimed at establishing why there is low enrolment of midwives under the eLearning project in Uganda.

Methods: The study population comprised of 6,226 (UNFPA estimate, 2011) enrolled midwives working in selected public and private health facilities in Uganda identified through the 5 districts or regional referral hospitals. The study protocol considered 150 midwives who have not enrolled for upgrading in any professional development courses.

Stratified sampling technique was used to select 5 district hospitals and 91 catchment health facilities from which 150 enrolled midwives were identified to participate in the study. To select respondents, we used simple random sampling technique. Each District hospital served as a primary sampling unit and was placed in a logical geographic order to provide the element of implicit stratification, each was randomly selected.

Standard questionnaires were administered to 98 respondents and in depth key informant interviews to 45 respondents in the study population.

Results: Results of this study shows that their factors influence enrolment to eLearning programmes with the major (56%) as limited information about eLearning programmes, others (34%) indicate limited basic computer skills and high training costs associated with upgrading.

Conclusion: Considering the limitation mentioned there is urgent need to review the programme strategy to consider increased awareness creation, basic computer training sessions and increasing subsidies on training to attract more enrolled midwives.

Recommendations: There is need to actively and widely advertise the program, conduct continuous ICT skills training and offer subsidies on scholarship level to attract more enrolled midwives.

Towards Affordable and Clean Energy through Life Cycle Thinking

Sustainable and Affordable Clean Energy in Sub-Saharan Africa: Unlocking financial opportunities that will increase private and/or public finance in her Energy Sector to achieve Poverty Reduction and Sustainable Development.

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According to the United Nations official listing of countries by world region, Sub-Saharan Africa is geographically the area of the Continent of Africa which consist about 48 countries that are fully or partially located south of the Sahara (Wikipedia). With population of about 800 million in 2007 and current growth rate of 2.3%, the UN predicts for the region a population between 1.5 and 2 billion by 2050 (Wikipedia). Given its rich

natural resources, the region's potential for economic growth and sustainable development is huge.

Similarly, with more than 1 billion inhabitants and vast energy resources and potentials, the region needs better and wider access to energy to sustain its economic growth and improve living conditions (OECD/IEA 2016). According to the UN, by 2040 the total power generation capacity is expected to quadruple to 385 GW. Capacity additions average 7 GW per year until 2020, and then increase to around 10 GW per year in the 2020s and over 13 GW yearly in the 2030s (OECD/IEA 2016). The sub-Saharan power sector is thus expected to expand progressively.

Meanwhile, due to the scarcity of capital and other factors, access to electricity in sub-Saharan Africa still lags behind the rest of the world. Economic growth and living conditions are severely constrained by a lack of electricity power generation, transmission and distribution capacity (OECD/IEA 2016). Over 635 million people live without electricity in the region and the energy sector lacks access to capital funds, technologies and capacity building. Therefore, significant investments are needed to massively support the sector for the region to ultimately attain its economic development (OECD/IEA 2016).

Fundamentally, the private sector is an indispensable force for economic growth and is especially very crucial in fragile nations like sub-Saharan Africa countries (World Bank Group 2016). However, in spite of the region's potentials as highlighted above, all too often private investors perceive doing business in fragile environments as too risky and fraught with many challenges, but also with some opportunities which make them want to participate especially in her energy sector (WBG 2016). Hence, there is the need for the various governments in the region to unlock financial opportunities that will increase private and/or public finance in their Energy Sectors to achieve Poverty Reduction and Sustainable Development.

The objective of this paper is to examine the main obstacles currently standing in the way of unlocking financial opportunities to solve energy problem in Sub-Saharan Africa; highlight the needs why the various governments of the region should participate with the private investors and why private sector also would want to participate in their energy sector; discuss the main sources of financial opportunities available in financing energy projects that would improve the investment climate for greater public and private investments and facilitating the tapping of domestic and foreign capitals for the sector's development. Finally, the paper tries to proffer solutions to overcome the identified obstacles.

What role can solar energy technology play in achieving SDGs in Africa?

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Energy crisis remains one of the greatest challenges facing Africa development. Despite fast growing economies in Africa, businesses and quality of life are being affected by lack of power. The majority of the African population lives in rural areas without access to clean, affordable and reliable energy. A wide variety of strategies are needed to ensure that more than 500 million Africans, which are largely low-income and off grid households, have access to clean energy.

The Science, Technology and Innovation (STI) can offer some important opportunities in addressing sustainable development challenges especially in power sector. STI has profound implication for the most of 17 Sustainable Development Goals (SDGs) and currently underpins the implementation of 14 SDGs in developing countries including countries in Africa. This requires paying attention to broader application of technological innovation such as solar energy and its potential in achieving some of these goals in African countries. Given the solar energy potential in Africa, the demand for solar technology continues to rise. Without doubt, solar power generation will play a significant role in Africa's future energy supply given its fast growth economy, and high cost and inefficiency associated with current power sources in the continent. This paper will analyse potential challenges and opportunities of solar energy technology for achieving SDGs by answering the following questions below:

- 1) What is the current status of STI policy in promoting renewable energy in Africa?
- 2) Do Global Environment Facility (GEF)-funded solar projects reflect STI policy for the application of renewable energy in Africa over the past decade?
- 3) Why have many solar projects failed to achieve Millennium Development Goals (MDGs)?
- 4) What are the implications for SDGs targets?

A Circular Energy Economy: Cross-Sector Successes in Brazil and India

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A new paradigm for energy production is one that emulates the closed-loop circular systems of natural ecosystems. At once holistic, economical and equitable, energy production built on reciprocal exchanges with other sectors (e.g. telecommunications, sanitation, and waste management) can leverage synergies and provide multiple co-benefits. Avoiding fossil fuels while reducing throughput of matter and eliminating pollution, such a circular energy economy offers a model for critical electricity provision for the next 2 billion people in emerging economies, both those moving to cities and particularly those who remain in rural poverty. Three exemplary cases, one in India and two in Brazil, reveal the efficacy of renewable power produced by cooperative, cross-sector initiatives.

Omnigrid Micropower Co., Pvt., Ltd. (OMC) realized a workable bottom line for solar-powered generation that serves some of India's poorest rural citizens only when combined with the power demand from the telecommunications sector. OMC's remote small-to mid-size solar power plants today serve nearby telecom tower base stations and deliver community energy needs. It utilizes mini-grids and adapted power equipment that eliminates expensive wiring for household services, from lighting, to small appliances. OMC's installations not only electrify villages, they provide new permanent jobs for rural citizens.

Itaipu Binacional (IB), the entity behind the world's largest generator of renewable power (the 5-mi.-wide 14 GW Itaipu hydroelectric dam) was concerned about power losses sustained from pollution of in its reservoir by the area's agricultural waste. It partnered with local farmers to develop an Agroenergy Condominium that used distributed biodigesters to process the waste from local corn production and farmer's herds, producing biogas sufficient to energize 2,200 households, yielding high quality fertilizer while improving dam water quality.

Methane recovery in Belo Horizonte, Brazil's third-largest city, illustrates the potential for closed-loop use of waste as an energy source in swiftly urbanizing settlements. In 2007, the city authorized the construction of methane recovery from its 65-hectare (161-acre-) landfill. Its cleaning and use in energy production was partially funded through the certification and sale of carbon credits under the Clean Development Mechanism. At this plant, further integrated related uses: a composting plant, construction waste and tire recycling, and an educational facility, producing not only additional revenue but creating new jobs in maintenance and operations of these combined facilities.

OMC's cross-sector power plant, IB's Agroenergy Condominium, and Belo Horizonte's integrated waste and energy program are examples of cross-cutting, strategic investments in renewable energy. Moving beyond conventional mono-sectoral planning and management of energy systems, these alternative, full life-cycle and circular approaches to power production are essential for solving energy poverty. These blended, multi-functional systems also foster job creation, allowing for economic growth while suppressing carbon emissions.

Water, Energy, and Agriculture in the Context of Climate Change and the SDGs

Addressing Food Insecurity with year-round Geothermally Run Greenhouse in Canada

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The idea I would like to propose is a sustainably run greenhouse production facility that provides year-round access to fresh vegetables with the use of geothermal energy for Arctic climate countries. A greenhouse will not only provide energy and food autonomy for northern countries, the vegetables grown will also be fair trade, local, fresh, affordable, healthy, organic and non-genetically modified. Imported food travels thousands of kilometres from the farm to consumers, contributing to a considerable amount of greenhouse gas emissions. In addition, in remote northern communities, the cost of fresh food is often high and of poor quality. As a result, people tend to resort to cheap packaged food, contributing to poor health. Hence the use of geothermal energy for a year-round greenhouse production facility has the potential to address food and energy security, unhealthy eating habits as well as reduce greenhouse gas emissions. Not only is geothermal energy a secure and sustainable source, it is known to be the cleanest source of electricity and heat, using less land and producing fewer emissions than any other energy source. Further, geothermal power uses large scale direct use of the hot water derived from the earth, is price competitive and lower than other renewables alternatives, including fossil fuels. Greenhouses can run with minimal waste production and environmental impacts through the collection and recycling of rain water eliminating the need for waste water disposal. In addition, a greenhouse in communities has the potential to provide synergetic local economic opportunities such as community gardens, chicken farms, composting and plant nursery. Greenhouses can also be used for school programs as they can act as a living biology lab providing for chemistry and biology lessons. This can encourage children to be more willing to eat vegetables if they understand the growing process and are involved in it.

The role of the National Adaptation Plans (NAPs) in agriculture for achieving multiple Sustainable Development Goals and implementing the Paris Agreement

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Climate change adaptation in agriculture is a foremost priority in developing countries. According to a FAO analysis in the Intended Nationally Determined Contributions (INDCs) agriculture sectors 93 % of developing countries included agriculture in their adaptation needs. The NAP process in agricultural sectors provides a tool for the implementation of the adaptation commitments under the Paris Agreement on Climate Change. The national adaptation plan (NAP), established under the Cancun Adaptation Framework, is mechanism to enhance medium- to long-term climate change adaptation planning and implementation in least developed and other developing countries.

Specifically, NAPs aim to reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience, and by facilitating the integration of climate change adaptation into relevant new and existing policies, programmes and activities, within all relevant sectors and at different levels, as appropriate.

NAPs can also support achievement of a number of Sustainable Development Goals (SDGs), specifically, SDG-1 “No poverty” by reducing revenues losses caused by the climate change impacts on agriculture in rural areas, SDG-2 “Zero Hunger” by improving agricultural productivity and adapting to changing climatic conditions, SDG-3 “Good health and well-being” by reducing malnutrition rate, SDG 5 “Gender Equality” by mainstreaming gender in adaptation planning and by integrating climate change measures into national, policies, strategies and planning, SDG-13 “Climate Action” by strengthening the resilience and adaptive capacity to climate-related hazards and natural disasters, SDG-15 “Life on land” by adjusting to climate change silvicultural practices, composition of species and varieties.

Considering the varying climate change adaptation needs of different counties, it is important to develop country and context specific NAPs. Therefore, the Integrating Agriculture in National Adaptation Plans (NAP-Ag) implemented by the Food and Agriculture Organization (FAO) and the United Nations Development Programme provides tailored support for address their specific climate change adaptation concerns related to the agriculture sectors and existing national planning and budgeting processes in eleven developing countries (Colombia, Gambia, Guatemala, Nepal, Kenya, the Philippines, Thailand, Uganda, Uruguay, Viet Nam and Zambia). Furthermore, for supporting the NAPs development, FAO prepared the NAP Guidelines for Agriculture, Forestry and Fisheries - supplement to the LEG NAP Technical Guidelines which provides a step by step guidance for implementation NAPs in agriculture sectors.

The objective of the presentation is to demonstrate concrete cases and lessons learned on implementation of the NAPs in agriculture and illustrate their specific contribution to the climate action and implementation of the 2030 Agenda on Sustainable Development.

Assessing the impact of climate extremes and energy use in crop production

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The agriculture dependency on fossil fuels along with the volatile prices raises concerns about the food availability and access, as historical trends indicate an evident link between food prices and energy prices. Moreover, adverse climate change impacts on the food system have been reported and are projected in different regions under different scenarios.

This study presents a baseline case for a vulnerability assessment of the agri-food supply due to two major components of impacts of the agriculture sector: extreme weather disasters and fossil fuel consumption. We choose as a case study, countries from where

the European Union has a high dependency on agri-food products. The goals are (1) to map external dependency of the EU28 agri-food sector in order to identify the major supplier countries, (2) to estimate the influence of extreme weather disasters on the agrifood production among supplier countries and (3) to elaborate on the energy intensity and the fossil fuel consumption of the agriculture sector among supplier countries. We used data on agri-food production and trade from EUROSTAT and FAOSTAT. Records on extreme weather disasters were acquired from EM-DAT between 1961 and 2013. A Superposed Epoch Analysis, with Monte Carlo method, was used to estimate the influence of extreme weather disasters on the average production in supplier countries. Data on energy consumption was obtained from the World Bank database. Hotspots of crop production vulnerability due to weather extremes include Brazil, the United States and Ghana regarding soybean and cocoa production affected by floods and droughts, while all supplier countries show a fossil fuel use for agri-food production above 95%. These results show the need to elaborate on EU28 food policy focusing on two major issues: the agriculture adaptation to extreme weather disasters on supplier countries and, on carbon mitigation measures applied to the agriculture sector on those countries, which is highly fossil dependent.

The Role of the Water-Energy-Food Nexus in Implementing the Sustainable Development Goals in Morocco

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In September 2015, world leaders committed to working towards a list of seventeen Sustainable Development Goals (SDGs) as part of a 2030 sustainable development agenda. Under each of the Goals is a list of quantifiable targets to be achieved in the coming 15 year term. As the international community works toward achieving this agenda, there are risks of potential competition between specific targets which could cause unintended consequences and further challenges to the progress of the Goals. These issues become particularly complex while focusing on the three highly interconnected Water, Energy, and Food Goals (2, 6, and 7). A strategy in one, has direct effects on the others. While it is important that we work toward achieving the 17 Goals, it is as important that we understand the level of interconnectedness and potential competition between them.

In this study, a quantitative methodology and tool highlighting the trade-offs among different pathways associated with achieving the set of targets under SDGs 2, 6, and 7 will be presented. The State of Morocco will be used as a pilot demonstration case study. Morocco has recently announced several national plans for better management of its water, energy, and food systems. That comes with increasing stresses of rapidly growing populations and cities, climate change, and booming industrial sector, particularly its phosphate industry.

This study will specifically: 1. Demonstrate how the SDGs 2, 6, and 7 with their respective targets are interconnected; 2. Present a preliminary pilot platform to assess the

impact of the water targets on the food and energy targets in Morocco; 3. Explore possible trade-offs for implementing different levels of the proposed water, energy, and food national plans; 4. Propose interventions within the three national plans (social, policy, technical), at different scales, which have the potential of reducing the existing competition and ensure a more sustainable resource allocation.

Different scenarios of population growth and climate change with different levels of progress toward the three SDGs will be assessed. This will be done by with the developed innovative water-energy-food nexus framework and tool specific to Morocco. Recommendations for integrative planning across different resource systems, governed by multi-stakeholders will be presented.

SDGs under the climate change threat: an impact assessment in the agricultural sector

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In September 2015, the adoption of the Sustainable Development Goals (SDGs) by the United Nations defined broad and ambitious development targets for both developed and developing countries encompassing all sustainability dimensions (economic, social, and environmental) and designing the pathway towards an inclusive green growth.

Climate change will pose serious risks for human and natural systems, hindering the already arduous way toward SDGs. Moreover, climate change impacts will not be evenly distributed within regions and across regions, poor people and developing countries will likely be affected more than the others by global warming side-effects due to their higher vulnerability and the lack of resources to invest in precautionary adaptation measures.

It is essential to quantify the heterogeneity of climate change impacts across regions not only taking into account its economic costs, but also a broader set of indicators, ranging from poverty and malnutrition prevalence to healthy life expectancy. Quantifying impacts is the prerequisite for mobilising funds for adaptation and better direct them to the more impacted areas.

This presentation will offer an ex-ante assessment of climate change impacts on the global pathway towards achieving SDGs, and will highlight the contribution of adaptation measures in keeping on track of 2030 targets.

Our analysis relies on a recursive-dynamic Computable General Equilibrium (CGE) model developed and enriched with indicators representative of each SDG. CGE models have a flexible structure, and can capture trade-offs and higher-order implications across sectors and countries that follow a shock or a policy. These models are suited to assess the performance of economic and some environmental indicators; in order to consider some key social indicators, ICES was further developed relying on the empirical

literature and directly estimating the relations between indicators and endogenous variables of the model.

Our framework considers 28 indicators covering 16 SDGs. The analysis has a world coverage, but we aggregate the result in 45 countries /macro-regions. The baseline scenario reproduces a Shared Socio-economic Pathways 5 (SSP5) and it is used as a benchmark to assess the impact of climate change related shocks on the agricultural sector.

The presentation will shed some light on the possible costs of climate change impacts in the agricultural sector overcoming the usual analyses that stops to a mere economic assessment and highlighting how and at which extent shocks and policies may affect all sustainability spheres.

Water-Intensive Food Multinationals and SDG 6: How the Actions of the Former Relate to the Achievement of the Latter

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It is being increasingly recognized in the literature on how multinational corporations (MNCs) are adjusting to climate change and/or are contributing to the Sustainable Development Goals (SDGs) that the management of supply chains is crucial to both. This is due largely to how widespread a supply chain can be; the more locations in which an MNE's supply chain is located, the greater the exposure it has to different aspects of climate change. What the MNE learns from adapting to climate change in those different locations can be shared throughout the supply chain, giving the MNE important strategies and tactics to improve efficiency, reduce costs and improve profitability. That this is beneficial to the sustainability of an MNE is clear, but to the extent that what it is doing generates spillover effects in the areas where the supply chain operates, these benefits can contribute to the achievement of particular SDGs in those areas.

This connection between supply chain management and climate change/SDGs perhaps is evidenced best in large agriculture-based, or food, MNEs. If one was to choose at random the sustainability report of one of the top 10 food and beverage companies in the world, it is highly probable that among the major sustainability concerns in it would be water and energy. Take beverage companies, for example. These are highly dependent on a consistent and sustainable supply of fresh water for their products, so whatever affects the availability of water, and the energy it will take to access it, will be of concern. So as climate change affects the availability of water, these MNEs will need to develop ways to use water more effectively and/or find other sources of water, all in an energy efficient way. And this concern is not confined to beverage companies. Any MNE engaged in the production of an agriculture good. Take, for example, coffee and cocoa. The trees used for the production of coffee and cocoa are highly sensitive to climate, and, of course, water, so the harder it is to find suitable places to locate coffee and cocoa trees, the harder it is for coffee and cocoa producers to be sustainable. Whatever the coffee and

cocoa producers can do to prolong coffee and cocoa growing in the face of climate change will benefit the MNE and the locations in which coffee and cocoa are grown.

The thesis of this paper is that the way in which large food MNEs manage their supply chains, with particular respect to the use of water and energy, in reaction to climate change will lead to developments throughout the supply chain that will, either directly or indirectly, positively affect progress toward SDG 6. The way in which this thesis will be demonstrated is through a critical review of the sustainability reports of a select group of the largest food MNEs, examining what these MNEs are doing to encourage the efficient and sustainable use of water resources throughout their supply chains.

The SDGs and the Arab World: Questions about Citizenship, Gender, and Conflict

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The Arab World suffers from large inequities within and between countries, corruption and poor governance, high levels of unemployment and erosion (or absence) of social protection nets, gender discrimination with deep social and institutional roots, militarisation and armed conflict, and large numbers of internally displaced people and international refugees. The paper discusses the extent to which the SDGs framework can help in addressing these problems and whether there is a risk it might lead to policies that might aggravate them.

Focussing on low female labour force participation, poor protections for non-citizens and high opportunity costs of militarisation, the paper argues that the SDGs do not draw sufficient attention to these problems. This is exacerbated by what seem to be opt-out clauses provided by the SDGs to governments reluctant to commit to specific targets, especially on issues of gender discrimination. As such, SDGs may constitute a missed opportunity for the Arab World. Furthermore, while the combination of these problems is particularly stark in the Arab World, these challenges are in no way specific to the region. On the positive side, the emphasis on citizen rights and democratic and transparent government in the SDGs may help in fighting gender discrimination and the abuse of non-citizens, and in better addressing the human and ecological impacts of conflict and militarisation.

Water, Energy and Agriculture in the context of Climate Change and the 2030 Sustainable Development Agenda - Mitigating risks to a sustainable future for Australia

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Sustainable Development (SD) is one of the most confounding challenges to development and natural resource governance. Yet, for over 25 years SD has been the dominant paradigm of growth; the subject of a global dialogue about what sustainability means and how to implement it. Governments around the world (including Australia's) have been committed to SD as a policy goal, supported by policies ranging from international agreements, national strategies, regional programs and local plans. On 25 September 2015 world leaders adopted the 2030 Agenda for Sustainable Development é Transforming Our World (2030 Agenda), including the Sustainable Development Goals (SDGs). This gives renewed impetus to global development efforts to stimulate action in areas where progress has stalled, and respond to new challenges for the period 2015 to 2030 and beyond. Climate change is one such challenge. It is a long-term problem and a defining environmental issue in the sense that all policy decisions need to be defined and implemented within the context of climate change. Indeed, climate change threatens to undermine decades of social and economic development, as well as efforts to protect the environment as temperatures increase, with flow on effects to land and water, and more frequent and extreme weather events. As one of the driest inhabited countries, whose economic development relies on sound water and land use management, Australia will need to take critical steps to achieve meaningful progress and secure its future. This article explores some of the key challenges that remain and possible pathways that Australia could choose to follow over the coming decades.

Potentiality of Biogas as Renewable Energy Technology and its role for the Conservation of Environment

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The study shows the status of biogas as a Renewable Energy Technology (RET) and its role in the conservation of environment by reducing the consumption of fuelwood and Greenhouse Gases (GHGs) emission. 95 household survey, 10 key informant interviews, 3 focus group discussion and direct observatory technique were used for primary data collection. Fuelwood was found to be dominant energy resource which comprises 93.73% of total energy and rest 6.27% of energy was supplied by other sources of energy. The fuelwood consumption was 71.29 GJ per year per household which emits 646.1 tCO_{2e}. The study shows that the annual GHGs reduction was found 7.62 tCO_{2e} per biogas plant. On the basis of population of the agriculture based livestock of the study area, there was the possibility of 84 biogas plants of size 6 m³ which can reduce the total 638.82 tCO_{2e} of GHGs emission per year. The study showed that the use of biogas technology can save 46.67% of fuelwood which can conserve 217.32 tons of fuelwood per year per household. The simple payback period in term of fuelwood saved for the construction of 6 m³ biogas plant was found to be only 4.08 years. Thus, the reduction or substitution of fuelwood as a primary energy resource, reduction of the GHGs emission and high potentiality of biogas in the area with adequate number of agriculture based livestock clearly indicates that biogas is as a suitable RET in reducing GHGs emission and helps in mitigating climate change.

How will environmental systems analysis inform the Water-Soil-Waste Nexus in 2050 to support Sustainable Development?

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Sustainable Development pursues to improve human life by socio-economic activities while remaining within planetary boundaries. Due to complex environmental interlinkages this goal requires effective environmental management approaches. Different concepts have been formulated in the past decades such as Integrated Solid Waste Management (ISWM), Integrated Natural Resources Management (INRM) and Integrated Water Resources Management (IWRM). More recently the nexus between the water-energy-food sectors (WEF-Nexus) and the water-soil-waste resources (WSW-Nexus) have emerged. Their added value to environmental management is still debated. All approaches share a systems analysis view to understand physical interlinkages in support of sustainable decision making. They have in part been excitedly celebrated but also heavily criticised for vagueness and lack of implementation. To realise holistic management, an epistemological foundation with a clear description on how researchers can inform environmental management approaches is necessary. Environmental modelling under the auspices of systems analysis is a key task of scientists to support decision making towards a sustainable future.

There is yet a lack of systematic comparison between these concept in relation to how system analysis and especially modelling helps to increase the understanding of physical interlinkages. A thorough analysis of differences, similarities and overlaps and the question whether the nexus concepts é and especially the Water-Soil-Waste Nexus é can add value to the other environmental management concepts is missing in the scientific debate.

The objective of this paper is to compare ISWM, INRM, IWRM and the WEF-Nexus with the focus on how the approaches aim at generating environmental scientific knowledge. The second objective is to discuss recommendations for an epistemological foundation for systems analysis in the WSW-Nexus.

We performed a literature review and analysis of key documents of the concepts under scrutiny as well as a bibliometric analysis and interpretation of literature that refer to modelling applied within either of the integrated management approaches. Altogether roughly 400 models will be included in the bibliometric analysis.

The preliminary results show that systems analyses in ISWM remains mainly at the municipal scale and is carried out with Life Cycle Assessment methods. It considers the waste system as a whole yet lacks to describe the interlinkages between waste as a resource and its interlinkages to other environmental resources. In INRM, analysis remains at the local scale of farming systems. It prioritises investigations to improve agricultural farming techniques while taking into consideration its effects on other natural

resources. IWRM emphasises the importance of the basin scale to analyse the water system, including its interlinkages to land and other sectors. This is done mainly by hydrologic models coupled with other environmental modelling tools.

Based on the upper findings we propose to use the benefit-shed as the appropriate analytical scale for the water-soil-waste resources system. From this we accordingly derive environmental models as one piece in the puzzle of creating scientific knowledge to inform the WSW-Nexus in the era of climate change.

Renewable energies in 2050: Modelling the link between renewable energies and climate change

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The currently operating fossil-fuel-based energy system has proven to be one of the main drivers for climate change. Transitioning to a renewable-based energy system is one of the widely advocated and modelled solution pathways for achieving long-term sustainable development and addressing climate change. However, results regarding their possible contribution to address climate change and sustainable development are dependent on the assumptions made with regards to renewable energies. Therefore, the study deals with the following research question: How to model renewable energies in macroeconomic energy-climate models for 2050? To answer this question, renewable energies and their technological, environmental and economic characteristics are analysed in a disaggregated manner. This is followed by an overview of current macroeconomic energy-climate models, in which different approaches to model renewable energies are described. Based on the review of current practices of modelling renewable energies and contrasting it with other research in the energy field (e.g. resource limitations on harvesting technologies, impact of climate change on renewable energy), the gap between the current knowledge on renewable energy potentials and modelling practices is explored. Thereby, the assumptions of many models that renewable energies are unlimited is challenged, as many renewables depend on harvesting technologies, which again depend on critical materials as well as the harvesting rate is an important factor. Another assumption that is often found is that the relation between energy and climate change is unidirectional. However, climate change also impacts on renewable resource availabilities. To support this argument and to present a possible advanced way of modelling renewable energies, a model structure that allows to incorporate the necessary environmental, technological and economic characteristics found in the literature of renewable energy on a global and local scale is built. The method applied to build this model structure is System Dynamics. There are two main goals to the modelling effort: (1) gaining insights into how different assumptions on renewables can affect model results and (2) identifying the most relevant characteristics to be considered in order to draw the right conclusions on how renewable energies can help to address climate change and how climate change effects their

availability. This is important to understand how a sustainable energy system for 2050 and beyond can be designed.

Water Security in the Era of Climate Change: Issues, Cases, Practices

Are Climate Change Adaptation Strategies Inclusive? The cases of Surat, Durban and Rio de Janeiro

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Climate change presents an unprecedented challenge for society, as it brings forth changes that undermine our current political, economic, social structures and ecosystems. It has been recommended by climate scientists and world leaders that in order to avoid catastrophic effects we must drastically reduce GHG emissions and implement adaptation measures where necessary. An integral condition of both mitigative and adaptive strategies is whether or not vulnerable populations within communities and countries are recognized within these measures. It is maintained that whilst there are more vulnerable areas around the world, there are heightened vulnerabilities for marginalized populations. This article explores three different adaptation strategies of cities in the Global South: Surat, India; Durban, South Africa; and finally, Rio de Janeiro, Brazil - in order to distinguish the level of inclusiveness of vulnerable populations within these cities' plans. Following individual analyses of the strategies, several recommendations are put forward in relation to the discussion; looking at financial, collaborative, and timeline recommendations.

Transboundary Water Management: Add Climate Change and Stir

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There are many transboundary river basins worldwide. In Africa, international river basins cover 62% of its landmass. Transboundary waters are, in some cases, shared but not managed or governed properly. When coupled with the added pressure of climate change, water management will become even more complicated. In this paper it is argued that in order to have effective and sustainable transboundary water governance, adaptation and mitigation for climate change need to be included in transboundary agreements. The paper focuses primarily on two transboundary river basins in the African continent: the Nile River Basin and the Volta River Basin. The importance of transboundary water management is examined, as well as its associated challenges in light of the Nile and Volta Basins. Their existing and/or planned institutional arrangements are also addressed. Furthermore, this paper provides general knowledge on

how climate change will affect transboundary waters while also exploring the hypothesized impacts of climate change on the Nile and the Volta Basins. Finally, SWOT analyses of the Nile Basin Initiative (NBI) and the Volta Convention are presented, assessing the extent of their preparedness to the impacts of climate change and outlining some general recommendations regarding how to approach climate change in the transboundary management context.

Combating Climate Change and Achieving SDGs through Integrated Watershed Management (IWM): Lessons from India

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Integrated Watershed Management (IWM) focuses on the management of a watershed at the local level using a holistic, multi-stakeholder, and multidisciplinary approach. This extends past the hydrological conditions and understands the interconnectedness of IWM as a socioeconomic and political unit. India's watershed management has demonstrated a continual evolution of managerial practices from top-down and engineering to participatory and integrated approach. This paper highlights the evolution of practices within India's IWM, issue, and challenges, its potential to combat climate change and contribute to the SDGs. In Spite of an impressive evolution and impact at the local level, the sector still lacks a basin perspective in planning and designing watershed interventions at the micro/meso level. Though convergence policy was adopted long time back, alignment of policies and institutions from the central to the district level is still a big challenge. Further, sustainability of the infrastructure and institutions created at the local level is also a big issue in Indian IWM initiatives. Subsequent lessons learned involve inside out planning and use of pre-existing social structures rather than always creating new ones which could increase local ownership and participation, sustainability and adaptive capacity of local villages.

Addressing Water Security Challenges in Caribbean Small Island Developing States to Increase Resilience against Climate Change Threats

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Caribbean Small Islands Developing States have been known to be more vulnerable than other states to the effects of Climate Change. As the effects become more evident in the region, the current vulnerabilities are at a high risk of being aggravated; in this case, freshwater access, quality and availability has become one of the biggest problems the islands face today. In order to create a more resilient future for CSIDS current issues need to be observed, analyzed and addressed. By looking at the Caribbean agenda in regards of water protection and distribution, agriculture, urbanization and tourism this paper looks

to explore and provide a better understanding of the vulnerabilities faced by CSIDS. In addition, it will analyze the current methods used by the local people and policies implemented by governments and organization as a response to climate change threats on water. Lastly, the paper will offer some insights into possible future approaches that could increase the resilience of water resources.

Unintended Consequences of Dams and Water Security: An Insight into Women's Vulnerability and the Spread of Malaria in Ethiopia

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The building of hydro-dams as an adaptation strategy for climate change is highly contested due to the environmental, social and economic impacts on the most vulnerable populations. Hydro-dams are highly politicized as they are significantly tied to foreign investment and the hydraulic mission as a path to promote economic growth. Climate change threatens the safety of dams, reducing hydropower and water 'security' with potential to contradict the intended outcomes. This paper will examine the nexus of dams, water security, climate change and vector-borne diseases in Ethiopia and sheds light on the prevalence of malaria due to hydroelectric dams on women's health.

Assessing the Vulnerability of Bangalore's Water Supply to Climate Change

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Bangalore is one of India's fastest growing cities, with the metropolitan region having an estimated population of 9.6 million inhabiting an area of 561 km² (Smitha, 2016; Gopakumar, 2012: 37). The city has undergone a process of transformation not only in the Information Technology (IT) sector, but also in its administrative decision to expand the urban agglomeration to include 8 municipalities and 110 villages. This has resulted in problems of access to and supply of water which are increasingly aggravated by the natural population growth and the migration of people into the city. The Karnataka Climate Action Plan also indicates from global climate model predictions that climate change will result in increases in higher temperatures and the frequency and severity of drought conditions for some districts in Karnataka state including Bangalore. In order to meet water access and supply needs for the ever-growing population, the Bangalore Water Supply and Sewerage Board (BWSSB) needs to adopt innovation solutions to both relieve pressure on groundwater abstraction and to move towards more sustainable sources of water. In addition to addressing these existing challenges of water supply in Bangalore, it is of extreme importance that water resource managers are also able to

address the predicted climate change impacts. This paper examines Bangalore's preparedness in addressing climate change in relation to water security. It assesses the existing geographical, physical, social, and political threats using exposure, sensitivity, and adaptive capacity as the three components that determine a system's vulnerability. The paper concludes by highlighting several approaches Bangalore can utilize in adapting to climate change and addressing water challenges.

Trade not Aid: International Trade as a Means of Adaptation for Food and Water Security Under the Influence of Climate Change in the Sahel Region

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This paper examines how international trade may be used by countries in the Sahel region of Africa, in adapting to food and water insecurity caused by climate change. "As a result of climate change affecting different regions of the world, there will be a significant change in the production comparative advantage which certain countries or regions enjoy, or which enables them to sustain themselves, thus leading to a state of high deficit of certain agricultural produce which used to be in abundance or which was already limited" (Baldos, U. L. C., & Hertel, T. W. 2015). One way in which the negative effects of this change in production comparative advantage and lack of food/water availability in general can be curtailed is through trade with the global food market. The various policies and hindrances prevalent at the moment, which will not make this method of fighting food insecurity successful, are examined and various solutions or changes that need to be made in order to make international trade a viable means of reducing food insecurity are discussed in this paper.

Poster Presentations

Agronomy for Sustainable Development

Key Innovations for Food and Water Security

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Achieving the SDGs is fraught with a long list of constraints and barriers. The Least Developed countries are those most vulnerable to climate change, will see the greatest increases in population growth and experience the greatest threats to water and food security. The challenge is not only to increase food production in these 49 countries, but to provide generalizable and replicable, professional systems that can be adapted to local conditions. This paper posits that there are no shortcuts to achieving the goal of food and

water security and that key innovations such as those detailed below should and can be adopted.

Sub-surface drip irrigation (SDI) is the most water-use efficient irrigation system commercially available today. SDI offers opportunities to reduce N₂O emissions, to reduce overall fertilizer application rates and to reduce weed growth and use of herbicides. It virtually eliminates evaporative losses while significantly increasing transpiration. This research illustrates how the benefits of SDI can be further augmented by one application of a hygroscopic humectant at the beginning of the first irrigation cycle and by injecting oxygen and nitrogen through the irrigation system throughout the growing season. These two augmentations to SDI reduce the amount of water, nutrients, herbicides and pesticides when compared to traditional furrow or drip systems, and provide more robust root development and healthier produce with longer shelf lives and reductions in waste.

This study examined the performance of the AirJection system on SDI us in a cantaloupe field of 1497 acres (606 hectare). One hydraulic, venturi-type, injector with one air snorkel was installed at each lateral. There were four alternating replications: each replication was seven beds wide to accommodate harvest regimens. The drip system consisted of one dripperline per bed at a depth of 30 centimeters and a spacing of 1.5 meters width and 50 centimeter spacing between emitters. Air was injected at a rate of 15% by volume. Pressure in the system was between 1-1.7 bars.

The results after the first year are as follows: The increase in yield in the AirJection sections were, mean average, 34% greater than in the control. The return on the investment of the AirJection system was \$996,772 over the 1497 acres or \$6,678/acre (\$16,496/hectare). The farm expanded the use of the AirJection system over the next seven years and averaged an increase, over 12,000 acres (4856 hectare) of between 12%-35% in yield. The farm experienced less maintenance of the drip system in the AirJection sections than in the control sections. The energy cost per box (about 12 cantaloupes) for the AirJection system was approximately \$0.02. The average price to the farmer for a box of cantaloupes is approximately \$3.00. So the percentage of energy cost to captured income is 0.067. Subsequently, this system has been successfully used in peppers, strawberries, tomatoes and corn.

The Mazzei AirJection system has other positive implications. The system is powered by the pressure of the irrigation system; no outside source of energy is required. The system injects only air from the atmosphere so no chemicals or amendments need be shipped, stored or applied.

The second augmentation is the injection of liquid Hydretain. Hydretain[™] is an inexpensive, biological agent with a food-based USDA label, and is also labeled for use in Europe, Africa, Asia and Latin America. Hydretain[™] attracts free water molecules from the air and soil matrix, essentially converting water from its vapor form back to a liquid state, making water, which has evaporated or run-off, available to the plant in the rhizosphere. This paper summarizes reliable and valid case studies illustrating a range of

47-75% water and nutrient savings in beans, broccoli, potato, cauliflower, bell peppers, tomatoes and cucumbers with higher net weights, reductions in wilting and more robust root development.

Each augmentation can be applied independently. The Hydretain product can be applied with all irrigation systems, not only SDI. The position of this paper is that the temporal urgency of improving production within the context of climate-smart agriculture demands the adoption of best available technologies.

Empirical Analysis of the Agricultural Sector of Ghana: The Role of Governance

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Agriculture notably is the backbone of Ghana contributing enormously to GDP growth of the country. Moreover, the sector has been declining in growth over the past years. With the current concern of food security coupled with sustainable development, agriculture cannot be taken out of the equation. The research aims at investigating the factors that cause the growth and development of agriculture in Ghana by answering the question of the role of governance, economic and production factors to the growth and development of agriculture in Ghana.

The agricultural sector analysis model was estimated using a multiple regression statistical model on a 24-year time series data covering the years 1990 to 2014. Data employed in the research was obtained from the World Bank, Food and Agriculture Organisation, Ghana Statistical Services, Bank of Ghana, The Global Economy and Transparency International database.

Results from the research showed that production factors such as export value and percentage arable land significantly affects the agricultural growth of Ghana. More so, the analysis proved that government expenditure towards the agricultural sector had a significant influence on the agricultural growth of the country. HIV prevalence also had a positive impact on the agricultural growth of Ghana. Governance factors such as rule of law, control of corruption, regulatory quality as well as government effectiveness also had a significant impact on the growth and development of agriculture in Ghana.

Agronomy and Value Chains for Sustainable Development

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I candidly believe peace, education, health and food security form the pillars of humanity and human survival. Any achievement of any Sustainable Development Goals (SDGs) without significant achievement of the four, would give lopsided development at the very

least or none at all at the worst. In other words, without the four, development achievements made thus far are at risk and there might be no development to sustain. Let us consider agronomy and the potential of its value chains for this abstract.

“Agriculture in the 21st Century faces multiple challenges: it has to produce more food, with a smaller rural labor force, adopt sustainable production methods and adapt to climate change”¹. The challenges to agriculture are made even more astronomical by the fact that global population is expected to have grown by 2.3Billion by 2050.²

According to the World Bank, agriculture is estimated to contribute 3.901% of the USD 78.28Trillion of the World’s GDP

(<http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS>) and yet agriculture directly employs 29.5% of the World’s population as at 2014

(<http://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?page=5>).

This statistic is generally inversely proportional to a country’s GDP per capita; the smaller a country’s GDP per capita, the more likely a significant proportion of its population gets its livelihood primarily from agriculture. Consider Burundi and Ethiopia at approximately USD 276 and USD 620 GDP per capita respectively; with 89% and 77% of their populations involved in agriculture respectively compared to Norway and Australia at approximately USD 55,000 and USD 43,000 GDP per capita respectively; with 1.9% and 3.9% of their populations involved in agriculture respectively.³

Poverty and economic inequality are enshrined by a system that essentially seasonally or permanently alienates a significant proportion of its population from the production value chain, whether deliberately or inadvertently so. A country dependant on agriculture for livelihood and foreign exchange (majority which are the countries least performing on the MDG indicators in absolute terms) has direct linkages to SDGs 1, 2, 8, 10 and 15; if proper agro-production and agribusiness practices are upheld within the country and the global market.

I would like to ask two questions for the benefit of this paper;

1. A country journeying to the development levels of G8 economies, what are the returns on agriculture investment; the social and economic multiplier effects; and backward and forward linkages to all the other 15 SDGs if it were to embrace all the parameters of SDG 8 and SDG 17 in agriculture?
2. The core spirit of SDGs is equity. How then can, countries ranked lower in the global economic and social indicators; the very ones with a majority of their population in agriculture achieve the SDGs if agronomy is not the center of their progress? In other words, how can they ensure; “No One is Left Behind” in these countries?

To answer the first question; the returns, multiplier effect and linkages will vary from country to country but on the overall are immense, particularly in the countries with the worst socioeconomic indicators. To answer the second question; they unfortunately cannot, I believe.

¹ Food and Agriculture Organization FAO: High Level Expert Forum-Global Agriculture towards 2050.

² UN Department of Economics and Social Development <http://www.un.org/en/development/desa/news/population/2015-report.html>

³ Inference is made from lines of best fit from simultaneous equation combinations of any 2 countries among the top 10 GDP per capita and a proportion of their population involved in agriculture and compared with the same among the 10 countries with the least GDP per capita.

Source of data is CIA Library.

What defines Sustainable Land Management in Dryland Areas: A Case Study of Baringo Basin, Kenya

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Dryland areas are some of the most vulnerable regions in the world- susceptible to not just poverty owing to lack of livelihood opportunities but also to extreme climatic events. Desertification has been recognized as one of the fastest growing threats to the human population with multitudes of organizations coming together to fight it, one of the most notable being the United Nations Convention to Combat Desertification (UNCCD). Having made this point, it is of importance to note that indeed, there have been some positive and interesting developments in arid regions over the last few decades and the Rehabilitation of Arid Environments Trust (RAE Trust) is an example of one such initiative. Based out of Baringo, Kenya, RAE trust has rehabilitated over 8000 acres of arid land by converting them into productive pastures. This research was conducted with the RAE Trust between June and August 2016.

The question that this research has attempted to answer is what defines sustainable land management in dry land areas, specifically, in pastoral and agro-pastoral regions. Breaking this down further, there has been an attempt to arrive at specific land management strategies that have been put to use on different types of pasture fields. These strategies have all lead to income generation in Baringo and the research has attempted to explore that relationship. This research followed a mixed methodology approach- semi structured interviews and focus group discussions were conducted to collect qualitative data and RAE Trust's internal database was accessed for quantitative data.

The results of this research point out that it would be impossible to arrive at a certain factor that best describes land management for dry lands. It is a combination of off- field management decisions, group dynamics, and community relationships and on- field factors like strong fencing and no overgrazing. It has further shown that management styles vary depending on whether or not the piece of land in question is a common resource and that there are different development implications for both.

Species composition and vermicomposting studies on sustainable mountain agricultural in Kumaun region of Indian Himalayas

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Earthworms are one of the most important and dominant invertebrate present in the terrestrial ecosystems. They are ubiquitous, abundant and highly reproductive organisms and are 'keystone species' in soil food webs. The deterioration of soil fertility through loss of nutrients and organic matter, erosion, salinity and soil pollution are the negative consequences of modern agricultural practices. Vermicomposting is an integrated technique of composting as it employs the composting material passes through the earthworm gut which is loaded with the bacteria helpful in composting. Vermicompost provides major and micro- nutrients to the plants. It improves aeration of soil, humification, soil texture and water holding capacity of the soil. The tropical soils are mainly plant nutrient deficient whereas the majority of nutrients are entrapped in agricultural by products. Present study includes the random faunastic survey of the earthworms from foothill or sub-mountain region in south to the mountainous region in the North of Himalayas along the altitudinal gradient. Endemic species i.e *Amyntas gracilis*, *Metaphire holutti*, *Metaphire anomala* etc. have been identified along with the exotic species *Eisenia fetida* from the surveyed region. The purpose of the study is to compare the vermicomposting capacity of the exotic species with the endemic species to ensure that the local species can also be utilised in villages for the production of high quality vermicompost locally in the mountain agricultural practice.

Autosufficient Integral Farm Program, Social Approach Program for the Rural Sector

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Based on a whole philosophy of life but above all in the maximization of resources to improve the living standards of the peasant family, the integral farm develops according to the search for a perfect balance of nature, achieving with this the no Generation of waste, but that all products and by-products are managed as food, fertilizer, fuel, etc., within the productive unit that is the peasant farm.

It seeks to teach to diversify agricultural production to increase income sources and not rely solely on a product, or wait a single time of the year to earn income, but rather the farm has a steady stream of resources for welfare of the peasant family, if they alter the environment and protect the water sources and forests.

Being a change of culture and demonstrating that the efficient use of resources in a farm can give effective fruits both from the family food part and economically with income without waiting for a harvest but all year, are the effective demonstration of the program Integral Farm, the results are evidenced in the change of mentality of the peasant family and the young peasants who see in this program an efficient alternative not to abandon their plot but by the other to get the most out of it, impacting In a positive way in the diminution of the cordons of misery of the great cities of the country

Screening introduction and improvement of Finger millet (*Eleusine coracana* (L) Gaertn) Varieties as a hope for sustainable food Security in Nigeria

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Finger millet is an important security crop but it is not popular in Nigeria. This is due to many reasons. Although it is one of the most nutritious among all the major cereals and also a major staple food for millions of people, the crop has received less attention in Nigeria. The few farmers that accepted the crop in the country identified some problems associated with the production of finger millet *éviz*: striga problem, difficulties in differentiating between weeds and finger millet at early stage of growth, high labour requirement as a result of the use of broadcast method of planting, to crown it all the problem of blast which could be as a result of the current global warming is a big problem. Blast was reported to have reduced between 10 to 80 % yield. The other serious problem reported by farmers that adopt finger millet as one of their crops is the fact that they have no access to improved varieties or cultivars. It is therefore important to make the farmers aware first of the crop and its importance and then source for improved cultivars. It is also important to develop complete agronomic interventions for finger millet with an aim to reduce the labor requirement and drudgery faced by farmers. Improvement of agronomic practices in finger millet is a must for encouraging farmers for continued cultivation. In Kaduna State farmers inter crop it with ginger. Therefore researchers need to look at the cropping system approach rather than on one single crop. Furthermore, development of proper value chains, regulated markets, establishment of production cooperatives, and various value addition initiatives should receive support so that demand can drive the cultivation. Thus the reason for screening varieties suitable for cultivation in Wukari in Nigeria.

Scaling up the Farmer Field School approach - challenges and opportunities

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In 2017 having a global overview is an ambitious project because of the several implementations and the adaptations during the last decades and because in two different

communities in the same region of the same country the approach could be completely different, but in literature, through guidance documents, it's possible to identify a number of steps to create the approach. The aim of this report is to deeply understand the evolution of the approach from its creation and to underline the possibilities that it has today.

The Farmer Field School approach from the 80's

The FFS is a school without walls, created for the farmers by the farmers with the help and the cooperation of scientists that can both teach and learn.

Historical background

The Farmer Field School approach has been created by the FAO during the 80's as a response to the green revolution, aimed to gain behavioral changes in land use and management among communities (Braun et al., 2006).

The first project was established in Indonesia as Integrated Pest Management FFS in response to the resistance and sometimes resurgence of pest species; initially it has been designed to address a specific problem in a specific local context by placing the control of small scale agro ecosystems in the hands of people who actually manage it (Okoth et al., 2006). Then it has been flexibly adapted to over 90 countries (FAO, LEI and CTA, 2006) in response to the growing demand due to the necessity to feed an increasing number of people (Leeuwis, 2004). The use of the word "adaptation" is not casual because one of the main characteristics of the approach is actually the fact that works exclusively at a community level. It changes to address the necessities of the small farm holders in relation to the specific soil type, water availability and food security, playing a multidimensional role not exclusively related to crops themselves (Habermas, 1984).

Why FFS?

The main FFS objectives and necessities have been divided in ten categories (Waddington et al., 2012), namely:

1. Improved crops productivity and establish an appropriate model for agriculture management
2. Food security and nutrition: increasing the crop yields and using micronutrient rich foods (SPRING, 2014), people are more likely to have more food and a more balanced diet (USAID, 2014); additionally the lack of knowledge in food preservation, preparation and storage can affect the community in relation to health and hygienic problems (FAO, 2013).
3. Market access or entrance: promoting labor and managerial skills to generate, where possible, an additional income.

4. Community and farmers' empowerment through a participative adult-learning approach
5. Environment: ensuring sustainable food production, soil-water management and avoiding waste.
6. Pest and Pesticide reduction
7. Livestock healthcare and management
8. Social development and technological advancement
9. Institutionalization: involving NGOs, local and governmental organizations and stakeholders' partnerships in a cooperative action to ensure a long lasting impact for the community. Health: with innovative FFS groups in West Africa promoted by IFAD in relation to vector-borne diseases and with the promotion of HIV/AIDS prevention in rural communities (IFAD, 2011)

Structure of the approach

Despite having many variations of the original FFS approach there are characteristics that are common across all. A global objective, that can be pursued by the approach in general terms, has been identified by the UN with the second SDG: "increasing the agricultural productivity and the incomes of small-scale food producers, particularly women, indigenous people, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, markets and opportunities" (UN, SDG 2.3, 2015).

Building Resilience to Climate Change

Making the UNFCCC Work for the Rural Poor in Esan Land

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Climate change and poverty are twin global problems threatening human survival especially among the rural poor in the developing countries including Nigeria. They have also become major concern of the Sustainable Development Goal (SDGs). The global community, in recognition of these problems, in 1992, negotiated the United Nation Framework Convention on Climate Change (UNFCCC) to help humanity majority of which are rural poor cope with the adverse effects of climate change through access to climate information, finance, modern technology and capacity building. Most studies on the UNFCCC tend to focus on its operations at the international and national levels whereas its effectiveness is better appreciated against its impact at the grass root level. This paper believes that a focus on the operation and impact of the UNFCCC among the rural poor will help identify the gaps with a view to filling them and making the Convention more beneficial to the target populace. This will also help in realizing the SDGs It is in line with this objective that this paper appraised the specific effects of climate change on the rural dwellers in Esan land. It further investigated how the rural dwellers in Esan land perceive and adapt to climate change, and examined the challenges

of climate change adaptation among the rural dwellers in Esan land. These were with a view to throwing light on the rural dwellers' awareness and vulnerability to climate change and the impact of the UNFCCC on their adaptive capacity.

The study used primary and secondary data. Primary data was obtained through the administration of structured questionnaire on a total of 250 purposively selected respondents aged 40 years and above (old enough to know about changes in their local climate) drawn evenly from 10 purposively selected rural communities with evident climate change manifestations from across the 5 local government areas of Esan land. Data were analysed using the descriptive and content method.

The results found that climate change awareness in the study area was high though inadequate; that the rural dwellers in Esan land have tried to adapt through diversification, changes in farm timing, use of improved farm inputs among others; that inadequate information, lack of finance and training in capacity building, and obsolete technology constituted the challenges of climate change adaptation in the study area

The study concluded that though there was general awareness of climate change among rural dwellers in Esan land, they were however, still very vulnerable to its negative effects mainly because the UNFCCC has not made appreciable impact in the area. This could undermine the realization of the SDGs in the study area.

Towards Climate Resilient and Inclusive Urban Development in Latin America: Showcasing a participatory planning project in three cities

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This presentation is based on the "Participatory Decision-Making for Climate Resilient and Inclusive Urban Development in Latin America" project. The primary objective of the project, funded by CDKN, IDRC, and FFLA, is to identify and apply a practical, innovative and participatory methodology to support climate resilient and inclusive urban development in the rapidly growing small and medium sized cities of Latin America.

Not only is Latin America one of the most urbanized regions in the world, it is also one of the most hazard-prone. Moreover, the region is heavily affected by urban poverty, socio-economic inequality, substandard housing and infrastructure and inadequate institutional capacity. The research takes place in the cities of Santa Ana, El Salvador; Santo Tomé, Argentina; and Dos Quebradas, Colombia, which are small to medium sized cities that have experienced rapid development in the last few decades. All three cities encounter different urban problems and are at risk from different impacts of climate change requiring various disaster risk reduction, climate change adaptation and resilience building strategies.

This research comes at a time when all post-2015 development frameworks (Sendai Framework for Disaster Risk Reduction, the Paris Accord for Climate Change, the Sustainable Development Goals and the New Urban Agenda) recognize the importance of urban areas for the future of safe, equitable, resilient and sustainable development. Local governments and governance play the most important role in achieving this. This requires a specific focus on urban governance, particularly as a decision-making process involving all local stakeholders, which also enhances the feasibility of implementing such decisions. This project seeks to answer that need and to develop a practical way in which stakeholders are integrated into the decision-making process, that not only empowers citizens, but also facilitates the implementation of strategies that are identified towards a resilient urban development. The project uses a decision support tool and methodology in a multi-stakeholder setting and test and assess in different contexts issues such as risk, vulnerability, urban development and decision-making. The goal is to explore different options to integrate disaster risk reduction, climate change adaptation and resilience building strategies that will also ensure less inequality and increase empowerment through a participatory process. This participatory process is being implemented in the project cities and the presentation will showcase the results of this participatory process, outlining expected positive outcome, such as strategies on risk-informed urban planning and development, infrastructure upgrade, ecosystems management as well as social capacity development, as well as any challenges acquired during this process, which can be applied in different settings.

Youth Decision Making in Agricultural Adaptations to Climate Change An Analysis in East Africa

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In conjunction with the contemporary narrative of Africa's "youth bulge" and youth's disinterest in pursuing agricultural livelihoods, this paper explores the extent to which youth (18-35 years old) have decision making power in the implementation of agricultural adaptation practices due to climate change in East Africa. Focus groups discussions, case studies, and individual interviews were conducted with a total of 155 youth and 42 policymakers and stakeholders in selected sites in Tanzania, Kenya, and Uganda to assess youth's knowledge of adaptation measures and their role in the decision to implement them at the household, community, and national levels. Our findings suggest that youth have an understanding of climate change and how to adapt to it. However, they are unable to do so due to lack of agricultural inputs and financial capital, insufficient land ownership, indirect participation in decision making and limited access to markets.

Resilience to climate change: Politics and Practice of Development

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The proposed paper seeks to explore a policy framework for mapping regional assessment indicators for studying the resilience of socio-economic and environmental systems, and evolve an understanding of the social and cultural institutions that obstruct transformations towards sustainability. Our theoretical framework will study resilience as emergent from the field of systems ecology as a framework of human-nature relations that implicates not simply the question of human adaptability to changing ecological prerequisites, but also questions and re-shapes the pathway from adaptive resilience to transformative resilience, by looking at context-specific social and cultural variables.

This marks a significant shift from the idea of resilience as simply the ability of a system to maintain persistence and stability or, additionally, adaptive capacities, in the face of change as the foregrounding idea being that resilience is not a uniform process across scales and is shaped by social and political systems of a local geography.

In the context of this framework understanding, the proposed paper will not only yield a policy framework for mapping indicators for assessing resilience at a local landscape, but also make substantive contributions to the theory of resilience as a social and political project which, if it empirically factors in the local societal variables, can substantively enhance an ecosystem's pathway to sustainable transformations.

Local to global: Communities at the centre of policy implementation

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What do international policy frameworks mean without the people most vulnerable taking charge?

These policies mean nothing. They sit on the shelves and we meet all over the world. Without communities. Policies mean nothing.

The narrative is widely accepted now : disaster risk reduction saves more lives, reduces human suffering and prevents economic losses. Risk reduction also contributes to economic prosperity. The impact of climate change negatively affects access to water, and consequently affects food security sectors in agriculture, livestock, health and nutrition. The impacts extend to other social sectors like education, social cohesion (peace), infrastructure and create more inequalities in gender roles. Climate induced disasters push vulnerable people further into poverty.

The Partners for Resilience (PfR) is an Alliance of five Netherlands-based working on building community resilience through climate change adaptation and ecosystem

management initiatives. The PfR is a collaboration joining humanitarian, development, DRR and ecosystems perspectives. Local perceptions of what risk is crucial in community-based resilience initiatives, thus PfR places a strong emphasis on the centrality of communities in driving the resilience agenda.

PfR, funded by the Netherlands Ministry of Foreign Affairs, is advocating for the application of an integrated risk management (IRM) approach to reduce impacts to shocks from climate change, ecosystem degradation and mal practices in development investments, or a combination of these factors. PfR advances policy dialogue on risk reduction from concrete programmes implemented by PfR members in Africa, Asia and Latin America where it has proven that we can reduce disaster risks but also create community economic prosperity. The session will showcase practical experiences on integrating diverse skills from environment, humanitarian and development practitioners and the role that traditional knowledge plays to build community resilience, diversify livelihoods in drought/flood prone areas from a climate change and eco-system management perspective. PfR emphasizes placing communities at the centre of risk reduction through risk analysis/assessment, development of early warning mechanisms as well of planning and implementation of programmes through an inter-sectorial/interdisciplinary perspective.

On a basis of eight key principles, the IRM approach strives for:-

1. Local ownership - Promote community self-management, boost empowerment and create local ownership. This will put communities in the driving seat of their own development. Local and traditional knowledge and resources should be the basis, and should to be complemented with external resources, including scientific knowledge, to make interventions more effective and sustainable.
2. Livelihoods - Focus on protecting and strengthening livelihoods, both from a humanitarian and a development perspective. The robustness of structures and arrangements through which individuals, families and communities function determines their ability to withstand or recover from shocks and stresses. Risk management should therefore focus on livelihoods through a combination of community interventions and targeted dialogues with stakeholders to make policies, investment decisions and practices risk-informed
3. Landscapes - Recognize the broader geographical scales (landscapes) on which the drivers of risk express themselves. By regarding risk in a wider landscape, the places where it originates and where it manifests itself become clear é places which can be geographically remote.
4. Ecosystems - Moreover the role of ecosystems for community safety and resilience needs to be recognized: degraded ecosystems can increase disaster risk, while healthy and well-managed ecosystems can function as a buffer for hazards and contribute to people's livelihoods.
5. Timescales - Encompass different time scales in risk management, enabling its adaptation to changing risk situations in both short and long-term, and ensuring that early warning information can be translated into appropriate action. Global and local - Make global and regional policy frameworks and agreements risk-

- informed by local realities, so that they effectively enable IRM initiatives. The accompanying systems and structures should in turn ensure that indeed local communities benefit.
6. Integration - Apply a holistic approach. Since hazards and risks are not only manifold but also often mutually reinforcing, single-sector orientations should be avoided
 7. Partnerships - Approaches will become most effective if involved stakeholders (communities, government agencies, private sector, knowledge institutes, and civil society) collaborate to complement each other's expertise and resources in order to traverse different sectors.

The approaches applied by PfR exemplify how to bring coherence in the implementation of international agreements- Sendai, the SDGs, Paris Climate Agreement and New Urban Agenda.

Reappropriation of Resilience to Neoliberal Vision Political Sustainability in Post-Paris Africa's Climate Change Adaptation

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Paris Agreement is credited with finding enduring solution to the political gridlock of limiting carbon emission globally. Despite its remarkable achievement, COP21 has reframed adaptation to resilience by insisting on self-reliance strategy as the most sustainable option for mitigating climate risk. Although resilience to disaster risk is improving globally, Africa is witnessing re-appropriation of the concept skewed towards neoliberal vision of political life. Dislocation exists between sustaining adaptation strategies of the poor and one-size-fits-all market-led resilience strategy. In its present form, resilience is a reactive process involving complex interactions between different stakeholders. These stakeholders hold different notions of building peoples' resistance to change. Most of these views are shaped by interests, political experience and their historical past. In this adaptation regime, financialization of risk is a precondition for overcoming vulnerability as acceptance of sufferings determines adaptability. This relocalization of adaptation arising from the internalization of coping strategy has serious consequence of deterritorialization which is capable of triggering political instability.

This paper examines correlation between resilience and political sustainability in sub-Saharan Africa showing how they are inextricably bound with the implementation of Nationally Determined Contributions (NDCs). Our analysis is through Disaster Risk Reduction Capacity Assessment (DRR/CA) methodology based on a review of primary data and relevant documentation related to DRR, NDCs, NAPA, environmental management and climate change adaptation in Nigeria. The selection of respondents is contingent upon their expertise in answering the research questions. A total of forty (40) experts were purposively sampled with the respondents drawn from the MDAs, academia, and CSOs. Data were collected using a well-structured questionnaire and personal interview. The method avails us opportunity for an in-depth case study approach

which x-rays array of adaptation strategies. This illuminates consequence of not sustaining individual knowledge, attitude and practice of diverse actors at different stages of agroecological complexities.

The study finds that resilience in its current form has its own demons. We confront resilience's demons in the reinvention of neoliberal wheels at Paris. Though the NDCs attempted to integrate some of the age-proven strategies of the poor yet, are fundamentally flawed as they are not region specific neither do they address specific adaptation challenges of most regions. Instead, they have created further avenue for internalization of uncertainties by displacing sovereign authority of the poor for those who control instruments of building resilience.

The result shows that the NDC has minimal local anchorage as it is an externally driven agenda. For political sustainability, portfolio of challenges that have cumulatively made attainment of the NDC a tricky venture should be overcome while region specific adaptation practices should be synergically integrated into a comprehensive toolkit mainstreamed into national development plan. Refocusing policy towards individualization coping strategy requires biomass economy is made building block of low-carbon and climate resiliency. In post Paris era proactive adaptation requires synergetic integration of the NDCs with Climate-Smart Agriculture to address food and energy crop paradox, creation of disincentive in the form of eco-tax and eco-label and incentive through granting of subsidy to the clean energy sector.

Cultural Heritage in the Context of Sustainable Development Goals: A Rationale for Engaging Heritage Paradigm into Climate Actions

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Cultural heritage, despite its widely acknowledged contribution to social, economic and environmental goals, has been largely marginalised in the discourse of global sustainable development agenda. In spite of the wide ratification of the UNESCO Culture Convention by vast majority of the States Parties to the Convention, cultural heritage has been somewhat trivialised in the mainstream sustainable development discourse. This perhaps, is due to a complex of reasons and sometimes, fundamental misconceptions. On the one hand, this is partly due to the fact that the term 'cultural heritage' often evoke diverse paradoxes in different contexts of usage and also, hypothetically, due to the canonisation of modernist ideologies on the other hand.

Over the last few years however, there has been increasing intellectual awareness on the part of the UNESCO to posit platform for developing and testing new approaches that demonstrate the relevance of heritage for sustainable development. Within that context, three main thematic areas were identified in which the World Heritage Convention perspectives can be integrated into the SDG, such which includes; environmental sustainability, inclusive social development and inclusive economic development.

Despite the surge in awareness however, the precise quantitative and qualitative targets and indicators that express the contribution of the cultural heritage to sustainable development remains inadequately conveyed and largely oblique in contemporary literature today.

Against the backdrop of the three identified thematic areas in which cultural heritage can be a contributor to sustainable development, this paper therefore aims to posit an indicator based approach to position the contribution of cultural heritage in the context of environmental sustainability, precisely, the SDG goal 13 é climate actions. To achieve this imperative therefore, the paper is organised in twofold. Firstly, the literature review of the paper is drawn on the documents produced so far by UNESCO in the context of World Heritage Convention and sustainable development. Secondly, the empirical part of this paper relies on the result of a research conducted by the author with Louroujina Village in North Cyprus as the case study. Conclusively, the paper argues that lessons from energy consumption and carbon emission rates in cultural heritage can be a contribution to the abatement of greenhouse gases from the building sector if the ethos are incorporated at the policy level especially in developing countries where movements against cultural heritage is not - yet - as exacerbated unlike the developed countries.

Climate Change: Effects and Adaptive Measures in Africa

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Climate change has constituted a global menace to standard of living in many countries of the world. Africa continent are among the most susceptible to climate change impact. In order to ensure environmental sustainability, food security and socioeconomic growth in this region, strategic mitigation and adaptation to climate change impacts needs to be employed. This review paper highlights on climate change impact and adaptation in Africa.

Prolonged and intensified droughts has been recorded in Eastern Africa; unprecedented floods in Western Africa; depletion of rain forests in Equatorial Africa and an increase in ocean acidity around Africa's southern coast.

Temporal migration pattern has been adopted in Sudan and Ethiopia as a way to adapt to recurrent drought; most western part of Africa have adapted to flood by building houses on stilts. Also, crops biotechnology developments have been applied to increase Agriculture production in many parts of Africa. However, the level of adaptation has not kept pace with the rate of climate change effects; boosting adaptive capacity will build climate change-resilient livelihoods. This will require substantial investment in: income diversification, disaster-risk management and effective extension services among others.

Climate change will have significant impacts on communities and livelihood. Boosting adaptive capacity of the vulnerable group in response to climate change will help to safeguard sustainable development and food security improvement of their population.

Coping and Adaptation to Climate Vulnerabilities: Implications for Agricultural Livelihoods in Semi-Arid Ghana

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Coping and adaptation strategies represent an important mechanism to surviving vulnerabilities associated with changing climatic conditions in semi-arid regions. The research adopted sustainable livelihood framework to identify specific coping and adaptation strategies adopted by farming households, analyze the outcomes and ascertain the implications on the vulnerability context within which farming livelihoods are pursued in a semi-arid region of Ghana. The study area was Kassena Nankana Municipal - the communities of Doba Sirigu, Doba Gayingo, and Gingabnia. Data was collected through participatory learning and discussion in focus groups, household surveys, and interviews, with a follow-up transect walk to validate responses. The participants were mainly farmers and a few officials from development organizations and local government department of agriculture and environment. Responses were analyzed qualitatively with inferences to the quotes from respondents. Frequency tables were also generated from the survey responses on perceived changes in temperature and rainfall. The results show that farmers' are becoming increasingly exposed to erratic rainfall, rising temperatures and frequent storms in the study area. On the other hand, they have developed diverse livelihood strategies to cope with and adapt to risks and vulnerabilities of the perceived changes in rainfall and temperature. However, the effectiveness of the strategies in reducing vulnerability cannot be said with certainty. While some of the strategies have helped to reduce livelihood risks and enhance security in the short-term, others have led to socio-economic and environmental consequences on agricultural livelihoods, thus exacerbating the vulnerabilities and poverty situations of some households. The research notes that sustainable coping and adaptation strategies in semi-arid areas depend on farmers' ability to access on-farm support services from relevant organizations, secure finance, and have knowledge of the realistic changes in climatic conditions. This recommends that government and development partners should design holistic education programs on livelihoods, health, environment, and climate. It also calls for more agri-business investment training, community-wide support on climate adaptation and access to sustainable financial services to farmers in semi-arid Ghana.

Building Resilience to Climate Change at Local Level: A Case of Community Forests of Nepal

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Nepal is regarded as one of the most vulnerable country to the impacts of climate change. Its impacts are evident and have threatened the livelihood of local communities. As the impacts are localized, building resilience of local community is the starting point to build resilience at the national level as well. In this paper, I try to explore the relationship

between community forests (CF), and its potential contribution in building resilience to the impacts of climate change. Extensive review of the climate change related policies have been carried out to elicit policies about the climate resilience. Discussion was also carried out with the relevant governmental and non-governmental organization (NGOs) officials. Moreover, as a case study to find out the field level scenario, three community forests of Parbat district were also visited. Similarly, Climate change adaptation plans of these CF were reviewed, and discussion with the executive members, and observation of the implemented activities were also carried out in the field.

Nepal has formulated various policies and programs to support climate resilience at the local level. For instances, National Adaptation Program for Action (NAPA) 2010, Climate Change Policy 2011, and National Framework for Local Adaptation Plan for Action 2011 have emphasized the local level actions to build resilience to climate change. About twenty thousand community forests users groups are functional in Nepal primarily to conserve and manage the forest resources of Nepal. In the changing global and national environmental and political context, they are continually adapted to solve the emerging environmental as well as social problems. CFs have been carrying out activities categorizing in six impact categories viz. agriculture and food security, forest and biodiversity, water resources and energy, water induced disasters, human settlements and physical infrastructures and human health. Besides that community forests were also found to be carried out capacity building and awareness raising activities on climate change adaptation and resilience. However, it is found that local level financing is crucial for the successful implementation of climate change adaptation plans. Various local level adaptation plans are prepared in Nepal but low financing has resulted in weak implementation of those plans in the field. The same was found to have been applied in case of community forests in the study area as well. Likewise, the government and NGO sectors has provided inadequate amount of budget to implement the activities. On the other hand, discussion with the officials at the district and national level revealed that lack of mainstreaming of adaptation plans into the plans and programs of governmental line offices/agencies and NGOs resulted in the lack of adequate fund for the implementation of climate change adaptation/resilience related activities. Therefore, mainstreaming the climate change related activities of the community forests with the plan and program of the governmental and NGOs can improve the effectiveness of community actions to build the climate resiliency.

Inundated: Holistically Improving Institutional Coordination and Crisis Management Following Superstorm Sandy

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This paper and presentation analyzes institutional coordination and crisis management efforts surrounding Superstorm Sandy in the New York Metropolitan Area. It argues that response and recovery efforts were inconsistent, and at times ineffective, due to the lack of utilizing a holistic and systems thinking approach. Using the Rockaway Peninsula as a fractal exemplar of the region, this document identifies ways to improve preparation,

response and recovery in a resilient fashion through improving communication, establishing trust, overcoming cognitive biases, creating a greater linkage between disaster planning and emergency management, and leveraging tools such as risk analysis and needs assessments. Through institutional coordination, crisis management and organizational dynamics research; stakeholder interviews with those involved with response and recovery efforts; and comparative analysis with regional, national and international examples, it develops a set of recommendations for holistic preparation and response in a disaster event, while considering the complex political and geographic structure of the region.

Off-Farm Livelihood Diversification as a Strategy for Adaptation to Resilience Against Climate Change in Rural Uganda

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The threat of climate change on agriculture is continuing to pose significantly adverse effects on income and food security in Uganda. With 81.6% of the population living in rural areas, the dependency upon agriculture as a source of income is high. These effects include shocks and stresses such as droughts, failed harvests and flooding and are only likely to increase in both frequency and intensity. Thus, as recognised by scientists and development practitioners alike, [Ugandan] livelihoods are at risk (ibid) due to threatened agricultural productivity and the repercussions on financial stability.

This research will examine off-farm livelihood diversification as both an effective and imperative strategy for adaptation to resilience against climate change in rural Uganda. With the goal to reduce dependency upon agriculture as a sole source of income, I will be using a mixed methods approach to understand the current implementation of off-farm livelihood diversification and it's success to increase human capital (experience, skills and willingness to innovate), generate earnings (additional cash resources), decrease vulnerability to effects of seasonality, increase assets and reduce poverty.

An in-depth literature review, supplemented with current policy documents, will help identify the previous socio-economic barriers for both Ugandan local communities and policy makers. This will be complimented by my primary data, collected through semi-structured interviews and focus groups. Current and past literature has indeed demonstrated the effects of climate change on agricultural productivity, yet there is more to be discovered on how this can be better implemented in Uganda. In other words, preliminary research indicates that income diversification is an adaptive strategy toward resilient development, yet further empirical research is required to identify this as a resilient strategy to the effects of climate change in Uganda. The research study will include an examination of a number of stakeholders, in particular the government and their role in supporting policies to enable this particular labour transition (capacity to provide necessary education to develop skills off-farm, provision of resources and distribution of capital). Furthermore, qualitative interviews with farmers will allow an in-

depth analysis of the experience of beneficiaries: their willingness to engage with off-farm livelihood diversification and their lived experience to allow them to do so. During a 10-week study (beginning 28 May 2017) I will specifically research the current adaptive and transformative capacities for livelihood diversification (location in Uganda TBD). NGO's and local community leaders will also be approached for interviews.

Using Ecosystem-based Adaptation for building resilience to climate change: case study from a pilot in Ha Tinh, Viet Nam.

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Ecosystem services are the benefits that billions of people around the world depend on for their livelihoods. Sustainable livelihoods are an important factor for building resilience, and any changes in ecosystem service flows can bring consequences for livelihoods and vulnerabilities (Folke et al., 2002). Ecosystem-based Adaptation (EbA) is understood that, using biodiversity values and ecosystem services to support people adapt to the adverse impacts of climate change.

Infrastructural or 'hard' adaptations to cope with climate change can have a positive impact in some certain cases, but require costly investment. Meanwhile, there are some 'soft' or green adaptation measures that offer assistance to farmers to mediate the severe impacts of climate change. EbA has comparative advantages over hard measures in that it tends to provide multiple benefits in addition to climate change adaptation (Jones et al., 2012). Since the concept EbA is relatively new, there is a need to develop and then test practical and systematic methodologies and approaches for identifying and implementing EbA practices in the field. The identification, assessment and selection of EbA practices are important not only to smallholder farmers, but also local authorities involved in developing adaptation strategies. This study shows that forest protection and enrichment is one of the most promising EbA measures for building resilience have been selected by farmers.

Smallholder farmers in Son Tho commune - a mountainous area, Vu Quang district, Ha Tinh province, Vietnam depend on ecosystems for their daily subsistence and lives. They have been severely affected by different phenomena of climate change in recent years. Thirty families in the commune were selected to participate in the EbA pilot "Natural forest protection and enrichment as a buffer during extreme droughts" - identified from the participatory Vulnerability Assessment. The pilot covers three hilly slope sections, protecting and enrichment of native timber species in the upper part, planting orange in the middle part - together with contour and soil binding techniques, and keeping bees in the lower part. One year after the start, these 30 households were surveyed to locate what ecosystem good and services they benefit from the pilot. Data was collected at meetings with commune staff, both male and female farmers through open-ended and structured questionnaires and focus-group discussions. All surveyed farmers acknowledged that they receive direct and indirect benefits of different interventions mentioned above.

These benefits are to help farmers build resilience to extreme droughts - the most severe climate change phenomenon in the area.

Firstly, ecosystems are helping to maintain diversity and redundancy. Species, ecosystems, and farmers in the survey area respond differently to climate change, and different elements of this system compensate for one another functionally. According to the survey, the pilot provides all four types of ecosystem services for building resilience. Provisioning services, firewood from pruning, animal's food, and underground water in the upper part; Orange for income, animal's food in the middle part; honey in the lower part. Regulating services, water storage capacity, micro climate regulation, runoff and erosion control, moisture and mulch contents. Supporting services, the pilot may help conserve biodiversity, increase the pollination capacity to have better fruit productivity. Cultural services, higher forest density and orange plantation bring recreational values to the community and provide opportunities for tourism.

Secondly, the participation of communities benefiting from ecosystem services is important to maintain the ecosystems. Farmers who depend on existing ecosystems for their daily lives would pay more attention to the negative impacts of the extreme weather events and the ecosystem degradation. Involvement of farmers in using and managing ecosystems is considered as key to the health and functions of ecosystems, because it increases the degree to which these farmers take ownership of them (Ostrom, 2009). The responsibility of maintaining the health of ecosystems lessens the improper using of ecosystem services by any single farmer. At the same time, the implementation of the pilot also helps to share information and raise awareness of other farmers nearby. Thus, people can see the possibilities for up-scaling pilot to a greater scale, ensure people and ecosystems have capacity to deal with climate change and continue to develop.

Conserving Habitats and Biodiversity in Latin America & the Caribbean

The Impact of the Public Policies in the Forestry Sector on the Care and Productive Capacity of the Forest

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I will carry out my field practicum in Oaxaca, Mexico with CIIDIR-IPN (Centro Interdisciplinario de Investigaci3n para el Desarrollo Integral Regional 4 Instituto Politecnico Nacional), to analyze the impact of public policies within the forest sector, specifically in the State of Oaxaca, primarily in the areas of productive capacity and forest care. My practicum will analyze the new forest law being implemented in Mexico to determine its positive and negative attributes with regards to the forest sector. It will be necessary to work with different stakeholders including communities and ejidos of the Mixteca region of Oaxaca, the public sector, CONAFOR, the academic sector and, if is possible, the commercial sector involved in the commercialization of wood products.

Diverse sources of information will be consulted including legal documents and interviews with the aforementioned sectors will also be carried out.

My practicum will explore if public policies respond to the needs of the forest sector. Are laws updated in a continuous fashion to favor the forest sector? This work will be timely since the new General Law on Sustainable Forest Development was approved on March 7, 2017, and the country is embarking on a new phase, making it necessary to shed light on the likely impact it will have. The opinions and perspectives of different actors involved in the forestry sector will be important inputs into this analysis.

Objectives

General objective

Prepare an analysis of the potential impacts of new public policies (new forest law) on the forestry sector

Determine the perception of different actors (representatives of communities and ejidos, CONAFOR officials, academics, and perhaps people involved in the commercialization and processing of timber) with respect to the potential impacts of the new law.

- What are the potential benefits of the new law?
- What problems can the new forest law generate?

Analyze the most important policy implications of the new forest law in the forestry sector

- Will new public policies generate benefits in the forestry sector?
- Is there a gap between the application of public policies applied and the needs of the forestry sector?

Setting Priorities and Measuring Impact in Conservation and Sustainable Development Projects in Madre de Dios, Peru

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The Madre de Dios region, located in the Southern Peruvian Amazon, is the “Capital of Peru’s Biodiversity” and the home of several indigenous groups. Despite its cultural and environmental importance, this region faces serious problems, including high levels of poverty and environmental degradation. The various entities working to address these problems, however, struggle to identify the most effective approach for making progress and achieving sustainability at the same time. This difficulty is compounded by the fact that, in many cases, the data that would be necessary to make these determinations is inadequate or lacking entirely. For this reason, some experts have begun stressing the need for a more evidence-intensive approach to addressing these problems. The Effective

Altruism (EA) movement was formed to address this need. One high priority area that receives relatively little attention from EA, however, is the linkage between Conservation and Sustainable Development (CSD). My research aims to help fill this gap by investigating what impact means in the CSD context, and how this value may be measured. The data I collect will be used to develop new, or strengthen existing protocols and improve interventions over time.

Forests and Land Tenure: A Look at National REDD-type Initiatives in Costa Rica, Mexico, and Ecuador

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As consensus grows regarding the anthropogenic causes of climate change, deforestation has emerged as one of the primary contributors to greenhouse gas emissions worldwide (IPCC 2007, Parker et al. 2009, Hall 2012). This urgent need to drastically reduce global deforestation as a climate change mitigation mechanism has led to the launching of the international initiative UN-REDD (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries) (UN-REDD 2009). The move of forests to the international scale poses many implications for land tenure as the vast majority of carbon-rich forests reside in regions where land ownership is ill-defined, contested or insecure (Bruce et al. 2010). As Latin America comes forth as the global leader in terms of expanding REDD coverage, Costa Rica, Mexico and Ecuador stand out as the three Latin American countries developing national-level REDD strategies through the incorporation of pre-existing forest conservation programmes with a PES (payment for environmental services) component (Hall 2012, Petkova et al. 2011). While efforts are in place to attempt to minimize several structural challenges associated with REDD and land tenure, the rapid expanse of these programs has posed several implications including an insecurity of land title, conflicting overlap between land and resource rights, and a potential loss of territorial autonomy. These implications point to a need for increased capacity building, programmatic flexibility, conflict mediation, clarification of grey areas, and a proper mechanism of consultation in order to create an increasingly equitable participation process that minimizes land conflicts and promotes an overall sustainable forestry management system.

Economics and Demography of Natural Disasters

The United Nation's Cooperation to Transboundary Basin and Island States in Case of Natural Disasters

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According to the Principle 1 of the United Nation Conference on Environment and Development: Human being are the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature. Under this belief in the Hyogo Framework of Action 2005 é 2015 as well as the Meteorological World Organization emphasizes the necessity to become stronger transboundary basin and island states where living more than 44% of the world population.

The assistance given by United Nations to riparian countries affected for natural disasters could became easier if the Organization had identified the transboundary basin and island states by continent according to the natural phenomena that have caused more victim

The detail's level of information that every country has about itself are heterogeneous and the only common data are number of victims when a natural disaster occur, consequently was made a methodology in order to know how vulnerable are transboundary basin and island states to face natural disasters.

The vulnerability's level to natural disasters were estimate through matrices with intensity register of drought and flood, earthquake, volcanic eruption, storm, tsunamis, mass movement, extreme temperature, but the main variable was determinate by the number of mortal victims.

To make easier the decision of the Unites Nation at the moment of support a cooperation treaty to became stronger places less resilience to those natural disaster that frequently affect that areas, were organized the results given a priority order, according to the number of people who live in each transboundary basin and island state.

Besides, other methodology was made to estimate some kind of difficult that could face if the United Nation tries to support those places less resilience where are human groups which different political, social, economical, religious characteristics. Through matrices with data about number of countries repairs of the basin, number of habitants of the basin, number on practices religious, number of language used by people who live in the basin, the estimated average political stability among repair countries which share the hydrological unite, average of human development index according to the number of countries that form part of the basin and the development gender index.

The results of the methodologies previously mentioned are summarized by a code alphanumeric to identify the easier a priority order.

Education for Sustainable Development: An Issue of Consciousness and Values

The World's Biggest Promise: SDGs for Everyone

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MY World Mexico is a network of 35 organizations, movements and 120 volunteers working at a local, national and international levels for the Implementation, monitoring, financing and socialization of the Sustainable Development Goals (SDGs) in Mexico. The project started in Jalisco, Mexico collecting over 400,000 MY World ballots and reforming the State Development Plan in alignment with the SDGs. Since 2016, MY World Mexico has operated throughout Mexico, collecting over 30,000 MY World 2030 surveys and impacting in Mexico's National Voluntary Review during the High Level Political Forum on Sustainable Development, the ECOSOC Youth Forum and the Commission for Social Development.

As of today, MY World Mexico is now a partnership between Corporativa de Fundaciones, A.C., the United Nations Volunteers Programme in Mexico and the SDG Action Campaign. The three ways in which MY World Mexico takes the SDGs to people in Mexico:

1. SDGs campaigns.
2. Humans of MY World.
3. Conferences, lectures and workshops.

Our core activities relate to Education for Sustainable Development: An Issue of Consciousness and Values. Through hundreds of voluntary actions throughout Mexico, we make sure people are involved in the SDGs at the local and national levels.

Quality Education for all: Virtual Global School

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I strongly believe in the power of Education, namely the chance to be free and independent, as well as the opportunity to grow, to reduce inequalities, to reach gender equality and, finally, peace.

I feel very fortunate to be born with the chances that I happen to have every single day of my life. Yet I have not understood why some people got the possibility to have this path in life. Me, You, We all are so fortunate. Every morning I wake up feeling the responsibility of those children who live in a war zone, or in a refugee camp, and they have no voice. They have no responsibility, it is not their fault if they have been growing up in such areas. But it is not time to pity them. It's time to take action.

Education is a Basic Human Right. In some countries though it ended up being a crime, especially for girls. Many children all over the world do not have the access to education because of poverty, war or gender inequalities. What about their dreams? And what about

their Rights? We should all speak up to let them have Quality Education. And to stop poverty é the key of success is the end of segregation.

Quality Education is one of the 17 Sustainable Development Goals, through which other Goals could be reached: Decent Work (#8), Reduced Inequalities (#10), Gender Equality (#5), No Poverty (#1), Good Health and well-being (#3) and Peace (#16). Education is a blessing, as well as Technology is.

I also strongly believe in the power of Technology, whether we think of Internet or of computers and tablets. We should all have understood that Internet is not a computer network, but it is an infinite tangle of people.

Moreover, Internet is now a Basic Human Right. Thomas Hughes, the executive director of Article 19, said that Internet is essential to achieving the Agenda 2030 for Sustainable Development, and no state should be seeking to slow this down. It facilitates vast opportunities for affordable and inclusive education globally and it has a great potential to accelerate human progress.

It is convenient for us to look at the synergy of Technology and Education: it could be the best gender-free, affordable, safe and powerful tool in the World.

Let's now think of Democracy, and where it could be. Democracy can (and does) bloom where there is Holding, Listening and Sharing. Holding, Listening and Sharing are the best antidote against Hate, together with Education, of course.

Internet is Freedom and it gives the ingredients for Peace. How can we reach Peace? Through Solidarity. And how can we reach Solidarity? Through Education and through the perception that things could be seen in different ways, thanks to a sort of a window, that is Culture.

So, I'd say, powerful synergy of Education and Technology.

Some quick questions now: how easy is it for an average girl in a Developed Country to take a selfie and post it on Instagram? How easy and cheap is it? Now let's imagine that the whole time spent on Instagram or such would be spent in writing English and Maths lessons for children living in a refugee camp in Syria. How easy would it be? How satisfying? We are all so fortunate, and I will never stop to say it.

I've been volunteering as a virtual teacher for some schools in Ethiopia, Pakistan and Guatemala. I teach children some basic English and Maths through Skype and emails. There are no words that can explain the joy of sharing with them something that I have, which is knowledge. Knowledge can be so powerful, more than a gun will ever be. Maybe for this reason somewhere it is easier to give a gun rather than a book.

Children are the backbone of our Society and every single child in this World deserve a fair chance of getting quality education during his or her life.

My project is to create a sort of a platform, a learning-cloud, where children and teachers may find materials for their lessons. Volunteers may be involved in marking homework, every hour of every day, 24/7, in every part of the World.

Environmental sustainability in the italian achitectural teaching

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The paper collects some research and teaching experiences done over the last few years in the field of the environmental design of Architecture.

Particularly the contribute try to analyze, by a critical review of this experimentations, potentialities and limits of the application of sustainable development's and circular economy's principles into the Architectural field.

All the students's activities have been oriented on a systemic design approach, based on the evaluation of the environmental implications of architectural choices throughout the life cycle of the building. To this end, references to the main environmental design and assessment methodologies such as bioclimatic design, ecodesign, life cycle design and life cicle assessment was fundamental.

These design methodologies have been tested, at various deeping levels, both in the design of new neighborhoods and buildings and in the energetical and environmental refurbishment of existing ones.

Coherently with the current italian government guidelines for land use reduction, design choices regarding new buildings have always been accompanied by a preliminary assessment, related to the opportunity to respond to the new needs through the reconversion of existing buildings, especially the historical ones vey diffused in Italy.

Experiences done have evidencied the need to improve the control level of project's environmental impacts, expecially in its early stages, through a deeping knowledge of available resources (materials, energy and enterprises) so that decisions can be oriented towards a real feasibility and sustainability. Furthermore, have also been able to detect the fundamental role played, on the urban scale, by the availability of primary data on microclimatic conditions of the site, on the basis of which orienting the localization choices. This informations, also essential for the bio-climatic configuration, needs to be integrated at the building level by further primary data regarding the eco-profile of materials and products used, to create a complete environmental picture of the building itself.

Apart from the architectural outcomes, the adoption of these methodologies by the students has allowed them to increase their environmental awareness and stimulate their attention to the development of sustainable design solutions.

It has also allowed the development of innovative functional hypotheses, capable of producing significant improvements in the living quality of new and existing public buildings and spaces. It confirming the fundamental need to accompany the political programs choices with realization hypotheses capable of prefiguring the outcomes of its.

Education Data Analysis for SDGs Achievement: An Eagle Eye View

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Transforming Our World is the message conveyed by the United Nation in its 2030 agenda. Compared to Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs) emerged to address global challenges, taking into account national priorities and cultural differences.

Acknowledging global values is imperative to be reflected in our actions, as the Russian philosopher Alexander Chumakov argues that the main purpose for humanity is to achieve unity, while recognizing our cultural differences. Therefore, it is a priority to lay down a set of agreed upon foundations and principles for a global society, and to formulate a global consciousness and a humanistic worldview that effectively reveals the realities of our problems, this is where the role of education comes in handy toward achieving SDGs targets.

SDGs implementation requires an integrative process to ensure achieving desired targets, as the interconnectivity between goals is evident. Education serves as a mean of implementation (MOI) that is crosscutting through all of SDGs. Although, advanced technology has revolutionized business and work environment, education and capacity building aspects are still lagging. Education systems in less developed countries still concerned with classic subjects that lack tapping uncharted potentials, and focus on urgent global challenges. Setting the foundations at the basic education students through raising awareness and encouraging them to explore and investigate these problems, and teaching them how to use critical thinking methods to suggest creative solutions to such problems will have a direct impact on their personal behavior toward these challenges in their day to day routine, leading to a greater impact on the magnitude of the problems and the time required to overcome.

School effectiveness studies concluded that teachers make a difference. Yet, the lack of sophisticated tools to map the quality of teaching and learning remains a challenge. Elliot Eisner stipulates in his book “The Enlightened Eye” that the ability to discern patterns of behavior in the classroom is what distinguishes the expert who acquired deep understanding of classroom dynamics throughout years of practice. There are relatively

few theoretically grounded and validated tools designed to “map” the ongoing teaching-learning process in classrooms. Along this research paper, the construction and validation of a fuzzy hierarchical system for teaching effectiveness enhancement will be described. It is an adapted “tool” that aims to “measure” teaching and learning practices within classroom activities. This system is a combination of four computational intelligence procedures, i.e., hierarchical building scheme, the gray relational analysis, fuzzy construction rules, and fuzzy inferences.

The proposed paper will investigate and analyze current basic education systems in the MENA region, and its alignment toward achieving sustainable development goals. The hierarchical fuzzy system’s estimations regarding teaching effectiveness characteristics will be used to extract the most relevant observable and measurable practices that reveal teaching weaknesses and strengths, and affect students’ engagement and motivation to learn, to assist in recommending a set of policies and action plan to capitalize on the strength points and enhance the weak aspects.

Impact of Information Communication Technology in Rural Schools of Nigeria: Case Study Enugu State, Nigeria

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We live in an era of information explosion, once there was want of information, today we are drowned in the surge of information. Without the basic computer literacy, one finds it almost difficult to function comfortably in society. Information Communication Technology (ICT) plays an important role in bringing an innovative change in education system focusing on the rural schools' development by conveying education to the primary and secondary level. Educational programs for the rural areas cannot by themselves reach out to all the communities under consideration. These areas are geographically dispersed and if these programs for such rural areas are to provide reasonable attention, accessibility technological means must be considered. There has to be an existing or proposed infrastructure that would enable these programs to be conveyed. The research shows, through data collected from Secondary schools in Enugu State in 2006 and 2016, the impact ICT has played in the awareness of students and how it has impacted their way of education. There is however, still a vast difference between students in urban areas and those in rural areas in other words, significant differences have been found among the students of ICT based and non-ICT based schools. There is therefore, a pressing need to primarily finance ICT projects focusing on the needs, aspirations, capacities and perspectives of the vast majority of students in rural areas. The government has taken some initiatives to integrate ICT in education system however this comes down to a trickle in the rural sector mainly due to the lack of infrastructure. There is therefore enough evidence to suggest that the rural schools should be encouraged to use ICT teaching tools. Though the technological and physical infrastructure in rural areas is still a major difficulty in taking advantage of the benefits of ICT, it is obvious that unless these schools take matters into their own hands, they would continue to lack in the benefits of ICT. Therefore, a cyber-café could be set up in the schools on a Public-

Private-Partnership (PPP) model similar to the ones in use in India. These cafés could be operated on an energy efficient model so as to impact education in a more effective manner. Experts in education have suggested that ICT will cause an even more dramatic prototype for E learning since learning over the Internet is neither time bound nor place bound. The aim is "education anytime anywhere for anyone."

1-2 Strategy for Diffusing Educational Technology

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Educational reforms and the development of innovations into education have been a goal of the U.S. federal government for more than a century ago. Policy makers believe that the effective integration of educational technology into teaching and learning can stimulate educational reform. Further, many educators have showed positive significant outcomes of educational technology use in language learning. For example, Drexler (2010) found that technology use could transform the traditional classroom environment where the teacher is the knowledge provider and the students are the recipients to a differentiated classroom where students collaboratively work with the teacher to achieve individual, pair, and group learning objectives. Also, technology use may lead to learners' autonomous learning (Terrell, 2011).

However, the probability that technology will be adopted and used efficiently and effectively by teachers is low; this is the case even though many education institutions continue to spend large amounts of money on updating hardware and software. According to the literature, this low probability often stems from the lack of professional development for teachers and admins about how to use educational technologies. In particular, the lack of teacher familiarity, knowledge, and practice with technology has been pointed out as problems.

This paper constitutes a portion of my dissertation study that involves understanding the process behind diffusing educational technology. The aim is to find ways to assist low-tech areas. Therefore, this strategy fills a gap in the literature by building on Rogers' Diffusion of Innovations Theory (DIT) and synthesizing it with the teacher education with technology literature to suggest guidelines that guarantees the sustainability in technology professional development. It offers a strategy that consists of two stages to be considered when implementing technology professional development with teachers in general and language teachers in particular. Each stage in the strategy was designed to address key issues acknowledged in DIT, yet was effectively renovated by me, the developer of this strategy. In the first stage, persuasion "why", knowledge "what" and practice "how" are the key issues that were addressed. The second stage sustains teachers' development with the use of technology through creating an enabling environment for teachers to grow with the use of technology. Both stages constitute the essence on which the 1-2 strategy for diffusing educational technology is based.

Implementing the idea of this strategy effectively would contribute in bridging the technology gap between high and low-tech areas.

Bases of Learning

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Aiming to contribute with the achievement of Sustainable Development Goal # 4 (Quality Education), the Sustainable Amazonas Foundation (FAS – acronym in Portuguese) through the Education and Health Program (PES – acronym in Portuguese) develops since 2012 the project “Bases of Learning” for sustainable development. The project’s strategy is applies experiential education as methodology for training elementary and initial grade school’s teachers that work in multisite classes of riverine schools, located in communities within protected areas of Amazonas’ state. The method presupposes practical learning, where teachers learn by doing the activities together with the students, following fourth steps: starting – survey – application – evaluation.

The learning material is composed by 60 Activity Guides, that approach themes such as (i) community development, (ii) human body (iii) forest (iv) local traditions, (v) health, (vi) current issues, (vii) geography (viii) history, (ix) arts and (x) pollution. The content aims to stimulate multidisciplinary learning and oral diction of multisite classes’ students in riverine communities, strengthening the commitment with the formal educational base, that has a major seek qualify and the offer of education. This action-oriented teaching method promotes many benefits to student, as their participation within subject of the teaching-learning process.

The elaboration of the Activity Guides were made through dialogues and experience exchanges between teachers, students and other social actors, in a participatory model building process that aimed to guarantee necessary knowledge and skills to promote communitarian sustainable development. All produced material was compiled in the "Bases of Learning for Sustainable Development - what did we learn today?" book, co-created by FAS and Farol Comunicação e Cultura.

The content is unique because approaches a content according to local realities - with educators’ collaboration from Amazon region – that dialogues with local elements and promotes identification and meaning to the learning process. The ludic-educational activities proposed by the project can be take inside and outside classrooms. The content of the book is adapted through regional references such as chestnut, community development, pirarucu fish, and Amazonian traditions legends, providing practical and easy-going activities for teachers and students.

Approximately 100 teachers and 400 students from 5 protected areas (State Reserve Juma, Mamirauá, Cujumbim, Uatumã and Negro River) took part in the training workshops from 2014 to 2016 in partnership with the Municipal Secretariats of Education

of 6 municipalities (Novo Aripuanã, Uarini, Jutai, Itapiranga, São Sebastião do Uatumã and Iranduba).

Education for a Sustainable Future: Meeting an Unmet Demand

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Living in the 21st century presents unprecedented challenges led by rapid technological changes, globalization, and significant development issues. They are reshaping the world at a pace that is eliciting dissonance in the citizens, societies and institutions of the western world. The vast gap between rich and poor continues to grow; unequal societies perform poorly on all forms of social problems and exclusion.

Promisingly, the agreed 2030 Agenda for Sustainable Development to transform our world and the adoption of the Sustainable Development Goals (SDGs) have fostered global understanding and uplifted hope to better the planet and its people. Given the current environment of unprecedented and uncertain global transition, a vital transformation driven by a need to learn from new knowledge and skills, and even revisit development is required to achieve the SDGs.

Sachs expresses sustainable development as a worldview and also a method of solving global problems. While we have made some progress in both the areas, we have a long way to go. The paper would explore the fundamental system change required to achieve the universal, integrated and indivisible SDGs. It begins with recognizing education as a necessary condition to achieve a sustainable future. Ensuring a learning process that engenders the learners' capacity to analyze, reflect on alternatives, and make values-based ethical choices is a start. It requires skills and ability to negotiate to make sound choices affecting local and global societies, and the ecosphere in the context of inequality and power issues.

Hope for a better quality of life for all and a desire to manifest it in reality as a universal imperative requires interdisciplinary education as an essential mode to meet the demand of behavioral change. Making the content holistic and teaching pluralistic would constitute sustainability to be an integral element of societal and political trends. Not surprisingly, the sustainability researchers have already started to structure their work within the framework of public discourse of science.

Environmental Challenges in Migrant Host Communities: The role of Education for Sustainable Development in tackling Waste Management

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Migration is an ever increasing concern in the world we live in today. We do not only see refugees fleeing war and persecution, but also climate migrants and environmental refugees running away from natural disasters and devastated environments that bring intense poverty. As migrants settle in new communities this results in culturally diverse migrant host communities where people's consciousness and values differ. These differences become increasingly challenging when educating for sustainable development and working towards reaching the 17 sustainable development goals.

In the wake of the European migrant crisis, the Greek island of Lesbos has become one of these culturally diverse migrant host communities. Lesbos is an island near the Turkish coast and is reaching its carrying capacity as migrants cross the Aegean Sea to reach European soil. This is resulting in a number of environmental challenges, with increased waste production being the greatest one. As migrants move to mainland Greece or Europe, the no longer needed life jackets, rubber dinghies, fiberglass boats and municipal solid wastes remain behind.

However, fleeing conflict and intense poverty, the migrants cannot be held solely accountable for these environmental challenges they pose on the host community. It must be recognized that ultimately environmental protection relies on the citizen's culture. Thus, it needs to be understood how people from different cultural backgrounds relate to, engage with, and care about the environment in the host communities.

This presentation looks at the consciousness and values of both migrants and the local population towards environmental issues, and particularly waste management, on the island of Lesbos. A conducted survey revealed information on the knowledge, attitudes, and behavior of migrants and locals towards waste management on the island. The study identified gaps in environmental education and consciousness in an attempt to understand where there is room for improvement and whether there is a need for more focused educational programs towards certain population groups. The proposed presentation reflects on these findings giving insight on how to address controversial environmental issues in culturally diverse communities in order to reach the sustainable development goals. More broadly the presentation will explore what are the challenges we face in reaching Target 12.4 on waste management - By 2030, substantially reduce waste generation through prevention reduction, recycling and reuse - and how can education for sustainable development help overcome these challenges in migrant host communities.

Frontier of well-being

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2017 World Happiness Report" suggests that we need a moral action and secular ethics as a code of compliance for contemporary people, hoping to achieve world equality, justice and sustainable generation. The important manifestation is that mankind has to control, attach importance to the life of the individual, but also to the life of the family state to continue, and save the diversity of species and the sustainable development of natural

ecology, but also become the conditions of happiness in 2017 countries. The goal of "sustainable development" is the prosperity and prosperity of human society, culture and nature. Based on these questions, the first part of this article will be from Aristotle to Jeremy Bentham on the individual to the collective happiness, in this globalized world, the group's happiness index affects the personal feelings of happiness, morality is necessary for the conditions of happiness The The second part of the "happiness" of the sustainable development of the value of invocations, follow the common good practice to become the world to observe the ethics. The third part explores how the boundaries of happiness should be grasped in the postmodern consumer culture.

Main Factors Contributing to Cognitive Growth in Preschool Children in Tanzania and India

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Early Childhood Care and Education (ECCE) is a program that aims to create a holistic foundation for children from birth until the start of primary school with the goal to prepare them for lifelong learning and healthy development. ECCE supports children's cognitive, social, emotional, and physical development through a multi-faceted program, which provides children with nutrition, basic health-care, and education. ECCE plays an even more critical role in developing countries, where children facing poverty are more likely to lag behind their wealthier counterparts in development, and thus benefit tremendously from the kinds of holistic support that programs like ECCE offer. A focus on the early educational advancement of children leads to a better standard of living, helping to reduce the wealth gap. In this research, a comparative analysis was conducted of the ECCE in two countries, India and Tanzania, and the factors that contribute to an effective ECCE program was investigated. In addition to an in-depth interview with an ECCE field worker in India, personal field work experiences from India and Tanzania were also incorporated. The objective of this study is to bring more awareness to the global conditions of ECCE, and demonstrate how India and Tanzania, as case studies, shows both the issues and successes of their ECCE programs, and recommend best practices for potential scale-up projects and replication in other countries.

Education is a critical factor enabling the achievement of Sustainable Development Goals (SDGs), working towards a better educated and more globally aware generation. Having an ECCE program that can foster and maintain itself sets a stronger foundation for future growth and decreases the resources needed to achieve the same standard at a later time; fewer resources are depleted when addressed at an earlier age, allowing for a more efficient use of these resources. In order to achieve SDGs, these programs have to improve on the basic academic courses currently stressed to encompass a more interdisciplinary approach. In this manner, education becomes a long-term tool that is both adaptable and applicable to global real-world issues. Through solutions such as an online database, countries can allocate less physical materials and resources, but advance and maintain higher levels in educational standards. In addition to academics, a child's mental and physical well-being must also be a backbone of SDG philosophy. Looking

ahead to 2050, ECCE programs can establish itself as a stepping stone for a healthier generation that better utilizes technological and medical resources currently available to our society: a more inclusive globalized society.

Haitian Parents' Vision for their Children's Future

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This study was developed to provide an insight into the vision of the future that the children are growing up under in a small developing community in Sibert, Haiti. The results of the survey and focus group provide interesting insights into the caregiver and parental hope of propelling children into the best future possible, while resting that aspiration solidly on the pragmatism and acceptance of real life conditions that they face.

We approached the ecology around a child growing up in Sibert, Haiti from the perspective of their parents and caregivers and come away with two equally important findings:

1. There are considerable barriers that parents and caregivers are constantly protecting their children from. As evident from their response, these adults are making strides with the lack of education and job prospects for their families. But they also find access to healthcare bleak and immovable.
2. Parents and caregivers value education and have high aspirations for the children that they look after; however, infrastructural and governmental challenges hinder their hopes in obtaining quality education for their children.

This study allowed the authors to conduct a critical needs assessment of the HEART School community in Sibert, Haiti. This effort affords the HEART School the opportunity to receive concrete and tangible feedback to develop sustainable programming and planning for community initiatives as the School currently serves as an active community center for their students and families. Furthermore, this case study also recommends various ways for a school to serve as a community-hub for diverse developing communities.

Re-defining "Quality Education" through the Perspectives of Kenyan Teachers

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While access to quality education has been heavily emphasized on the global development agenda, many times, "quality education" can be viewed from a Western perspective in educational research. Therefore, the purpose of this study was to examine how local Kenyan teachers understand the concept of "quality" education. This study was

conducted in the Kwale district of Kenya in two public primary schools and one private school. The study conducted in-depth focus group sessions, interviews, and administered surveys to collect data with local teachers currently serving the above three schools.

Some of the findings were that teachers believed that the following factors influenced their ability to work towards providing quality education in their classrooms and schools: lack of quality and sustainable infrastructure, inadequate teacher salary, long working hours, students coming to school without meals, inadequate prep for nationwide exams, skepticism of the Vision 2030 agenda, mismatched curriculum, and unsafe working environment around the school for both teachers and students. Teachers believe that particularly in this rural area, the aforementioned challenges greatly affect their abilities to provide quality education in their schools, which altogether re-define their views and perspectives of the country's vision for "quality education for all."

Moderating Role Of Islamic Work Ethics Between Employee Empowerment, Interpersonal Trust And Organizational Development In Public Sector Of Pakistan

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Human resource being strategic asset of organization can play vital role in organizational development. Organizations today understand the importance of employee empowerment and interpersonal trust to gain competitive edge. Both have been considered effective tools for effective organizational growth. Individuals having higher opportunities and in their jobs and trust in their leaders are likely more productive and loyal towards their organizations. Therefore within the organizational context this article explains the importance of employee empowerment and interpersonal trust in organizational development and the role of Islamic work ethics in organizational development through employee empowerment and interpersonal trust in public sector of Pakistan.

Sustainable Development Education for Indigenous Communities in High States of Vulnerability in Colombia

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The current is the abstract of a project being implemented by the foundation that we believe may be replicable and a good example of education on sustainable development for indigenous vulnerable communities but that also improves their life, health, income and quality of life.

This is a project to guarantee food safety and sustainable development for indigenous families -in high states of vulnerability (poverty and malnutrition)- in La Guajira,

Colombia where they are trained in cultivation, production and commercialization of the Nopal Cactus. The Nopal is highly nutritious and mitigates climate change effects on dessert soils.

This projects has been to train wayuu indigenous families from “Resguardo Indígena Provincial” at Barrancas, La Guajira in Colombia, in all related matter of cultivation, production, use , commercialization and marketing of the Nopal cactus. Experts from Guayaacanal Organization are involved in teaching with a practical approach (teaching while doing) the most advanced techniques to produce Nopal and a variety of derived products from nopal with the main objective being to leave installed capacities, abilities and tools within the Wayuu communities in order to finally break the poverty cycle. This would guarantee food safety, not only by consuming the nopal as part of their regular diets but also by selling the different products derived from nopal (jam, natural medicines, among others).

Also, the nopal can be safely consumed by the community cattle. Ensuring their regular livelihood by guaranteeing productivity.

Furthermore, cultivating nopal in these lands would help improve the fertility of dessert soils. It grows easily in these conditions, therefore, few inconveniences are met for the crops. A fact that has been proven scientifically everywhere the cactus grows. Therefore, it would help mitigate climate change effects in the area, improving the quality of life of these indigenous families. The intervention lasts 3 years in order to guarantee its sustainability. It will be executed in 3 phases: 1-Orchards Plan (Cultivation and Production). 2-Associativity (Small Business, Entrepreneurships). 3-Marketing.

It is scientifically proven in Mexico and in some parts of Colombia that the nopal cactus affects positively the soil where it is cultivated. Besides providing for a source of food and income for the indigenous communities, the nopal cactus improves the fertility of the soils, reducing significantly the erosion of the dessert lands in la Guajira where our participants (wayuus indigenous families) live.

Reducing the erosion mitigate the long droughts that these communities go through every year, making it posible to cultivate with very small amounts of water. Not only the participants have a source of food for them and their cattle that is highly nutritious (high source of energy, carbs, calcium, vitamin C). But the nopal is very versatile and many products (including natural medicine, jams, varied salads, sweets) can be easily made from it. Therefore, it presents an opportunity for entrepreneurship for the indigenous communities to start small business where they could sell these products to other indigenous communities and local colombians.

This guarantees the preservation of a community in high state of vulnerability that is in danger of disappearing more and more every year. And the organization with this initiative is ensuring their food safety, income and development by the use of a cactus that grows naturally in their lands and is part of their culture but has been undestimated by them.

The Power of Citizen Participation

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What struck me most powerfully on my arrival to India in April 2017 was the constant noise. As I gazed at the bustling crowds in the busy streets, I was overwhelmed by many questions. The question that stuck at the forefront of my mind was: 'How is it possible to hear the voice of a marginalised person in the midst of so much noise?' The answer, I learned, is both complicated...and surprisingly simple.

For those smaller voices, organisations like PRIA (Participatory Research in Asia) serve as a microphone, providing education and training opportunities, helping to build the capacities of citizens, communities and institutions, and enabling the establishment of vibrant, gender-equal societies.

One of their main missions is in building the capacities of communities through the establishment of SIC networks. So, what is an SIC? In a nutshell, an SIC (Settlement/Slum Improvement Committee) is a collective group for improving basic services in informal settlements by helping to strengthen civil society voices. Through meetings and community participation, slum dwellers have been organized into SICs. The capacities of SICs have been built through training and orientation about different central as well as state government schemes available for the urban poor.

SIC members have been encouraged to develop a rapport and good relations with each other to enable them to share their knowledge and find solutions to their problems together. Joint meetings are held for this purpose. Through sustained discussions, members of the SICs can identify and articulate their demands and share them with other stakeholders in the city planning process. The idea is simple. Empowered citizens are those who are aware of their rights, responsibilities and the services and public resources they have access to, and are committed to taking action when these are withheld from them.

Meeting people in various informal settlements, I realised that this initiative, titled 'Engaged Citizens, Responsive City', has contributed to building healthy and conscious communities by encouraging self-esteem and solidarity and promoting the value of local identity. Programmes for capacity building have created conditions for citizens to participate voluntarily and to develop the ability to solve community problems together. I found the SICs to be good examples of how mature civic awareness can be promoted and embraced. The SIC members were shifting from listening to the information provided by organisations like PRIA to productive meetings that required no external facilitators, premised on the belief that while a lay individual may have less knowledge than experts, when citizens gather to think about what they need for the community they live in, they can pour out brilliant ideas that no expert has ever thought of.

This research was conducted with the support of PRIA in the framework of their ECRC project (Engaged Citizens - Responsive City) which is an initiative of PRIA, currently supported by the European Union. It aims to develop capacities of the urban poor to participate in planning, implementation and monitoring of sanitation services. In this paper, we will see the people living in informal settlements develop a strong thirst for knowledge as they are encouraged to seek out opportunities to make positive changes and improvements to their quality of life. Through this study, I hope that the SICs, which have been 'educated' (through trainings and discussions), will continue to contribute to the betterment of their settlements and the on-going renewal of hope.

Mass Media Functionalities and the Sustenance of Nigeria Development

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After several trials, development was elusive in developing countries. Since modernization programs that were to trigger off economic growth could not lead to the emergence of dependency paradigm, which claimed that underdevelopment of a group of countries is the result of the development and growth of others. The systematic utilization of appropriate communication channels and techniques to increase peoples participation in sustainable development and to inform, motivate and train rural population mainly at the grassroot level investment in quality education skill and knowledge from the core of this paper. The paper discusses issues which prevent the realization of sustainable development in rural nigerian. The focal point of discussion is the fact that a comprehensive national development agenda can only be established when there is a functional mass media system that are ready to carry development message to and from the remote grassroots areas. However, rural poverty, corruption and the neglect of the rural areas. Over the past decades it have been identified as major constraints to sustainable development in nigeria. The paper reveals that bad political influence and poor media landscape all together make sustainable development in nigeria 'a one step forward and two steps backward'. Although the paper recommended indigenization of telecommunication companies and channels of communication with a view that they alone have inherent capacities induces to sustainable development to occurs in nigeria.

What University Students Think a Volunteer is vs. What a Volunteer Really Is: University Students' Volunteer Perceptions

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Obviously, NGOs undertake important responsibilities for sustainability and sustainable development. Their primary scarce resources are financial/nonfinancial materials and volunteers. According to 2014 World Giving Index, Turkey is in the 132nd place among 135 countries. This result let us think about potential reasons of this unsatisfactory situation. One of our basic assumptions was that there might be a relationship between

the volunteer perception of a person and his/her never being a volunteer in an NGO. In this study, we conducted 9 focus groups with 52 university students (29 female, 23 male) from Istanbul who have never experienced a volunteer activity in an NGO. First, we asked them to imagine a volunteer and we gave them a questionnaire form that would be helpful for describing the volunteer they have imagined. By using a questionnaire form we tried to get detailed information about how a university student, who has no experience as a volunteer, has imagined a volunteer. We asked students to describe the volunteer they have imagined considering his/her gender, age, education, occupation, income, marital status, religious view, country, family the imagined volunteer grew up, personality, relationship with his/her family and friends, hobbies and finally the volunteer activity that the imagined volunteer is attached. After each student explained what they have imagined we also made them discuss about their feelings and ideas about being a volunteer. Results revealed some unexpected and interesting outcomes which would be helpful to understand what university students feel about volunteer activities and for being a volunteer in an NGO. For example, 81% of all participants imagined a female volunteer. Additionally, respondents also mostly thought that their imagined volunteer was focused on a childcare related volunteer activity. Detailed results will be shared and discussed in full text.

Here we confront with a critical question: how and to what extend does this imagined volunteer represent a real volunteer from the field? We will discuss this by considering both the relevant literature and the previous research findings on volunteer demographics and volunteer activities from Turkey and from the rest of the world. We believe that our findings can be useful both for policy makers and NGOs.

Learning by Practice: Sustainable Development in Ghana's Gold Mining Sector

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Sustainable development is a very slippery concept and has been subjected to many debates and contestations in the literature. The concept means different things to different people depending on one's discipline and background. In the mining sector in particular, sustainable development has been a major issue of contention among industry players and academics with some arguing that, because mining falls under the non-renewable sector, the concept should not even be an issue for discussion. The study employed semi-structured interviews to understand how the concept is embraced and embedded in the gold mining sector in Ghana. Findings of the study revealed that five of the largest gold mining companies in Ghana have different approaches of implementing sustainable development practices. The study recommends that the government in consultation with the various stakeholders in Ghana's mining sector should develop a legal framework that will ensure that mining companies adhere to the sustainable development goals (SDGs) recently adopted by member countries of the United Nations.

Factors Affecting the Consumer Satisfaction Levels of Private Education Providers of Sri Lanka - Employable Force for 2020, Trends and Challenges

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Educational policy reforms taken place from time to time and lack of educational expenditure bared by the state have led to many social criticisms and lack of confidence on the prevailing university education system in Sri Lanka. As solution, private university education became a new addition to the education industry of Sri Lanka in the recent past. Although with varying financial expenditure bared by the private sector as opposed the state sector they are still subject to lack of resources and experience in the industry. In Sri Lanka the concept of “private education” is ill-defined due to cultural factors and despite that the private universities are keen on highlighting the “market competitiveness” and assured “employability” status of their paid educational products while the state universities are seeking ways to convert their education systems towards more “marketable products”. This points out the educational goals expected to achieve by private sector as promised in line with economical and social goals of the country. However, it is important to understand the consumer satisfaction levels of private university students that can bring about this new change to the society. This study will address the factors affecting consumer satisfaction of private university students of Sri Lanka . The analysis will be based mainly on the quality of education, relationship maintenance and customer care, active student services, skill development and cultural orientation. The outcomes of the research will lead to a balance and sustainable private university education system which supplies reliable and employable products to the job market of Sri Lanka.

Extreme Events Affecting Life and Livelihood for Small Island States

Impact on Islands: How Islands are Adapting to Climate Change

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The presentation 'Impact on Islands' will address ways in which small island developing states are adapting to the influences of climate change, including extreme events. One practical case from each of the three SIDS regions (Caribbean, AIMS, Pacific) will illustrate important lessons learned and insights from their sustainable development journeys. The cases will be placed within the context of the UN's SDG framework, thereby linking them directly to specific global goals that are most relevant to islands.

'Impact on Islands' concerns both the negative impact climate change has on islands, as well as the positive impact that coherent sustainable development can have. It will include key recommendations for increasing the latter.

Long-term Psychological Impact of the 2001 Earthquake on Young Children in Haiti: Seven Years and Counting

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This study looks into the long-term psychological impact the earthquake in 2001 has on young children (ages four to twelve) in Haiti. While such traumatic event occurred seven years ago, many difficult situations hindered the country from rebuilding, particularly when it came to the psychological well-being of its people. Without being exposed to adequate interventions, many trauma-affected children were left behind without appropriate services or needs. Many non-profits entered the country after the earthquake in 2010 in the efforts of serving children and families with diverse needs in the aftermath of the earthquake; however, such solutions were only instant and unsustainable that many children are currently left behind without receiving adequate treatment or interventions. And because many children lost their family members through such unexpected traumatic event, they have gone through a very complicated grieving process that continues to affect their lives today. Through in-depth interviews, this study serves as an opportunity to better understand how such traumatic event continues to affect young children's daily lives in order to find sustainable solutions. This study particularly looks into different examples and ways schools can provide such services to support the psychological needs of trauma-affected children. The goal of this study is to raise more awareness of the current situation of Haitian people to better provide them with sustainable solutions, particularly when it comes to their psychological well-being, as it affects the rebuilding process and growth of the country altogether.

Sinking Maldives

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MALDIVES IN THE NEXT HUNDRED YEARS

The hidden post-apocalyptic scenario of the threatened country isn't reflecting the amenity of the tourist paradise but in the next hundred years the two sides of Maldives will probably become closer one to the other.

According to the WHO in the Maldives, under a high emissions scenario, mean annual temperature is projected to rise by about 3.6°C on average from 1990 to 2100; destroying the hopes of staying under the 2°C, but has been studied that if global emissions decrease rapidly, the temperature rise is limited to about 1°C é in this optimistic scenario "only" a third of the population will be affected because of soil

erosion, rising of the sea level or health problems due to the change in temperatures, flora and fauna. Of this third, an annual average of 31,800 people are projected to be affected by flooding due to sea level rise exclusively between 2070 and 2100.

And regardless the change in emissions over 25 thousands people are expected to be at risk of malaria or other kind of diseases due to climate change.

FAO is coordinating closely with the Government to develop programmes in the areas of fisheries legislation and capacity building for vessel monitoring. Ongoing cooperation includes strengthening the capacity of the Government to comply with their commitments to the international standards related to Monitoring, Control and Surveillance (MCS), and technical studies on future MCS needs and the feasibility of implementing an electronic observer programme in order to ensure not only food security (from fisheries or agriculture) but a sustainable first sector in the next decades. In addition, with the FAO and under the sustainable management of the Bay of Bengal Large Marine Ecosystem (BOBLME) project, assistance was provided for turtle conservation, developing the grouper management plan and a national plan of action for shark fisheries. (FAO)

Of course this remains a positive view of the future for the country because of its extreme vulnerability of the impact of climate change, which implicates that if the natural boundaries won't be respected globally the worst possibility will be a stateless country. In that case has to be considered that the necessity of partial or complete abandon of the land could occur in the next hundred years and the consequent involvement of policies to ensure a land, food, health, education to the next generations.

Fostering Equity and Social Inclusion in Cities

Access to the job market for physically (motor-disabled) people in Kazakhstan

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Inclusive labor market is one of the weakly developed sectors in Kazakhstani economy, implying that the access to the job market for the disabled people is limited in Kazakhstan. The unofficial statistics states that only 2.6% out of 400, 000 disabled people of working age population is employed (theglobaleconomy.com, 2015). However, this number includes individuals with mental disability which is out of the scope of this research. The given study will focus only on physically disabled people. The definition offered in Provision on determining the main criteria for disability approval does not differentiate between physical and mental disability (egov.kz, 1992). Moreover, the provision clearly marginalizes disabled people by defining them as socially disoriented people (ibid). Consequently, the given study defines disabled people as those individuals who have physical (motor-disability) difficulties in performing daily activities. Nevertheless, based on this figure of 2.6% we can assume that employment among the

physically disabled people is also low and in need of careful address from the side of the government of Kazakhstan.

According to Saduakassov, the expert from Kazakhstan Confederation of Disabled People the situation of the integration of the disabled people is improving in Kazakhstan. However, despite the existence of the legal framework such as Law on Social Protection of the Disabled People (2005), the UN Convention on the Rights of Persons with Disabilities ratified 2015, the 3% quota requirement for the employment, in practice the integration of the disabled people is not ensured properly. Consequently, it can be seen that there is a policy gap between the legal documents and the applicability of those legal norms in real life. After conducting preliminary research on the obstacles for the inclusion of people with disabilities, the given areas were identified as impeding the process of employment for such people. They are lack of education, existing stereotypes towards the disabled people and poor infrastructure outside and inside the buildings (Maidyrova et al, 2013).

The legacy of the Soviet times, where disabled people were educated in specialized institutions and usually were hidden away, is still present in Kazakhstan. Thus, creating unwelcomed attitude of disabled people in their employment because they are mainly considered to be a burden. The given assumption is the result of incompliance with the 3% obligatory quota system. According UNDP, there are 20,000 wheelchair ramps in Kazakhstan, of which three quarters are non-usable for the disabled people (Witte, 2017). So, it can be seen that inclusion of disabled people in ordinary lives is urging problem and is already at the forefront of governmental agenda. However, the aim of the given research is to identify the main barriers in employment of the disabled people and propose the ways towards actual implementation of the existing norms and facilitate greater government investments in organizations with disabled people.

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Déyé món, gen món: Language, Power, and Development in Deaf Communities of Haiti

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In Haiti, where Deafness tends to be viewed as a curse upon the family, services for the Deaf are limited, contributing to inequity and social exclusion of Deaf communities. Lack of services and social stigmatization are especially problematic in the aftermath of natural disasters such as the 2010 earthquake and Hurricane Matthew in 2016 because Deaf communities have unique needs in emergency contexts. For Deaf individuals in Haiti, these needs pertain to access to communication and services, limited by the lack of a standardized sign language in the country.

While the Langue des Signes Haïtienne (LSH) is the language most commonly used by Deaf individuals in Haiti, to date there has not been a thorough documentation or standardization of this language. Sign standardization and sign language interpreter training has strong potential to facilitate communication, expand access and services, and bolster integration and advocacy for Deaf and Hard of Hearing communities in Haiti. Before standardization can be implemented, a community needs assessment is necessary to gather input on the design, execution, social value, and unmet needs that such a project can fulfill. This assessment, in which Haitian Deaf perspectives must be prioritized, would ensure that funding for sign standardization and interpreter training projects are efficiently and effectively directed.

Global Deaf Connection (GDC) is in the preliminary phase of a five-year project funded by Christian Blind Mission (CBM) and hosted in-country by Haiti Deaf Academy (HDA) to standardize Haitian sign language and establish a training program for sign language interpreters. Based in Port-au-Prince, home to the largest Deaf community in Haiti, and in partnership with GDC and HDA, our team (co-authors Hannah Bohn, Jennifer Compton, and Amal Warsame) will design and execute a community needs assessment to identify the facilitators and barriers to sign standardization and interpreter training, innovations in the field, and needs of the Deaf population pertaining to equal access to communication.

In order to be accountable and transparent to the funder and the communities affected, GDC and HDA also seek to measure and document the process and outcomes of the project. In collaboration with the HDA team and soliciting input from various stakeholders, our team will scope, create, and begin implementing a monitoring and evaluation plan. This plan seeks to ensure any measurable outcomes have baseline data, communicate with stakeholders to gather opinions and attitudes on the project, and develop methods for future data collection.

By identifying the facilitators and barriers of the Deaf community to communication access, GDC and HDA can develop a program to address the needs of the community holistically. Additionally, the implementation of a monitoring and evaluation plan will allow the organizations to assess success of outcomes, analyze community impact, and

ensure transparency of project funding. Through the execution of a community needs assessment and the design of a monitoring and evaluation plan, GDC and HDA will be prepared to undertake their sign language standardization and interpreter training project to expand Deaf access to equal communication opportunities, thereby fostering equity and social inclusion of Deaf communities in Haiti.

Not Too Young To Run

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According to the Inter-Parliamentary Union (IPU), 51% of the world population is under 30, but only 2% are members of the parliament. The IPU further describe that people between the ages of 20 to 44 make up 57% of the world voting age population but only 26% of the world's members of parliament (MPs). Moreover, what is alarming is the fact that in spite of youth being the main voters in elections but 73% of countries in the world has age restrictions on running for elected offices.

In the context of Tanzania, things are not satisfying at all in terms of the number of youth in elected positions. As per the statistics issued by the Inter-Parliamentary Union (IPU), Tanzania is ranked 81 out of 128 countries for having only 0.6% of parliamentarians aged under 30 though due to National Election Commission (2015)-NEC the number of voters between the age of 18 to 35 are 6,155,613 (27% for young men) and 6,738,964 (30% for young women). Furthermore, only 10.8% of members of parliament aged under 40 which also make Tanzania being ranked 91 out of 128 countries in the global ranking. This is definitely a problem which requires immediate solution considering the fact that youth are not only the leaders of tomorrow but also today and for many years to come. Thus, excluding them in decision making bodies will not only diminish their participation in politics but also create a society with outdated solutions and ideas which will not work for the majority of youth in the country.

By becoming fully aware of the plight of precluding youth in running for elected positions, Not Too Young To Run project comes as a medicine to promote and raise awareness among youth by not only inspiring them to run for public offices but also to get fully involved in decision-making bodies such as the parliament and local councils. In this regard, the number of youth leaders will increase starting from the local authorities to the central government and be able to influence policies, laws, and regulations.

Civic Engagement and Development of Collaboration between Community Organizations in Cities

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Background

Living in the city for more than eight years, I have realized the great disconnect between the aspirations of many people who come to the city and the reality that hits them once they get here.

From high cost of life, lack of a stable employment, overstretched social amenities, lack of affordable housing and air pollution; all these realities stood in stark contrast to the hopes of better opportunities and improved quality of life in cities. In 2015, I interacted with young people from around the globe who were coordinating the engagement of young people in the Habitat III process. From then on, I joined the UN MGCY and engage in the global work of involving young people in the making of the New Urban Agenda.

The Poster

This research by the Nairobi Urban Creators seeks to find the correlation between urban poverty and livelihoods of individuals through organizing youth consultations in communities around the city and collecting their priorities regarding sustainable urban development.

We will be working on the FuR process of the New Urban Agenda over the long-haul - through organizing youth engagement forums by partnering with various partners including the State Department of Housing, the Nairobi County Government, the Youth Unit of UN Habitat and the University of Nairobi.

After the Habitat III conference in Quito, Nairobi Urban Creators will be providing a platform of engaging young people and their networks meaningfully in the national implementation framework, including the Follow Up and Review process, of the New Urban Agenda.

The poster will discuss the execution of this program and the significance of why this program will be important to community organizations that work to improve the quality of life within the urban space.

Indigenization of Graduate Studies Programs

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Winnipeg is home to one of the largest urban Indigenous populations in Canada. Consequently, the University of Winnipeg has been involved in efforts of “Indigenization”. Indigenization of the academy, as defined by the University, in part, refers to building an institution that seeks to determine effective ways to be more

inclusive of Indigenous peoples, perspectives and knowledge in every aspect of academia. The goal of Indigenization at the University of Winnipeg precedes the Truth and Reconciliation Commission's (TRC) 2015 Calls to Action. This goal has been strategized for undergraduate students through the implementation of the Indigenous Course Requirement (ICR) in the Fall of 2016. The University has thus made it part of its mandate to support incoming students with baseline knowledge about Indigenous peoples and culture.

A strategy has yet to be put in place to address Indigenization at the graduate level. This study sought to identify potential strategies that could be implemented to engage and include graduate students in the process of Indigenization. The research was conducted through a series of semi-structured interviews with representatives from most of the graduate studies programs offered at the University consisting mainly of faculty members and one student. The interviews provided a historical context of efforts and processes of academic Indigenization, examined different understandings of Indigenization among the different graduate programs, acknowledged the structural challenges of the academy and communication between programs, and uncovered potential strategies for graduate level engagement. The findings focus on three emerging concepts: a lack of clarity of the term of "Indigenization", suggestions for Indigenous-specific cultural workshops, and a lack of communication regarding strategies and practices between departments. Finally, this study presents recommendations for future policy and strategies for Indigenization at the graduate level.

Indigenization may be a point of contention which requires internal and strategic confrontation within academia. Overall, this research sought to open a discourse regarding the integration of Indigenization at the graduate level within different departments and programs. The research did nonetheless reveal the University's current practices and what participants anticipate for the University's future in terms of Indigenization strategies. More importantly, what has been emphasized throughout the research is that the process of Indigenization entails a transformation and shift in values within academia.

Impacts of climate change on children and youth in Spain and measures to address them

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The disproportionate impacts of climate change on children and youth

Children and youth are among the most vulnerable to climate change because of their biological development, increased energy and metabolic consumption, their social behavior, their longer life expectancy, and the because they are practically absent from the climate change decision-making fora. The article aims at analyzing the impact of

climate change on children and youth and to identify the measures (mitigation and adaptation) needed in Spain to address them while their rights are observed.

The impact of climate change on children in Spain

Spain is one of the European countries most vulnerable to climate change. 2016 was the fourth warmest year since it was registered. At the current rate of decreases in greenhouse gas emissions the country could experience temperature increases of 5 ºC by 2050. This same year, precipitations were reduced by 20% and the average temperature increased throughout the country. Heat waves, rising temperatures, increasing droughts, rising sea levels and declining water availability are just some of the effects of climate change in Spain. Frequency and intensity of these impacts are expected to increase over the next decades.

The benefits of climate action in children and young people in Spain

Mitigation measures will benefit children's and young people's wellbeing. One of the most important is reducing consumption of fossil fuels in urban areas (most of them linked to use of private vehicles, also building's energy consumption and industries). Since sources of air pollution and climate change coincide, both problems will be reduced if measures are taken to reduce the burning of fossil fuels (oil, gas and coal).

Improving air quality and reducing pollution levels: 98.6% of the Spanish population breathes polluted air every day according to WHO levels (Ecologistas en Acción, 2016). According to the Living Conditions Survey (ECV) for the years 2013, 2014 and 2015 about 10% of households with children in Spain suffer environmental pollution inside their homes (ECODES and UNICEF Spain, 2017) with wide differences among different areas in the country. A recent study estimated that airborne particulate pollution has caused the premature death of 26,830 people in Spain over a decade. According to the study, 75% of these particles in a city is a result of human activities, mainly traffic (Instituto de Salud Carlos III, 2017).

Sustainable food for children and youth: Food production is one of the primary areas linked to the greenhouse gas emissions production in Spain. Each of phase of the food production process (from agriculture, transport and consumption and waste treatment) are sources of GHG emissions. If food is produced extensively and by farmers near the places of consumption, many greenhouse gas emissions are avoided during transport and refrigeration.

Addressing energy poverty: Climate change has a substantial impact on the heat and cold waves that cause an increase in temperatures. However, 9% of the Spanish population (ACA, 2016) cannot maintain a comfortable temperature in their home. Not all members of the family are equally affected by this problem. Children, adolescents and the elderly are among the most vulnerable population due to physiological reasons. Living in homes at inappropriate temperatures affects school progress and children's emotional well-being, doubles the likelihood of respiratory problems, and even causes the smallest problems to

gain weight, higher hospital admissions, and asthmatic symptoms. It is estimated that children living in homes that are too cold are up to twice as likely to suffer from respiratory illnesses as those living in sufficiently hot homes.

Improving health services to address impacts of climate change on children: The fact that children are among the most affected by environmental and climatic problems, places pediatrics at the center of the response. They know the impact of environmental pollution and climate change on children and know the most appropriate measures to reduce these impacts and improve the quality of life. However, in Spain health professionals have limited access to specific training on how to address environmental health problems of children and youth. This lack of training constitutes one of the main barriers to the development

Gender and Sustainable Development

Young Female Decision Makers in Ghana, Senegal, and Liberia

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Every person matters and should be counted to achieve sustainable development. The United Nations predicts and monitors world demographic trends, but the prevailing mass displacement over the past decades its impact on people was never anticipated.

This paper traces the events leading to the post-conflict period in Ghana, Senegal, and Liberia. Analysis of the 2007 and the 2013 Liberia Demographic and Health Surveys (DHS) makes it possible to explain why rural Liberian females are more vulnerable to gender inequality, urbanization, and social systems than their sisters in urban areas.

The DHS contain characteristics of multistage sampling design. With sample strata, clusters, and weights, researchers can magnify a disparity.

Agriculture is a major but inadequate source of income in rural Liberia. Even after a fourteen-year civil war ended in 2003, rural households cannot harvest enough staple crops because of improper land preparation, few inputs, and insufficient farming technology. The Center on Conflict and Development at Texas A&M University, sponsored by the Howard G. Buffett Foundation, reported in 2013 the prevalence of 'traditional' agricultural techniques dating to the 1970s, which resulted in stagnant rice yields of less than two metric tons per hectare. As a long-term consequence, underprivileged daughters and young mothers in this rural society may not have opportunities to be literate and educated. Meanwhile, females in the capital city, Monrovia, have almost equal chances to live a better life compared to male urbanites.

Urbanization has widened an economic, social, and educational gap in rural and urban Liberia. The other West African countries é Ghana and Senegal é have had the same trend.

Not only the 2007 and the 2014 Ghana DHS, but also the 2007 and 2015 Senegal DHS provide target populations who have similar economic, geographic, and social advantages/disadvantages to Liberia. Grouped 15 to 19-year-old females in Ghana, Senegal, and Liberia by these factors a Monte Carlo Simulation was performed to predict various decision-making processes over a thirty-year period.

Three main findings were found. (1) If social systems provide equal educational opportunities to young Ghanaian, Senegalese and Liberian females, their wealth indicators may increase. (2) In some rural households in which female heads allocate resources, the accumulation of wealth may be higher than when husbands decide. (3) Female empowerment benefits individuals and the entire family because of a better family decision-making process.

The results from this study have important implications. The more females in the city that pursue goals of achieving a better life, the more knotty are the problems for daughters and young mothers in rural areas who will be isolated, abandoned, and neglected. To ameliorate the issues faced by rural females, they must be targeted for development. It is abundantly clear that to achieve sustainable development females must be the decision makers. Recognizing this situation in many countries that are in post-conflict recovery is of paramount importance in the preparation of students with professional interests in international development. Only in this way will development organizations succeed in overcoming the development challenges that exist across the world today.

Gender Equality and Gaps in Income: An Approach to Explore the Status of Bangladesh

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This paper seeks to illustrate the synopsis of gender equality and the gaps in income in the prospect Bangladesh's initiatives to meet the UN Sustainable Development Goal SDG-5. In this study the secondary data sources from different organizations, published academic journal articles and reports related to the area have been analyzed to explore the objectives of this research.

This study analyzes data from 2006 to 2016 to explore the gender inequality gaps in income in Bangladesh. The analyzed data reveal that in terms of score of male-female ratio of labor force participation, Bangladesh's position in last ten years in an improving trend while in terms of score of wage equality for similar work the value confess and decreasing trends which indicates the demotion of Bangladesh. Moreover, in terms of male-female ratio of legislators, senior officials, and managers the trends for Bangladesh during the mentioned period also reveal demotion continuity. Furthermore, the male-

female ratio of professionals and technical workers shows that Bangladesh's score during the period kept a steady increase.

However, based on the findings it is suggested that urgent measures are needed to tackle gender and other inequalities in Bangladesh, which result in women's lower economic status. These include implementing living wages, increasing access to social protection, putting in place progressive tax policies that will finance good quality universal public services and recognizing, reducing and redistributing unpaid care work. These actions should take into account consideration of how to extend benefits to the informal economy where many women are concentrated. Decent work, one of the Sustainable Development Goals, can be one of the principal solutions to growing inequality, if those in power drive the transformation of 'low road' jobs to 'high road' jobs.

GENDER, LABOR AND POLITICS: How women's labor participation affects their access to political power

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With a growing awareness of persistent gender gaps and their effect on the status of women and nations' economic development, there is currently extensive strategic planning and investment in women's economic empowerment. However there is a growing body of research that challenges the implicit assumption that women's economic empowerment is helpful in improving the status of women. This literature, though, has conflicting arguments in the degree to which economic investment in women contributes to their overall empowerment and this body of literature is small. There are also data and knowledge gaps regarding the positive effects of women's economic empowerment on social and political participation, though it seems an implicit assumption in country-based strategic planning and investments. This area of study is ripe for an in depth analysis as women's empowerment is the current logical underpinning of development planning and policies.

To add to growing knowledge in this area, this research focuses on women's status and empowerment specifically through women's participation in labor and politics, examining their level of participation in each, . I will attempt to identify some economic and political mechanisms that influence women, and also their families, communities and nations, to change their perspectives that presently allow for or perpetuate norms and practices that are harmful to women.

Cambodian women have almost 80% participation in the labor market but a 20% participation as political leaders. To better understand development work being done in-country to empower women, and related challenges, I conducted interviews with development leaders in Cambodia. I also interviewed Cambodian women regarding how their work participation affected their community status and access to decision making power, and political access and influence.

Women must be proactive agents of change in their status and to do so must have access to the knowledge and tools that will assist them. In Cambodia this process has been partially organic, through grassroots women's political leadership organizations, land rights and labor advocacy, and partially through the active participation of the Royal Government of Cambodia in partnership with various nongovernmental organizations. In this blog I further explore how labor and political participation, both direct and indirect, influence women's empowerment and will use this blog as a platform to publish my findings in a case study of Cambodia.

Gender and Sustainable Development: Empowering Women in Armenia

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One of the issues in Armenia remains the involvement of women in conflict resolution and peacebuilding processes. Women can play a significant role of change agents in the society in conflict transformation, confidence building, and reconciliation. However, women were somewhat alienated from these processes, particularly in the case of Nagorno-Karabakh conflict, where almost political leaders é exclusively men are engaged in negotiations and diplomatic relations.

Another issue is the women's engagement in business and decision-making in economic relations. Women in Armenia are not reaching their economic potential. Women bear a disproportionate share of household responsibilities and consequently face barriers to formal employment. Thus, the economic aspect of gender equality is equally important as the political dimension in Armenia.

Entrepreneurship is seen in Armenia as a crucial option for women to gain a livelihood. In terms of loan requirements, women and men face similar obstacles in accessing finance. However, there are gender-based obstacles, which compromise women's ability to start and grow small and medium entrepreneurs. These include (a) lack of appropriate skills, information, and familiarity with the business environment; and (b) questions of self-confidence, lack of networks, aversion to risk and inexperience in running a business. Cultural perceptions that women do not make business decisions mean that women have few role models.

This study aims to facilitate women to enhance business skills, financial literacy, and confidence in their entrepreneurship abilities to enable them to build productive businesses in profitable sectors, and benefit from economic opportunities:

- Through the consistent efforts of the government, civil society and development partners to minimize women's alienation from the various political and economic processes.
- To strive to promote gender equality and empowerment of women through both mainstreaming gender dimension into its programs and initiating and implementing

gender-specific projects, as well as incorporating the principle of equality of men and women into its human resources and other corporate policies and practices.

This study will carry out using methodology that includes country consultations, focus group discussions, and review of secondary sources.

Addressing the gender issues such as stereotyping, women's limited access to economic opportunities, political participation, this assessment will suggest key policy reforms and service delivery improvements that empower women in Armenia.

Inaccessible Workplace Invisible Labour

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Rapid urbanization is changing the relative roles and responsibilities of both men and women with more women entering the formal job sector. This has led to transferring of social reproductive roles of women to domestic workers. The supply side is being fueled by poverty in the rural sector due to low employment opportunities, unproductive or low productive agricultural land, high level of illiteracy which limits the job opportunities and limited opportunities for women in the labour sector. This has resulted in increase in migration of women workers from the rural area to the city 'feminization of migration'. A majority of them are women from the marginalised section of the society. Due to large number of women being involved in domestic work it is undervalued due to gender discrimination and the belief that no skill sets are required for the work.

Domestic work is largely invisible to the society as the work space are private households which may be multiple in nature and thus are inaccessible. The exploitation many domestic workers face stems from the informal and hidden nature of workplace. Domestic work has the potential to empower women and reduce poverty provided they do not face exploitation. This is an exploratory study to assess the socio economic status and self reported position on violence by domestic workers in Delhi NCR. The first section of the paper highlights the journey of the domestic workers from the place of origin to the final destination. It talks about the push and pull factors that lead to migration of women and the reason for working as domestic worker. The second section talks double burden of violence the women which does not get highlighted due to the invisible nature of work and the patriarchal society in India which considers women last in line. The domestic work sector makes an important contribution to the economy of a country by enabling educated working women to delegate their responsibility to domestic workers. It also helps the domestic workers to have financial independence. Thus, for an inclusive growth in the society it is important to highlight their issues and challenges.

How countries are mainstreaming gender in the sustainable development goals implementation: a HLPF desk research study

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Background: Gender equality and women's empowerment was considered a cross cutting issue during the negotiations of the open working group for sustainable development and earned a stand-alone goal when the agenda was agreed upon by 193 member states in September 2015. Member states agreed that to achieve sustainable development by 2030 it was necessary to achieve gender equality and empower women. However, when the first High-Level Political Forum ("HLPF") occurred a year later countries were struggling to include gender as a cross cutting issue in their implementation plans. The objective of this study was to analyze the number of countries in the first HLPF country reviews that mainstreamed gender in their sustainable goals implementation plans taking into consideration the thematic review leaving no one behind.

Methodology: 22 countries presented at the 2016 HLPF under the theme ensuring no one is left behind. The author conducted a desk research analysis of the national voluntary review reports presented at the HLPF and analyzed the number of countries that incorporated a gender lens into their Sustainable Development Goals implementation efforts.

Results: No comprehensive gender mainstreaming plans were identified. Of the 22 countries that presented a national voluntary review only five mentioned gender as a cross-cutting issue and of the five only two mentioned gender equality as part of their overall sustainable development plan. One country discussed the need to form partnerships with different stakeholders to achieve gender equality, and a second mentioned the general need to prioritize gender equality in implementation efforts.

Conclusion/recommendations: The authors hypothesize that, to achieve goal 5 and mainstream gender across the implementation of all SDGs countries must take specific actions that can include: appointing gender experts to national SDG implementation commissions or equivalent bodies; include ministers of gender or equivalent national gender bodies in all SDG implementation efforts; develop gender sensitive budgeting; partner with CSO, private sector, academia as well as gender specialized UN agencies and other stakeholders that specialize in gender issues; take specific actions to develop political and social will to include a gender perspective into national implementation efforts; harmonize ongoing gender equality efforts such as the ICPD plan of action and beyond 2014 with SDG implementation plans including goal 5. It became apparent in the 22 countries general implementation plan overviews that gender was not being prioritized as a cross cutting issue. It will be impossible to 'leave no one behind' if countries do not take a thoughtful look at how to achieve gender equality and find adequate formulas to holistically include gender in their implementation efforts.

Limitations: The 2016 HLPF thematic review was not focused on goal 5 'Achieve Gender Equality and Empower all Women and Girls' and hence might have influenced countries' decision not to focus on gender as a cross-cutting issue.

Roadmap to Women's Empowerment in Tanzania's Water & Sanitation Sector

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This poster will focus on addressing issues of gender inequality and water scarcity in rural Tanzania. Despite the growth of urban areas within the developing world, particularly Africa, rural areas have not received the same attention and have been marginalized. Thus, the aim is to prevent further marginalization of an already vulnerable group; it is to ensure that rural areas get clean water while also ensuring that women receive the same opportunities as men in the workforce. This will be done through examining two cases studies that tackled similar issues from different perspectives and involved key stakeholders through the implementation plans. The first case study of the Ghana WASH project focuses on the success of an NGO which attempted to support marginalized groups. The second study focuses on the role of the local government in addressing issues in gender inequality through implementing several strategies that help women fit into the workforce. The aim of these case studies is to use their success as a baseline for the implementation plan in Tanzania to enhance the country's implementation plan and learn from other examples and putting it against the shortcomings in water security for women in Tanzania. Therefore, an implementation plan was put in place to include three main factors. First, various actors should be considered for the success of such a project. Secondly, programs should be properly staffed to ensure that such communities become resilient. Finally, budgeting such projects and continually monitoring their progress to ensure that people are benefiting

USAID/INGENAES Nutrition and Gender Study: Honduras

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My field practicum research will take place from May 8th 2017 to July 15th 2017th in rural, Western Honduras. Working with the United States Agency of International Development (USAID,) and the University of Florida, my field practicum will directly address gender. The project will be both research and development for USAID's Feed the Future project, INGENAES. I will be researching in the field while also presenting agriculture extension methods to two distinct regions, Santa Rosa de Copàn, department of Copàn, Honduras, and Gracias, department of Lempira, Honduras. My project will be focused on answering the question "how does masculinity affect the willingness of males to participate in gender and nutrition training and apply knowledge in the household?" In order to answer this question, I will go about taking surveys and hosting focus groups in the areas surrounding both Santa Rosa de Copàn and Gracias. The surveys will try to answer questions regarding the effectiveness of agriculture development in relation towards gender in rural Honduras. This project was envisioned because it is theorized that

development workshops have been focused mainly on women, and we want to figure out if men have any participation as well. We want to see how agriculture development affects males in rural Honduras, as well as measure if said males are participating negatively or positively with other development projects in their communities.

The data will be collected in two distinct districts to check for variations and similarities. I will be administering surveys in randomly selected communities in intervals of up to 20km, 40km, and 60km from each city center. The random community selection will be implemented in order to eliminate potential biases while obtaining data that is more accurate for USAID and the University of Florida. The communities selected will be under 200 households each, and the houses surveyed will be required to have at least one male over the age of 18 residing at them. Every other community surveyed will also participate in a focus group to add qualitative data to the quantitative survey data. I am planning to Survey around 300 households, while hosting around 12 focus groups in total (6 male and 6 female.)

The workshop trainings component of the project will come in the form of gender, nutrition, and agriculture-extension meetings with rural Hondurans. These workshops will be hosted by USAID, and I will be there to help teach and promote better farming practices through the lens of gender. Honduras is currently facing a feminizing shift in its agricultural lifestyle because more and more, the men are moving to the cities for the male-dominated job market, leaving the women behind to watch after the farms. The workshops, surveys, and focus groups will ultimately look into the developing world of the rural-agrarian lifestyle of both female and male Hondurans.

Once all the data is collected and assembled, the project will conclude with future policy recommendations for USAID in terms of agriculture, gender, and nutritional workshops. The data collected will help paint a clearer picture about the current status of males in rural Honduras, and whether or not they are benefiting from trainings and development projects from USAID.

Girl Scout Programming around the SDGs

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Girl Scouts current programming has an impact on Sustainable Development Goals 5,13, and 17. Sustainable Development Goal 5 (SDG 5) aims to achieve gender equality and the empowerment of all women and girls. This goal has two targets that apply to Girl Scouts. The target of ensuring “women’s full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic and public life” meets Girl Scouts mission of building future female leaders (UN Women, 2017). Girl Scouts programming gives girls the skills to be advocates for other girls in their community and around the world. When girls are aware of their role in the global community they are driven to strive for solutions that help everyone locally and abroad.

Additionally, Girl Scouts works with all actors influencing policy. The bipartisan Congressional Girl Scout Troup is an example of how the issues Girl Scouts advocates for can bring everyone together to work towards a common goal.

The target to “Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels” is being promoted through Girl Scouts Office of Public Policy and Advocacy (UN Women, 2017). This office is dedicated to promoting the legislative agenda Girl Scouts publishes every year. The current agenda promotes policy that improves girl’s financial literacy, outdoor appreciation, access to STEM education, and promotes global citizenship.

Girl Scouts current programming supports this legislative agenda. Two examples of programming include afterschool STEM education and the cookie sales program. The after school STEM program provides girls a supportive environment to explore STEM. The cookie sales program teaches girls financial literacy skills early on (Girl Scouts, 2017). Girl Scouts is making leadership development available for all and not only for those who can afford it. In New York City, Girl Scouts has launched Girl Scout troops for homeless girls (Stump, 2017).

SDG 13 focuses on combating the effects of climate change. The legislative item to increase outdoor activities of girls helps to create environmentally conscious leaders. When girls connect with the outdoors they gain a greater appreciation for the environment and can become advocates for its protection (Girl Scouts, 2017).

SDG 17 is centered on building partnerships for sustainable development. Girl Scouts Policy and Advocacy office builds partnerships with other non-profits and agencies that work towards achieving the mission of Girl Scouts. These partnerships are important because the changes needed to achieve sustainable development cannot be accomplished alone. Girl Scouts advocacy works to make sure that the United States continues to have a thriving non-profit community in which partnerships for change can be built.

Girls Scouts Programming can be fostered to help build the leadership of women in the US and globally. For all of the sustainable development goals we need strong leaders to lead the way. In Girl Scouts is where they will be found and supported.

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Bread Power: How Bakeries Are Sustaining Livelihoods in Rwanda

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The Women's Bakery is an education-centric social enterprise committed to empowering women and developing women-owned businesses. At our core and in our services, we are women-centric. We strive to provide women with:

1. An educational foundation;
2. Sustainable and gainful employment;
3. Opportunities for improved health.

As a social-enterprise start-up we have learned a lot since we began operations in 2015. One of the most important learnings has been that though impactful, our skills development training is not always enough to guarantee improved livelihoods. Thus, in addition to our 150+ hours of vocational training, we have developed a unique, business model that we call a "Bakery In A Box." This model aims to provide not only skill-based training, but also launches trainees into direct employment opportunities in bakeries. This packaged program emphasises the collective opportunity for education, gainful and sustainable incomes, and health.

ABSTRACT PITCH

The Women's Bakery believes that providing sustainable and gainful opportunities for women will have a multiplying effect that will help achieve the SDGs developed by the United Nations. With consistent income, women will invest in education and healthcare, improve their own autonomy, and create a strong sense of community. From our baselines surveys, pre-and post-tests, and focus groups, we are able to collect powerful indicators that amplify expected (and unexpected) outcomes of our work. Feedback loops from our evaluation process continues to inform our decisions to refine our programming and model.

Using both quantitative data and qualitative reflections from TWB's East Africa based team, The Women's Bakery would like to present on how data directly informs programming. And, the challenges and success of expanding programming while we simultaneously refine our model. Instead of fearing what it means to pivot and grow, TWB seeks to promote boldness in issues of change in how programs are delivered. Too often, other non-profits or social impact groups are fearful to change how they implement programs é but if we can trust the data we collect, we have an opportunity to understand

the highly integrated processes of what it means to change lives, communities, and the world.

We believe in the power of bread to change the lives of individuals, their families, their communities, and the world é and we look forward to sharing this with the ICSD community – one slice of bread at a time.

Integral Ecology and Sustainable Development: An Ecofeminist Conversation with Laudato Si'

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The encyclical letter, *Laudato Si'*, presents a profound theological and ethical reflection on the environment and sustainable development. This reflection is developed around the concept of integral ecology, which articulates the fundamental relatedness of all creation. This relatedness is traced to the Genesis accounts of creation, in which all creation similarly bears the mark of God and is unvaryingly good. Hence, it contradicts an androcentric notion of creation that portrays man as superior to woman and, ipso facto, other creatures. Thus, *Laudato Si'* seems to evince an ecofeminist liberationist perspective that is unprecedented in the tradition of Catholic Social Doctrine. As a school, Ecofeminist liberationist theology suggests a deep connection between the social domination of women and the ecological degradation of the earth. It also sees in this connection an intricate link to the oppression of the poor. Hence, the interests of *Laudato Si'* and Ecofeminism seem to converge in their common quest for an integral paradigm of sustainable development. In this light, this paper proposes to engage *Laudato Si'* in a creative conversation with Ecofeminist liberationist theology. This conversation aims to explore if and how *Laudato Si'* could bring Catholic theology into a constructive dialogue with Ecofeminism. The central argument here is that such a dialogue could facilitate a more robust understanding of sustainable development. Here, a robust understanding of sustainable development integrates the relevant contributions of both *Laudato Si'* and Ecofeminism into a practical developmental agenda.

Defining Strategies to Incorporate Women into the guayusa (*Ilex guayusa*) value chain

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Guayusa (*Ilex guayusa*) is an endemic tree from the Ecuadorian, Colombian and Peruvian Amazon. Even though it has a restricted distribution, many indigenous groups in this area have cultivated. Through the combination of indigenous knowledge, scientific research progress and technologies, Runa Foundation in collaboration with the Kichwa from Ecuador, have expanded the production of guayusa towards a final tea product that is marketed internationally. Consequently, this research will contribute (1) create job

opportunities for indigenous women and empower them, (2) increase the production of guayusa for local and international markets, and (3) diversify an agroforestry system, strengthening them with native species, such as guayusa. This will strongly contribute to the sustainable development of the livelihoods, of the indigenous communities, and of the forest (through its management and use).

This research will be based in the northern Peruvian Amazon (Lamas, San Mart n). Where I will develop a gender assessment for the incorporation of indigenous Kichwa Lamista women into the creation of Guayusa Value Chain (GVC), as a sustainable alternative to prevent forest loss and empower women. I will begin this project by analyzing the situation in Tena, Ecuador, where women already work with guayusa within an agroforestry system and farmer's associations. My main task will be to identify the best practices to adopt for Peru. Once in Peru, my main objective will be to define strategies to incorporate 250 women in participating in the future guayusa value chain. I will start by doing ethnographic observations and semi-structured individual interviews, where I will be able to engage with women, for further collective participation.

This initial contact will allow me to do participatory observation for the current indirect participation that women perform in the cacao and coffee cooperatives. During this phase, I will collect qualitative information that will help me understand women's perspectives on the introduction of guayusa. As a second phase in Peru, I will arrange 3 workshops, which I will use to enrich my information and define the strategies to be proposed, as well as to keep women acquainted with the research I will be then progressing.

Understanding Women's Job Prospects and Gender Inequality Issues in a Developing Community: A Case Study of the Cabarete Community in the Dominican Republic

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The Dominican Republic is a country which has experienced significant issues in gender inequality. In this society, women are typically given unequal opportunities when it comes to access to education and the job market in the Dominican Republic. Many job opportunities, especially those requiring labor, are reserved primarily for men. In response to this inequity, Mariposa Foundation was created in efforts to empower women by providing diverse educational opportunities, including job training. This qualitative study focuses on women involved in the Mariposa foundation, aiming to capture how the Mariposa foundation has shaped the views of women in the Dominican Republic. Specifically, the study examines women's perceptions of job opportunities and their views of achieving "success" in the Dominican Republic. This case study was conducted with the help of the Mariposa Foundation, a non-profit organization that is currently devoting their work to providing access to quality education opportunities for girls and their families in the Cabarete community in the Dominican Republic. By conducting in-

depth surveys and focus group sessions, the study analyzed various community development components in the following areas: current job prospects for young people and gender inequality issues. These components were pre-selected by consulting with the community members of Cabarete through a preliminary survey to better understand and pinpoint on significant issues affecting the community. This case study also serves as a needs-assessment for the Mariposa Foundation to understand their diverse challenges of young women in order to better provide for the Cabarete community they are currently serving.

Women's work and economic development: the case of BPOs and Indian women

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This study looks into the development of the Business Process Outsourcing (BPO) industry in India and how it has significantly influenced the rise of women employment in its society in the recent years.

Initially in India, women were thought as classic housewives and people believed caring and raising the house was the responsibility of women. However, after the rapid surge of the BPO industry, women in India are leaving their home and starting up on their new opportunities in workforce. Development in BPO industry significantly empowered women in several fields: jobs, education, and marriage. One of the main field that influenced women's life and changed the Indian society is women employment.

Business Process Outsourcing (BPO) is a contracting of a business task such as customer service, IT support for the third party service provider. BPO services include Call Centers, Medical Transcriptions, and banks. Development of BPO impacted the growth of India in many ways: gender equality, economic growth, and enhanced business process. After BPO industry developed, women embarked a first step on their work forces. Rapid development in BPO industry gave "a major fillip to the country's growth, helping it to narrow down the several 'divides' that separate its society." Initially, because of the traditional stereotype -- socializing between different sexes before marriage was unacceptable and women employment was not encouraged. There was a magnificent boarder line between men and women, where men were able to get opportunities of work, while women stayed home nurturing their family. Therefore, this paper looks closely into how such industry changed the growth of women employment and its culture from various perspectives.

Religious and Cultural Clashes in the Modern World: Understanding Latent Issues of Middle Eastern Wives

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The goal of this paper is to shed light on contemporary development issues regarding gender inequality in the Middle East (ME) and bring the religious and cultural factors causing friction in the global security context to the forefront of not only academia and scholarly discussion but also public awareness. This thesis will present a qualitative case study of the wives of (ME) Ph.D. students at Texas A&M University (A&M), illuminating the challenges they face as a result of the overwhelming shift from their war torn home countries to a democratic society in the U.S.

These challenges will be investigated to demonstrate common trends and address problem areas that merit more attention. The contemporary development issues in gender inequality identified in this case study will serve as the foundation for a practical application course designed by a joint effort between the Bush School of Government and Public Service and the Department of Agricultural Leadership, Education, and Communications (ALEC) for graduate students interested in development careers. In the course, students will assess the challenges facing ME wives of Ph.D. students at A&M and propose solutions to remedy these challenges by empowering these women with respect to the limitations set by their cultural and religious contexts. This examination is of great significance because ME wives are an invisible group that is capable of tremendous influence during their time in the U.S. and upon returning to their home countries. The prospect of empowering the wives of ME Ph.D. students may have numerous implications for future economic, food, environmental, and world security.

Purpose of the Course

The course will fulfill the need for connecting development theory to real world implementation by allowing students to gain practical experience for future development professions. The need for this course is evident due to the fact that there are few capstone courses in development work available at the Bush School and ALEC. Many students are interested and apply to the capstone at the Bush School but enrollment is limited.

This thesis is meant to offer a point of intersection by providing students with a starting point for the course. The importance and emphasis of the course will be on identifying local issues with international scope, where students will gain experience in understanding and addressing cultural challenges, so that they are better prepared for a career in development, especially in regards to gender inequality.

Students will engage in a local hands-on project where their work will benefit the ME wives. Students will gain skill sets in critical thinking, communication, collaboration, and creativity by gaining insights about the challenges ME wives face at A&M and in College, Station, Texas. It is the author's intent that this thesis paper will have utility within the academic community in order to better prepare students interested in development careers; producing successful evidence-based programs for a more peaceful and prosperous world.

What are the socio-economic barriers for girls to accessing secondary school in Tanzania?

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Objective:

REALISING OPPORTUNITIES: APA – CVM are promoting women's and girls' rights in the district, increasing their awareness on human rights violations; the project they required me to follow is related to the causes of girls dropout of school such as difficulty to access to the structure or to the basic services within the school, parents or husband economic status or financial difficulties, discrimination, corporal punishments or sexual harassment, pregnancy, etc... Their target on this issue is to achieve the 25% decrease in girl's dropout of school (primary and secondary) in Bagamoyo. "The barriers are many and culture plays a strong role".

Main Research question: WHAT ARE THE SOCIO-ECONOMIC BARRIERS FOR GIRLS TO ACCESSING SECONDARY SCHOOL?

(THROUGH ADULT PERSPECTIVE)

Sub questions:

1. Challenges for girls to access to secondary education
2. Challenges for girls to remain in secondary education – dropout rates, causes
3. Implications and impact on large number of girls having to drop out of the educational system – in depth understanding of the topic and related issues

Justification: the Tanzanian MOE launched 5 years ago a program named Plan for Secondary Education Development (SEDP) but the secondary school enrolling rates are around 56% and gender disparities are enormously affecting the percentage of girls that actually conclude the School. The reasons for the dropout rates can involve family financial status, discrimination, corporal punishments, pregnancy, child marriage, sexual harassment, basic infrastructures within the school itself or transportation difficulties. I will try to better understand the reason why the girls in Bagamoyo District are not enrolled in the local schools, their everyday life and the role in the families and the broader effects on the community.

"Discrimination, abuse and violence against women and girls (VAWG) is wide-spread and common in Tanzania due to patriarchal and traditional norms. Two out of five women in the 15 to 49 age range have experienced physical violence. One out of ten women aged 15 to 49 years have experienced forced sexual intercourse against their will. Levels of discrimination, intolerance and violence against women and girls are extremely high" (UNWomen).

Tasks:

- To carry out a literature review of existing documents and data to better understand the topic and broader implications. The document mentioned as fundamental for this research is the HRW report “I Had a Dream to Finish School” Barriers to Secondary Education in Tanzania but then the literature review will be completed with other documents and reports about international organisations’ country overview or topic approaches (UNICEF, UNESCO, UNWomen, Human Rights Watch, Ophi, etc...), Policies, MOE initiatives, Laws, Academic literature, etc...
- Because the area I’ll work in is limited, I’ll compare the secondary data found to the actual situation I’ll live in.

During the Fieldwork a mixed method approach will be needed.

- Gathering quantitative data with a structured questionnaire with the same questions but written in 3 different ways – for mothers, for men and for teachers – about the girls’ reasons for not being at school, family attitudes and necessities to have them at home, etc... The organization suggested me to have max 20 questions focused on both girls’ everyday life and family attitude.
- Gathering qualitative data with interviews based on the results obtained through the questionnaire.
- Organizing some focus groups on the topic involving 6-10 members of the community to discuss previous girls’ schools results, dropout causes, girls’ role in the family, etc...
- If possible, better understanding the community through a participative approach
- To summarize all above in an overall research report.
- To prepare an oral presentation on the research process and results (by the end of the 10th week)

Governance of Energy Transformations: Key to Sustainable Electric Systems

Sustainable Energy Generation through Wastewater: A situation in the Urban City of Lagos, Nigeria

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As Nigeria’s economic capital and commercial nerve centre, the city of Lagos is undergoing speedy urbanization. With an estimated population of over seventeen million people, Lagos is one of the world’s fastest growing cities. One of the prominent natural endowments that has borne the brunt of this rapid expansion is the Lagos Lagoon, a water body that has been used for sewage disposal for more than half a century. The large volume of sewage deposited in the lagoon on a daily basis has escalated due to the rapid growth in the city’s population. The thrust of this paper is to explicate the repercussions of wanton sewage disposal into the Lagos Lagoon and to highlight the potential which Lagos has to generate massive energy from sewage waste in order to meet its energy

challenges. From ten separate stations across the Lagos Lagoon, water samples were collected and analyzed to ascertain the existence of pathogenic entities using the techniques of sedimentation, microscopy and culture. These pH levels and

Biochemical Oxygen Demand (BOD) of the samples were tested using the pH meter and BOD test apparatus correspondingly. This paper shows that sewage disposal into the Lagos Lagoon has made the water body ecologically unhealthy for aquatic plants and animals. It has also decreased the visual

appearance of the environment. Further, this cruel practice has exposed some persons that come in contact to the lagoon's waters to pathogenic infections. Extant studies have pointed to the fact that sewage waste is a key energy source, with 1 kilogramme of dry faecal sludge having a calorific value of 17.3 millijoule. This paper strongly recommends the dynamic use of faecal sludge to save the Lagos Lagoon from sewage pollution and upscale energy supply in Lagos.

Innovations, Institutional Linkages and Knowledge Production: A Case of Solar Energy Sector in India

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The study is motivated by the need to accelerate the supply of renewable energy with special focus on solar energy with a vision of affordable and reliable clean energy because it addresses the issue of climate change and fostering sustainable development in India. Energy is an important sector for economic growth of a nation like India. The country's economy is one of the fastest growing economies in the world. Due to the rapid growing population and growing economy, the consumption in energy sector has increased rapidly in the country. There is a wide gap between the country's energy production and the energy consumption (Krishna, C., Sagar, A.D. and Spratt, S., 2015). According to Ministry of New and Renewable Energy, solar energy promotes the ecologically sustainable growth and also addresses the country's energy security challenge among the various forms of renewable energy. It is also one of the promising sectors which discourse the issues of climate change under National Action Plan on Climate Change. Recently the government of India launched "National Solar Mission" which target the country as one of the global leader in terms of solar energy production, promoting R&D and developed trained human resource for solar industry. Knowledge production refers here the research outcomes such as patents and research publications from the various R&D institutions, university, firms etc. Linkage means the interaction or collaboration between various actors and institutions who shape the solar energy sector in the country. And innovation stands here the ability to absorb, adapt and transform a given technology into specific operational, managerial skills that accelerates an innovative organizational culture, characteristics of internal promoting activities and capabilities of communication facilities of firms to others in both market or non-market relations.

The main objectives are to explore the knowledge production and its transformation or functioning in the sector, to study the dynamics of innovation in the domain of solar energy and to assess the role of public policies on solar in support of R&D. The sectoral system of innovation framework is adopted for this study. For understanding the knowledge production we use bibliometric exploration from Scopus online database and for the analysis of patents we are mapping with the help of USPTO (United States Patent and Trademark Office) and IPO (Indian Patent Office). The study highlights the number of research publications and patents has been increased in the country and there is a significant presence of productive R&D organization, academia and supportive policy initiatives. The country ranks among the top ten country in terms of knowledge production pertaining to the field of solar energy and particularly having the maximum publications in the area of poly-crystalline, thin film and dye-sensitized technologies. However, the country is far behind others in terms of investment in solar R&D. This paper also addresses the research trust area in various emerging solar technologies in the country and explores the ways in which various actors, agencies and policies shape the solar sector from the different perspectives on innovation literature.

Killing two birds with one stone: Decentralized renewable energy systems for energy transformation and rural electrification

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A reliable energy supply is the basis for health, education and new perspectives in economic growth and societal development. An energy transition towards renewable energies with universal access to energy is thus the key to the future development of many countries in sub-Saharan Africa and South-East Asia. There, energy access is especially underdeveloped in rural areas.

In our work we show a way of combining electrification schemes with energy transformation efforts. This allows leap-frogging centralized, carbon-intensive power supply systems and reaching a renewable and decentralized electricity system ensuring universal access to electricity. We have selected the case study of Nigeria to discuss details of this transformation process. Within the Nigerian Energy Support Program (NESP) Project é financed by the European Union and Germany é we developed five least-cost geospatial rural electrification plans for five federal states of Nigeria. These plans show similar patterns even though the conditions in the different states vary greatly. The patterns we discovered are:

- Before extending the central grid, on-grid power generation needs to be strengthened. The reason is that frequent power outages currently lead to the implementation of inefficient and highly polluting back-up infrastructure for grid-connected customers which are otherwise obsolete.
- In order to electrify rural areas during the time when the central infrastructure is still weak, off-grid electrification by mini-grids or stand-alone systems should be

- encouraged. Support is needed through policies, regulations, new business models etc.
- Merging on- and off-grid efforts to one optimized energy supply system combines the advantages of decentral and local power generation with the economies of scale of the central grid system. This means that decentral power generation allows local value creation and use of renewable energy technologies which is combined with balancing effects of interconnected systems.

With this contribution we want to encourage discussions on how to combine electrification and transformation efforts in different developing countries worldwide. The ICSD serves as the perfect platform to reach out to international experts engaged in trans-disciplinary dialogue.

Financial Viability in Renewable Energy Projects in Australia using the Mathematical Algorithm of the Monte Carlo Simulator

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Australia has a developed economy and free energy market that has driven the entry of unconventional generators to the electricity generation network. Policies such as the Green House Gases (GHG), the carbon tax and specific renewable energy targets (RET) have been fundamental steps in this transition. However, when it comes to implementing these types of change projects, it is essential to analyze some financial aspects that justify the initial investments that merit realization.

This work seeks to review the economic and financial viability of the power generators of the Clemente Wind Farm and the Solar Center of the University of Queensland in Australia using the mathematical algorithms of the Monte Carlo Simulator which uses more than 4000 possible scenarios of random samples And a probabilistic view for decision making, which is based on the Capital Asset Pricing Model (CAPM), which describes the relationship between systematic risk and expected return or profitability for financial assets, particularly Actions.

The future energy grid: Demand Side Management and Distributed Energy Resources.

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The rapid industrial growth that occurred during the twentieth century was marked by the incremental occurrence of significant side effects on the atmospheric environment such as acid rain, depletion of the stratospheric ozone and global warming. However,

international efforts to achieve sustainable societies are increasing as the consequences of climate change are starting to be felt. International commitments to the Kyoto protocol, the United Nations Framework Convention on Climate Change (UNFCCC) and later the Copenhagen Accord and the Paris agreement have resulted in significant commitment by various countries to reduce greenhouse gas emissions.

Despite this global action plan towards achieving sustainable societies, greenhouse gas emissions grew more rapidly between 2000 and 2010 than in the previous decade. The main contributor to this was the energy supply sector, which in 2010 accounted for approximately 35% of the total anthropogenic greenhouse gas emissions.

As the 21st century progresses, the electricity sector is seeking to take advantage of novel approaches to meet the growing energy demand and abide by the required environmental targets. To achieve these goals, the concept “smart grid” emerged, and utilizes new technologies that can potentially establish an open electricity market, increase the adoption of renewable energy sources and finally decrease or control the demand for electricity. Currently, the electric power industries of many developed countries are discussing the possibility of promoting energy demand management, as it is considered a cost effective and reliable solution that can help ease the operation of the electrical system. The concept of demand side management incorporates activities that alternate the demand profile of the end-users to match electricity supply, improves energy efficiency, decreases overall energy consumption and aims at efficiently integrating higher shares of renewable energy resources. Additionally, demand side management can also be employed to facilitate the integration of distributed generation, a promising approach to relieve the existing power system from today’s stress on transmission and distribution networks, reduce greenhouse gas emissions and improve the efficiency and reliability of the electric power system.

The proposed research aims to study the energy consumption and generation patterns of a sustainable neighborhood in Japan, which has earned a LEED ND platinum rating. More specifically, this research will evaluate the current and future behaviors and intents of the residential and commercial energy consumers of Kashiwa-no-ha area. Further, this project will conduct a questionnaire survey to acquire qualitative and quantitative data related to the preferences of the energy consumers and their intent to adopt new energy habits such as energy production and energy conservation. The main methodology utilized to understand household intents will be a refined model of the theory of planned behavior.

Additionally, this research will discuss the potential of a project that integrates distributed energy resources and implements demand side management in order to reach a new level of grid efficiency and to achieve higher level of energy independence on a small community. The results subsequent to the examination of data will yield useful insights and recommendations for future policy changes.

Facilitating Microgeneration and Renewable Energy Transition in Russia

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Russia's position regarding the 7th UN sustainable development goal "Affordable and clean energy" is unique. On the one hand, most of its population has access to affordable electricity, with about 17 percent of the total electricity demand being met with renewable energy sources. Only about 7 percent of Russia's population is off-grid, and many off-grid residential areas are supplied with power produced by diesel generators. On the other hand, the affordability of electricity for the Russian residential sector is largely guaranteed by cross-subsidies and other types of subsidies that distort the economics of the energy sector and dwarf the development of renewable energy. Moreover, renewables are dominated by large hydropower, with bioenergy and waste accounting for only 0.3 percent of the total generation. Other renewables, like solar, wind and geothermal, still account for negligible shares.

Thus, one of the most urgent tasks for Russia on the 7th sustainable development goal is to develop renewable energy technologies except for large hydropower. Successful progress on this task, alongside with the progress on energy efficiency and power infrastructure, as well as with the enhancement of international cooperation in this spheres, will allow Russia to create a sustainable energy system.

Russia has already started to develop renewables other than large hydropower. In 2013, it adopted a novel capacity-based scheme to support solar, wind and small hydro in wholesale power and capacity market. In 2015, Russia introduced a support scheme for renewable energy sources in retail power market, which also covered the off-grid segment of the power market. As of 2017, Russia has commissioned about 100 MW of solar PV plants under the new legislation.

Currently, in 2017, Russia is preparing to introduce microgeneration and to allow microgenerators with total installed capacity of up to 15 kW to feed excess energy into the grid. When rules for microgeneration are enacted, the Russian renewable energy legislation will cover all major electricity segments, except for one: microgenerators that need more than 15 kW of installed capacity and are not ready to comply with the strict requirements of the retail market.

Since microgeneration is currently of high interest in Russia, the main goal of this paper is to explore its costs for the most popular microgeneration technology – residential solar PV – and to estimate its economic viability in terms of payback time and levelized cost of electricity (LCOE). To complete this task the author will use the data of Russian solar PV solutions providers and compute various scenarios: off-grid and on-grid systems, with and without storage. The results of this research will allow to develop recommendations on the microgeneration support scheme in Russia. The author will also propose the general recommendations for the Russian renewable energy sector to enhance the sustainable development of the country's power system.

Educational benefits and social impacts of solar photovoltaic systems in rural Kenyan schools

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In many developing countries, the high costs of grid extension and the externalities associated with fossil energy production such as fluctuating fuel costs and maintenance of diesel generators led to most rural electrification programs opting for renewable energy systems, especially solar photo voltaic (PV) systems. The Kenyan government, through the Rural Electrification Authority, equipped over 500 public schools in remote areas with solar PV systems over the last 12 years, starting in 2005. Additionally, some schools have also benefited from solar PV systems highly supported by international donors. This research was aimed at investigating the level of efficiency in the deployment of these projects and to establish the effects of having a school being electrified in the midst of a community lacking access to modern sources of energy. This objective was achieved by carrying out a detailed case study analysis of eleven primary schools in Kenya using solar PV systems to elaborate how these systems have impacted on the school, as well as the communities within which the school exists.

Findings show that solar PV systems used for pumping underground water had a positive impact on students' performance and discipline as the students no longer had to leave the school premises during teaching hours to go fetch water for drinking and cleaning during school hours. Furthermore, an increase in the level of community involvement in the project was observed as community members could readily access clean underground water during the day which improved the health of community members in general. On the other hand, solar PV systems used for lighting purposes yielded positive impacts such as improved academic performance and discipline among students due to the availability of longer studying hours. The availability of solar PV system made it possible for some schools to convert upper elementary students to boarders hence shielding them from ills such as child prostitution and drug abuse. However, there was minimal community involvement and in some instances conflicts arose among community members, with regards to water needed for the school to operate. There were also cases of vandalism especially during school long holidays.

The study concludes by emphasizing the importance of capacity building both individually and communally for a successful solar PV system implementation in schools. Moreover, a simultaneous access to electricity and clean water in schools is essential to ensure better health and academic performance among students, as well as to improve the cohesion within the community within which the school exists. Improving the cohesion within the school members and the surrounding communities is vital as it would encourage these stakeholders to embrace the project and become champions of ensuring the project's success.

Rethinking power markets: capacity mechanisms and decarbonisation

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This report introduces capacity mechanisms, a policy instrument for power markets, considers their implications for meeting parallel objectives of security of supply and decarbonisation.

Our review suggests that capacity mechanisms risk undermining parallel energy and climate objectives by locking in dependence on high-carbon, inflexible power generation assets. The introduction of these tools is often politically motivated and not based on a rigorous analysis of their need. Finally, the uncoordinated introduction of capacity mechanisms risks undermining wider efforts to integrate energy markets, which, paradoxically, are meant to ensure a more efficient use of resources and improve security of supply.

As a number of countries are moving ahead with the design and implementation of domestic capacity mechanisms, it is therefore a key moment to influence this process.

Green Growth: How Can We All Profit from the Low Carbon Transition?

Achieving a Greener Environment: Implication on the Economy of OPEC – Case Study of Nigeria

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With the advent of climate change and global warming national governments under the United Nations have been collaborating to seek widespread global solutions to the drastic climatic changes to prevent future environmental disasters. It is on this premise that the United Nations Framework Convention on Climate Change was setup to provide the framework and action agenda to combat climate change globally; with the main focus being reducing Greenhouse Gas concentrations, majority of which comes from carbon emissions, a large percentage of which is attributable to the Oil and Gas Industry, either from its extractive process or through its by-products such as petroleum used as fuel for cars and power generating plants. The effect of the Oil and Gas Industry on the environment and climate has resulted in the clamor for transition from fossil fuel and energy to the exploration of a more cleaner and climate friendly solution (green energy solutions) either for powering vehicles or generation of power which would ultimately force the Oil and Gas industry into an existential crisis unless more environment friendly solutions can be identified. This paper is aimed at assessing (1) The effect reduction in utilization of Oil and Gas products globally would have on Oil Producing Countries

especially those that solely depend on the sale and export of these products as the only viable source of foreign exchange making up over 50% of their national Export GDP (2) The potential growth in the economy through the creation of new jobs by diversification to the renewable energy sector which has been identified as a potential source of highest employment generation next to the agricultural sector and a review of the economy in relation to dirty energy and clean energy (3) Role of Adaptation and Mitigation in combating climate change and the potential benefit and advantage of implementing these strategies on the economy. Review response measures and compensation plans by exploring all the opportunities available for economic growth outside of the Oil and Gas Industry; such as technology/manufacturing, industrialization, implementation of climate smart agriculture, transportation plan and efficiency, availability and provision of IT infrastructure and management of water resources.

Mining as a Catalyst for Sustainable Development

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Minerals and metals fundamentally underpin the functioning of every aspect of modern society. From electricity generation to the provision of the tools of connectivity; from the agricultural and manufacturing industry to the health industry and toothpaste ingredients. The dependency increases as the world embarks on the fourth industrial revolution and the need for a circular economy is recognised. However, society's negative perception of mining activities is also increasing with its contribution to increased inequalities, community confrontation and conflict as well as environmental degradation receiving widespread attention.

Thus, in spite of its relatively small size as an industry, the mining and extractives sector has the extraordinary potential to support the achievement of or impede or compromise the Global Sustainable Development Goals (SDGs).

Since mining is a global industry and is often located in remote, ecologically sensitive and less-developed areas, it has the unique potential to catalyse the sustainable development of the region by delivering on Goal 9: 'Build resilient infrastructure, promote sustainable industrialization and foster innovation'

This goal addresses the role of investments in infrastructure, transport, irrigation, energy and information and communication technology, which are crucial to achieving sustainable development and empowering communities in many countries. It has long been recognized that growth in productivity and incomes, and improvements in health and education outcomes require investment in infrastructure.

If carefully managed, inclusive and sustainable industrial development can provide the suitable environment to promote income generation activities and allow for the development of sustained livelihoods and stable communities.

Mainstreaming Climate Finance: Market-based Solutions to Climate Change

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International consensus, academia, and market indicators point to the long-term inevitable mainstreaming of green finance, and in this case more specifically, climate finance. This assessment is clear in foreshadowing an outcome where the World Gross Product (GWP) is mostly fueled by clean energy. In other words, where economic growth is de-coupled from rising CO₂ and other harmful emissions into the atmosphere. However, there is no clear consensus on time frames for this transition to be completed or any assurances on this matter. At the beginning of last century, John Maynard Keynes warned against business-as-usual, laissez-faire approaches that hinted towards long-term solutions to complex monetary issues. Banking on long-term solutions was a misleading guide to current affairs of the time. Similarly, this century's scientific consensus spearheaded by the International Panel on Climate Change (IPCC) and the United Nations Environment Programme's 'Emissions Gap Report' point to a scenario where it is clear that in the most optimistic international course of action (as described in the Paris Agreement of the UNFCCC), the said transition to a carbon-free economy might come too late. If we consider global temperature increases per year, the measured particles of carbon in our atmosphere, and the consequences to our global society, banking on business-as-usual, long-term solutions might prove catastrophic. It is therefore a useful and an urgent endeavour to highlight the clarity in the assessment of present barriers to climate finance as brought forth by academic and international consensus via UNSDSN, UNEP Inquiry, UNEP FI, and the G20 Green Finance Study Group, including the IMF and the World Bank. The contribution of this paper is to elaborate on the aforementioned barriers in order to propose market-based solutions that can accelerate a transition to a carbon free economy. This paper will specifically look at leveling macro obstacles to the mainstreaming of climate finance globally which include fiscal incentives to fossil fuels, lack of bankable projects and governance for a green economy worldwide.

SDGs as a great opportunity for the green growth in the private sector

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The new 2015-2030 agenda places particular emphasis on the role of business in achieving the SDG, with the private sector's participation in achieving these goals being considered as a critical contribution.

Due to the special characteristics of Iberdrola's activity, its performance generates important synergies, essential for the economic and social development of the countries.

As acknowledged by the United Nations SE4All initiative, socio-economic development is being fed by the growth of the energy sector allowing new opportunities for economic growth of communities which in turn translate into new increases in energy demand and, therefore, in the investments needed to meet the growing energy needs.

In this way, the development of the ordinary activity of the electric sector is shown as an element that favors the attainment of all the objectives, through the creation of new economic opportunities, thus favoring the improvement of education, health, sanitation, the position of women, the environment...

This is due to the dual role of electricity, which allows it to be both

-an end product in itself and

-a basic input for economic activity.

This situation places electric utilities in a privileged position linking their ordinary productive activity in order to comply with the ODS.

Iberdrola maintains a high commitment in environmental matters and the fight against climate change. This commitment leads to the reduction of the environmental impact of its operations through an increasingly polluting generation, the implementation of biodiversity programs and the improvement of operational efficiency, including sustainable use of natural resources, prevention of pollution and the proper management of waste generated.

Iberdrola is a reference company in the electric sector because of the characteristics of its generation mix, its investment profile (betting on renewable technologies and emissions reductions) and the ambitious goals that have already been self-imposed.

These efforts are aimed at making the productive activity of the group 100% compatible with the achievement of goal number 13 ("taking urgent measures to combat climate change and its effects") and, therefore, with the objective of limiting the increase in global temperature at two degrees Celsius.

Iberdrola, in its attempt to advance in the accomplishment of objective 7, is simultaneously advanced in the development of objective 13. In a collateral way, this advance in these two objectives implies in improvements in the general conditions of life that result in the achievement of the whole new agenda of sustainability designed by the United Nations.

Investing in a Greener Future: Rethinking Sustainability in Aviation

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Airlines are burning billions of gallons of fossil-based jet fuel each year, accounting for a concerning volume of global carbon emissions. As aviation grows as an industry with flights worldwide expected to double in number over the next 15 years, air travel's contribution to climate change continues to be a sensitive issue.

For Cathay Pacific Airways, aircraft emissions make up 99% of the company's carbon dioxide output. Leading the aviation sector's charge to cut pollution, Cathay Pacific is transitioning from fossil-based fuels to biofuels, retiring and recycling less fuel-efficient aircrafts, and tackling sustainability within the company across departments. By also being the first airline to ever invest in a biofuel producer, Cathay Pacific is actively enabling a greener future.

In this session, Philippe will share the innovative ways that Cathay Pacific is reducing its carbon footprint, and how other businesses can replicate similar measures across industries.

A fundamental measure Philippe will highlight is the process behind implementing key waste management and recycling initiatives. One unique and pivotal measure Cathay Pacific executed includes recycling plastic and nylon waste like plastic bottles and salvaged fishing nets, which are otherwise hazardous to marine life into passenger blankets and cabin carpets.

Philippe will also address the success and challenges of transitioning to biofuels on an industrial scale. Cathay Pacific is already using 10% biofuels on many of its delivery flights, and its new aircrafts are now as much as 25% more fuel efficient; next, Cathay Pacific plans to use a half-half mix of biofuel and conventional fuel on trans-Pacific flights, and pledges an 80 percent reduction in emissions.

Philippe will share the tactical steps Cathay Pacific has taken to achieve the level of sustainability it is at today. With Cathay Pacific's efforts as an example, Philippe will also speak to the opportunities, partnerships and lessons learned along the way to achieving sustainable development goals at local and national levels.

Knowledge and attitudes about the 'green car' concept among bank officers of Colombo district

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Abstract

Human endeavours throughout the ages have been the driving force of global development. It is also evident that these efforts in return has resulted in damage to the environment we are living in, mainly in terms of carbon emissions. Higher the number of carbon footprints, higher the disturbance to atmospheric equilibrium resulting in health problems, global warming and climate change. Vehicle emissions is one of the key contributors in this vicious cycle. Therefore, in the mission of accomplishing sustainable development goals and environmental sustainability while ensuring a green growth, adoption of 'green car' concept could bring about a healthy revolution. Hence, it is worth while identifying the challenges in 'green car' usage.

Although many studies have been conducted on assessing the consumer knowledge and attitudes on 'green cars', studies observing the association between these components are lacking. Therefore, the main objective of this study was to describe and compare the factors associated with knowledge and attitudes about the 'green car' concept among bank officers of Colombo district, Sri Lanka.

In a descriptive cross-sectional study, with a two-stage sampling process, non-probability sampling was used in the first stage to select the study venue and stratified sampling in the second stage to select the individual subjects within the venue. Using a self-administered questionnaire, knowledge and attitudes were assessed. Knowledge against socio-demographic factors were compared using independent sample t-test, attitudes against socio-demographic factors and knowledge against attitudes were compared using Chi-square test; both at a significance level of $p \leq 0.05$. In a sample of 300, the response

rate was 95.6%. Majority (54%) had a high level of knowledge, but knowledge on 'green car' identification and electric car recharging was poor. The most important factor considered when buying a vehicle was cost, while the most important factor discouraging buying an electric car was recharging issues. Although most had eco-friendly attitudes, bank officers with a higher level of knowledge had more pro-environmental attitudes. Majority (55%) were willing to buy a 'green car' vehicle as their next vehicle.

In conclusion, knowledge of bank officers on 'green car' concept was at a satisfactory level and a higher level of knowledge was associated with more eco-friendly attitudes. However, most of them were uncertain about 'green cars' replacing conventional cars overtime.

Health and Sustainable Development

Eco-toxicology in the Arctic

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For this project, I will work with an organization called Alaska Community Action on Toxics to as part of the Alaskan Conservation Foundation Internship Program. I will create a documentary film about the eco-toxicology and how it affects Alaska Native populations. The documentary project will serve as my Practicum Project for the Masters of Sustainable Development Practice Program.

The Alaskan Community Action on Toxics is an organization in Anchorage that focuses on environmental justice, environmental health, and its relation to toxic chemicals. The arctic region is an atmospheric sink for industrial chemicals that are emitted all over the world. In addition, toxics often accumulate in the body fat of animals that are an essential part of the Alaska Native diet. For these reasons, Alaskan people have abnormally high levels of endocrine disrupting chemicals in their body. Alaska also has several toxic waste sites owned by the US government. This issue is particularly interesting as a point of intersection between environment, health, governance, business, and inequality.

Objectives of the project:

1. Develop the analysis of how and to what degree Alaska Natives in the Anchorage area and on St. Lawrence Island (Sivuqaq) are impacted by toxic chemicals in their communities.
2. Document the current role of different stakeholders in combating their concerns associated with pollutants in the environment, and the degree to which they collaborate with communities on efforts to address their concerns.

3. Identify opportunities for collaboration among key stakeholders, highlighting the strengths and contributions each one might make to provide cooperative measures.
4. Develop materials that can be used to engage with different stakeholders on behalf of the cause and the organization

Methods:

- Talk and engage with the community members and stakeholders. Host events, such as workshops, and table at local Anchorage events.
- Hold focus groups to gather key issues and narratives.
- Assist with field research that is currently being conducted by the organization.
- Research and write about environmental health and create articles, info-graphs, signs, and charts to disseminate information to public and communities.
- Conduct ethnographic research with the local community around Anchorage and St. Lawrence Island (Sivuqaq).

The outcome of this project will be a final report of my findings as well as a 15 minute documentary film and a short promotional video to assist Alaska Community Action on Toxics in their advocacy work.

Harnessing the positive impact of family planning on environmental sustainability to reduce the global unmet need for contraception.

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Well-established reproductive rights rest on the recognition of the basic right that all couples and individuals have the information and means to freely decide the number, spacing and timing of their children. Nonetheless, over 225 million women have an unmet need for contraception, and over 20 million women perform unsafe abortions each year. Progress on reproductive rights has been unacceptably slow, and numerous barriers to family planning exist, particularly for vulnerable groups such as migrants, refugees, and teenagers.

Reproductive rights and environmental sustainability have synergistic interests: access to family planning is a pathway to environmental sustainability, as one of its well documented effects is the lowering of fertility rates. However, because of the legacy of past population control programs characterized by human rights abuses and of the framing of reproductive rights as individual in nature, the global development, environmental and feminist movements are loath to recognize the family planning, population growth and environmental linkages.

In this paper, I stress that the absence of population dynamics considerations in the 2030 Agenda for Sustainable Development may undermine the long-term progress towards the achievement of its goals. However, a window of opportunity to re-consider the linkages between family planning, population growth and environmental sustainability is created by the combination of the following factors: a) the need to advance reproductive rights and improve health outcomes; b) the prominence of environmental sustainability concerns on international policy agendas and; c) the scale of the global population growth momentum.

Next, I analyse in which ways the family planning movement can increase its prominence, funding, and legitimacy by re-considering these linkages and integrating environmental sustainability in its ideological framework. Examples of existing instruments integrating environmental sustainability in family planning are discussed, and include environmental conservation programs adopting what is known as a “Population, Health and Environment approach”, and National Climate Change Adaptation Programs of Action identifying family planning as a priority activity to respond to their urgent and immediate needs to adapt to climate change. Last, I integrate elements of social movement theory to review how the family planning movement could benefit from social change messaging addressing environmental sustainability.

Conclusion: The positive impact of family planning on environmental sustainability can play an important part towards reaching the Sustainable Development Goals 3.7 and 5.6, aiming to ensure universal access to sexual and reproductive health-care services.

Icelandic Social Support Model and Icelandic Adolescent Mental Health

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As stated in the 1946 Constitution of the World Health Organization, “[health] is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity”. Decades later, despite great strides in healthcare, and medical technology, we are still burdened by disease. Mental illness has emerged as a top issue globally; in fact, depressive disorders are the second highest cause of disability worldwide, with anxiety ranking 9th, schizophrenia 12th, and bipolar disorder 18th. World leaders have recognized mental health as a top global health issue by including mental health and substance abuse in the United Nation’s Sustainable Development Agenda with SDG #3 “Good health and Well-being”.

Although the Nordic countries are revered for their progressive social and health policies, they are disproportionately burdened by mental health and substance abuse issues. Notably, Iceland has made considerable improvements in mental health and substance abuse among their youth. The Icelandic community credit these admirable reductions to

investment in a multilevel social support program, which we have baptized as the Icelandic Social Support Model (ISSM).

Studies indicate that increased social support has been shown to have positive impacts on mental health, and suggest that interventions and social support among youth may improve mental health symptoms. The ISSM model is characterized by: 1) strong relationship with family; 2) strong relationship with friends; 3) strong relationship with community; and 4) community engagement. ISSM programming aims to increase youth social support, whilst involving a wide range of relevant stakeholders and socially innovative programming.

This mixed methods study incorporates both quantitative and qualitative data streams designed to evaluate the effect of the ISSM on Icelandic adolescent mental health. During the qualitative phase, we will conduct interviews with key stakeholders and adolescent focus groups in each geographic region to collect feedback on the ISSM and identify barriers and resources for adolescent mental health. During the quantitative phase, we will perform a secondary data analysis of cross-sectional Youth in Iceland (YiI) survey data to explore the relationship between ISSM and self-reported mental health. The YiI is an annually conducted, nation-wide survey of all 10-18 year old students enrolled in Icelandic public schools, collecting information on demographics, behavior, and social variables.

We will perform a content analysis of the transcribed focus groups and respective interviews to elucidate key themes and patterns. For the secondary data analysis, we will create social support and mental health scores to allow us to quantify participant involvement in the ISSM and observe possible dose-response relationships. We will then use a multivariate logistic regression model to relate the social support and mental health scores, including terms for covariates that may confound or bias. We hypothesize that more participation in the ISSM (a higher social support score) will be associated with improved mental health (a lower mental health symptom score). Results from the evaluation will be shared with the Icelandic community.

Food Security, Marine Conservation and Dietary Health of the Small Scale Fishers of Belize

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Fisheries throughout the world are over-exploited through unsustainable fishing practices and face additional stresses from pollution and climate change. Millions of people are dependent on fisheries for food and income; this holds especially true for those in less economically developed equatorial coastal regions. Belize is considered a leader in expanding conservation regulations towards stabilizing marine ecosystems. However, there is insufficient data on the impacts of these regulations on stabilizing food security in this region. Through interviews with NGO workers, government officials, and fishers, perceptions of current conservation and fisheries management techniques in the Port

Honduras Marine Reserve (PHMR) were collected to investigate the degree of their success. Furthermore, health surveys were collected in towns adjacent to PHMR to measure food consumption patterns and fish dependency for micronutrients. It was found that while all households had acceptable diets and nutrient intake, many families are being affected by the rising prices of fish costs. If prices continue to rise, food consumption behavior is more likely to change, especially those in poverty, and contribute to a decrease in micronutrient intake. Understanding the connection between food security and fisheries management practices is the next step in adopting management protocols that will benefit marine conservation and human well-being, as well as highlight areas where the two are incongruous. This study will help explain similar issues in other coastal communities, perhaps limited to those that use the Mesoamerican Reef for harvesting. This research provides an immediate opportunity to have large-scale policy influence on marine conservation in a critically important marine biodiversity hotspot.

Mental health consequences of Development-Induced Displacement faced by tribal people

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Context: The displacement of indigenous communities to make way for development projects is a routine occurrence in low-and-middle income countries, like India. The tribal populations are the ones that have to bear the brunt of these developmental activities most frequently due to their close proximity to the natural resource-rich areas. Although much has been written about their economic and social experience of displacement, the psychological effects remain largely unexplored and poorly understood. Consequently, even as the state has made efforts to provide economic relief to these displaced communities, psychological mitigation and rehabilitation efforts continue to be missing.

Evidence indicates that the experience of these populations in the aftermath of displacement can have severe long-term psychological effects. In this overview, the author has divided the effects into two categories: (a) reduced mental health and well-being, and (b) increased incidence of mental illnesses. With respect to the former, the conditions are tricky to capture because of the poor understanding of the tribal psychological context. For the latter, diagnosis and treatment using conventional methods is difficult because of how different these populations are from the mainstream. For instance, there is evidence of members experiencing a profound and prolonged grief and 'nostalgia' after having been separated from their land, and of people displaying atypical somatic symptoms of depression: neither of which are reflected in typical diagnostic criteria.

In this overview, the author discusses the incidence of both categories of mental health consequences experienced by tribal communities in India that have been displaced due to developmental projects.

Methodology: The study is based on extensive literature review of available research articles, governmental and non-governmental reports that are available in the public domain. The key words that have been used for this purpose include ‘displacement and tribe’, ‘mental health and displacement’, ‘mental illness and displacement’, ‘psychological well-being and displacement’, ‘tribe and well-being’.

Results: Based on available reviews, the study proposes a two-part approach to address the mental health consequences experienced by tribal populations. The first includes identifying, studying and documenting the two categories of conditions as uniquely experienced by the population in question. The second part includes creating a policy input document that outlines in detail the requirements (including technical knowledge, infrastructure and human resources) for offering mental healthcare for displaced tribal people.

Conclusion. The most effective approach to reduce the psychological harm caused to tribal populations is to enhance the state’s development-induced displacement policy by providing an effective empirical understanding of the mental health consequences.

Barriers to accessing maternal health services in Uganda: an investigation into the experiences of women living in the slums of Kampala

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Understanding the barriers women face in accessing maternal health services (MHS) in Sub-Saharan Africa (SSA) is imperative to achieving Target 3.1 of the 2030 Sustainable Development Goals (SDGs). The target implores the reduction of maternal mortality ratio to less than 70 per 100,000 live births by 2030 (UN, 2015). Today, the maternal mortality ratio in SSA remains high at 546 per 100,000 live births (UNICEF, 2017), the highest of all regions globally. Extensive research has been carried out focused on barriers to MHS access in rural areas across SSA (Rutarema et al., 2015). However, the marginal value of this research focus is changing. As of 2012, 32.8% of the population in SSA lives in urban areas (ABDG, 2012). This figure is expected to rise to 50% by 2030, and 60% by 2050. Furthermore, rapid urbanisation has resulted in the proliferation of slums rather than formal settlement construction in SSA (2012). Although some 33% of the population live in urban areas, the proportion of slum dwellers is 65% (2012). Furthermore, this proliferation is set to rise with increasing urbanisation.

There is a dearth in research available on the maternal health status of women in slums across SSA, and no research carried out in the slums of the city of Kampala. This specific research aims to address this dearth and provide value by examining the barriers facing women in accessing MHS in the slums of Kampala, Uganda. This investigation utilises both quantitative and qualitative research methods, in the form of questionnaires and focus groups, thus providing both an in-depth and broad understanding of these barriers. The research participants include women of reproductive age living in the slums,

international NGOs operating in the slums and local health workers. These methods will provide a deeper understanding of the different perception of such barriers between those working in the health sphere and the lived experiences of the women in the slums.

This perspective research will identify trends of the barriers women face in accessing MHS in the slums of Kampala and it is hoped that it will pave the way for future research in slums across SSA. Furthermore, this research is essential in aiding local policymakers in ensuring enhanced availability of MHS for growing urban populations. Additionally at an international level this research will provide evidence of the importance of a holistic approach to the provision of MHS focusing in both rural and urban areas.

Access to MHS is vital for women's well-being, the reduction of maternal and infant mortality. The presence of explicit targets for the reduction of maternal mortality in both the Millennium Development Goals and SDGs highlights its significance. Thus, in identifying the barriers facing women in accessing MHS in the slums of Kampala, this research serves to identify the social determinants of maternal health for the marginalised members of the Ugandan population allowing for improvements in MHS access in the future. Growing urbanisation will continue to put pressure on MHS in urban areas. Without evidence-based research identifying these issues for local, national and international organisations, Target 3.1 and thus sustainable development cannot and will not be achieved. In fact the progress made since the turn of the Millennium may even be reversed.

HEALTH & SUSTAINABLE DEVELOPMENT: Perceptual Pathways to Sustainability, Salutogenesis and Beyond

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This paper outlines a conceptual framework, through which sustainable development practices could be generated, by synthesizing several concepts of health and drawing perceptual pathways linking personal and planetary health. It also highlights the importance of perceiving health through the salutogenic model, introduced by Aaron Antonovsky in 1979 to achieve this.

Bodily systems function in a cohesive manner for us to be healthy and sufficiently resilient to sustain health. Our planet too is made up of various systems. Some are natural while others are manmade, implemented through development activities. If the latter disrupt the former beyond repair, it may not only threaten the way we live, but the very existence of our species. Therefore it is important that developmental practices ensure the sustenance of a liveable planet. Perceiving the effects of development on the planet in the same way we perceive our health, may allow us to draw many parallels between personal health and planetary health. However we must first change the way we perceive health.

Pathogenesis is the origin and development of diseases. It studies how we become ill. When we treat an illness, we try to correct this process of becoming ill, hoping that health will ensue. Our preventive efforts try to avoid or delay these pathogenic processes. salutogenesis, refers to origin and development of health. It is the study of how we become healthy, independent of the process by which we become ill. It is not the reversal of pathogenesis but a process of its own. There are health promotional models based on salutogenesis that take into account our 'sense of coherence' in determining health. The ultimate aim of salutogenic model is to initiate individuals on a self-actualizing pathway that result in an optimal state of physical mental and social wellbeing while being in harmony with the environment. Adapting such an approach to personal health may result a change in our perception and behaviour, not only towards our own health but the health of our planet too, in a manner that we adapt sustainable ways of living and development.

Furthermore personal genomics is increasingly gaining better understanding of our own biology. Simultaneously we are starting to focus on more personalized approaches to health evidenced by the emerging field of personalized, preventive, predictive and participatory medicine (P4 Medicine). Advancement of technology will make the use of personal genomics more wide spread enabling their interpretation through evolutionary genetics. Soon we will be able to develop salutogenic approaches to personal health based on personal genomics interpreted against the backdrop of evolutionary forces and therefore to find new determinants of health. This understanding could be used to treat and prevent diseases while promoting health; an approach that goes beyond salutogenesis. I call this Salutogenetics: both a new word and a concept. It is the synthesis of the emerging fields of personal and evolutionary genetics with salutogenesis. The ultimate outcome of this synthesis I believe will be a sustainable planet inhabited by a healthy population.

Are Malawi, Rwanda, Uganda and Zambia prepared to meet the Sustainable Development Goals' Health Targets? A Policy Analysis

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According to the World Health Organisation (WHO), national health policies “define a country's vision, priorities, budgetary decisions and course of action (Who.int, 2016).” Policies act as a legitimate, recorded consensus of a nation’s policy makers on how to move forward in a particular area. It can serve as a point of reference when there are many changes outside of the health sector such as economic crises, coups d’état, natural disasters and armed conflicts. For low-income countries, it helps donors and other stakeholders understand not only the state’s priorities, but previous accomplishments, and unfulfilled needs of various constituencies. Published and accessible policies can also be used as a road map for nations with similar dynamics and demographics looking for guidance on how to proceed in executing health programs.

Objective: The primary aim is to evaluate and compare how prepared Malawi, Rwanda, Uganda and Zambia are policy wise to achieve the thirteen health targets under Goal 3 of the United Nations Sustainable Development Goals (SDGs). This project evaluates how congruent national policies and strategies are with addressing the SDG health targets.

Methods: This body of work requires secondary research and literary review of national policy documents and United Nations policy language. Knowledge management databases on ministerial websites are heavily utilized. Additionally, some informational requests are made to ministerial staff.

Results: Analysis of Specific Targets

The countries score similarly on sexual reproductive health integration, universal health coverage, and human resources policy language.

Policy Preparedness Rankings

Rwanda ranks best on the matrices. All countries are strongest in knowledge management, with the notable exception of Malawi. The countries collectively struggled most with cross-sectoral and/or intersectional policy language.

Conclusion: Rwanda is the most prepared policy wise to achieve the SDG health targets. All policy recommendations will require capacity, resources and above all, political will.

Beliefs, Barriers and Breakthroughs - Accessing Sexual and Reproductive Health Care Services, Information and Education: A Review of Tanzania's National and Institutional Policies

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Tanzania suffers high adverse reproductive and sexual health (RSH) indicators including high levels of maternal mortality, adolescent births, mother to child transmission of HIV, persistence of child and teenage marriages, girls forced to drop out of school due to pregnancy, and low contraceptive prevalence. RSH programmes have limited orientation to key populations and there is little evidence of integration of RSH and HIV/AIDS interventions (HEARD, 2015).

Adolescents constitute a significant proportion of the population, at about 34.7% (15-34 years) (TDHS, 2015-2016). A high percentage of adolescents are sexually active; Two in five girls are married by the age of 18 and more than 50% of 18 year old girls are pregnant or already mothers. Contributory factors to early sexual debut and high numbers of unplanned pregnancies may include a contraception prevalence of just 12% for sexually active adolescents and young women (15-24 years old) as well as limited provision of comprehensive sex education in schools, resulting in a lack of awareness and

education around HIV, AIDS, and RSH fuelling myths and the spread of misinformation (HEARD, 2015).

The Research Problem

Reproductive and sexual health services, information and education have never been truly viewed as a main priority for investment by National governments, despite the positive impacts investment in these areas has on an adolescent population, such as the prevention of unwanted pregnancies and sexually transmitted diseases. This lack of venture can be seen worldwide yet it is more prominent in the global south, in countries such as Tanzania, a country that has the 11th highest adolescent (15-19) birth rate in the world at 119.38 per 1,000 live births (MoH et al, 2016). These pregnancies have major influences on the father and mother, in particular the mother, as her ability to progress economically and/or educationally is jeopardised and in most cases halted, preventing these young women from reaching their full potential and posing psychological stress.

Understanding the reasons behind lack of investment in RSH services and education is a key component in moving forward towards customised universal reproductive and sexual health education and healthcare. This researcher recognises the importance of observing and questioning human behaviour derived from culture, traditions and beliefs alongside current strategies and policies implemented in order to achieve breakthroughs in preventing unwanted, unplanned pregnancies, sexually transmitted diseases and HIV/AIDS.

The Research Purpose

The aim of this research is to analyse data collected previously by this researcher in Dar es Salaam University College of Education (a government run institution, and one of the leading colleges in teacher training in Tanzania) and consider how this data collected and analysed corresponds to national and institutional strategies, policies and reproductive rights in place in Tanzania. The United Nations Sustainable Development Goals, goal 3; 'Ensure healthy lives and promote well-being for all at all ages', with particular focus on target 3.7; 'by 2030 ensure universal access to sexual and reproductive health care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programs', will drive this research, as it is imperil when focusing on policies and strategies in place in Tanzania.

The Research Objectives

This researcher aims to gain deeper insight into and understanding of the behaviours and beliefs that enclose and have a major impact on reproductive and sexual health education, rights and services in Tanzania -drawing from previous research conducted at Dar es Salaam University College of Education; 'How the students and staff of DUCE, perceive and engage with Reproductive and Sexual Health and Reproductive and Sexual Health Education, information, services and supports available at DUCE - The rise of unplanned pregnancy and the myths surrounding contraception. Previous year's research at the

college alluded to increasing rates of pregnancy on campus; research was conducted to investigate these gaps.

It is hoped that by analysing the data collected and linking it with the progress Tanzania is making in achieving this target, it will become apparent that more progress must be made in areas such as education and its significance in providing people with control and confidence over their bodies, as well as giving individuals the ability to reach their full potential in life by preventing sexually transmitted diseases and unwanted/unplanned pregnancy.

The Effects of Maternal Health Literacy on Child Health Outcomes in Oyo State, Nigeria

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Both education and health are core to the achievement of the Millennium Development Goals and the Sustainable Development Goals. Health status can be intergenerational as parents often transfer their knowledge of health practices to their children. Health knowledge and literacy is essential for quality health outcomes which is why health literacy is important for the achievement of SDG 3 and SDG4. Children are vulnerable and depend on the health knowledge and literacy of their parents for quality health outcomes. It has been argued that intergenerational transfer of health status starts as early as childhood or even in the womb. Child health is a fundamental human right and an essential foundation for human development. This study therefore aims at focusing on a particular aspect of the intergenerational transfer that affects mother's health education and subsequently the health their young children. The paper examines the effects of maternal health literacy on child health outcomes in Nigeria. In spite of the existence of different components of health literacy, few attempts have been made to examine the effects of these components of health literacy issues empirically in a comprehensive manner. In fact, the specific role of health literacy as one of the main elements of social determinants of health in Nigeria has only been given limited consideration. The obvious link between parental health literacy and good health status of the child is the mother's ability to obtain and process health information.

This paper is restricted to four components of maternal health literacy namely, ability to seek and obtain health information, ability to process health information, ability to understand and interpret health information, and ability to appropriately use health information. Child health services will be restricted to those available in the primary and secondary healthcare institutions in randomly selected sites in South west Nigeria. In doing this the paper will construct a health literacy scale for mothers in Nigeria taking into consideration the core areas of health literacy. The computation of Health literacy Scale for Mothers is based on the score of the health literacy scale based on the score of each participants will be divided into three: into Inadequate, Marginal and Adequate. A model examining the effect of health literacy on child health outcome would then be estimated.

The results is expected to indicate the nature and magnitude of maternal health literacy in Nigeria as well as effects of health literacy on child health outcomes in Nigeria. This will be complement with expected relationships between education of the mothers, age and birth order of children and their significant effects on child health outcomes. The results will definitely add to knowledge on options that can be followed towards achieving some of the SDGs.

Yellow fever: Reflections on environmental justice and sustainability in the reurbanization of the disease.

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Introduction: This article will analyze the latest outbreak of the yellow fever currently occurring in Brazil, as well as its causes and the consequences on the reurbanization of the disease in the country. Outbreaks of the wild type of Yellow Fever are not uncommon in Brazil, often due to vaccination coverage. The outbreak that hit urban centers in 2017 and caused panic in the population of the major cities such as Rio, Belo Horizonte and São Paulo, has arrived to the southeast by routes BR-116 and BR-101. Certainly, the epidemic was perceived more intensely in Minas Gerais. Curiously, it happened after an environmental disaster that impacted the Rio Doce with toxic and lethal materials due to the rupture of the Fundão Dam Of Samarco Mineração S.A., a joint venture of the world's largest mining companies, Brazil's Vale S.A. and Anglo-Australian BHP Billiton. This work intends to evaluate the magnitude of the spillover effect in the dispersion of the wild vectors *Haemagogus* and *Sabethes*, for urban areas, Concomitant with the migration of non-human primates in the search for a new habitat. All these factors coincided with the high rates of *Aedes aegypti* and *Aedes albopictus* in urban areas, vectors of urban yellow fever.

Objectives: to describe and analyze the change in the epidemiological profile of Yellow Fever in Brazil in the face of the rupture amplitude of the Fundão Dam. It is believed that the environmental disaster may have caused the spillover in the dispersion of the wild vectors and the redevelopment of Yellow Fever. It is necessary to analyze the epidemiological characteristics of yellow fever, highlighting its incidence, pathogenicity, diagnosis, treatment and lethality. **Methods:** an epidemiological and ecological study was carried out with the collection of information published in print and digital media and scientific articles between 2005 and 2017, with references to the environmental impact of the rupture of the Fundão dam in Mariana, MG- Brazil and information from the databases of the Ministry of Health on the Yellow Fever Epidemic with expansion of the area of wild transmission to urban areas.

Results: 496 cases of yellow fever were confirmed in the country in this period, with 162 deaths and an average case fatality rate of 45.7%; The group of young adult males was the most affected; In the epizootics, a total of 4,240 non-human primates reported with suspected yellow fever were identified, 35% of them laboratory confirmed; In the period from 2005 to 2017 there was an expansion of the area of wild transmission of the disease to urban areas; Spreading to other regions beyond the Southeast, the Center-West Region, the South Region and part of the Northeast Region (Southern Bahia). **Conclusion:** The Environmental disaster in the City of Mariana-MG, designed a path of destruction with spillover of the vectors of

Yellow Fever, characterizing a reintroduction of the virus in an urban environment, With repercussions in several Brazilian states, evidencing a situation of environmental injustice in the form of conduct of the Company in the face of environmental damage and Public Health caused.

Understanding the Reproductive Health Education Needs of Adolescent Girls in Uganda

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Adolescent pregnancy and motherhood have remained major health and social concerns in Uganda. The purpose of this field practicum is to identify priority unmet needs, barriers, and constraints with regard to reproductive health education for adolescent girls and young women in Uganda, and to determine the best ways to meet those needs. A needs assessment and situational analysis were conducted with Shanti Uganda, which is a non-governmental organization located in Kasana Town in the Luweero District of Uganda. They are working towards reducing adolescent pregnancy by providing a reproductive health education program.

Participatory and qualitative methods were used to collect data including semi-structured interviews with 31 main stakeholders and 9 girls, surveys with 55 young women aged 14 to 26, and direct observations. Data about accessible health facilities and services for girls were collected from secondary official data sources. The evaluation of the Teen Girls Workshop provided by Shanti Uganda was also used to provide supporting evidence of the results of the needs assessment.

The findings of the interviews and the surveys revealed that even though the main source of information for adolescents is school, the lack of sex education and limited educational resources are still crucial obstacles getting proper reproductive health information. There are also cultural, social and traditional restraints preventing young women from getting this information either in home or even in school. These barriers constrain women from making a right decision for their health. The majority of interviewees and survey respondents agreed that school is the best place to educate adolescents. Also, many girls replied they are in favor in getting reproductive health services and education from health workers.

It is concluded that Shanti's proposed services focusing on a school cooperative program and Youth-Friendly spaces for girls can improve accessibility of education and ensure that the girls attend more. If Shanti develops a cooperative program with schools, they can reach more adolescent girls and their teen girls program can be implemented over a long-time period. Moreover, the education and services can be provided by Shanti's health workers in Youth-Friendly spaces, which is a powerful way of passing knowledge to youth, allowing active participation of both service provider and youth participants

Addressing child health inequities in the post-2015 framework. A perspective on how new country indicators could help SDGs implementation in high-income countries

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Addressing obscene disparities in wealth and opportunities within countries emerges as a top priority in the aspiration to implement SDGs. Few challenges illustrate this better than the interventions in global health. The universality of Post-2015 agenda aims to fight health inequality within all national territories, including high-income countries. For the first time, rich nations have set their own agenda for the implementation of SDGs through local roadmaps and programs. To follow up/monitor and review the progresses made, rich nations will have to design their own Country Indicators (CI) focused and based on cultural, social and economic features and national context.

The innovative broaden of UN agenda meets rich nations in the delicate moment of facing the reduction of people wellbeing after the last economic crisis. The implementation of restrictive political measures to address the economic difficulties amplified the gap between poor and rich people and accentuated increasing inequalities. The crisis profoundly hit the most vulnerable groups, such as children. Data from previous crises shows that exposure to poverty for prolonged periods has a strong and irreversible impact on child health and its effect lasts even into adulthood and it associates with a higher risk of chronic diseases.

We aim to design new CI to monitor the local implementation of SDGs to ensure equal opportunities for all children in high-income countries. For this, we carried out an extensive and systematic review of the literature on the health of children residing in Catalonia, Northern Spain. We selected studies published between 2010 and 2016 that link changes in the life and health of children with the financial crisis.

Data reveal that, during the crisis, the percentage of children at risk of poverty increased enormously in Spain (>5%) and Catalonia (>9%). A comparison of indicator data reveals an overall deterioration in Catalan children's health (2006-2012). Among others, the percentage of children that could not have breakfast before going to school, consume healthy food or eat protein every other day increased, as well as the percentage of children suffering from obesity and having risk behaviors. The results of these indicators were strongly influenced by householders' socio-demographic characteristics. In particular, we found that low maternal education level, being part of a single-parent family, being an immigrant, unemployment or job instability at the household are determinants of health which have a negative impact on children health and further deteriorate indicators' outcomes.

Our study shows that Catalan children living in adverse socioeconomic conditions experience worse health outcomes compared to those raised in wealthier homes.

Therefore, we propose a list of new CI considering the current child health situation and inequalities. CI aim to measure health habits, perception and status along with social performance that is strictly related to health. We also propose categories for disaggregated CI data recollection and analysis. Comprehensive data recollection, disaggregation and statistical analysis will point the way forward to new policy and resources' allocation to tackle health problems and inequalities in high-income countries, as what we measure is where we put our efforts.

Assessing the Efficacy of Low-Cost Air Monitors in Measuring Particulate Matter Concentrations on New York City Streets

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Air pollution is starting to be recognized as one of the most pressing public health threats faced by populations around the world, with millions of premature deaths per year attributed to it. As interest grows in monitoring and improving air quality, governments, scientists, and citizens have found that price is a barrier, with equipment that costs up to hundreds of thousands of dollars per unit. In response, lower cost air monitors are rapidly being developed to make air pollution monitoring more widely accessible. To assess if low-cost air monitors are comparable as alternatives to traditional, high-cost monitors, I deployed expensive microPEM monitors alongside the cheaper and newer AirBeam monitors to six bike riders in New York City as part of a larger air pollution epidemiology study. An outside software company, Multitude, then used their software to process and correct for deficiencies in the low-cost AirBeam data, including for known confounding variables such as temperature and humidity. The Multitude-processed AirBeam data were compared against the microPEM data to determine if the processing made the data significantly closer to the microPEM standard. Results show that the processed AirBeam data are still significantly different from the microPEM data, with a root mean square error decrease of just 24% after the Multitude processing. This signifies that the low-cost monitor must continue to be tested before it can be used as a viable alternative to traditional equipment. This report systematically assesses the errors from the AirBeam, microPEM, Multitude processing, and study setup, and makes recommendations to help influence the future development and use of low-cost air monitors such as the AirBeam and correction software such as Multitude.

Health Economics

Assessment of Scrap Vehicles Tyres in The Northern Cyprus

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Recently, the problem of used vehicle tires has become a focus in the Northern Cyprus. In this paper, the scope is to study the potential benefits of recycling scrap Vehicles tires

in Northern Cyprus. Cyprus is not an industrial country and has no serious pollution problems. The coastal area is under continuous pressure from tourism, recreation, urban and infrastructure development, and to a lesser extent, agricultural and industrial development. The assessment approach performed for tires used by northern Cyprus, They have developed a cost effective, environmentally friendly method for transforming used tyres into commercial-grade steel, oil or bio-oil, off-gases as green energy and Carbon Green. The latter of the scrap tyres are environmentally friendly replacement for carbon black required for new rubber tyre manufacture. The activity recycles 100% of these tyres into useable product to meet the EU's stringent criteria in this aspect. Unlike other processes of tyre disposal or recycling, they produce no carbon char which is deemed a hazardous waste. In conclusion, the energy generated at the factory can also be reused. A true recycling activity and providing a sustainable and environmentally friendly process contributing to global targets to reduce total carbon emissions.

Heat waves & Health - An econometric approach

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Human health and well being are inextricably tangled with the provision of air, water and food and the protection provided by the Earth's biosphere. Climate change thus poses an unfamiliar challenge to population and planetary health leading "to significant increases in illness and death" (Durban Declaration, 2011). Any threat in the environment, through climate change or weather variation, can strain human physiological and psychological functions. Extreme weather events, such as heat waves and cold spells, will ubiquitously impact global human health albeit disproportionately affecting poor and disadvantaged populations (Haines et al., 2006; 2014) - the main uncertainty is to what degree it will exacerbate current burdens of disease. Of all weather factors studied under the health umbrella, air temperature has the most defined relationship with human health. Heat waves have been associated with substantial mortality and and increases in morbidity.

With the general consensus being that there will be increasing severity and frequency of such extreme weather events, heat waves will further challenge healthcare systems and delivery across the globe. Increased morbidity and mortality from climate change will comprise an important part of economic loss and likely increase pressures on hospital and health services. Such health impacts will stress wider health and social systems. Therefore, health systems will need to be equipped with the ability to anticipate and respond to these changes in disease and utilisation patterns. This further emphasises its importance as a public health concern.

Our goal is to assess the impact of extremely high temperature on health outcomes. Although current studies have provided a general overview of this relationship, a lot is yet to be learnt. Our data allows the first large-scale empirical assessment of the health impacts associated with events of extremely high temperatures (heat waves) as further consideration needs to consider methodologies that accurately assesses heat wave effects.

The clearest way to isolate causal effects of the heat wave, accounting for confounding factors, would be to examine outcome differences between randomly assigned heat wave-affected areas and heat wave-unaffected areas over time. While this is not possible ex post, our methods mimic this general structure and imposes little parametric restriction. Imposing linearity, which implies the relationship between temperature and health outcomes is exactly the same at every degree Celsius and in every time period, is an inaccurate assumption that is strongly disputed by current literature. Therefore, we aim to exploit a natural experiment by employing a differences-in-differences research design to help isolate causal impacts.

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Indicators, Feedback Loops, and Impact Evaluation for the SDGs

Developing effective M&E systems for adaptation to climate change in India across sectors: challenges and recommendations

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The topic of adaptation monitoring has increasingly gained importance within the face of new and rapidly expanding adaptation portfolios in India. Since 2008 India has prepared a National Action Plan on Climate Change and this has led to sub-national climate change planning culminating into State Action Plans on Climate Change (SAPCC) for 35 Indian states. The concrete financial support to operationalise these plans is still under discussion at the national level. At the national level, the funds are expected to come from the ongoing centrally sponsored schemes and programmes and at state level through state schemes. In addition to that a national adaptation fund has been set up to support implementation of concrete adaptation projects under SAPCC. India is also active towards tapping the International climate change adaptation finance like Adaptation fund board, GEF and green climate fund of UNFCCC. These proposals are already in synergy with the vulnerabilities and subsequent strategies mentioned in the State Action Plan on Climate Change.

So far, no standard climate impact or adaptation monitoring framework exists at national or at state level in India to track SAPCC implementation or monitor the effectiveness of adaptation measures being implemented at local level. What is currently available is the

monitoring mechanism of the currently implemented centrally and state sponsored schemes and M&E frameworks for projects endorsed under National and International climate funds. Hence the need to get evidence on the contribution that adaptation measures make to reducing vulnerability to the impacts of climate change becomes important. There is also the need to learn which measures work and which do not and how do the myriad of adaptation activities currently ongoing contribute to the national targets for adaptation. For the purpose of this paper 3 case studies have been studied in linkage with the SAPCCs; one NAFCC (National Adaptation fund for Climate Change) project, one AFB (Adaptation Fund Board) project and one GIZ demonstration project on adaptation to analyse the synergies, current challenges between frameworks for M&E of adaptation at national, sub-national and local level. The analysis also develops recommendations to plan an adaptation project and set up an M&E system using the GIZ five-step approach for adaptation M&E. The approach helps in identifying adaptation additionality and the formulation of adaptation-specific indicators that can be used for M&E of adaptation in India.

Impact of Corruption on Government Machinery and Sustainable Development

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Public corruption has emerged significantly due to the influences of socio-economic and political factors as challenges before public institutions not only in the developing but the developed nations around the World. The elected and appointed officials are entrusted and expected to protect the interest of the people with integrity. However, corruption remains widespread in the countries and there are instances of political and bureaucratic corruption and misuse of public funds. Unfortunately, judiciary could not even get itself isolated from the black engulfing clouds of corruption. The sectors which are most affected by corruption, include public procurement, tax & customs administration, infrastructure, public utilities, and the police. The alarming situation is clearly noticed when we see Corruption Perception Index of the Transparency International Report. United Nations in its Sustainable Development Goal, has stressed the need to substantially reduce corruption and bribery; promote the rule of law; develop effective, accountable and transparent institutions; ensure responsive, inclusive, participatory and representative decision-making at all levels; strengthen relevant national institutions and ensure equal access to justice for all.

In India, the fight against corruption has been declared a high priority by the Government. To eradicate corruption from the Country, multiple anti-corruption institutions were created within the existing legal and institutional framework. However, it is necessary to study how far the Anti-Corruption Machineries are performing their functions efficiently and effectively for curbing corruption to ensure sustainable development? What kinds of obstacles are being faced by the different groups of

stakeholders towards the Anti-Corruption Institutions? How can feedback loops be eradicated and achieved as per sustainable development goals for combating corruption?

The present study examines the linkage between corruption machineries as per the perception of public from Himachal Pradesh in relation to sustainable development. The research paper confines to the three districts, out of 12 districts of Himachal Pradesh on the basis of highest number of corruption and trap cases and is based on primary data collected from stakeholders.

A New Approach for Tracking Philanthropic Activity to the SDGs

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As the social good sector looks ahead on the journey towards achieving the SDGs, advancing the use of impact measurement, indicators and feedback loops will become an imperative key to success. The adoption of the SDGs in 2015 not only provided a framework to achieve change globally, it also prompted a challenge for social good organizations to align their programs and measure their contributions towards furthering specific SDGs.

At Blackbaud, it is our mission to provide software, services, and data intelligence that empowers and connects people to advance the social good movement, including global initiatives like the SDGs. Over the past three years, we have been researching how to equip and enable the social good sector, in particular foundations and corporations, to track and measure the outcomes and impact of their grantmaking and employee engagement initiatives.

Our preliminary research found a major shift toward results-focused philanthropy but a lack of tools allowing foundations and corporations to track, measure and report back on outcomes. In addition, there was a heightened desire for more collaboration and agreement on what should be measured, leading us to develop a sector-sourced taxonomy for a new outcomes measurement solution.

With the new imperative to demonstrate contribution towards the SDGs, Blackbaud collaborated with three other organizations, including Global Impact, to map the SDGs and associated indicators to ICNPO/NTEE codes, so that companies, foundations, nonprofits and other social good organizations could not only measure their work against internally set objectives, but also to the larger framework of the SDGs. Mapping the SDGs and associated indicators to a universal code allows organizational alignment and contributions to be more strategically managed and reported on. This is an essential aspect given that with 17 goals and an additional 169 targets, the new SDGs are significantly more granular than their predecessors, the Millennium Development Goals, creating many new complexities to measurement.

The SDG mapping project resulted in multiple solutions. Global Impact embedded it into its consulting work by helping clients map employee giving and volunteering to the SDGs, and used this mapping data to help organizations enhance their alignment with the SDG framework. Blackbaud is embedding the mapping into its Blackbaud Outcomes™ technology solution to enable grantmaking organizations to start tracking the impact of their programs toward the SDGs, with a feedback loop allowing funders and grantees to collaborate during the course of a grant (product update to be released on May 13, 2017). Ultimately, connecting all the players addressing similar issues, from service providers to funders, will better allow for measureable progress in SDG-related grants.

The SDG mapping work being done by these partners is enabling organizations to deliver data-driven storytelling that furthers the SDGs. Data-driven storytelling can help elevate and more broadly share lessons learned from philanthropy and corporate engagement initiatives. This mapping project provides a framework that allows stories to inform future funding decisions and drive future progress toward achievement of the SDGs.

Empirical analysis of corporate sustainability impact on the financial performance of the company

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Lately, more and more companies around the world are starting to apply the practices of socially responsible investment, aimed at achieving corporate sustainability. These companies are starting to care about the environment, local communities and strive to maintain ethical business practices. Some of them carry out this transition voluntarily, others are forced to adapt to legislative changes in their home countries. Nevertheless, the empirical research does not display definitive results in support of the idea that corporate sustainability practices have positive impact on the financial results of the companies that employ them. Most studies consider either individual countries or a small sample of companies, or a short time interval, and that may be one of the reasons for variability in results. In this study, we have attempted to eliminate these shortcomings and to undertake a comprehensive analysis of the impact corporate sustainability practices have on financial results, based on a broad sample of companies and over long time interval.

As a key measure of a company sustainability, we have taken the fact of its presence in the Dow Jones Sustainability Index (according to RobecoSAM). The financial results of the company were assessed according to internal (financial and accounting) and external (market) company performance reports, including data of enhanced (social and environmental) reports from the Bloomberg database. Additionally, we have used the ACSI consumer satisfaction index to evaluate the impact of corporate sustainability of a number of US-based companies at the company's consumer perception. The sample of the study amounted to 300 companies from 10 countries (Brazil, China, Germany, India, Mexico, Russia, South Africa, Spain, Thailand, United States) for 10 sectors of the economy (Banks, Consumer durables (Homebuilding) Diversified Financials (Services

and Capital Markets), Energy (Oil and Gas Upstream, & Storage and Transportation), Food Staples, Retailing & Materials (Mining, Metals, Steel, Chemicals), IT services, Telecommunication, Transportation (Airlines) and Electric utilities) for the period from 2010 to 2016. For panel data we have used the regression analysis.

As a result, we have discovered that companies applying corporate sustainability practice are characterized by high levels of market capitalization, a larger amount of free cash flow, strong dividend policy (income shares), the optimal values of financial leverage, but on a number of sectors they were also characterized by lower values of profitability (ROE, ROA, ROIC), higher values of WACC and suboptimal liquidity. It is also worth noting that materials, energy and high-tech IT companies have shown to be more sensitive to the fact of making it into DJSI: most of the differences caused by the corporate sustainability financial indicators were displayed in these sectors.

Based on the panel data, we have established positive relationship of internal company performance results (represented by ROA, ROE and revenue growth) and external results presented by size of market capitalization, Tobin's Q and a Price to book ratio. With exception of the financial sector, where corporate sustainability growth has reduced the internal performance values. Most likely, this suggests that environmental and social costs in this industry don't instantly raise internal results, but directly increase investment costs, which reduces the efficiency of the asset usage. For investors, these investments are a good sign, pointing to the long-term sustainability of the company, which corresponds to the signal theory, therefore, corporate sustainability has a positive effect on market evaluation.

Analysis of the consumer satisfaction index correlation with the DJSI has revealed the lack of statistically significant link, although a number of intermediate indicators of sustainability, such as GRI compliance and Amount of Environmental Fines showed a strong correlation.

How far are the Brazilian Cities from achieving the Sustainable Development Goals? An analysis based on SDG Index

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The 17 Sustainable Development Goals (SDGs) seek to address economic, social and environmental issues in a sustainable manner underpinned by good governance. For the 15-year period the SDGs are covering, the world population is projected to increase by 1 billion people and two-thirds of those will be living in cities. Cities face major challenges in terms of sustainable development and inclusive growth, and Brazil is not an exception. Although the country has improved its indicators for sustainable cities, it still has challenges especially regarding to reduce inequalities and promote peace and justice across the largest cities. Those challenges might vary greatly from a place to another, and possibly no one municipality performs outstandingly in every goal. Each city has its own particular capacity to meet these goals and its own lessons to learn from the others.

Given the extraordinary potential of urban spaces for transformational change, we suggest an in-depth look at the performance of each 20 metropolitan area in Brazil in the proposed 17 goals, in order to enhance local policies and institutional coherence. This study compares how the 20 largest cities in Brazil are performing relative to SDG targets, based on the SDG Index methodology and on the created dashboard profile. Its final goal is to serve as a management tool to support the implementation of the SDGs in and by Brazilian municipalities located in metropolitan areas. The premise is if policy-makers have a detailed profile of the strengths and weaknesses of the individual municipalities regarding SDGs, they will be able to design and implement local sustainable-oriented policies for their cities.

For achieving the goal, we adapt the SDG Index methodology, using the available data for cities indicators in Brazil. In total, 72 indicators for metropolitan areas were chosen to measure the 17 SDGs. The data for each indicator was ordered from worst to best providing a score for each SDG - the final SDG Index is the arithmetic average of the SDG scores. The second step was to create a SDG dashboard for each Metropolitan Area where each goal was colored as “green,” “yellow,” or “red”, indicating whether the area has already achieved the goal (green), is in a “caution lane” (yellow), or is expressively far from achievement as of 2015 (red). The SDG Index and dashboard together create a profile for each metropolitan area which makes possible to compare them in a ranking and highlight the strongest and weakest SDGs for each one. The Metropolitan Area profile allows us to organize the regions in groups according to their strengths and weaknesses, discuss the results in common-challenges groups and compare to the country and region’s results.

Our research is currently on the data analysis phase and we will have the 20 metropolitan areas ranked until August. At the event, we will present our key findings as well as highlighting solutions on how Brazilian municipalities’ strengths can help each other and other developing countries on achieving SDGs in largest cities.

Sustainable Development Goal 10 - Reduced inequalities. Where does Portugal stand?

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Sustainable development goals (SDGs) are an important tool to bring countries' efforts together, in order to achieve a sustainable future for the world. The 17 goals, which include 169 targets were adopted during the United Nations Summit on September 2015, in New York, where world leaders committed to their full implementation between 2016 and 2030.

While the Millennium Development Goals were mainly focused in developing countries' needs, such as extreme poverty and universal primary education, SDGs broaden the spectrum and include also the high-income countries. Therefore, this ambitious agenda requires them to think about the policies already implemented and to perform a continuous monitoring.

It has been pointed out that one of the principal challenges for the Organization for Economic Co-operation and Development (OCDE) countries is goal 10 – reduced inequalities. Although existing inequalities reflect a country's development, high-income countries are also facing a rising gap between the poorest and the richest people. Furthermore, this goal is closely related to the fulfillment of the other goals.

This work aims to describe the present situation of Portugal regarding SDG goal 10. We started by analyzing Portugal's performance on the three indicators featured on the SDG Index & Dashboards - A Global Report: Palma Ratio, Gini's Coefficient and Program for International Student Assessment (PISA) Social Justice Index. Afterwards, we conducted a more detailed research in order to evaluate Portugal's status on goal 10 targets. Data was collected to assess existing inequalities based on economic status, gender, race, disability and age. Additionally, we reviewed Portugal migration's politics and transaction costs of migrant remittances. Since health inequalities are one of the main consequences of social and economic inequalities, they were also analyzed.

Evaluation of the three main indicators ranks Portugal at developed countries level, but at the bottom of OECD nations. A more detailed analysis shows that Portugal excels on migration policy, standing second in the Migration Integration Policy Index (MIPEX). Nonetheless, transactional costs of financial remittances to developing countries are still above recommendations held on SDG 10.

On the other hand, gender inequality (particularly regarding leadership positions), age discrimination and prejudice against minorities are still preminent issues in Portugal. And even though the law stipulates gender equality and there is a National Committee for

Equality and Against Racial Discrimination, they have shown to be clearly insufficient to mitigate the existing inequalities.

Data reveals inequalities on healthcare access, particularly regarding low socioeconomic status population and migrants. Low educational level and female gender are related with obesity and low self-perception of health status. Portuguese National Health Plan addresses equity challenges in healthcare access and highlights the importance of social determinants of health, but there is a need to implement focused strategies.

Portugal is committed to SDGs and an effort to improve is currently being made, particularly on inequalities related issues addressed on goal 10. Nevertheless, gender equality, age discrimination, prejudice against minorities and healthcare access are priority areas, requiring specific interventions to achieve all goal 10 targets.

Testing the Causality between Consumers' Environmental Awareness and Fuel Efficiency of Private Automobiles: Case study on Japan and South Korea

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This research aims to illuminate the causal relationship between consumer environmental awareness level in and fuel efficiency of private automobiles in Japan and Korea. This research will specifically examine Japan and South Korea by in both countries and testing the causality relationship of consumers' environmental awareness level with the private automobile fuel efficiencies. Eventually, the contribution of this research will be providing one of the evidence through econometric tests as well as through comparative discussions, thus establishing a basis of in solving one of the environmental issues.

1. Introduction

This research seeks to improve the previous researches' foundations. While previous quantitative literature on the relationship between environmental awareness and fuel efficiency of passenger cars has illuminated positive relationship between the two, there is relatively less research on the causality. Taking note of this dearth of causal literature, this research will contribute to the discourse by demonstrating that increasing consumers' environmental awareness will accelerate, in other words cause the increase of, fuel efficiency in respective countries. The causal relationship depicted in this paper will shed more light on consumer needs that is critically lacking in corporate funded research. Such illumination is fruitful because an enhanced understanding of consumer needs is essential to better explain economic interaction between producers and consumers.

2. Methodology

To determine the causality between changes in the level of consumers' environmental awareness and the fuel efficiency of purchased private automobile in the market, time

series analysis, Granger-causality (VAR), OLS and correlation analysis will be used. This research is based on time-series data of fuel efficiency of Toyota and Hyundai passenger vehicles under 2000cc engine displacement from 2002 to 2014 by month, gathered from US EPA. To estimate the level of environmental awareness, the Environmental Performance Index score published by Yale University was chosen. Variables representing respective countries such as GDP per capita, educational level and pollution levels were gathered from World Bank Data base. All variables were converted to log format in order to prevent distortion of interpretations due to the different units of coefficients. Degree of freedom of 4 was chosen because lag-order selection statistics test indicated that 4 was optimal.

3. Conclusion

When the null hypothesis “Environmental awareness increase does not cause increased fuel efficiency of passenger cars” is tested for both countries, it is rejected. Therefore, increased environmental awareness of South Korea and Japan will increase fuel efficiencies of respective countries. Furthermore, the results indicate that the explanatory power of environmental awareness to predict the behavior of Japanese customers is significantly higher than that of Korean customers, since Japanese Chi² value is 56.39 and P-value was 0.000 where South Korea recorded 17.26 and 0.002 respectively. This result indicates the importance of increasing environmental awareness because doing so can increase the fuel efficiencies and, as a result, reduce the amount of greenhouse gas emissions in both countries.

Indigenous Ways of Knowing and Approaches to Sustainable Development

Climate Change and the use of Traditional Weather Forecasting Techniques among Small-Farmers in Trelawny, Jamaica

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Small-scale farmers in small island developing states (SIDS) such as those of the Caribbean are among those at greatest risk of being affected by climatic change and variability. Small-scale farmers are renowned for their resourcefulness and use of traditional knowledge to eke out a living with scarce resources. Traditional knowledge, local or indigenous knowledge highly regarded among some while dismissed as illiterate musings of rural folk. Among farmers however there is growing respect for the use of traditional knowledge in making weather forecast in the face of changing conditions and climate change. The study sought to examine the traditional forecasting methods among small farmers in Sherwood Content, a small rural community in the Parish of Trelawny on the north coast of Jamaica where changing climatic conditions have been reported by farmers. The researcher also sought to assess how farmer’s perceptions of climate change

affect the use and confidence in traditional forecasting methods and whether they were being altered based on the observed changes in local conditions. The study uses a mixed methods approach to gather data from 160 household heads in the community. Qualitative and quantitative analysis methods are used to extract findings from the data set. Based on the findings it is clear that farmers in the area have observed changes in the local conditions over the last 20 years. The influence of traditional weather forecasting methods is seen in the perceptions farmers have of the changes. Many farmers continue to rely on changes in the atmosphere and the behaviour of plants and animals to assess weather related phenomena. Current and potential adaptation strategies are also impacted by traditional beliefs. The influence of indigenous knowledge systems and cultural beliefs is evident in the way climate change is perceived and understood. The co-marriage of these beliefs with scientific knowledge can produce a rich body of information that great value to grassroots individuals and academics as well as build the resilience of farmers and other stakeholders.

Quilombola community of Alto da Serra do Mar: analysis of the term of agreement of use of territorial area superimposed with the State Park of Cunhambebe, Rio de Janeiro, Brazil

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The quilombola community of Alto da Serra do Mar, located in Rio Claro, in the state of Rio de Janeiro, has part of its traditional territory (Cameru area) superimposed on the Cunhambebe State Park. With the objective of avoiding conflicts over the management of this area and the inappropriate use of natural resources, a Term of Use Agreement of the overlapping area has been elaborated, with the supervision of the Federal Public Ministry, which counts with the participation of the Through its association, the National Institute of Colonization and Agrarian Reform (INCRA), responsible for the land regularization of the quilombola territory, and the State Institute of Environment (INEA), responsible for the Park.

The quilombola community is composed of 20 families that occupy a territory of 327,19 hectares, of two discontinuous land areas: Area 1 of housing and production which makes up most of the quilombola territory with 211,98 hectares, and should follow the standard procedure of Presidential Decree for expropriation and, later, titling of the quilombola community as a collective area, as directed by Decree 4887/2003; the Cameru's Area, used only for production (banana plantation and pasture), with 115,21 hectares, superimposed on the Park, and for this reason it will undergo another process and will not be challenged, being necessary the management Shared between the traditional community and the state environmental agency.

The Park, in turn, was created for State Decree né 41.358/2008 and, subsequently, to the formal request of the community quilombola petition made in 2006. The Park has

approximately 38.053 hectares spread over three municipalities in the region and the Plano Is still under development.

The Quilombola Territories are categorized as Protected Areas in Brazilian legislation in the National Strategic Plan for Protected Areas - PNAP (Decree 5.758/2006). While the Cunhambebe State Park is defined as a conservation unit belonging to the integral protection group and governed by the National System of Conservation Units (SNUC - Law 9.885/2000). In both cases, it is the responsibility of the State and Brazilian society to contribute to the sustainable use of environmental resources, in the case of quilombola territories, and to the preservation of natural assets, in the case of the Park.

There are frequent cases of territorial overlap involving traditional communities and integral protection conservation units. For these situations, shared or participative management is seen as a solution, but there is a great difficulty for public policy makers and implementers to create mechanisms that help and guide this shared management, which have become a great challenge both in the academic and Within the competent government bodies.

The purpose of this project is to analyze the elaboration of this Term of Use Agreement, with a special focus on the solutions and restrictions presented for shared management and the conceptions and practices of rules of use of natural resources both for the quilombola community and For an environmental agency, believing that the research will contribute to subsidize new regulations of territorial and environmental management policies of the quilombolas territories in the country.

A Livelihood for the Maya: The Viability of Milpa in Rural Quintana Roo, Mexico

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Rural poverty has gained great attention for attaining poverty reduction goals, with growing emphasis on people's livelihoods. Policies and development programmes oriented to alleviate rural poverty ought to understand better the priorities of the people they seek to assist, the assets they have and the contextual incentives and barriers that shape their livelihood choices. When the rural context is that of an indigenous community, the cultural norms, values and identities play a role in the definition of the kind of development they want and the means to walk that path. Understanding this can lead to projects more attuned to the livelihood strategies of the indigenous poor, and therefore more accurate and effective in reaching them.

This study focuses on the traditional livelihood of the Maya: the Milpa, a natural resource management and production system based on rain-fed, slash-and-burn subsistence agriculture with a strong cultural significance. We centre our analysis in the rural communities of Felipe Carrillo Puerto (FCP), the Mayan Zone of Quintana Roo, in

Mexico. Our aim is analyse the viability of the Milpa as a sustainable rural livelihood (SRL) in this context. The newness of a research like this in the context where it was developed calls for an exploratory and inductive approach: instead of departing from a hypothesis of whether Milpa is or not a viable SRL, we gathered and analysed a vast amount of qualitative and quantitative data to generate evidence-based hypotheses as conclusions.

Fieldwork research was carried out for this study in two villages. A semi-structured survey applied to 23% of households in both communities provided information on household demographics and assets, detailed farming practices and livelihood strategies, as well on opinions on Milpa productivity, uptake and improvements. Due to the nature of the data collected, both quantitative and qualitative approaches were used to analyse it: Stata 13.1 was used for statistical analysis and thematic clusters were used for more qualitative data.

Anticipating conclusions, evidence allows us to put forwards the following hypotheses of Milpa viability as a SRL, all of which can be further explained: 1) Milpa is not a universal livelihood for the Maya villages of FCP; it is, though, still majoritarian. 2) To do Milpa makes a lot more sense when a person has ejido rights. 3) There is more to this livelihood choice than farming outcomes. 4) Milpa's sustainability into the future would require revisiting the place of the young in the rural economy. Modest as they are, these findings have important policy implications; without taking them in consideration, poverty-alleviation oriented programmes for the Maya communities of FCP are likely to face more challenges than need be.

Sustainable Tourism Assessment and Mitigation Strategies for the protection of their natural and cultural assets, of two Ashaninka Communities in Peru

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Aerija and Sapani are two indigenous communities located in the upper Ucayali river basin, in Peru. These two communal territories are the most immediate to Atalaya, one of the main cities in the Ucayali region, in the Amazon Rainforest. The emergent urban expansion of Atalaya and the most important touristic attraction, Quebrada Sapani (located in Sapani Community), are threatening the cultural and natural assets of the Ashaninka people and their forest's biodiversity, respectively. It's urgent to regulate the touristic activity in the midst of the accelerating urban development.

To do this, I will begin by (i) studying the area: species distribution, life zones, forest types, natural resources that could additionally be given a tourism use; and both communities' social and cultural features; to understand what needs to be preserved, and in what order of priority. I will then (ii) analyze the social acceptance of tourism activity in both communities; the (iia) tourism impacts and the actions that should be taken for the current disorganized tourism activity; and (iib) define the touristic area and to stablish the

rules for visitors to follow while visiting the communities, in order to define how interested are the local residents in ameliorating, and expanding the touristic activity in their communities. Finally, I will (iii) study the current touristic activity supply and demand in Atalaya city.

The result of this research will grant the first baseline registered in the Atalaya province, that will allow a better usage of tools based on existing data (results from this project), and underpinned decision making for the local authorities. This research will be executed in collaboration with the local stakeholders, including the indigenous groups, residents of Atalaya, private business, local public authorities, and the regional authority, as well as with support of the Ministry of Tourism and Commercial Trade. This is a one year-based research that will be useful for all kind of investment's interests, research purposes, new registries for the Peruvian national database, and other uses for the civil society.

'Complex Crisis' and the rise of Collaborative Environmental Governance: Institutional Trajectory of a Wildlife Governance Experience in Ghana

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How do we explain the phenomenon where most natural resources get depleted and destroyed whilst others have become largely sustained over time? Natural resources governance is underpinned by institutions and structures which evolve “circumstantially” over time in order to remain sustainable. An attempt at understanding the contemporary institutions and governance structure of a resource requires an in-depth ethnographic enquiry. Adapting a four-phase institutional analysis framework, this study discusses the adaptation and evolution of wildlife governance structures and institutions using the unique experience of Boabeng-Fiema Monkey Sanctuary in Ghana. The study adopted a transdisciplinary research approach which was participatory and consultative with key stakeholders. The key observations are that: wildlife institutions have gone through three main evolutionary phases, a pre-collaborative phase, which was exclusively underpinned by informal institutions [local or indigenous knowledge]; a critical juncture stage [local knowledge and systems proved unsustainable], where contextual challenges led to an adaptive response; the third and contemporary phase is a collaborative governance regime, where the erstwhile informal institutions have been complemented by formal state structures and institutions to synergistically enhance viability of the wildlife species. A major finding is that although monkey species in this study context faced hunting threats in the 1970s, the adaptive response strategies by indigenous people helped revamp or rejuvenate the system which has seen monkeys and their natural habitat [forest] remaining sustainable over time till date which continues to attract tourists from Africa and beyond. In spite of the problems posed to community members by the monkeys (wildlife), the study still observes a cordial human-wildlife relationship which is explained by the robust nature of local people's approach to sustainable wildlife governance. The study provides four key conclusions which have implications for indigenous knowledge and approaches to sustainable development.

New Technologies and Solutions for Development Practice

40 Years of Innovated Industrial/Future Based Agri Tech Sustainability For Small Scale Farmers, at Zero Food Waste

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Being seed/food TECH, Horti-family-funder to small-scale-farmers since 1975, were nominated distributor of EU/USA SEED companies, Our funding to farmers is at buy-back agreement for annual produce, suffered losses in agriculture. The entire INNOVATED researchers of food/agriculture have been collaborated at various loss-stations for the achievement of sustainability at:

1. Farming stations.
2. Domestic/village stations
3. Fruit-vegetable market stations
4. Grain-cereal market stations
5. Storage stations
6. Seasonal processing stations/infrastructure

At all above seasonal/infrastructure stations/processing/mobile drying facilities/sun drying/peeling/slicing/grading/threshing/cutting etc, were provided to maintain sustainable development/implementation, our innovated-production sheets totally changed the agriculture parameters, and vision of losses was eliminated. The community was mobilized technically which enhanced social-economic up-gradation, above mentioned TECHNOLOGIES was carried out to achieve health- economics/ SDGS.

Similarly innovated training centers on pre-harvest bases were installed at above stations with proper processing-parameters and the technical planning/ implementation/monitoring/management was introduced in agricultural-processing. In all our operational processing communities the female-gender are our processing source.

Prior to 1975, we developed multiple value-added scientific processing parameters sheets to eradicate AGRONOMY/natural disasters with value-added intermediate technologies as per sourcing sites which improved healthy equities in RURAL areas. A wide range of healthy saving sheets were developed, gained productivity results, entire manual saving /processing converted into mechanized farming by guidance of our field researchers. All other damaging challenges were resolved scientifically to improve invitational nutritional biological farming, and we entirely changed food agriculture system by application of value added multiple intermediate farming economical technologies.

All identified issues were converted into sustainable life-cycle systems, technical saving solutions of our inputs developed food/agriculture partnerships for SUSTAINABLE equity, elaborated AGRI approaches were emerged into sustainable developments in RURAL environments with climatic changes, affordable sustainability is being applied at sourcing sites to gain natural resourcing with cross cutting value added technological parameters.

Due to instant killing of perish-ability/weight-volume by AGRI TECH expertise developed sustainability which controlled effectively our timely researched applications. Qualitative/quantitative AGRI TECH impacted our funding, improved lost conditions, delivered field processing productivity, non-SDGs challenges were dominated scientifically.

Our innovated game changing progressive ecosystem technologies facilitated our food Agri clusters that enhanced dynamically in surrounding sites largely with future based multiple technologies, practical field research shared by Agri partnerships, mobilized scientific/technological expertise to practical problems solving for organic farming.

We started implementation of SDGs during 1980 with innovated sustainability, killed poverty in our approachable areas with climatic change, provided technological based solutions with unique methodologies which converted old losses vision to innovated organized productivity with sustainable dried processing developments, source effective partial drying applicable potential impacted to sustainable consumption/production processing which eradicated unsustainable agriculture vision.

Local sourcing raw material processing/ production/private label packing/sales have totally affected the normal practice of life and the local economic competition at neighboring level has scaled up, small scale industries such as grinding-machines/threshing-lines has also been modified for multiple processing, and has created strong economic potential level and dominated non-activities challenges in the economy. Local technological facilitation is being supported by us under farmer/industry partnership.

We have a complete road-map/processing lines/processing sheets/innovated multiple value added production methodologies with food irradiation storage etc, developed food/agriculture partnership nationally, are in capacity to save 1/3rd losses during 2017-2018 instead of 2050. Our 40-years innovated-tech in sustainability, may be applied for the saving of 1/3rd food losses for the killing of hunger/poverty in the world. There are 40-45 crops in losses, our game changing IN-HOUSE technologies invented a common dried processing plant for the total range of 50 crops, reshaped EU/USA dried processing-lines by the conversion of 40Ft FCL-containers into tunnel/trolley type driers and prices are comparatively 20 times less than EU/USA prices.

Being innovator of industrial/future based AGRI TECH in sustainability invented practical/technical/scientific/industrial processing-solutions, Multi-dimensional

technological drying approaches have been applied to kill sourcing loss, faced/fight against losses as a FRONT-FIGHTER-ORGANIZATION in world.

Until now all researcher/scientists has failed to give technological solutions, but we are only innovator for practical approaches of technological drying solution, offer our technological solutions to ICSD for killing hunger/poverty in any part of the world for any crop. In short our innovated multiple technologies are capable to start saving 1/3 losses by 2017-18, instead of 2050 under the partnership of ICSD.

Feasibility Analysis for Social Impact Bond to Alleviate Gang Violence in Central America

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Recent decades have seen a steep rise in gang activity in the Northern Triangle of Central America -- Guatemala, El Salvador, and Honduras -- where an estimated 85,000 gang members contribute to some of the highest homicide rates in the world. Such criminal activity significantly impairs Central American economies, decreasing Honduras' GDP by approximately 9% each year, for example. Furthermore, instability and rampant gang violence are the primary causes of northward migration from Central American countries. Most bilateral and multilateral aid currently funds heavy-handed security measures, though these initiatives have proven to exacerbate violence. Some community organizations have successfully piloted violence prevention initiatives, but do not have the funding to scale further. For this reason, a Social Impact Bond (SIB) represents a novel solution to this complex problem.

Also known as “pay for success financing”, SIBs utilize private capital to finance social projects with predetermined outcomes, resulting in public sector savings. SIBs significantly increase available capital and transfer risk from the public to private sector. Additionally, service providers are incentivized to create effective programming, and governments can allocate funding only to projects with positive results. Given the presence of underfunded, yet successful, violence-prevention projects in the Northern Triangle, we believe the climate is conducive to an SIB. Our research compares development finance theory with the social reality of the Northern Triangle to assess the feasibility of implementing what would be the first SIB in Central America.

Our feasibility analysis focuses on four categories of criteria: 1. Meaningful outcomes, 2. Measuring outcome success, 3. Time needed to achieve outcomes, and 4. Necessary legal and political preconditions and supports. Grounded in literature and interview data, preliminary results include a landscape analysis of the Northern Triangle identifying the social, political, cultural and economic factors that would facilitate or obstruct an SIB. Through interviews and focus groups, we will assess the interest of relevant stakeholders, including: Central-American NGOs, potential investors, gang members, government agencies, and diaspora communities. Using this data, we will begin designing and structuring an SIB that targets gang-violence in the Northern Triangle. This research

ultimately offers a contextually-specific, financially sustainable solution to a long-intractable issue.

Business Education Teacher - An Instrument for Integrating New Business Education Technologies for Sustainable Development Practice

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The world is changing. The world of the 18th and 19th centuries is different from the world of today. This dynamism is also blowing across every sphere of human existence. New developments in businesses and new technologies have fueled rapid changes in the world of business as the modern office no longer uses the traditional methods of collecting, processing, disseminating and sorting of information as well as doing business generally. This stems from the important role it plays in the national economic and business development. Information technology (IT) has become an important tool for the achievement of the needed globalization. It enhances the flow of information across boundaries of the nations with little regards to the geographical barriers. This implies that the business education teachers should be adequately prepared in order to integrate the information technology applications with business education. This integration would prepare the Nigerian citizens to face the challenges of the application of these new technologies in the national business activities. Education across the world is now centred on new technologies, hence business education cannot ignore the importance of utilization of new technologies. Therefore, this study examines the elements of globalization and information technology on business education in Nigeria. It observes that teachers are the instruments for integrating technology in business education and concludes that without adequate training, technology-based re-orientation, and up-grading to imbibe new ideas engendered by the new technologies, it might be difficult to achieve sustainable development in the business education sector in Nigeria.

Innovation to Promote the SDGs

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Addressing the Sustainable Development Goals will require many billions of dollars in funding, as well as posing enormous hurdles in coordination and governance. How do we ensure that support arrives at those who need it most? How do we ensure that individuals and firms are furthering the cause of sustainable development, rather than detracting from it? Why would they be willing to work towards it in the first place? Innovation and close relationships with firms in the private sector may help address some sustainable development challenges in areas where regulations are weak or poorly enforced, or where funding is insufficient to pursue development by traditional means. Innovative solutions é either new technologies or practices, or technologies and practices applied in new ways é can lower costs for firms sufficiently such that actions that advance sustainable development are those that bear the lowest cost. Thus, private firms can be incentivized

not only to act in ways that promote sustainable development, but in fact be the driving force behind it. Ultimately, actions based on self-interest are far more durable than reactions to temporary public pressure or bona-fide goodwill.

This paper will present a case study on the implementation of evaporative cooling vest programs in Qatar and the UAE. It will explore the incentives facing firms and other key local and international stakeholders. Evaporative cooling vests, typically used in sports and other niche industries, were reapplied to reduce the strain on workers from occupational exposure to high temperatures. In the UAE and Qatar, the majority of low-skilled labour in the construction industry is of foreign origin, bearing limited protections from their host governments. The ongoing roll-out of evaporative cooling vest programs is financed primarily by the construction firms themselves, seeing a public opinion and worker productivity benefits. It will present the findings from interviews with government and NGO officials and academia in the UAE, Qatar, and Canada, as well as evidence from evaporative cooling vests trials by Canadian NGO aegis.

Feasibility Analysis for Social Impact Bond to Alleviate Gang Violence in Central America

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Recent decades have seen a steep rise in gang activity in the Northern Triangle of Central America -- Guatemala, El Salvador, and Honduras -- where an estimated 85,000 gang members contribute to some of the highest homicide rates in the world. Such criminal activity significantly impairs Central American economies, decreasing Honduras' GDP by approximately 9% each year, for example. Furthermore, instability and rampant gang violence are the primary causes of northward migration from Central American countries. Most bilateral and multilateral aid currently funds heavy-handed security measures, though these initiatives have proven to exacerbate violence. Some community organizations have successfully piloted violence prevention initiatives, but do not have the funding to scale further. For this reason, a Social Impact Bond (SIB) represents a novel solution to this complex problem.

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A Risk Assessment Model for Humanitarian Prosperity

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A risk assessment model for humanitarian prosperity that focuses on the Sustainable Development Goals, governance and geography is a new technology and solution for development practice. Based on the Arbitrage Pricing Theory, this model includes SDGs as objectives and focuses on six actors for their achievement in any given territory. Further, by adapting the financial market's knowledge and expertise for development practice, return is measured as prosperity and is maximized based on the risk assessment model. The governance model to be used requires the joint effort of multiple actors following Michael Porter's and Michael Kramer's (2006) shared value concept and Rio's Pact (www.pactodorio.com.br) experience. The six actors identified are: the public and private sector, international organizations, academia, non-profit organizations and civil society. The integration of experiences and information allow for each actor to take advantage of their complementary and competitive advantages. Governance mechanisms can facilitate the execution of the integration and thus, increase the scale of local partnerships for sustainable development. As La Rocque and Shelton-Zumpano (2014*) concluded, this approach can increase the legitimacy of democratic representation particularly when participatory information technologies are used. The comparative advantage of the six actors works as a catalyst for development practice. Moreover, geographic information is crucial as each territory has different needs and must be catered for accordingly. High quality information brought from the collaboration of this governance model allows for a better comprehension of different territories and thus, the prioritization of different SDGs in each. Technology needs to be used to connect the six actors through information sharing and for example, participatory data collection, creating place based solutions. The result is a risk assessment model with 17 objectives (SDGs) and six actors that can be used in any given territory maximizing prosperity and creating a portfolio of territorial prosperity based on the chosen SDG for any given territory.

*<https://www.wilsoncenter.org/sites/default/files/Paper%20La%20Rocque%20and%20Shelton-Zumpano%202014%200.pdf>

Harnessing ICT to scale-up agricultural solutions: gender equality considerations

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Sustainable agriculture solutions have been heavily researched and field-tested in recent years. A vast array of solutions, like mobile money, farmer-field schools, cooperatives, radio education programmes, and fertilizer-minimization techniques, among others, have showed promise for improving the social and environmental sustainability of agriculture. But when it comes to uptake of these initiatives on a broad scale and at a farm level, these solutions have faced difficulties being implemented effectively and universally. The goal of my research is to examine what role ICT does and can play in more effectively scaling up agricultural solutions. Further, I will adopt a gender-responsive framework to take into account common barriers faced by women farmers in both agriculture and access to ICT.

This project fits into the thematic area of “New Technologies and Solutions for Development Practice” because it will survey a broad range of ICT-enabled scaling projects internationally, and identify success factors and lessons learnt from those programmes. Development practitioners, researchers, and other actors will be the main subjects targeted by surveys, focus groups, and key informant interviews to gather these results. The project will also survey women farmers with and without access to ICT. Ultimately, the research and its recommendations should provide a valuable resource for the development community to use in better integrating ICT and gender equality to maximize agricultural scale up.

The Use of Technology in Strengthening Traditional Communities by Community Based Tourism

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One of the main complaints of the elders of traditional communities about the perpetuation of their culture today is that young people are no longer interested in local culture, the cause of this disinterest, according to the elders is the modernity. As a consequence, they have the perception that there is an increase in crime and drug use in the locality. These reports have often been evidenced in several communities, a worrying fact since the transmission of culture to the younger ones through tradition is the perpetuation of that community as traditional. Community-based tourism is one of the

development and resistance strategies of traditional communities. The use of network communication, which comprises a finite set of nodes that establish social links or specific connections, which occur through communication, has been widely used. The technological use of networks is one of the most discussed currently, the internet has been used as an interactive channel having great functional potentiality. Many traditional communities have been seeking as an alternative income option with community based tourism. For that, a proposal was made for an interactive site with a tourist route in game format. This tool provides an increase in the communication and homogenization in the understanding of the information and thoughts of the members of the network, as well as the encouragement to the site visitors to carry out the itineraries due to the interactivity of the same. It is a possibility for the perpetuation of traditional cultures, which if once considered threatened by modernization and globalization, today, with the correct use of technology, can rather help in strengthening these communities, attracting young people's attention to this market. In addition, it is constantly reported by members of traditional communities that parents do not want their children to go through the difficult situations they have passed, depending directly on the environment and conditions of the same. They want a higher quality of life for their children and encourage them to seek more profitable activities, not seeing their own culture as an opportunity to generate value. The strengthening of Community Based Tourism with the use of technology as a support, besides attracting tourist attention and increasing the visibility of this market, also attracts the attention of young people from the communities who feel more comfortable in a desirable reality they wish to achieve by participating actively in the process, inserting themselves into a niche in which their parents or grandparents do not yet know, thus giving their collaboration, for the strengthening of their culture, however much it may be in a different way.

Land use and Land Cover Accounting a Require for Environmental Management of Bangladesh

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Land use and land cover is one of the key components of the natural resources of Bangladesh. These resources are fundamental to sustainable development as country's large subsistence sectors depends on land. However, this resource is increasingly being subjected to intense pressures brought about by human activities. Natural resources problems have become major concerns of development planners as they attempt to promote rapid economic growth and at the same time preserve and conserve the dwindling natural resources base. Despite measures taken by the Bangladeshi government in recent years, the natural resource base continues to deteriorate. The rapidly growing Bangladesh population has dramatically increased the demands for natural resources and has caused significant changes in quantity and quality of the natural resource. Aquatic and floodplain ecosystems continue to be severely degraded. The wetland ecosystems have lost connections with larger water bodies (rivers and canals) due to siltation and land filling or draining for agriculture and homestead use. More than

50% of seasonal and perennial wetlands have been affected by growing unplanned urban and agricultural land use. True forest habitat, which is less than 6% of total land area is declining rapidly and massive deforestation has resulted in loss of biodiversity and productivity of tropical forest resources.

All these problems need well thought out strategies to address them. Approaches integrating environment considerations and, in particular to take into account cumulative impacts, are therefore essential to face the problems. Now a days Environmental management practices are trending away from simple, local scale assessments toward complex, multiple-stress or regional assessments. Land use and land cover study can help for these assessments through GIS and remote sensing.

Therefore, the present study attempts to suggest the method to study the land use and land cover change of Bangladesh as land use and land cover changes occur at all scales, and changes at local scales can have dramatic, cumulative impacts at broader scales. Another attempt will be to find the cost effective techniques to study the land use and land cover change in Bangladesh through GIS and remote sensing. Very few studies have focused on this issue in Bangladesh. It is believed that this study has the applications in environmental management and policy making for sustainable development of the country.

The SDGs Made Simple - A Systems Thinking Approach

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The idea for this paper was triggered by a comment made by the Minister of Education of an African Country. The author had been having discussions with the Minister on the possibility of the Minister going into the classroom in a school of his choice and delivering a 40 to 45 minutes lesson on the SDGs under the World's Largest Lesson Initiative. The Minister had graciously agreed to deliver the lesson; but then, as if as an after-thought he added: "I will deliver the lesson at a school in the capital, but such a lesson must be delivered in at least one school in every region of the country. Better still, every child should receive this lesson". He then went on to add that the children should understand what the SDGs mean for them, and only then should the world expect them to act. The idea of the study was thus sowed.

The study is based on extensively examining (review and analysis of) various SDG documentation and lengthy discussions with professionals working with the SDGs. This was in order to figure out the types of achievements and challenges they associate with the SDGs. Achievements highlighted included: (i) the universal nature of the SDGs, being applicable to both developing and developed countries; unlike the MDGs that were directed mostly at developing countries, and (ii) the recognition of the interrelations between the various SDGs. The challenges highlighted by some professionals included the view that the SDGs are 'too ambitious', meaning that unconsciously they are not

expected to be achieved fully. Secondly, there was the ever present question: ‘how are we going to successfully monitor and evaluate implementation, and report on a timely basis?’

The ordinary professional or worker (or student) going about his/her daily business wonders what the SDGs are all about, and what are they expected to do? This last challenge in particular dictated the title of the paper. The SDGs has to be made simple if, to paraphrase the Minister, people (children) are to understand what they mean and to act upon them. This implies completing the view from the ‘demand side’.

The paper presents a simple robust Results Based Management (RBM) tool - the RBM Logical ScoreCard (RBMLSC), which captures the ‘performance profile’ of a development intervention in just one page. Applied to the SDGs it gives the results framework of the SDGs (in one page) showing the ‘big picture’ of the hierarchy of results (results-chain) reflecting the theory of change / logic underpinning the SDGs. This allows everyone - supply professionals and demand implementers alike - to read from the same page, thus enhancing the chances of successful implementation.

The Sustainable Business Case Framework as a Method for Measuring Costs and Benefits in Sustainability for a Specific Supply-Chain

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The Sustainable Business Case Framework (SBCF) is a method for establishing costs and benefits in sustainability for a specific supply-chain. Given the plethora of methodologies that try to identify and measure the costs and/or benefits related to sustainability, the first question we need to answer is: why one more? We argue that the SBCF bridges the different spectrum between fair value and the methodologies related to life-cycle analysis. It also provides a link between measurement and valuation-based models. Finally, it has a different locus as most models. Here, the unit of the analysis is the supply-chain. In the life-cycle models the unit is a product. By looking at the supply-chain we gain insights regarding the bottlenecks for the creation of eco-premiums and we try to bring into light important issues on the behavior of companies when they have to take into consideration cooperation with downstream and upstream firms. The SBCF is an applied inductive methodology, instead of a theoretically informed one. The models in section 2 allows us to put the results found by applying the methodology into a broader context. The SBCF can be generalized, as it is tied to other methodologies with a focus on how sustainability issues have a financial impact in companies around the world. Nevertheless, at first it was built to determine the sustainability benefits and costs in the beef industry in Brazil.

The SBCF was the result of a joint field project between AtKearney and the Center for Sustainable Business (CSB) at NYU Stern. The final methodology was designed after a series of analyses and interviews with the companies from the beef industry in Brazil. Interviews were conducted by telephone and in-person in January, 2017. In total, unstructured interviews and requests for data resulted in the participation of 30 companies. The resulting methodology comes from a combination of standard valuation techniques, direct financial information from companies, and evidence from the unstructured interviews. Most importantly, the methodology focus on the benefits as much as in the costs regarding sustainability issues. If sustainability was a mere question of costs for companies, than the optimal solution for society, given positive bargaining costs and incomplete property rights (otherwise the Coase theorem guarantees an efficient solution for the negative externalities generated by economic activity) involves regulation and/or taxes. By going beyond costs and risks associated with sustainability the present methodology is positioned alongside Elkington (1994), Lubin and Esty (2010), Zeidan et al (2015) and other works that consider the possibility that companies can promote sustainability.

A supply-chain analysis of the beef industry is particularly appealing because of the direct relationship between this industry and social welfare. Not only the direct impacts on the environment - de Vries and de Boer (2010) and Capper (2011) provide an excellent summary - but moral issues related to meat consumption make any study on the beef industry richer than the typical industry analysis. Alongside the general ethical concerns, there are the ones related to deforestation and the role that the beef industry plays in it.

The SBCF tries to capture the costs and potential benefits of sustainability by looking at the entire supply-chain and the potential effects and interactions of sustainability issues.

Poverty Eradication, Social Protection, and Equality in the SDGs

Nexus of Poverty, Environment and Urbanization in Nigeria: Implication for Sustainable Development

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This paper examines the nexus of poverty, environment and urbanization while also examining its implication for sustainable development in Nigeria. Poverty is a major challenge of the third world countries and in Africa particularly to which Nigeria belongs. The nations GDP has not translated into decreased level of poverty, as a lot of the population still lives below the poverty line. As a result of the level of poverty experienced in the rural areas and the conflict prone areas of the nation, there is increased in-migration of people from the rural to the urban centers as many believe in the idea that

there are lots of opportunities in the urban centers thereby creating an environmental challenge of congestion, pollution, increase in slum areas and so on. Urbanization experienced as a result of the influx of population and the need to provide housing also translates to environmental challenges.

Successive Nigerian administrations from the colonial era has placed little attention to environmental issues but rather to their own wealth generation which drove up the level of corruption, poverty and inequality in the country, hence a challenge of meeting the criteria for achieving sustainable development in the nation as all hope seem to fade. The environmental challenge of oil spillage in the southern part of the country which has affected the livelihood of the rural dwellers in those areas has led to a history of unrest in the south, thereby translating to increase poverty in the area. Also the rising number of internally displaced persons in the northern part of the country; Internally displaced monitoring center (IDMC) estimates that there are almost 2,152,000 internally displaced people (IDPs) in Nigeria as of 31 December 2015 which has also resulted in increased level of poverty in the region.

There is a great need for poverty eradication in the country as without achieving or reducing the level of poverty which is GOAL 1 of the Sustainable Development Goals, and reducing the level of unequal distribution of wealth in the nation, Nigeria could not be said to have achieve its goal of sustainable development.

This paper therefore looks at the relationship between the concept of poverty, poverty eradication, environment and urbanization and its implication for sustainable development.

Explaining Public Support for Social Protection: Empirical Evidence from Ghana

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In recent decades, social protection has increasingly gained global credence and acceptance as a key tool for reducing poverty, enhancing social cohesion and promoting economic growth. As such, many low and middle income countries especially in Africa, Asia and Latin America are currently expanding their public social protection systems by implementing either social assistance schemes (eg. cash transfers, food vouchers, & in-kind transfers) or social health protection programmes (eg. national/community health insurance schemes) and even in some cases both.

However, despite the recent prevalence of social protection initiatives in the developing world, not much has yet been done to explain factors that affect the sustainability of social protection, for instance that of public support. A majority of the studies available predominantly center on evaluating the impact of social protection on various dimensions of poverty and human capital development. The existing evidence on public support

largely stems from studies on attitudes towards redistribution or support for the welfare state in highly developed countries. Therefore, using data from an attitudinal survey conducted in Ghana between January to March 2017, this paper analyses public support for social protection in a development context. The paper explores the role of factors such as self-interest and attitudes towards the poor in explaining support for social protection. Furthermore, the paper analyzes how and in what ways these factors hinder or facilitate reform processes across the different policy areas of social protection. Lastly, the paper also explains how public support could contribute to the political sustainability of social protection reforms in developing countries.

This study contributes to expanding the literature on demand for social protection by highlighting factors specific to a developing country context. In addition, the paper is of high policy relevance for national governments, policy makers and international donor agencies since its findings has direct policy implications for the design and implementation of both new and existing social protection instruments in various developing countries across the globe.

Assessment of Consortium Approach in Food Value Chain Development on Income of Smallholder Farmers in East Africa, Countries of Uganda, Tanzania and Rwanda

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Agriculture as one of the most important sectors in East African Community (EAC) accounts for about 80% of the workforce involving the smallholder farmers in rural areas for their livelihoods. In spite of this the EAC is characterized by low agricultural productivity and low incomes thus rated amongst the poorest in Africa. The reasons for this are poor access to well structured and efficient markets, inconsistent supply of quality inputs and finance. Moreover several value chain approaches have been adopted to bridge the gap, but still low income of smallholder farmers persist, thereby making them vulnerable to shocks.

However the consortium approach under the Regional East African Community Trade in Staples (REACTS) project implemented by Kilimo Trust is a response to address the gaps of low agricultural productivity and incomes of smallholder farmers and other actors in the value chain.

The ongoing study, therefore seeks to assess and analyze the effectiveness of the consortium approach vis-a-vis conventional approach in food value chain development on productivity and incomes of smallholder farmers. The assessment would be done on the capacity building efforts to meet the requirements of well understood markets which the farmers can sell, the post-harvest handling process of the produce, access to high quality inputs, credit facility and the acceptability of the produce to highly competitive trading systems in cross border trades. The value chain actors would be selected through

randomized controlled variable using questionnaires, key informants guides and focus group discussion guide. The study would be conducted in Uganda, Tanzania and Rwanda.

The study would evidence- based information of the effect of the consortium approach on productivity and profitability with a view to promoting scalability and sustainability of the consortium approach in EAC. The findings will reveal the critical success factors for sustainability of the approach; the Strengths, Weaknesses; Opportunities and Threats (SWOT) for further development in the value chain.

Feasibility Analysis for Social Impact Bond to Alleviate Gang Violence in Central America

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Recent decades have seen a steep rise in gang activity in the Northern Triangle of Central America -- Guatemala, El Salvador, and Honduras -- where an estimated 85,000 gang members contribute to some of the highest homicide rates in the world. Such criminal activity significantly impairs Central American economies, decreasing Honduras' GDP by approximately 9% each year, for example. Furthermore, instability and rampant gang violence are the primary causes of northward migration from Central American countries. Most bilateral and multilateral aid currently funds heavy-handed security measures, though these initiatives have proven to exacerbate violence. Some community organizations have successfully piloted violence prevention initiatives, but do not have the funding to scale further. For this reason, a Social Impact Bond (SIB) represents a novel solution to this complex problem.

Also known as “pay for success financing”, SIBs utilize private capital to finance social projects with predetermined outcomes, resulting in public sector savings. SIBs significantly increase available capital and transfer risk from the public to private sector. Additionally, service providers are incentivized to create effective programming, and governments can allocate funding only to projects with positive results. Given the presence of underfunded, yet successful, violence-prevention projects in the Northern Triangle, we believe the climate is conducive to an SIB. Our research compares development finance theory with the social reality of the Northern Triangle to assess the feasibility of implementing what would be the first SIB in Central America.

Our feasibility analysis focuses on four categories of criteria: 1. Meaningful outcomes, 2. Measuring outcome success, 3. Time needed to achieve outcomes, and 4. Necessary legal and political preconditions and supports. Grounded in literature and interview data, preliminary results include a landscape analysis of the Northern Triangle identifying the social, political, cultural and economic factors that would facilitate or obstruct an SIB. Through interviews and focus groups, we will assess the interest of relevant stakeholders, including: Central-American NGOs, potential investors, gang members, government

agencies, and diaspora communities. Using this data, we will begin designing and structuring an SIB that targets gang-violence in the Northern Triangle. This research ultimately offers a contextually-specific, financially sustainable solution to a long-intractable issue.

Thailand's Efficient Trade Agreement and its Impacts on Poverty and Income Inequality

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The purposes of this study are to examine changes in Thailand's economic structure in order to design the proper and efficient policies of Free Trade Agreement (FTA), and to investigate the impacts of FTA between Thailand and the main exporting countries including China, the United States of America, Japan, Malaysia, and Hong Kong which mainly highlights the impacts on macroeconomic variables, poverty, and income inequality. Research methodologies are the descriptive analysis, Revealed Competitive Advantage (RCA) Index, and Computable General Equilibrium (CGE) model.

The results reveal that there is a significant change in Thailand's economic structure between 1961 - 2014. The proportion of agricultural output to Gross Domestic Product (GDP) dramatically declines as a result of slower increase of agricultural output compared to other sectors; meanwhile, the share of Thailand's GDP derived from industrial sector definitely increases as a result of the continual Thailand's national economic and social development plans since 1961, the promotion of international trade, and the export-oriented Foreign Direct Investment (FDI). Additionally, it is found that export is the main Thailand's economic motivator which one of the interesting methods to boost the volume of export is FTA.

Thailand has currently signed FTA, both bilateral and regional framework, with many countries. Nevertheless, according to the results from CGE model, the gains in economic dimension will be maximized if Thailand signs FTA with main exporting countries stressing on liberalizing mainly its competitive products. Additionally, the results suggest that FTA can help reducing poverty but the income distribution will clearly worsen because the return to capital owner is higher than to labor. Thus, government and negotiator should concern more on the distribution of benefits from future trade agreement and also the remedy measures for the negatively affected group.

Poverty as a Violation of the Right to Life

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The problems associated with poverty, are extremely important for the population in most countries of the world. The author concludes that the violation of the right to life and health takes place for the people living in poverty. At the same time, the standards which were elaborated for the evaluation of the poverty level, do not respond to the science-based requirements for a man's income which is required to meet his minimum needs. In this connection, an emphasis is placed on the introduction of the concept of "real living wage" for the definition of the poverty line of a particular country and creation of a single site for monitoring state living wage, real subsistence level, distribution of the population by income, poverty line set by state and independent experts, prices on basic food products arranged by countries. The author concludes about necessity of introducing payment for labor on the basis of a real living wage level (and if this minimum is below 50% of the average wage then on the amount of 50% of the average wage in the country) and the tariff scale which should take into account social usefulness of a profession and qualification of an employee. At the same time a particular level of wages must not be lower than the amount established by a tariff scale. Payment for labour in the USSR with wages in Ukraine during the transition to the market economy is compared. The conclusion is made about the growth of poverty in Ukraine in three times during transition to the market economy, and concealment of poverty increasing by reducing official poverty line in three times in connection with the normative decrease of an allegedly "scientifically based" consumption. The article points out that in order to implement international principles guaranteeing sufficient wages, adequate social protection, Ukraine has adopted a number laws and bylaws which comply with international human rights standards, but the current amount of the subsistence minimum which is determined on the basis of the Resolution of the Cabinet of Ministers of Ukraine "On Approval of food products sets, non-food items sets and sets of services for main social and demographic groups of the population" and the lack of indexation of population's income in the past two years lead to the violation of a human right to life. The author makes an attempt to analyze whether the current standards of guaranteed right of everyone to an adequate standard of living in Ukraine correspond to the Ukrainian Constitution and applicable laws of Ukraine.

Social Protection Systems for Poverty Eradication in Uganda

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Uganda achieved great success in reducing poverty in the Millennium Development Goal period, surpassing the target of halving its poverty rate. Despite these gains, vulnerability remains high and the transitory nature of poverty can be seen in the fact that 'for every three Ugandans who get out of poverty, two fall back in' (World Bank, 2016). Taking the figures of those in extreme poverty and insecure non-poor together, almost 78% of Ugandans could be considered as vulnerable and in need of social protection.

Internationally, the importance of social protection systems is recognised in Goal 1 of the Sustainable Development Goals, by the International Labour Organisation and through

the Addis Ababa Action Agenda. Goal 1 of the Sustainable Development Goals aims to ‘end poverty in all its forms everywhere’, and sets as targets that countries should ‘implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable’ (United Nations, 2015).

Uganda has recognised the importance of providing comprehensive social protection systems for its population as a means to reduce poverty and support its goal of reaching middle-income country status by 2020. As such, Uganda has begun implementing a system of social protection support for vulnerable populations, encompassing two pillars: social security, and social care and support services. As a form of social security, Uganda is rolling out a programme of direct income support with support from DfID, Irish Aid, UNICEF and the World Bank. Under this programme, two forms of direct income support have been provided. The pilot period saw the introduction of Senior Citizens Grants and Vulnerable Family Grants between 2010 and 2015. In the second phase, from 2015 to 2020, the Government has phased out the Vulnerable Family Grants and expanded the scope of the Senior Citizens Grants project.

The aim of this research is to understand what the challenges are in implementing social protection systems for vulnerable populations in Uganda. The research uses qualitative methods to examine: the conceptual framework of social protection systems; the pertinence of the Ugandan policy approach as laid out in the National Social Protection Policy; the monitoring and evaluation arrangements for the social protection system; and the institutional and practical challenges facing the implementation of the social protection system at national, district and local levels.

The findings of this research will have immediate relevance for the continued implementation of the social protection measures introduced to date, as well as for other social protection measures that may be introduced in the future. The research will also have relevance for other low-income developing countries considering the introduction of social protection systems. As the National Social Protection Policy was only recently adopted in 2016, little research has been conducted on this new policy approach and so this research will address the current gap in the literature on the implementation of social protection policies in Uganda. The research is also timely given the adoption of the Sustainable Development Goals in 2015, with its target of implementing social protection systems for all.

Prospecting Sustainable Development in Nigeria Through Poverty Eradication and Social Protection

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The issue of sustainable development in Nigeria through poverty eradication and social protection has been a serious challenge to various countries in the world including Nigeria. This has prompted the initiation and implementation of various intervention

programmes including the present Sustainable Development Goals aimed at provision and sustenance of socio-economic and infrastructural facilities which their access to the people would accelerate poverty reduction and engender social protection in the country. The presence of these socio-economic infrastructure would enable the citizens, especially the down trodden have access to the wide distribution of the benefits of the economic growth and significant improvement in the incomes that would improve their living standard. This study therefore set out to examine the prospect of sustainable development in Nigeria through poverty eradication and social protection. The study contends that sustainable development in Nigeria through poverty eradication is the only means to entrench social protection that would transcend to peace and security in the country. It asserts that Nigeria with its abundant natural and human resources has the potential to achieve this, and that in the light of some daunting socio-economic challenges permeating the Nigerian economy, it is needful that the government concentrates on key sectors that can assist to accelerate and sustain its developmental objectives. The data for the study were collected from documentary sources, media commentaries, scholarly inputs and direct observation, while content analytical approach was adopted. The study adopted system's theory as its framework of analysis. The study found out that the previous poverty eradication programmes initiated and implemented in Nigeria by various governments carried out without provision for their sustenance while the poor ones were never identified and given the opportunities to have access to these intervention programmes which would have given them the needed social protection and as such had no significant impact on the lives of the poor. The paper concludes that sustainable development is a viable bridge builder for poverty reduction and social protection in Nigeria.

Public Spending and the Poor in a Nigeria's Nascent Democracy: Lessons for Inclusive and Sustainable Development

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Nigeria came into existence in 1914 as a result of amalgamation of the North with the Southern protectorates. Following years of military rule after gaining independence in 1960, and a republic in 1963; the third Republic was born in 1999 and this was followed by a successful transmission of political leadership from one civilian administration to another through the process of election for the first time in the 2007 general elections. The Nigeria economic fortune occasioned by oil boom of 1970s brought fundamental changes in the Nigerian economy such that before July, 1986, Nigeria witnessed a traumatic economic crisis. For example, there was heavy dependence of the economy on crude petroleum such that oil and gas comprises over 90% of Nigeria's exports and more than 70% of consolidated budgetary revenue. Public sector also became the prime mover of the economy through huge investments of oil revenue in physical economic and social infrastructure.

Oil discovery created both external and internal imbalance in Nigerian economy that has impoverished more than 64% of Nigerian households and widen poverty and inequality

gap. Poverty remains one of the most critical challenges facing the country and population growth rates have meant a steady increase in the number of poor. Poverty has risen in Nigeria, with almost 100 million people living on less than a \$1 (£0.63) a day, despite economic growth. The proportion of Nigerians living in absolute poverty has risen from 54.7% in 2004 to about 60.9% in 2015. Nigeria is one of the top five countries that have the largest number of poor; ranked third in the world where 7% of the world poor lives and failed to meet the Millennium Development Goal (MDG) of eradicating extreme poverty and hunger. In the 2014 Human Development Index, Nigeria ranked 152 out of 187 countries which placed Nigeria among countries with Low Human Development index.

The direct provision of tax-financed public consumption goods and services to the very poor has been found to be an important instrument of a comprehensive policy designed to eradicate poverty. This include increase expenditure on education, health, infrastructural development, public health projects in rural villages and urban fringe benefits, school lunches and pre-school nutritional supplementation program and provision of clean waters and electrification to remote rural areas. Accelerating the creation of productive jobs through private sector growth, improvements in education (skills) and increase education and labour force participation of women can also be a medium-term strategy.

This study investigates trends in public expenditure to health, education, infrastructural development and specific poverty eradication programme and how this relate to social outcomes in health and education among the rural and urban dwellers and among men and women in Nigeria from 1999 to 2015. This is to determine whether shifting governments' policy focus to giving greater attention to equity in outcomes rather than fiscal equity will ensure inclusive and sustainable development in Nigeria.

Towards Achieving the Sustainable Development Goals: How Far Can Africa Go in the Face of Dwindling Commodity Prices?

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The sustainable development goals (SGDs) are initiatives designed by world leaders to make the world a better place to live in. Embedded in the seventeen (17) SGDs are specific action plans targeted at tackling fundamental issues of poverty, hunger, health, insecurity, climate change and resource conflict to mention just a few. Despite the significance and the all-encompassing characteristics of these goals, Africa, where most of the issues to be addressed through the SGDs abound is currently experiencing a downturn considering the prices of its main source of revenue plummeting. The continent is one of the fastest growing economies in the world with favourable weather and large landmass for agriculture. Africa is a continent relying majorly on natural resources (agriculture and solid minerals contributing 55-97 percent of Gross Domestic Product) to provide the much needed improved welfare. Apart from the dilapidated infrastructure situation resulting from long years of neglect, the continent is also faced with the problem of climate change, corruption, youth unemployment and rising urbanisation thereby

putting a strain on the meagre income accruing to the continent. This paper therefore investigates the extent to which the SDGs is achievable in the face of the dwindling prices of the continent's exportable commodities. This is because implementation of projects and programmes targeted at addressing some of the core issues highlighted in the SDGs remains a herculean task because the much needed income is not available. The paper therefore suggests re-prioritisation and implementation of low cost, inclusive but highly impactful projects and programmes targeted at addressing hunger, poverty and other primary needs of the vulnerable inhabitants of the continent. Government and the private sector in these countries should team up to add value to primary agricultural commodities as well as solid minerals exploited in the continent instead of selling it at give-away prices to shylock buyers from industrialised nations. Also, investment in primary infrastructural facilities will also reduce production cost and enhance growth of small and medium scale enterprises (SMEs) in Africa.

Creating Sustainable Livelihood For Youths in the Cocoa Value Chain: A Case Study of Igangan Community, Osun State, Nigeria

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Nigeria plays a key role in the cocoa sector globally. Cocoa is a very important part of the cash crop family in the agricultural sector in Nigeria. This crop poses a great avenue for young people to create opportunities for themselves by optimizing the value chain to create a sustainable livelihood and improve the living standards in their local communities. The value chain cuts across the different stages; which is from the production to marketing to processing and final consumer stage. In every stage of the value chain, opportunities abound and if it is maximized, can lead to income generation. If the cocoa sector is properly placed, it can bring about prosperity and sustainable livelihood among rural dwellers in cocoa producing communities.

The purpose of this study is to evaluate the prospects and opportunities available for young people along the cocoa value chain in Igangan community. The main objective of this study is to examine the current state of cocoa farming in Igangan; the challenges faced by youth in cocoa farming business and explore the opportunities available along the cocoa value chain to improve their livelihood. This study will make use of primary data collected from a field survey in the community administered through questionnaires and Focus Group Discussions as well as secondary data gotten from written texts, Nigeria Bureau of Statistics and the Central Bank of Nigeria bulletin. The data will be analyzed using descriptive and inferential statistical technique.

It is expected that at the end of the study, it must have been able to critically examine the state of cocoa farming in Nigeria and Igangan in particular, it will examine the challenges faced by young people in cocoa farming business, as well as suggest opportunities available in the cocoa value chain and how the youths can key into them to create sustainable livelihoods.

Sustainable Development Goals to Achieve the Aim of New Urban Agenda

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What does the New Urban Agenda aim for? In short, an equal and sustainable society throughout the world by implementing the SDGs, which solves these main problems of poverty, insecurity, and inequality. In very short, an Utopia in reality! (the ideal world).

However, the question is how? (with this over-growing population of 7 billion now itself and what could be the situation in 2050!) So, what should be the approach to find the solutions of the problems? To find the solutions to these big problems, first it is necessary to look into the roots of these problems (to prevent from committing the similar mistakes again!). As, why has this problem of poverty not been solved yet? Secondly, about the solution: How will the poverty be eradicated from human-civilization now and also become sustainable in true sense? And who will accomplish the solution? When zooming into the facts of the human society: going to the root causes of the problems humans have created, and which are now being tried to be solved through ‘development’ and of which New Urban Agenda is an ideal vision:

Equal world for all- however, considering the reality that humans have already divided and living in groups known as, ‘high-income/class, middle-class, and low-class’ then, how should the “equality for all in all aspects” in the societies could even start, in their respective cities? (mind-set problem)

Sustainable world for all- however, considering that when it comes to development, there is less equal division of natural resources in planning which is in harmony to the local environment? (to prevent any climatic changes and disasters caused by human activities)

Humanity- however in practice, the modern high-standard education is lacking the most important basic element i.e., moral human values of trust, respect, care, honesty to prevent any inhuman activities (Social protection).

Therefore, to achieve sustainable development it is necessary to consider equality in all aspects of SDGs to reach at least closer to fulfilling the dream of ‘Utopia’ (meaning, New Urban Agenda).

Is not the solution in the problem itself? To consider not only few, responsible to solve world problems however, everyone responsible for the development of their own-self and sustainably developing own community together! Why? Because, the solution is simple to understand and effective to apply. How it can be applied? There are techniques which have been practiced in other respects but not yet visualized as big common solutions to the world-wide problems.

However, now these can be applied by modeling new ones for today's context from exploring those alternatives in the following research paper (which shall not only solve problems of poverty also, sustainable development throughout the world).

It seems, there is a gap (in reality) in the approaches of how to start-up to implement the SDGs in cities to achieve the ultimate goal of New Urban Agenda. So, the quest is to explore the alternative ways and develop a process-cycle of connecting aspects to solve the problems as a whole dealing from the root causes approach.

The Significance of Good Governance Institutional Quality to Economic Growth and Development (In EME Country)

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Economic growth and development require adequate open institutional frameworks that protect and enforces the law, equitably and justly among all participants in the economy. The quality of institutions promotes the process of economic growth and development. This paper will explore the significance of the quality of institutions for economic growth and development, with a review of recent literature and supportive data from the Global Competitiveness Report (GCR) and Corrupt Perception Index (CPI) in relation to good governance in some selected developing countries. In considering the nature and intensity of good governance institutional quality and the synthetic instrument of economic growth and development, the paper empirically analysis the annual data suing specific indicators. The finding assumes various key roles, play by an institution in the process of economic growth and development. Furthermore, analysing the indicators showed that the quality of good governance framework is strongly dependent on the following aspects: the quality of political leadership; illegal payments and bribe (Corruptions). Similarly, property rights which including intellectual property; the efficiency of the legal framework; the independence of justice. The paper also observed that capacity of social and economic actors to exert pressure to change and eliminate inadequate institutions plays an important role in the economy growth and development. Moreover, the quality of the interconnection between organisations and the supervisory institutions in the economy growth and development was also analysed. These aspects may make or mar the growth and development of the economy; as such, this paper proposed that policy maker should practically and socially improve the quality and infrastructure of the institution to deliver long run economic growth and development.

Education Eradication of Poverty: Case Study of Kalinga Institute of Social Sciences

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Framework: India presents a paradoxical picture of poverty amidst in plenty. Despite endowed with vast human and natural resources and achieving substantial progress in many areas during the past sixty years of planned development. It is plausible that poverty and multidimensional deprivation provide evidence of poverty in Country. The proportion of the poor who suffer long duration poverty is likely to be significantly higher in those parts of the country that suffer greater incidence of severe poverty and multidimensional deprivation. Education is described as a tool to eradicate poverty. Since the link between education and poverty is neither a linear nor a simple cause and effect relationship, it can be concerned that lack of education is perhaps the most important reason for poverty. It has been an accepted fact that poverty reduction or eradication through education can never be achieved without the right mix of policies and strategies guided by a strong commitment to achieve it. Any discussion on poverty eradication in India can never be fruitful without a study on the most deprived sections of the society called Scheduled Tribe by the constitution of India.

Description of Practical application: The intervention towards serious knowledge production and praxis about indigenous societies and their real life-world cannot be more timely than now. Globalization has started percolating into interior regions of the world including India. The academia and civil society's role becomes more paramount during this juncture. An organization christened as Kalinga Institute of Social Sciences (KISS) germinated at the start of this liberalization era in 1992-93 has been working with tenacity in order to mitigate any unwarranted ill effects of liberalization and most importantly to realize human rights of tribals. The solution offered through this institution to the age old problem of Indigenous population was holistic education with sustainable livelihood and special emphasis on preservation of indigenous culture. With passage of time KISS has become a beacon of hope for thousands of hapless Indigenous populace dreaming a respectable place for themselves and future generations. KISS, the largest residential Indigenous institute of the world, now houses little more than 25,000 Indigenous children and are provided with holistic education, vocational/skill training, food, accommodation, health care, state of the art infrastructure etc.

Outcome: KISS has demonstrated exemplary achievements in academics and sports with students joining India's elite professional institutions like IITs, IIMs and being part of Indian national teams of various games at international arena like Asian Games, Commonwealth Games and probable for Olympics. World bodies like UN, Universities, International Foundations and organizations have come forward to create a synergy for this endeavor. Strong alumni of 7000 youths have already started impacting Indigenous communities and have become change agents. It becomes more paramount now to bridge imparting of knowledge (teaching), knowledge production (research) and practicing innovation in solutions- with Indigenous population at center-stage for their sustainable development. We all are answerable to the future generation about the approach we undertook for development and sustainability of its Indigenous life world. And KISS aptly fits the bill reflecting social inclusion and community engagement at its core.

Implications:

Over the last two and a half decades, the education sector has got a lot of attention. Educational attainments have been linked with every single socio-economic indicator used for measuring quality of life. The issues of development and growth engaging with the questions of productivity, income distributions and employment all consider skills acquired through education as an input variable in the production process. In the Indian context, the declining social sector expenditure in the post-reform period, the failing state of the health of primary education and the increased privatization of higher education have seen fierce debates among economists regarding provisioning of social sector goods. At this juncture Kalinga Institute of Social Sciences is working to start its branches in all 30 districts of Odisha, 10 states of India and across 10 countries around the world.

Minimising Marginalisation through Education

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Similar to an ‘untouchable’ social class, the Menja ethnic minority in Bonga, the administrative centre of the Keffa Zone in Ethiopia, faces complex social and economic forms of marginalisation. Traditionally a hunting community living in isolation in the forests and at the outskirts of settlements, the customs of the Menja are not well understood by locals, leading to misconceptions and them being somewhat of a ‘counter-culture’. The discriminatory practices the Menja community faces include being denied access to restaurants, being required to use different cups and utensils from others, exclusion from meeting places, being obliged to sell their products at a cheaper price, and facing physical violence when requesting services from businesses.

Additionally, UNESCO designated the Keffa Zone a Biosphere Reserve in 2010. These areas are established to promote biodiversity conservation through sustainable use. As the traditional economic activities of the Menja é producing and selling firewood and charcoal é impact on deforestation, new legislation which protects the environment brings further exclusion to the Menja. The marginalisation of this group further restricts their alternative sources of income necessary from this UNESCO designation.

Due to the marginalisation and economic discrimination they face, the level of attendance of Menja children in schools is poor with many dropping out at an early grade level. Children of this ethnic minority also tend to start school at a later age than the dominant ethnic group.

The organisations A Partnership with Africa (APA) and Community of Volunteers for the World (CVM) have been active in Bonga working to promote integration through training and workshops and increasing access to education. However, research on poverty and education issues is required to comprehend the problems being faced by the community and to guide future interventions. This research project will be the first collection of data on the discrimination and levels of access to education by the Menja minority in Bonga.

This project therefore aims to examine the types of discrimination this ethnic minority currently faces and what steps have been taken so far to integrate the Menja people through education. With particular focus on women, this research intends to answer the following questions:

- What are the barriers to education?
- What are the reasons for not continuing education or dropping out of school at an early level?
- What has the experience been for those girls who have received scholarships from the organisations APA and CVM to attend school?
- Are there barriers for the Menja ethnic minority to becoming economically productive members of society upon receiving an education?

This project will commence in May and terminates at the end of July and the findings would be summarised in the poster presentation at this conference.

A Contested Development Nexus: Participation in Contract Farming Schemes

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It is explicitly recognized that agricultural expansion due to the growing demands of food, fuel and fibre is a major cause of deforestation despite the importance of forest. Most of these forests are home to poor vulnerable farmers. Agricultural innovations are generally considered as core drivers of poverty reduction and economic in many developing countries. These innovations aim at market integration, higher yields and lower environmental footprints. Higher yields and higher incomes have been documented but also several trends of farmer exclusion, exploitation and social stratification. These innovations, are not only relevant to agriculture but also to forestry, given that some crops such as palm oil are at the interface of both. In particular, contract farming, is being proposed as an inclusive business model to address farmer inclusion and is gaining much traction. Despite the optimism that surrounds contract farming, farmer participation continues to remain very contentious and highly debated. The absence of a comprehensive literature review on comparative practices on farmer participation in contract farming schemes limits the policy implications of contract farming. By conducting a systematic literature review, this poster seeks to identify the factors and trends in farmer exclusion from contract farming schemes across developing countries. The poster discusses the link to the broader debate on inclusive development.

The impact of participatory approaches on Food Security

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In 1996 the FAO defined four dimensions of food security: access, availability, stability and utilization. The concept evolved in the last two decades and the focus moved to the most vulnerable creating links, new scenarios and programs such as the Concern's Realigning Agriculture to Improve Nutrition (RAIN) program, the Scaling Up Nutrition (SUN) movement or the adaptation to the Nutrition necessity of the Farmer Field School (FFS) approach.

In 2011 the International Food Policy Research Institute (IFPRI) worked on this nexus scenario of possibilities and then published a report of the Leveraging agriculture for improving nutrition and health conference held in New Delhi. At this conference the importance of linking Agriculture, Nutrition and Health was underlined (IFPRI, 2011). The prevalence of undernourishment in Sub Saharan Africa has declined from 33.3% to 23.8% between the 90's and 2014 but there are still more than 200 million people affected. The health's direct and indirect effect of malnourishment on people, especially during childhood, affects over 43% of the population. Despite the improvements, stunting, underweight and micronutrients deficiencies remains high, even where the access to food is no longer a problem (FAO, 2014). Access to health services is fundamental, particularly in the rural areas. Additionally with these initiatives it is possible to respect the idea of the right to food and not to be fed expressed by the UN High Commissioner for Human Rights, which explain that the conditions that have to be provided are related to an enabling environment where people can procure themselves adequate food for their families respecting their own dignity and not just the supplies (UN, Fact sheet 34).

Immediately after the mentioned conference several agencies working in the development field started to redesign their Agricultural programs to better address those links. Numerous partnerships were created with the new perspective on Agri-Food system research in order to look beyond food production in a more comprehensive view of the joint effort of the sectors. Strengthening human capital to focus on the poorest led to a cross-sectoral action at the community level. (IFPRI, 2011)

Essentially the initiatives started are working on four basic aims:

1. Ensure adequate food supplies in terms of quantity, quality and variety. A study carried out in Gambia showed that shortages of food usually coincide with the rainy season and have as impact an increased incidence of diarrhea, respiratory diseases and malaria.
2. Optimize stability in food supplies and in their prices because seasonal changes often place a severe stress on the ability of maintain an adequate and balanced food intake;
3. The price volatility - due to increase in biofuel production, financial activities, population and demand growth or unpredicted natural hazards - affects the adequacy, sustainability and accessibility to supplies by all who need them.

4. Secure sustainable access for all, avoiding gender, age or groups disparities promoting, where needed, home-gardening as a supplemental source of food supplies.

Of course the Farmer Field School is not the sole approach providing solutions to address those needs but has the potential to contribute improving household food security among in the most vulnerable districts (WHH, IFPRI and Concern Worldwide, 2011).

The ability to overview necessities and risks is anyway limited and to address this information problem the FAO developed the Food Insecurity Experience Scale (FIES) as a tool to fill the gap in global food security monitoring, particularly for assessing the access dimension at not national level but at the individual and household level (FAO, 2014). This deeper understanding of the individual lacks are due to the fact that the households farmers are the most in need because they often rely exclusively on their own products and to stay active and healthy to work in the fields an adequate and balanced diet is necessary (Larsen, 2014); even though it is necessary to distinguish poor farmers from resource-poor farmers (Heemskerk and Davis).

The strategies promoted by the FFS for dietary diversification and balanced nutritional intake include the promotion of mixed cropping and integrated farming systems, the promotion of home gardens and small livestock, the promotion of fishery and forestry products; additionally the strengthening of small scale food production, generating income and providing nutrition education to encourage a sustainable and adequate consumption.

Strengthening Community-Based Organizations (CBOs); as a Panacea to Poverty: A Study of Kibera Slum, Nairobi, Kenya

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Achieving Sustainable Development Goal 1- “End poverty in all its forms everywhere” with the first Target “By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions” demands that more strategic efforts need to be put in place to build on the success of Millennium Development Goal 1 which brought a decline from 1.9 billion in 1990 to 836 million in 2015.

One of such strategic efforts is to leverage on the existence of Community-Based Organizations (CBOs) or other self-help groups existing in least developed countries of the world. This study hopes to evaluate the roles that Community-Based Organizations (CBOs), empowered or strengthened, can play in an effort to catalyze or stimulate the process of community liberations from the trappings of poverty. The study focus is Kibera Slum, Nairobi, Kenya.

Nairobi is the 14th largest city in Africa with 6.54 million population and it is home to one of the largest slums in the world, Kibera Slum, which has about 250,000 population with most of them living on less than \$1.25 a day. One of the marks of successes of previous interventions in Kibera Slum is the successful formation of over 20 Community-Based Organizations (CBOs). These Community-Based organizations (CBOs) are recognized, encouraged and licensed by the Government of Kenya to function. These CBOs have their areas of focus or specialization within the community. Though membership is voluntary but a great sense of loyalty and conformity are expected of each member.

Previous studies on CBOs in Kibera Slum have been largely focused on the health sector, especially their relevance in the delivery of Anti-Retroviral Therapy. Despite community and institutional support, though with little material support, the potentials of CBOs becoming a system that generates “heat” within or a catalyst to begin and sustain the process of households in Kibera exiting the trappings of poverty has not been fully studied. Therefore, this study aims to explore these potentials by evaluating the CBOs and assessing their capacity to catalyze the process of poverty reduction in Kibera Slum.

Both primary and secondary data will be required for this study. This will necessitate the need to make use of a blend of qualitative and quantitative research methods in order to explore the available sources of information. Further broken down to use of questionnaires and focus group discussions for primary data, while secondary data source will be the Government of Kenya. The information gathered in the course of this study will be critically analyzed for the purpose of easy evaluation of the research. The responses of respondents will be analyzed using simple frequency counts, percentage, charts, mean, standard deviation and paired t-test. However, the focus groups discussions will be reduced to the most significant points.

The success of this study can be scaled up to other slums in Nairobi and to all other communities In Africa and Asia where deliberate efforts are made to target households trapped in poverty. Therefore, global efforts to reduce poverty will have tremendous impact on the remaining 836 Million people living in extreme poverty. However, with a completely adopted strategy of empowering CBOs working as catalyst to bring about the needed change from within.

Sustainability Science from SDSN Northern Europe

Future sustainable living (SDG 11)

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Cities are becoming increasingly bigger and are attracting ever more dwellers. Today, more than 50 % of the world’s population is estimated to live in cities, and the proportion is expected to continue to increase rapidly in the foreseeable future. This makes it

tremendously important to work to achieve an increased sustainability of urban life. Not only do we need to develop and put new technologies and solutions to use, we must also endeavor to influence human behavior in order to increase the likelihood of people acting in a sustainable fashion, and provide the motivation and awareness needed to embrace a lifestyle that can be supported by the world's limited resources.

There is no shortage of projects that aim to find and explore new ideas and avenues to improve the sustainability of urban life. In Gothenburg, Johanneberg Science Park has assumed a coordinating role for urban sustainability initiatives to effectively realize the vitally important goal of creating a sustainable city.

Johanneberg Science Park creates open interaction platforms "Open Arenas" for interdisciplinary exchange of ideas and knowledge between academia, industry, research institutes and society actors. Science Parks act as drivers and catalysts of sustainable innovation.

Johanneberg Science Park develops demonstration projects in collaboration with its owners, and since a great deal of focus is placed upon sustainable urban development at the park, projects tend to naturally concern areas such as living environment and issues related to housing. Sweden has, along with the rest of the world, both expansive plans to build more accommodation for its inhabitants, as well as great challenges associated with reaching the UN's goal on sustainability. In collaboration with two of Sweden's largest construction companies with around 1 000 000 members together, HSB and Riksbyggen, two projects are currently developing regarding future housing seen from all conceivable aspects of sustainability.

Riksbyggen; Positiv Footprint Housing

Positive Footprint Housing: Research and learning run in parallel with construction projects that focus on social sustainability, energy efficiency and reduced environmental impact. Together with Positive Footprint Housing, Riksbyggen seeks to create homes that are environmentally, economically and socially sustainable. The project will result in increased environmental, social and economic sustainability, where the gained insights and lessons will get their first practical application at the Housing Association Viva, with 132 apartments in Guldheden, next to Chalmers campus area in Gothenburg.

<https://www.johannebergsciencepark.com/en/projects/positive-footprint-housing>

The project wish to stress that sustainable building cannot be reduced to single issues to be addressed separately. We firmly believe that the way forward towards a sustainable future must be that of transparent efforts, integrated measures, and ambitions of transition rather than incremental improvements. This is that we have strived to achieve. And we are simultaneously genuinely proud of the fruits of our efforts, and impatiently curious of where our next project will take us.

HSB Living Lab

How should we live in the future? In an initiative by Johanneberg Science Park, HSB and Chalmers, 12 partners are collaborating in a project for future sustainable living. HSB Living Lab is a research and demonstration arena which also includes homes for students and guest researchers. In the 29 apartments of the living lab, equipped with monitoring stations and sensors, 33 people live in a changing building where the walls, facades and interiors develop as the research progresses.

The building is located on the Chalmers campus in Göteborg. Short and long-term research projects will be taking place inside HSB Living Lab throughout the project's ten-year life span. Living Lab offers a unique infrastructure including real and realistic living and working settings for conducting design research activities in close collaboration with future users, industry and other relevant stakeholder involved in the development of innovative technologies.

<http://hll.livinglab.chalmers.se/>

GAME Network - The GAME changer for sustainable development

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Gothenburg Action for Management of the Environment (GAME) is a network that brings together business with authorities and research organizations, with the purpose to strengthen the regional development in Region Västra Götaland within innovation and environment to contribute to sustainable development.

GAME has been actively involved in regional development since the mid 90's and has the following vision: West Sweden should lead the contribution to sustainable development.

The network wants to contribute to a region where:

- Fossil dependence and environmental impact have decreased
- Skills and resources are utilized and developed
- Innovative solutions are demonstrated and spread globally
- It is attractive to live, act as a company and cooperate within the region

GAME focuses on actively supporting collaboration between business, authorities and research organizations, with the aim of driving the development of innovation and environmental technology in West Sweden by:

- Providing a meeting place for networking with the purpose of widening West Sweden's participation in national and internationally funded demonstration projects in innovative environmental technology
- Contribution with knowledge for regional sustainability efforts through activities and investigations aimed at identifying opportunities and solutions to current environmental

problems and societal challenges

- Provide strategic environmental monitoring

Several challenges exist, e.g climate change and the need to plan and create sustainable cities. GAME engages in complex societal challenges and attracts key players to contribute to common goals, such as sustainable urban development, transport and energy. Together solutions can be found which are only possible through collaboration. The network also works to spread regional business solutions to the global arena, e.g through collaboration with SDSN Northern Europe.

The GAME network has initiated several innovation action projects within different arenas. One example is Climate Neutral Freight Transport (KNEG). The aim of KNEG is to show how climate impact from freight transportation by road in Sweden can be reduced through various measures. The projects focuses mainly on shipping efficiency, fuel production, vehicle efficiency, and expanded use of renewable fuels, <http://kneg.org/english-summary>

More examples of events and reports that GAME network has contributed with can be found at www.gamenetwork.se.

GAME's steering committee consists of representatives of West Sweden companies, research organizations and authorities and these are: SCA, SKF Sweden, DB Schenker, Babcock & Wilcox Volund AB, Port of Gothenburg, Ramböll, Chalmers University, Region Västra Götaland, County Administrative Board of Västra Götaland, Swedish Agency for Marine and Water Management, Business Region Göteborg, University of Göteborg's Environmental Science Center, University of Göteborg, RISE, IVL, Innovatum and Göteborg & Co.

GAME's project office is based at the University of Göteborg's Environmental Science Center (GMV) at Chalmers University of Technology and the University of Göteborg.

Sustainable Blue Growth

Scaling up the dissemination of aquaponic systems through the conversion of brownfield sites in Italy

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Aquaponics is a production system combining aquaculture recirculation with hydroponic cultivation in a unique cycle. The main benefits of this System are the considerable returns in production, as well as a rational and wise use of water and soil (it requires 90% less water than traditional agriculture systems). In addition, aquaponics enables the control of pollution factors, ensuring the production of secure, high-quality food. Indeed, aquaponics does not require the use of chemical agents for fertilization, given that the plants' nutrition is provided by organic – and therefore sustainable – sources (i.e. fish waste).

In Italy, aquaponics is a growing business, but the public opinion remains little informed about such an opportunity, and awareness-raising activities in this field are still inadequate. To date, the main aim of the few aquaponic players is to sell expensive aquaponic facilities and obtain the related returns. However, the effective economic and environmental benefits of this system could be obtained only through a larger and well-established market.

Therefore, we want to promote the dissemination of aquaponic systems by upgrading unused urban spaces. In order to do so, we need to operate in several directions. First, the creation of community aquaponic gardens. Second, the use of such community gardens to supply farmed seafood to production facilities. Third, the promotion of aquaponic consciousness and its advantages among the public opinion, planning awareness-raising activities and involving volunteers from all over the world.

Through the use of urban farming techniques we have the opportunity of achieving many of the Sustainable Development Goals. In Italy, soil sealing is soaring despite the countless unused urban spaces. We trust that if we give the chance to communities to build and use aquaponic systems that don't require the conversion of agricultural land, we will reap the full range of environmental and social benefits. This system is an opportunity to improve local food availability in the face of a growing global population and of shrinking agricultural land.

Brownfield sites are abundant in many countries, including Italy, but their conversion to rural fields could be too expensive. Instead, by using recycled materials it is possible to make the installation of aquaponics relatively cheap and easy to move around the city, involving as many people as possible in the use of this technology. In turn, this will create the necessary conditions for the establishment of a network of loyal customers of healthy and safe food, as well as the provision of services including consulting and design of new facilities. Finally, shops and restaurant could be provided with an additional source of income through the sale of locally-sourced seafood products.

At this stage, our project is looking to establish connections among national and international stakeholders in this sector, as well as to receive support for the construction of our first aquaponics facility.

Mapping the Shark Value Chain in Ghana: Past Lessons, Present Challenges, and Future Opportunities

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Elasmobranch species, including sharks, skates, and rays, are caught as targeted species and bycatch in Ghana. Both the targeted and bycatch shark fisheries provide locally-consumed animal protein, and a source of income for artisanal fishermen. Artisanal fishermen harvest meat for the local market, while shark fins and other products are destined for the lucrative export market.

Since the 1980s, following China's "reform and opening-up" period, Shark fin consumption has grown astronomically. High demand for shark fin in China has left global shark populations in peril. Heightened media attention and substantial lobbying

from conservation organizations and celebrities has pressured governments to regulate and, in some cases, ban shark fin trading and the gruesome practice of shark finning. These efforts, along with changing tastes among Chinese youth, have resulted in sharp declines in shark fin consumption.

However, a significant paucity in fisheries data, especially in the developing world, makes it difficult to assess the true extent of worldwide trade in shark products. On the Ghanaian national level, inadequate catch/landings data and socioeconomic data hampers the ability of the government to implement sustainable fisheries management policies. This data is also necessary for policymakers to determine the effects that the declining demand for shark fin and other products has had on artisanal fishermen.

Mapping the shark value chain is a first step in understanding who benefits from the shark fishery, how they benefit, and how policy interventions, at different levels of the supply chain, can ensure the sustainability of the shark fishery in Ghana. Using semi-structured interviews and ethnographic observation, I will collect key catch/landings data and socioeconomic data in Shama, Dixcove, and Takoradi.

My goal is to thoroughly understand the linkages between artisanal shark fishermen, buyers of shark meat and fins, processors, sellers, middlemen, exporters, and other players in the shark trade in Ghana. Understanding these linkages, and who benefits at different levels of the value chain, is imperative to crafting good fisheries management policies. Value chain analysis is critical to identifying areas of improvement in the infrastructure, regulations, and other factors impeding expansion of economic activities.

Sustainable Consumption and Production

Informal economic activities in Peru: A misleading path for economic growth and how to improve this situation

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Creation of new businesses and jobs are elemental requirements for economic growth of any country, but what happens when those new business and jobs are only possible without respecting basic rules, such as paying taxes, respecting labor rights or having function permits? This is the paradox faced by many developing countries, when we talk about informal economic activities, its capacity to boost the economy and how to transit towards formality in a successful way.

In Peru, several variables have contributed to ease informal economic activities, for example, a non-friendly tax framework for entrepreneurs, difficulty to obtain function permits, the social permissibility to this situation, among others. On the other hand, companies which comply with the law are in disadvantage with informal companies, due

to higher costs they have to assume. In the long-term, formal companies can be tempted to “cheat” if they consider this situation as an unfair competition that affects its business and they don’t trust in authorities for finding a solution.

Our analysis includes the review and evaluation of some examples of informal activities performed by individuals or small groups, and two activities made in large scale: illegal mining and illegal logging. Besides, we will appraise the impact of social permissibility with this situation, the difference between craft production and informal production, and finally, a few ideas to address with this issue, based on using of technology and leveraging on social commitment for finding sustainable solutions.

With this paper we expect to contribute to open the discussion about this topic, which has a great potential to transform the business environment of several developing countries which face a similar situation. Our governments must explore new approaches to solve this issue, which at the same time is an opportunity to foster economic growth, improve the quality of life of people and increase public resources.

The Consumers, the variable that completes the equation of sustainable and low emissions development: Sustainable practices on the demand side

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There is a positive relationship between current consumption patterns and emissions, as well as between consumption and sustainability. So far, the most climate mitigation action has followed a top-down approach, focusing on governments and business. There is currently a significant gap between the emission reduction contributions of the countries, presented at the Paris Summit of 2015 and the mitigation actions really needed to not exceed 1.5 ° C of global temperature increase. Therefore, scientific evidence warns of the catastrophic negative impacts, current and potential, of overcoming such a temperature limit, both for the planet as for humans and its civilization.

Behavioral changes in consumers have great power and potential to significantly reduce the environmental pressures and impacts. Sustainable practices of consumers are fundamental because they have the virtue and great power to significantly reduce environmental pressures and impacts, and at the same time to pull governments and companies to shift the paradigm of unlimited consumption and production, deep ingrained in our model of development. The sooner consumers and its sustainable practices are included as a key variable within the equation of sustainable and low in emissions development, the sooner we will positively tilt the scale towards the urgency to act to increase ambition and to accelerate the implementation of the necessary mitigation actions to maintain the climate within safe limits.

Given the wide variety and dispersion of studies on the sustainable practices of consumers, and even more about the underlying processes and factors under which

consumers adopt and promote sustainable practices. This study is based on a complete review of the literature and a comparison of several relevant case studies to: i) provide a synthesis of the current sustainable practices of consumers on their way to achieve sustainable lifestyles, some of one, which even could be considered as a lifestyle that change the identity based on consumption. (ii) To propose an analytical framework that will contribute to the understanding of what are the factors that favor the decision-making of consumers to adopt and promote individual or collective sustainable practices, that increasingly increase severity environmental stringency.

The proposed analytical framework constitutes a contribution to knowledge in the aspect of demand, which is acknowledged to have been little worked. And therefore, it can be very useful for: (i) consumers to now and have a better understand the types of sustainable practices that they can implement, (ii) decision-makers and public policy-makers as a tool for designing policies, and (iii) the scientific community, through constructive criticism and its proof by other specific cases or novel studies.

An Evaluability Assessment of a Sustainable livelihood in a Haitian Refugee Camp

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In Haiti, there is a shortage of formal sector jobs that pay a dignified wage, especially among women. Rebuild globally, a nonprofit organization, wants to reproduce the sustainable success of their sandal manufacturing social enterprise (which employs 16 women and one man) in other vulnerable communities in Haiti and beyond.

There are two situations which have exacerbated the already bad employment situation in Haiti. The first of these was the devastating earthquake of 2010. The second is the legal action by the Dominican Republic, which retroactively rescinded the immigration status of anyone of Haitian heritage who had come into the country after 1929. This has led to about 60,000 people living in refugee camps just inside the Haitian side of the border between the two countries. Among the humanitarian issues raised by this situation is the almost complete lack of employment within these camps.

On January 12, 2010, there was a massive 7.0 magnitude earthquake which resulted in thousands of lost lives and considerable destruction to Haiti's already crumbling infrastructure. Close to one million people were left homeless. Much of the damage remains to this day, and the already struggling economy was devastated.

Haiti has widespread unemployment, and the jobs that do exist are often in the informal sector and do not pay a wage which is sufficient to allow a person to live with dignity and self respect.

Normally when we talk about entrepreneurship projects in a developing country, we are talking about small one-person endeavors like a bicycle taxi or a woman with a sewing

machine. The problem is that when there is high unemployment in an area, there tends to be a glut of these types of jobs, leading to competition in these areas and pushing down the prices they can charge.

What they really need is real structure that fills local needs and employs at least a handful of people. Ideally, there would be a variety of such organizations across the country, staffing local people and improving the economy. This type of employment would also raise the skill level of the workforce, boosting Haiti's chances of attracting foreign business. This is the need that REBUILD globally is addressing.

REBUILD globally was born from the disaster of the 2010 Haiti earthquake, embarking on a mission to provide a sustainable, entrepreneur-driven solutions for survivors. REBUILD globally's goal is to replace the conventional methods of charitable aid with a thriving social entrepreneurial ecosystem. REBUILD globally has been improving the lives of those most affected by poverty and the earthquake for seven years by creating a comprehensive training program and subsequent employment opportunities. This is done through the creation of a local fashion brand and Haitian business, Deux Mains Designs.

REBUILD globally has trained, equipped, and empowered over 30 Haitian people to become trained leadership and craftsmen for Deux Mains Designs. This self-sustaining business produces fashionable, high-quality sandals from up-cycled (repurposed) tires for sale in the international market place. Each craftsman and woman has reached a level of self sufficiency with safe and secure housing. They receive enough money to provide education, nutritious meals for their families, and the ability to accumulate savings for long term impact.

Recently, REBUILD globally has also begun tackling the widespread unemployment issue that plagues the refugee camps along the border of the Dominican Republic. They have set up a shop in Fonds Bayard, one of the camps, to cut the soles out of recycled tires that will be made into their signature sandals at their main shop. The plan is to expand and set up other cutting shops in all five of the other camps. This will dovetail with future expansion of the assembly shops into other areas across Haiti.

My field practicum project is to standardize and document the existing Deux Mains sole cutting shop at the Fonds Bayard. The deliverable is a manual which functions on two levels: first it will document the the structure and procedures within the shop, and second, it will document how the manual itself was put together, in order to be a useful guide for the construction of future manuals for related ventures that will follow. Included in this manual will be a monitoring and evaluation plan.

State of the art in development of physical supply and use tables for the Czech Republic

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Sustainable consumption and production aims at “doing more and better with less,” increasing net welfare gains from economic activities by reducing resource use, degradation and pollution along the whole lifecycle, while increasing quality of life (UN, 2017). In order to measure resource use and to mitigate the related problems, material flow analysis has been conceived. The aim of this accounting and analytical approach is to monitor material and energy flows at various levels of detail, and to provide indicators which contribute to management of resource use and pollution flows from both economic and environmental points of view (OECD, 2008). The economy-wide material flow analysis (EW-MFA) treats the economy as a black-box monitoring overall input and output flows only while inter-industry physical flows are neglected. In order to increase analytical potential of this tool, it is advisable to construct a physical input-output table (PIOT) which shows input of raw materials and products by industries, inter-industry deliveries of products and a breakdown of output products and waste residues by industries. Data from PIOT can be used to analyse physical flows, considering the economic activities and structural changes that lie behind these flows, to analyse technological change, material substitution and to assess the effectiveness of policies targeting at sustainable consumption and production.

Input-output tables in monetary units are regularly compiled by statistical offices. This is not true for physical input-output tables, as compilation of PIOT is a labour-intensive task involving many data entries. The procedures for compilation of PIOT are defined in the System of Environmental-Economic Accounting (SEEA) (UN et al., 2014). PIOT is composed of two basic building stones: physical supply tables and physical use tables (PSUT). While physical supply tables set out the flows relating to the production, generation, and supply of natural inputs, products and residuals by different economic units or the environment, the physical use tables set out the flows relating to the consumption and use of natural inputs, products and residuals by different economic units or the environment.

The poster summarizes main principles for compilation of PSUT and presents state of the art in development of first ever PSUT for the Czech Republic for 2014. It is shown that the availability of physical data in mass units is medium to high for most parts of PSUT. The unavailable data include the intermediate consumption of products and accumulation of materials in physical stock of the economy, for instance. These data are estimated with the help of proxy variables such as use tables in monetary units and applying the balance identities for products and all materials entering and leaving the economic system.

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Moving toward Sustainable Production: Cross-industry Evidence from China

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Shifting unsustainable production and consumption is considered as one of the essential requirements for achieving the SDGs. China, one of the world's production houses, has become the largest greenhouse gas emitter. Its environmental impacts were felt beyond borders, especially in neighboring countries. By the same token, China's action on the environment has implications for the world. Beijing has been criticized for lax environmental regulations over the past decades. However, it has recently amended the Cleaner Production Promotion Law. Facing stricter regulations, how did Chinese companies deal with environmental challenges? Can stricter environmental regulations trigger eco-innovation? This communication seeks to answer these questions by presenting our theoretical framework, empirical research and findings to shed light on corporate environmental practices through programs and institutional responses ranging from regulations to economic instruments.

The theoretical framework consists of a theory of social change and a hypothesis in strategic management, namely the ecological modernization theory and the Porter hypothesis. The framework combines perspectives claiming regulation-induced innovation that would enhance economic growth and environmental quality. One emphasizes strategy and competitiveness; the other focuses on institutional developments in industrial restructuring processes. The research examined the interactions between technology, production and policy contexts to identify sustainable solutions for production systems. My first hypothesis assumes that Chinese firms used technologies, changed their strategy and management practices to meet environmental requirements. The second proposes that stringent regulations, market factors and social dynamics influenced implementation of environmental measures. The study is based on mixed methods and multi-level analysis by examining individual and system level factors associated with technological change. A two-year survey (2013-2014) was conducted in over a hundred firms in fifteen industry sectors from the Pearl River Delta region, known as the "factory of the world". Supplementary primary and secondary sources including participant observation, interview and environmental audit report enabled to bring a comprehensive understanding of changing relations between companies, state, market and civil society. We employed a comparative analysis of corporate environmental

actions within and across industry to identify determinants for resource efficiency, cleaner production and eco-innovation.

Heterogeneity was revealed by corporate responses in environmental strategies, which led to different technological choices to make environmental improvements. The majority of the surveyed firms complied with regulations and took various resource efficiency measures. Many participating companies moved to cleaner technologies. But only a fraction of them undertook eco-innovation. An empirically derived typology of enterprises is comprised of four enterprise types: “laggard”, “repairer”, “follower” and “eco-innovator”. The “laggard” had neither strategy, nor technology to improve environmental performance. On the contrary, the “eco-innovator” developed not only a proactive environmental strategy, but also cleaner products or production processes. The “repairer” used abatement measures and the “follower” adopted proven prevention technologies. Our findings supported to some extent the theoretical claim. Stringent environmental regulations may induce innovation to improve both economic and environmental performance. But the win-win situation is more likely to occur in firms with a strong environmental commitment, innovative capacities and substantial financial resources. Market pull and technology push were necessary but not sufficient to drive eco-innovative activities, especially those related to production processes. Therefore, policymakers need to design and implement measures to strengthen corporate innovative capacities and facilitate partnerships between stakeholders in order to create incentives for eco-innovation.

Redressing the (Unspoken) Dignity Gap - Thailand's 'Phook-Pinto-Khao' Project, Sufficiency Economy Philosophy, and How to Slingshot to SDG#16 via SDG#2, et al.

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It has been astutely observed that the remarkable aspect of post-2015 development agenda lies not so much in the expansion in scope and ambition vis-ö-vis the Millennium Development Goals, but in the conceptual leap from as-usual ‘North-South Aid/Assistance’ modality towards genuine ‘Global Responsibility’ conviction. The affluent, techno-industrialised North has just as much future survival at stake, economic growth paradigm to rethink, and burden to self-discipline as the hitherto-impooverished, subsistence-agriculture South. Aid-recipient countries of the South are imbued with renewed sense of dignity knowing that at the very least they are not the ones consuming more than their fair shares of natural resources, and in many cases are the ones making positive contribution in terms of carbon sequestration and climate stabilisation.

In Thailand, as with any other transition economies, an analogous ‘North-South’ division manifests itself locally as the ‘Urban-Rural’ gap in terms of wealth, economic opportunity, and standard of living, but also (and in our view more importantly) in terms of social status and a sense of dignity. This paper describes Thailand’s ‘PookPintoKao’

project, which whilst professedly enlists the participation of Bangkok urbanites to help improve the livelihood of rural rice farmers---addressing SDG#1, SDG#2, SDG#3, SDG#8, SDG#10, SDG#12, and SDG#15 along the way---was conceived from the very beginning to redress what we call the ‘Dignity Gap’ that exists between rice-consuming urbanites and rice-producing country folks, thereby promoting just, peaceful, and above all inclusive societies (SDG#16). This is particularly pertinent given the country’s past experiences with social-political unrests, perhaps borne out of years of rural farmers feeling indignant at being treated as second-class citizens.

The name ‘PookPintoKao’ derives from traditional practice whereby urban households---especially middle-income earners with neither time/inclination to cook daily meals themselves nor able/willing to eat out on a daily basis---subscribe to neighbourhood kitchens on long-term contracts to provide daily meals in Pintos (Thai tiffin boxes). Invoking this convenient arrangement, in the ‘PookPintoKao’ project urban households (the “brides”) would pay upfront for organic, high-quality, even exotic-variety, rice directly to growers (the “grooms”), both parties having been vetted by Facebook-based ‘PookPintoKao’ project volunteers (the “matchmakers”).

Section 1 describes the social-economic-political background as well as our personal inspiration for this project, reflecting Thailand’s Sufficiency Economy Philosophy, itself inspired and promulgated by H.M. King Bhumibol Adulyadej of Thailand as the paradigm for pursuit of sustainable development w.r.t. all spheres of our social/cultural, political/economic, and ecological/environmental lives. Section 2 describes key aspects of the ‘PookPintoKao’ programmes, the mechanisms by which they promote improved nutrition and sustainable agriculture, sustainable employment and decent work, whilst at the same time halting/reversing land degradation. Section 3 describes what is meant by reducing ‘Dignity Gap’, with rice-consuming urbanites feeling indebted to, rather than economically burdened by, rice-producing fellow countrymen. Section 4 describes how the ‘PookPintoKao’ model had been successfully emulated/franchised by other Thai activists, capitalising on revitalised private-public partnership. Section 5 concludes by discussing the relevance/applicability of the ‘PookPintoKao’ model in any other sustainable development context, not just for Bangkok urbanites and Thai rice farmers.

Digitalization as Enabler towards a Sustainable Circular Economy in Germany

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Moving towards more sustainable patterns of production and consumption have been globally agreed in the Agenda 2030 with its Sustainable Development Goals (SDGs). A special focus is also given to retrofit industries for increased resource-use efficiency in particular in the goals 8, 9 and 12. The German economy also needs to modify further its current ways of production and consumption to save more resources and to avoid more

waste. The increasing digital networking in complex industrial production and processes also opens up new potential for more sustainability. This paper delivers the first empirical findings on the relevance of digitalization to improving material efficiency in German industry. The analysis uses a unique dataset, for which survey data was specially and exclusively collected. It consists of responses from almost 600 German manufacturing firms taking part during the summer of 2016 in the representative survey ‘IW-Zukunftspanel’, which is carried out regularly.

There seem to be still barriers in German firms to digitalize their processes more. One main result is that efficiency-raising measures aimed at saving or circulating materials are only rarely heavily digitalized in the German manufacturing industry. Two main points of the analysis are:

1. To use less material: As a result of limited natural resources in the face of an increasing global demand for raw materials many German industrial firms are already taking measures to minimize their resource consumption as much as possible. Traditional efficiency-raising measures that optimize manufacturing processes are still predominant in the manufacturing sector, but new techniques and materials are also used. In many firms digitalization has already taken place, but very often only to a moderate extent. Furthermore, one in three companies is not yet digitalized.
2. To use resources more than once: In future thinking in complete cycles by looking at the entire life cycle/spectrum of a resource – from its preparation through its use up to its aftercare through recycling (circular economy) will be crucial to further increase resource efficiency. The basic course for a modern circular economy is not set yet in many manufacturing firms: saving materials on a broad scale as early as the product design stage, through materials cycle management or new business models are not very common yet. The results also show there is still more potential for more digitalization of these circular-economy relevant measures.

Addressing the gaps in sustainable consumption and production practices for Rwanda’s rural populations

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Despite urbanizing at a rate of 6.4 percent per year, over 90 percent of Rwanda’s population still engages in small-scale agriculture. With roughly 490 persons per square kilometer, Rwanda is the most densely populated country in Africa. And while it is outpacing many of its development targets, Rwanda is ranked the 18th poorest country in the world and 51 percent of families have difficulty accessing food consistently throughout the year.

Most Rwandans rely on their land as a source of food and income. Although acute malnutrition has dipped and stayed below 5 percent, 38 percent of Rwanda’s children

under five continue to suffer from chronic malnutrition. This means that while most young children are receiving enough calories, many are not absorbing sufficient micro- and macronutrients during a critical window of growth, the first 1,000 days.

Gardens for Health recognizes that in rural households, nutrition insecurity is caused by both a lack of essential food-related access as well as inadequate access to information. Since 2010, our organization has been conducting integrated interventions that address these interrelated issues, providing agricultural resources such as seeds, vines, trees and small livestock alongside essential nutrition, health and agricultural training. And the outcomes have been promising. Graduates of GHI's Health Center Program grow, on average, 7 different types of vegetables – a major improvement considering that at time of enrollment the average family grows just 1.4 (mirroring national averages at baseline). Consumption patterns are improving as well. Nationally, only 29% of children in Rwanda meet the standard for minimum dietary diversity, meaning that less than one third of all children consume four or more food groups each day. Among graduates of GHI's program, that number immediately rises to 62% and remains at 44% after 2-5 years. The percentage of children consuming iron and vitamin A-rich vegetables also increases by an average of 47% to 87%.

These outcomes not only help us understand the links between agriculture and nutrition in Rwanda, but also only comprise part of the bigger picture. To withstand the pressures of climate change and rapid population growth, farm land must be resilient. As soil health degrades, so does production (and therefore consumption) of nutritious food in the home. Poorly-nourished soil yields less nutritious crops, thus perpetuating a cycle of nutrition insecurity among vulnerable smallholder farmers.

Furthermore, the link between soil health and health outcomes extends beyond closing the production and consumption gap alone. Rather, we must invest in agricultural solutions that improve crop biodiversity while also promoting household dietary diversity. At Gardens for Health, we are demonstrating the potential that an integrated model - rooted in principles of conservation agriculture - can have on both crop diversity and food security.

In Rwanda, the need for sustainable food production is especially great, with 55% gradient slopes of problematic land upon which the poorest farmers depend. Gardens for Health collects data on strategies to improve soil health, increase water management efficiencies, and incorporate integrated tree-crop-livestock farming.

At the ICSD conference, GHI would be presenting our findings on which strategies are working, where we face challenges, and how we can continue to integrate agriculture and nutrition for sustainable food production and consumption in rural Rwandan households. We would also demonstrate how investing in sustainable nutrient security today equips the next generation of Rwandans to meet their full potential for generations to come, and our policy and programmatic recommendations to make this a reality.

Global Goods and Mining Across Diverse Landscapes: Sustainable Livelihoods and Challenges

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Global efforts linking consumption to sustainable production have often used supply chain due diligence, or relied upon national responsiveness to impact variables ranging from fair trade, child/forced labor, environmental impacts, to democracy and human-rights. As a production activity for technology, mining of non-fuel resources has a global presence, and offers a cross-cutting case study of these impact variables. Similarly, consumption, down a long and tangled supply chain but sometimes channelized market, has a global presence. For both production due diligence efforts, and for consumers, tracing back to mined resource impacts is challenged by the availability of information and variable, sometimes lacking, linkage to SDGs.

This paper addresses key commodities in established and emerging technologies,,including so-called “green” engineering,,and highlights the most relevant impact variables for different production locations. This paper will review the internationally impactful legal norms, including those arising from the U.S. (so-called “conflict minerals” under Dodd-Frank, which include tin, tantalum, tungsten, and gold), developing OECD guidance, and other developed country laws, as well as examine targeted country domestic enforcement of labor, environmental, and other applicable legal frameworks. This paper will also revisit the application of the “natural resources curse” along the supply chain for these key commodities, for those same communities with high dependence on extraction, and specifically artisanal and small-scale mining, or ASM.

Finally, this paper will examine the meaning of several SDGs for those most vulnerable and impoverished mining-dependent communities. Mining invokes cross-cutting issues of access to clean water, decent work, including the attendant health and safety risks associated with an inherently dangerous activity, and entrenched equity concerns. SDG indicators and targets related to mining will be examined and highlighted for those areas of strength and also areas for continued improvement and refinement. Lastly, these indicators and targets will be cross-referenced to existing policy and legal frameworks.

Sustainable Development Challenges in Urban Areas (Climate, Water, Natural Resources, Transportation, etc.)

Urbanization and Equitable Service Delivery: An Analysis of Water Supply in Korail Slum, Dhaka, Bangladesh

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In the Summer of 2017, I conducted my field practicum in Dhaka, Bangladesh working with BRAC Institute of Governance and Development (BIGD) and the Urban Development Programme (UDP) sector of Bangladesh Rural Advancement Committee (BRAC) Non- Governmental Organization (NGO). My study location was Korail Slum, an informal settlement located in the urban hub of Dhaka City. My objective was to perform a comparative assessment of the provision of drinking water within two wards of Korail Slum: Korail Unit Ward 19 (receives legal, adequate water supply) and Beltola Unit, Ward 20 (receives illegal, semi- adequate water supply).

Through country visitation in Bangladesh, ethnographic observation of the two different wards of Korail slum, and data collection from the semi structured interviews with Korail slum inhabitants, I observed the degree of autonomy and agency of the different zones in relation to their accessibility, affordability, and safety with regards to adequate drinking water. I then effectively communicated some of my comparative findings with the different stakeholders involved in the initial process of bringing a formal source of water resource provision to the slum community. During this sharing of information, I conducted semi structured interviews with the multiple stakeholders involved including 1) Dhaka Water Supply and Sewage Authority (DWASA), 2) NGO: Dushtha Shasthya Kendra (DSK) 3) NGO: WaterAid, 4) Community Based Organizations of Ward 19, and 5) a short conversation with Community Based Organization of Ward 20; this primary data was used to clarify secondary data and research collection. The main objectives were to better understand the sustainable development challenge of drinking water supply in urban slums and how this impacts the livelihoods of slum dwellers. And additionally, how future sustainable programs can be implemented within the slum to meet the developmental commitment of DWASA to provide legal water supply connections to all the slums of Dhaka City by December of 2018, by motivating and encouraging creative collaborative efforts between stakeholders.

Inter-Cultural Dialogue, Social Harmony and Sustainable Development in the Urban Context

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Urbanization in the contemporary era is affected by different factors such as immigration, socio-economic challenges, crimes, racism and social distance between different groups. There is hence a web of complex challenges faced by urban areas. This web of issues cannot be neglected when addressing challenges around sustainable development. Using

a multi-dimensional and integrative approach is hence very essential in striving to achieve sustainable cities. This paper will emphasize on the need for a cultural component in achieving sustainable development namely inter-cultural dialogue. To achieve sustainable development in urban areas, it is of great importance to address issues related to racism and social distance. Only social harmony can allow a conducive environment for surmounting sustainable development challenges in urban areas. Due to its city dynamics, this paper will use Winnipeg as a case study to highlight the importance of inter-cultural dialogue for sustainable development. Winnipeg has one of the largest urban Indigenous population (in Canada) and a growing newcomer population. The two broad communities share a lot in common, namely aspects of history (colonial encounter), cultural values and socioeconomic challenges. Despite this fact, there is a striking social distance between the two communities which is manifested by negative perceptions and tensions. There is a need to foster a safe space for dialogue between the communities so that racism is not escalated in this urban context. For that, a collaborative approach should be taken between organizations serving the different population groups, grass-root lead initiatives and faith based institutions. Different methods can be used, such as creative arts, storytelling, cultural exchanges, visual arts and dialogue circles. These can allow communities to learn about each other and develop openness and good ties. Without such an approach, communities will remain segregated and distanced which in turn will negatively affect the environment around sustainable development. Only when society has harmony and cohesion that challenges can be worked on in an effective and constructive manner.

Solid Waste Management (Case on Armenia)

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Research Questions: Which PPP model (with both local and international private sector interest) could be the best fit for Armenia if the Government follows the gradual approach of PPP models?

Background: Recent studies in SWM show that PPP is a common practice in SWM, especially in developing countries, where the governments due to some problems have decided to manage the waste with the cooperation with a private partner. Currently, the Government of Armenia decides to follow this direction. Moreover, a range of studies carried out (USAID 2009; ENPI Waste Governance 2010; EBRD 2011; KfW 2012) in SWM sector in Armenia has been stated, that Armenia faces the same problems, such as limited financial resources, institutional weaknesses, inefficiencies, uncollected waste in public places; environmental problems; health problems; weakness in service delivery, inadequate facilities, public participation shortcomings, etc., as the other developing countries. According to these studies, the Government of Armenia itself could not deliver effective and valuable services and to have an improved infrastructure in this sector is doable with the gradual introduction of PPP (ADB, 2013).

The aim of this study: The aim of this study is to reveal the possible PPP policy and PPP model, which will be attractive for foreign/local investor and fit into the Armenian reality.

Method: The decision tree: A descriptive model would be used in order to decide whether to install a PPP project or not and if yes, which PPP model will be the best choice.

SWOT analysis and Cost-benefit analysis would be used to assess the most effective type of PPP for a given project.

This research would utilize information gathered through ex-ante and ex-post surveys to fully examine factors that could affect the presented PPP models in SWM.

Secondary data, benchmarking techniques would be used to understand PPP practices across the world, mainly in developing countries and countries with economies in transition such as Armenia.

Findings: It is hoped that the findings in this study will assist the government to choose the preferred course of PPP and get maximum benefits from PPP forms.

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Local Action Harnessed Nationally, Can Solve Sustainable Development Challenges in the United States: Creating a Scalable, Sustainability Network Model with Metric Driven Initiatives That Brings Global Issues Down To Local Action

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The strength to move the sustainability needle in urban areas lies in the untapped power of community organization in our 19,000 cities and towns across this country.

Background

In the face of ever more apparent challenges to the broader environmental, social and economic systems within which communities exist, there is growing awareness among community leaders of the interconnectedness between local and global systems

Research Question

What is the best and surest way to create sustainable behavior change in people across all sectors and silos, which would cause them to make decisions and take actions that would have a positive effect on the greater society and the environment across the board?

Hypothesis

The Live Green Connecticut Network is designed to support and enhance the interests of community leaders and key stakeholders in business, government, NGOs, schools, and houses of worship by identifying effective strategies for enhancing community resilience, vitality and sustainability that will not only address local needs and conditions in Connecticut, but will also support global issues by our ability to scale this model to the national level.

Methodology

The Live Green Connecticut Network will engage current community leaders and stakeholders and also develop new leadership in advancing current and new efforts for sustainability planning and collaboration, solution implementation, and tracking results. Live Green Connecticut, a team of leaders with expertise in community planning, collaborative change processes and web-based shared data systems will guide network members through a collaborative learning, leadership and networking process.

Process

◆ Identifying proven and promising practices for inter-municipal/community initiative/project implementation ◆

- ❖ Track results on key indicators
- ❖ Encourage learning and collaboration across communities and sectors to align efforts and create synergy and results
- ❖ Consider role models that have applicability or transferability to other municipalities and provide opportunities for inter-municipal implementation
- ❖ Provide opportunities for leadership training, development and regional network building with existing organizations.
- ❖ Metrics and reporting drive planning and implementation.
- ❖ Networking, sharing best practices, interaction and support from subject matter experts, collaborative planning, and connections to resources will accelerate change

Summary

By facilitating an ongoing conversation, supporting a dedicated network and providing ongoing learning forums among community stakeholders, the Live Green Connecticut Network will generate the necessary mix of healthy competition, collaboration, resources, learning, technology and sense of possibility that will ultimately drive big ideas and innovation ❖ such as zero-waste schools, food rescue, multi-community native garden corridors, materials management and food scrap composting ❖ that can alter the change process from small and incremental to large-scale and transformational.

Key Factors:

- ❖ Annual Symposium
- ❖ Bi ❖ monthly forums
- ❖ Social Network that keeps members connected
- ❖ Metric driven, time bound initiatives

Future Work

Regional and national collaboration is essential to develop the core structure for a sustainable America. The Live Green Connecticut Model will take steps to create a strong foundation build upon executing local work that is derived from global issues.

Next Steps

- ❖ Live Green Symposium, February 7th, 2018, Grace Farms, New Canaan, CT
- ❖ Strengthen relationships with key non-profit organizations that retain Subject Matter Experts
- ❖ Deepen relationships with leading edge corporations who champion sustainability

- ◆ Sophisticated technology that provides the structure for an easy to use national social network and metric reporting
- ◆ Focused messaging and strong leadership
- ◆ Engage with other networks around the country
- ◆ Execute a regional symposium

Urban Ecology as a tool for analysis of the urban free spaces system

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The systems of free areas refer, within the concepts of Urban Ecology, to the relations of connectivity and complementarily, considering the environment, circulation, urban drainage, leisure, imaginary, memory and social life of urban spaces free of public or private buildings, planned or not. (Leite, 2011; Forman, 1997; Ahendt, 2004; Ahern, 1995).

For environmental and landscape studies, the concept of connectivity includes a set of possibilities regarding the connection of cultural and environmental values and contributes to new possibilities for planning of cities considering the challenges of sustainable urban development. In this work, we present a proposal of analysis of the potentialities of the use of a free urban area located in the Jardim Botânico neighborhood, in the South Zone of the city of Rio de Janeiro (Brazil), through the expanded analysis of the free area system as a part of the neighborhood object of this study.

The work was organized considering the definition of the area to be studied and the selection of the areas to compose the system of free areas (studied), connectivity analysis and covered area (local, urban, territorial) of the studied areas, survey of use and hierarchy of accessibility between public, private and transitional areas of free spaces, hydrographic, wind and vegetation analysis in the scope of the study and consultation of users regarding the perception of negative and positive aspects of the region, as well as potential future use of intervention in the field. The urban afforestation and the connection of the green corridors, as well as the rainwater management, were considered as relevant issues to compose guidelines of actions for the area under study.

The expanded analysis of the system of free areas, covering biophysical, urban and cultural aspects, based on the concepts of Urban Ecology, allowed us to determine the main characteristics to be considered in the intervention project of the studied area.

Understanding the role of non-state driven urban water development initiatives in informal settlements

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Residents of informal settlements in the Global South are typically marginalised by the state. In India, the state views informal urban development as an aberration, and seeks to limit it by ensuring the ongoing marginalisation of residents through frequent demolitions, the limitation of land tenure rights, and the denial of basic water, sanitation and hygiene services. In this context, residents are left to rely on non-governmental organisations (NGOs) and their own efforts to secure even basic services. However, development thinking and practice continues to view such non-state driven processes of development as stop-gap measures, rather than legitimate avenues of action. This project seeks to understand the role of non-state driven urban water development initiatives in informal settlements through case studies of the locally-led interventions of individuals and NGOs in three communities in Faridabad, Delhi, and Mumbai, India. The aim of this research is ultimately to disrupt the marginalisation of the legitimate processes by which actors in informal settlements are seeking improvements reflective of the lived needs and aspirations of residents, and to reflect on the implications of viewing such processes as legitimate for the way that urban development in informal settlements is approached by the state.

Urban Watercourses Restoration in Goiania - Macambira Anicuns Park

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Goiania, the capital of the state of Goias, is located in Brazil's Central-West Region. With 1.2 million inhabitants, it was founded in 1933. As is usually the case with urban development in Brazil, river systems have been severely affected by the removal of riparian vegetation due to pressures from the road system; irregular occupation of Permanent Preservation Areas (PPAs); lack of sanitation; a poor macro and micro-drainage system; and insufficient surveillance and collection of waste and rubble. This situation leads to deficient water supply in the municipalities; increased inundation due to the poor drainage of watersheds; deterioration of riverside environments; and the population's disconnection from streams and rivers.

The city of Goiania ranks well among Brazilian cities due to its high rate of green area, about 3.6 mi² per inhabitant. However, the same is not true for the quality of its river system.

The Anicuns Stream is one of the most polluted watercourses in the municipality. The basin formed by the Anicuns Stream and its tributary Macambira drains approximately

70% of the urban area of Goiania and discharges into the Meia Ponte River, which supplies a large share of Goiania's water.

In 2003 Goiania created the Environmental Urban Program Macambira Anicuns with the purpose of restoring the Macambira Anicuns micro basin. Negotiations with the IDB for funding this endeavor were undertaken and led to the signing of an agreement between the parties in 2009. In the same year, an international bid for the development of Macambira Anicuns was won by the multidisciplinary consortium Reencontro com as çguas, made up of the companies Hidroconsult Consultoria Estudos e Projetos SA, Basitec Projetos e Construções Ltda, Teixeira e Almeida Arquitetura e Consultoria S/S Ltda, and Rosa Grena Kliass, in partnership with Barbieri & Gorski Arquitetos Associados.

The Program has developed the project for a 16.5-mile linear park; two urban parks aiming at the restoration and protection of the river system; and infrastructure projects for drainage, transposition of bodies of water, regularization of local road system, and the creation of pedestrian and bicycle paths. Urban regularization has the purpose of solving problems caused by the unplanned occupation of urban space on the watercourses banks, with environmental protection of vulnerable areas, regularization of the land use, and adequate housing solutions.

Undertaking such an ambitious project poses many challenges, as it deals with living, dynamic, and changing systems and involves conflicts regarding the expropriation and removal of buildings.

But benefits are to be reaped: the revitalization of areas close to restored streams; the free availability of sports and leisure equipment; investment attraction; and the creation of job opportunities for the community, more humanized public spaces, and environment education centers.

The implementation of the Park is in progress since 2015. We wish to present the project to you as well as the record of what has already been delivered to the population: 20% of the total area.

Vitoria-Gasteiz: Green Infrastructure for a Sustainable Development

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Infrastructure is the basic physical and organizational structures and facilities needed for the operation of a society. In addition, it is in charge of sustaining the well-being of the members of society. Infrastructure is more than tunnels that reduce commuting time, or bridges that open trade between two regions; it is a tool to give society more time to enjoy their preferred activities, and a way to connect with other people. The strong tie

infrastructure has with society's well-being, is the reason why a well-designed infrastructure is key to develop sustainably.

This paper illustrates the efforts of Vitoria-Gasteiz, Spain to develop sustainably through the adoption of a comprehensive green infrastructure. The importance of green infrastructure is that it reminds society of its bio-centric past, and of the vast number of wheels that need no reinvention. In addition of the aesthetic and environmental services green infrastructure provides when properly planned, society also gains a broad range of economic and social benefits. This document will explore such benefits using Vitoria-Gasteiz's Green Infrastructure (VG-GI) as an example and contrasting it to the United Nations (UN) Sustainable Development Goals (SDGs). This project is limited to the targets and goals in which VG-GI has had a direct impact.

It was determined that VG-GI has had a direct impact on SDGs 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, and 15. The study aims to demonstrate the potential green infrastructure has as a tool to meet the UN SDGs. It is worth noting that many of the targets examined in this study are not met solely by the physical aspect of VG-GI, but by a combination of projects, policies, and outstanding individuals that rely on the green infrastructure as a source of inspiration, a space for experimentation, and a vital piece of the community. VG-GI should serve as an example of how infrastructure can once again become a tool for well-being, community, and sustainability.

Evaluation of Urban Drainage Infrastructure: New York City Case Study

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Flood response in an urban area is the product of interactions of spatially and temporally varying rainfall and infrastructures, such that the presence of impervious surfaces and constructed drainage system increase the runoff variability. In urban areas, however, the complex subsurface networks of tunnels, waste and storm water drainage systems are often inaccessible, pose challenges for modeling and prediction of the drainage infrastructure performance. The increased availability of open data in cities is an emerging information asset for better understanding of the dynamics of urban water drainage infrastructure. This includes crowd sourced data and community reporting. A well-known source of this type of data is the non-emergency hotline "311" which is available in many U.S. cities. "311" is the US Federal Communications Commission code assigned for non-emergency telephone communication that allows residents to ask for government services. This may contain information pertaining to the performance of physical facilities, condition of the environment, or residents' experience, comfort and wellbeing.

In this study, seven years of New York City 311 (NYC311) call during 2010-2016 is employed, as an alternative approach for identifying the areas of the city most prone to

sewer back up flooding. These zones are compared with the hydrologic analysis of runoff flooding zones to provide a predictive model for the City. The proposed methodology is an example of urban system phenomenology using crowd sourced, open data. We present a novel algorithm for calculating the spatial distribution of flooding complaints across NYC's five boroughs, and present an approach for separating the features that represent reporting bias from those that relate to actual infrastructure system performance. Kernel Density Estimator (KDE) is employed to create a smooth distribution of 311 calls. We then propose an approach to account for the effect of propensity using comparison of the spatial variation in the reporting statistics pertaining to other complaint types. The estimated propensity density is then used as a normalizer to infer the actual sewer back up condition. The result is identification of areas in NYC most prone to sewer back up flooding, or other reported phenomena, following the same approach. The sewer backup results are assessed with the spatial distribution of runoff in NYC during 2010-2016. With advances in radar technologies, a high spatial-temporal resolution dataset for precipitation is available for most of the United States that can be implemented in hydrologic analysis of dense urban environments. High resolution gridded Stage IV radar rainfall data with the resolution of 4km×4km along with the high resolution spatially distributed land cover data are employed to investigate the urban pluvial flooding. The rainfall data are used to calculate the excess runoff with respect to the Natural Resources Conservation Service approach, suggested by USDA for modeling the runoff in small watersheds of urban areas. The model consider antecedent moisture condition, soil type, and land use. The monthly results of excess runoff are compared with the sewer backup in NYC using Mutual Information (MI). It determines how similar the joint distribution is to the products of factored marginal distribution, meaning it captures nonlinear dependence. Having this relation, we are able to build a predictive model of flood zones according to the 311 phone calls for NYC.

Urban flooding is a material consideration in planning legislation, and it is hoped that the location of future development will ensure a reduced exposure to the hazard. The implementation of sustainable urban drainage systems and sustainable flood retention basins to control flooding and diffuse pollution for small and large scale developments is a very good practice in sustainable flood risk management of urban areas which is the main goal of this study.

Sustainable Affordable Housing Development in Indonesia

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The housing sector in Indonesia is in critical condition where majority of low-income citizens live in substandard dwellings and the number housing backlog is increasing every year. The housing problem becomes more urgent when the term 'sustainability' is considered and sustainable affordable housing is yet to gain its successful implementation. Global urbanization develops fastest in developing countries like Indonesia where informal settlements are rapidly escalating, hence, making sustainable

affordable housing strategies very critical in this context. The concept of upgrading informal settlements are changed over time and appeared to be inconsistent. Despite a lot of research on theme such as sustainable housing in Indonesian context, there has been a dearth of research examining the role of collaborative governance, as the current approach still shows fragmented approach between related stakeholders and community participation as the end user, and thus this research attempts to fill the gap. By using case study with multi-methods conducted in Jakarta, this research has an overall aim to critically assess the role of governance in addressing sustainable affordable housing in Indonesia and to understand informal settlements and interventions in Indonesia rather than imposing a framework from western perspectives.

Understanding population concerns about climate change-induced heat and the importance of green spaces in urban Côte d'Ivoire

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There is a very limited understanding of the potential effects of climate change-induced heat on the health of urban residents around the globe. While extreme heat events have been linked to increased mortality and morbidity of affected populations, the effects of more subtle and gradual increases in temperature that take place over decades remain to be fully understood. The current study assesses potential concerns on climate change-induced heat on the urban population in Cocody, a district of Abidjan, Côte d'Ivoire and reports on their adaptive measures. A combined analysis of temperature data over a 40-year period (1973-2012) and 500 household interviews was conducted. Outcomes revealed that Cocody was experienced a significant increase in the maximum, minimum, and mean annual temperatures over four decades. Three different climate periods categorized as colder (1973-1986), normal (1987-2002) and hotter (2003-2012) were differentiated, suggesting a progressively increasing warming period. Residents acknowledged awareness of those changing climate conditions and claimed to experience heat-related symptoms, such as general discomfort, headache, sleeplessness and nervousness. To escape the heat, most people reported to stay at home and use fans and/or air conditioning, or they would visit refreshment bars or green spaces to relieve the discomfort experienced due to heat.

Understanding the Species Mitigation Market in the United States and the Impacts on Sustainable Development

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As the United States transitions to a clean energy future, a commonly overlooked challenge is the large scale footprint that accompanies renewable energy development. The infrastructure of renewable energy, or “energy sprawl,” is often developed on land

with critical wildlife habitat. In order for the United States to meet its ambitious renewable energy targets, it is important to accelerate renewable energy without negatively impacting threatened species and their habitats.

Habitat Conservation Plans (HCPs) approved by the Federal Government under the Endangered Species Act allow project developers to plan ahead in order to avoid, minimize and mitigate for the harm of their projects on threatened wildlife and habitats. The HCP program has been in place for more than 30 years, providing substantial levels of mitigation funding for conservation. However, as a mitigation market for species, the program is not well understood. Little is widely known about the national program's direction over time, the total amount of compensatory mitigation being delivered, and whether or not mitigation dollars are being directed to maximize conservation outcomes.

In this study, we sought to identify trends in the program, and to study the design and delivery of compensatory mitigation under a set of 30 HCPs. Since the first Plan was approved in 1983, 946 HCPs covering over 97 million acres of land nationwide have been implemented across the United States. Additionally, we looked at 30 plans in detail, with planned compensatory mitigation totaling \$6.3 billion dollars. Given the large sums that are to be spent on critical habitat, it is essential that the delivery of the HCP program is able to be easily understood by all stakeholders- the US Fish and Wildlife Service (USFWS), which manages the program; communities; advocates, and developers.

Throughout our study, we encountered obstacles in accessing accurate, complete, and consistent information about HCPs. Therefore, the final portion of this project includes recommended improvements to the accessibility, accuracy, and consistency of this information. Moreover, we recommend the development of standardized metrics for the implementation of HCPs, and we propose a framework for reporting these metrics, which would allow stakeholders to more easily find and understand whether permittees were delivering on the commitments in their HCPs.

In order to understand the species mitigation markets under HCPs in the United States, it is important that cumulative compensation delivered to date is tracked. The integration of a high-level framework to track spending on mitigation projects under HCPs in the national database will provide a single location to input and monitor the progress of all plans in the history of the program, enabling all stakeholders to have a better understanding whether permittees were meeting their compensatory mitigation obligations, and delivering conservation outcomes across the country.

Environmental Risk Factors Associated to Acute Respiratory Infections in the Bamenda Health District North West Region of Cameroon

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Background: Household air pollution and seasonality are increasingly threatening human habitation in his environment. Assessing the relationship between, indoor air pollution, ambient air pollution, seasonal variations and their contribution to respiratory infection is a public health concern. Indoor air pollution generated largely by inefficient and poorly ventilated stoves, burning biomass fuels such as wood, crop waste and dung, or coal is responsible for the deaths of an estimated 1.6 million people annually. In Cameroon, 7,000 deaths year are associated to air pollution. The World Health Organization recommends maintaining Particulate Matter (PM 2.5) levels to about 10 micrograms per cubic meter for a safe environments. In Cameroon air has an annual average of 65 µg/m³ of PM_{2.5} particles, which is 6.5 times the WHO safe level. While the city of Bamenda registered an annual average of 132 µg/m³ of PM_{2.5} particles that is 13.2 times safe level (WHO, Breathelife, 2016).

Objective: We had as objective to assess what impact exposures to household pollutants and seasonal variations had on respiratory health of populations within the city of Bamenda.

Methods: We conducted a cross-sectional analytic and descriptive study in the city of Bamenda. Hospital registers were reviewed for the period January 2013 to April 2016. We also investigate patients visiting the participating health centers and diagnosed from ARIs, the respondents were administered a pre tested questionnaire and later followed to observe their household standard and household living conditions. Data was entered and analyzed using Epi-info 7.2. While excel 2013 used for graphical presentations. Chi-square test was calculated. Unconditional logistic regression analysis were also conducted. A level of $p < 0.05$ was considered as the cut-off value for significance.

Results: More than 71% of the population principally used one or more of a solid fuel types (OR, 0.44: CI, 0.21 - 0.92: p-value, 0.03). Indoor cooking exposed people 1.67 more times to ARIs at (CI 1.45 - 4.90: p-value 0.00). Environmental fires exposed people 1.1 times to ARI (OR CI, 1.03 - 3.55: p-value 0.03). Dry and dusty weathers exposed populations to ARIs with (OR 3.24: CI (1.47 - 7.13 p-value 0.00). the prevalence of ARIs in the BHD was 6% of all consultations

Sustainable Cities need Fire Resilient Buildings

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Fire is a disruptive event whether it is accidental, deliberate or a cascading effect from man made or natural disasters. It not only risks to injure and kill people it can also take away critical infrastructure. Besides the immediate effect of a fire the long term effect on the local community can be significant both emotional, economical and environmental.

Our built environment is changing. 21st century buildings need to accommodate a growing population primarily in urban areas where land is scarce. This has led to an

increased focus on high rise buildings. The way we live is also changing with a growing preference for big open spaces inside our buildings and often a mixed use of buildings for both residential and commercial purposes. Building materials such as brick, stone and concrete are being replaced with light weight materials and the use of plastic materials within the building envelope is increasing. At the same time, the buildings have to accommodate the needs of an aging population particularly in areas such as Europe and North America.

With increased pressure on the urban environment from population growth, change in demographics and climate change, it should not be acceptable that buildings are lost due to fire. Nor should it be acceptable for fires during extreme natural events such as hurricanes, earthquakes and wildfires to lead to the loss of a significant number of buildings. The fire performance of buildings needs to be an essential part of defining sustainable and resilient cities. Only focusing on life safety is not enough. We need buildings that are Fire Resilient.

The presentation will discuss how focusing only on energy efficiency and sustainability can lead to buildings that are not resilient to our oldest threat fire. Examples from real fires will be shown to emphasise the need for fire resilient buildings. Finally the necessary steps to take to deliver sustainable, energy efficient and fire resilient buildings will be discussed and possible solutions presented.

Property Development on Floodplains in Port Harcourt Metropolis, Nigeria: Acceptable or unacceptable Risk?

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Floodplain is an area of land adjacent to a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and usually experiences flooding during periods of high discharge. Floodplains which consist of flood-way and flood fringes are natural flood basins with varied ecological functions and socioeconomic importance, such as: flood protection, water quality improvement, removing excess sediment and nutrients, recharged aquifers, improved wildlife habitat, recreational industries, forestry management and carbon sequestration, provides natural buffers to streams from farm and ranch operations and many more. However, despite these varied ecological functions of floodplain areas of Port Harcourt Metropolis, urbanization and the quest for development have led to serious encroachment into the floodplains in the form reclamation and erection of buildings. The fundamental questions that arise are: how vulnerable are these structural developments to disaster risks associated with floodplains? What is the level of risks associated with erecting buildings on these floodplains? How acceptable are these risks? Providing answers to these questions forms the focus of this paper.

Exploring Challenges Impeding Sustainable Supply Chain Practices in Mining Sector

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The implementation of sustainability practices into the supply chains has gained less attention in Africa continent compared to the Europe, America, and Asia continents. Especially, in Democratic Republic of Congo (DRC) where mineral resources are abundant compared to other countries in Africa. In this part of Africa, there is a paucity of research about this topic due to the facts that supply chain sustainability still in the development and experimental phases. Additionally, in DRC sustainability practices have not received much attention from industry practitioners owing to business organizations seeking how to become competitive in the global market and making maximum profits whilst being sustainable. In light of this, the present study aimed at identifying relevant challenges hindering the development of Sustainable Supply Chain Management (SSCM) in mining sector of DRC. The findings revealed that the major barriers for creating SSCM involve Lack of commitment on environmental deterioration, lack of communication and knowledge sharing, Ineffective monitoring and control system, lack of effective policy and legislation direction, high cost associated with the implementation of SSCM, Poor Supplier Commitment, lack of green practitioners, poor senior managements' commitment, lack of recycling activities.

African Transport Corridors: A Problem-Driven Framework for Applied Political Economy Analysis of the North-South Corridor Programme

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The present understanding of cross-border transport corridor assessment and macroscopic transit trade simulations, without demonstrating a nuanced methodology, provides a limited rhetorical construction of corridor efficiency and considers transit trade flow as a systemic, stochastic and rational choice of travel demand. Taking the African cross-border transport corridors as the main domain of study and the North-South Corridor Programme as the focus of the research, the form of the study was designed as a qualitative case study that is exploratory and descriptive in purpose. Through subjecting a thoroughly reviewed academic literature on the African transport corridors, cross-border corridor assessment, and the complex corridor-transportation ecosystem to an inductive content analysis and hermeneutical interpretation, the present research reconstructed the conceptual, systemic, and politico-historic paradigms of the African transport corridor. A problem-driven framework for applied political economy analysis was developed to reveal the spatial, political, and operational bottlenecks impeding the efficiency of the North-South Corridor Programme, i.e., the transport corridor programme endorsed by the economic development communities as the most promising corridor programme to unlock unutilized economic for the landlocked countries in the Eastern and Southern Africa Region and considered as the busiest multimodal transport network in terms of

traffic and freight volumes. The analytical components of the study were designed with particular focus on the political geography and spatial morphology of the corridor location, transit transportation infrastructure quality, transit trade and transport regimes, and transportation governance issues with regard to the multi-country cross-border corridor management.

BBFuels of Puerto Rico, LLC: A Sustainable Industrial Model for Bioethanol Production in Puerto Rico

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BBFuels of Puerto Rico, LLC is a green company that proposes a novel approach to biomass conversion to energy that reduces the overall process complexity required to produce ethanol by means of wet water hyacinth of Puerto Rico (*Eichhornia crassipes*). The problems that this project solves are the lack of E85 supply for FFV owners and the overpopulation of hyacinths. Due to hyacinths high lignocelluloses content they can be considered a promising substrate for the production of bioethanol. The research innovation proposed consist of the study of endemic tropical bacteria population from three different, non food waste biomass and their way to development of a third generation's fermentation process the future conversion into ethanol. It could be useful as a source of biomass because of its abundance and feasible cultivation. The impact of this innovation could have over society will consists of improving the quality of life and the environment while providing an alternative fuel that is less pollutant at a lower cost than fossil fuels. BBF's and R&D component will be developing a new anaerobic fermentation process for the conversion of biomass in ethanol, biogas and byproducts. Experimental trials showed a good percent of glucose per mg/L of biomass. A special strand of acetogen bacteria in addition to a simple pre-treatment process effectively breaks lignocelluloses/lignin recalcitrance. Funding are running by and NSF/DOE SBIR proposal. Our goal is to integrate sustainability into industrial process. BBF will lead biofuel business Puerto Rico, but seeking to expand his arms to attend the Caribbean Region in order to promote a sustainable and green economy bridge.

An Assessment of Risks/Opportunities and Valuation of Ecosystem Services, in the Case of Mekelle City, Ethiopia

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Information on current status of ecosystem services has vital importance in preparing local, regional and national economic plans. Results from assessment report of the condition of ecosystem services valuation help decision makers to focus on the services that are more likely to be sources of risks and opportunities for specific decisions. The main objective of this study is to assess the risks and opportunities that are related with

ecosystem services within Mekelle city. Data for the study has been utilized from secondary sources and analysed using an Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) model. Findings of the study show that, there are different ecosystem services that provide a variety of goods and services in Mekelle city. Food and fresh water supply, genetic resources, air quality, climate and water regulation, water purification and waste treatment, recreation and eco-tourism, nutrient cycling and water cycling are screened to be relevant ecosystem services in the city. To assess the condition and trends of the relevant ecosystem services in the city, a detailed analysis of the condition of relevant ecosystem services is done. For this purpose, indicators are selected and used to evaluate the condition and trends of the relevant ecosystem services and the drivers. The relevant ecosystem services of Mekelle city are assigned with quantitative economic values by using market values for the relevant ecosystem services that are captured in the market and indirect values for those that are not currently valued in the market place.

SDG 11 in Lower Mekong River Delta. A literature Review Approach

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On 1st of January 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development, adopted by world leaders in September 2015 officially came into force. Over the coming fifteen years, the enrolled countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind. Although Agenda 2030 is moving into the signed countries, the implementation of SDG`s face a huge challenge and some constrains, particularly the ones are related to settlements, water environments and located on floodplains. Within holistic approach between the 17 SDG`s we aim our literature review on Goal 11: “Make cities and human settlements inclusive, safe, resilient and sustainable” applied at the Lower Mekong River Delta (LMRD).

We argue that a review of prior, relevant literature is an essential feature of any SDG`s implementation, and an effective review creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed.

In on hand this article explores a range of research papers and lessons learned describing the current status of the human settlements and the impact of the flooding at LMDR and in other hand explore the potential outcomes of SDG 11 that can be intervened under with. The literature review basically derives from publications from four major sources: the World Bank (WB), The Asian Development Bank (ADB), the Mekong River Commission (MRC) and scattered studies held by Vietnamese Universities.

Fleet Farming: The Journey to Food Deserts

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Fleet Farming is a bike-pedaled urban agriculture program which converts lawns into productive micro farms called “farmlettes”. This program provides a community-driven solution that counters the environmental costs of the agriculture industry. This self-sustaining program was created by an Orlando-based 501(c)(3) non-profit organization and accredited NGO of the United Nations, IDEAS For Us (IDEAS). The mission of IDEAS is to develop, fund and scale solutions to the world’s most pressing social and environmental challenges. IDEAS is the official parent non-profit of Fleet Farming. Together, these teams tackle many of the environmental, social and economic hardships globally affecting the natural world. At the local level, Fleet Farming’s mission is to transform underutilized land and resources into community assets.

Fleet Farming is directly relevant to Conference Sub-Theme Number Seven: “Education for Sustainable Development: An Issue of Consciousness and Values.” This urban agriculture program strives to educate people of all ages on the important factors affecting national food security. In order to achieve these ends, Fleet Farming offers free bi-weekly communal events called “Swarm Rides.” These events are seen as a much needed tool to highlight the environmental costs of the agriculture industry and demonstrates an urban farming technique that empowers individuals while “farming farmers.” The produce harvested from the plots can be sold at local farmers markets and restaurants, cycling food from the hyper-local sphere to vendors throughout the neighborhood. Effectively, this program is creating jobs, strengthening community members and battling the environmental costs generated by the current food system.

One of Fleet Farming’s goals is to lower carbon emissions of the agriculture industry with the use of bicycles for food distribution and by creating new branches in areas that have low access to organic, fresh produce. Generally, food deserts can be seen as the most underserved sectors of the food dispersal process. In low-income areas, grocery suppliers are not as invested in setting up locations servient to these neighborhoods versus middle to high income areas. Fleet Farming embraces this as an opportunity versus an obstacle. On many occasions, other solutions have come into burdened neighborhoods in hopes to address the present issues. However, over time some organizations lose momentum and community engagement. This can lead to a distrust of existing and future initiatives seeking to come alongside these communities in areas already experiencing challenges.

Most directly, Fleet Farming targets Conference Sub-Theme Number Fifteen: “Sustainable Development Challenges in Urban Areas.” The program offers a model for communities to work together towards food security by developing urban farming plots. This creates an opportunity to distribute organic produce throughout poverty-stricken neighborhoods using underutilized land. This solution incorporates economic growth in a socially inclusive model. It strives to create jobs, keep funding within a hyper-local sphere and generating a sustainable program that will solve the food security challenges within a food desert. Upon expansion, Fleet Farming networks with community leaders

and residents to tailor this model of urban agriculture to their community. Several gatherings will be held to connect all integrated members in hopes to inform every group within the food desert neighborhood about the program's cause. In doing so, this initiative can be seen as a community-run tool to tackle these challenges. Thus, food desert residents can feel a sense of ownership within the Fleet Farming branch in their vicinity.

To date, Fleet Farming manages 20 farmlette plots within the Audubon Park area with plans of expanding to 25 by the end of the year. Thanks to a Farmer's Market Promotion Grant from the United States Department of Agriculture, Fleet Farming and their partners will engage into the next stage of development to embark on the first food desert in West Orlando. By Summer 2017, Fleet Farming will activate their urban agriculture model to counter the challenges found within food desert communities. Exploring this will open the door for future initiatives to follow in the footsteps of the program while demonstrating the necessity of micro-farming in urban areas. Fleet Farming is one piece of the puzzle needed in the race to sustainable development in every community across the nation.

An overview of Building LCA from the sustainability rating tools perspective

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This study analyses the most representative features of Life Cycle Analysis (LCA) applied to the building sector concerning the environmental impacts of materials and products, through the study of the most shared criteria among four international sustainability rating tools: LEED, BREEAM, DGNB and Green Star. Since 2006, LCA has been internationally standardised with ISO14040 and ISO14044, making it a globally used tool for the environmental assessment of materials, products, building services and whole buildings. The European Commission, through the CEN technical committee (CEN/TC 350), developed the EN15804 and EN15978 standards to stimulate transparent communication about the environmental impacts of buildings and to try to reduce obstacles and limitations in construction industry application. This approach has strengthened knowledge and awareness of environmental impacts, driving designers, producers, stakeholders and policy makers towards more responsible choices and behaviours. Nevertheless, when it comes to buildings, different modalities of usage as well as difficulty in data collection, calculations and projection of service life scenarios, have led to different interpretations of the outcomes, increasing the challenge of accomplishing a comprehensive analysis. Due to this level of complexity, the building sector has not yet been able to exploit the potential of LCA as other sectors, showing a need for simplification and harmonisation. A growing interest and sensitivity is emerging in Europe about this topic since, in 2010, the European Union launched a ten-year strategy called "Europe 2020", in which targets on energy and climate are included, aiming at: a 20% cut in greenhouse gas emissions (from 1990 levels), a 20% improvement in energy efficiency and achieving 20% of EU energy from renewables.

This paper aims to identify the most representative characteristics of the LCA approach applied to buildings, from the perspective of four major international rating tools, through the analysis of the most common/shared features taken into account. These include: life cycle phases considered, impact categories and environmental indicators adopted, databases sourcing (involving the integration with EPDs) as well as calculation and benchmarking methods applied. Having identified these shared and important criteria, this review sets out draft guidelines for comparing buildings environmental profiles issued from the rating tools application. Such a framework could be embedded in the European national regulations, or simply provide a reference towards the achievement of Europe 2020 objectives.

Sustainable Development Goals(SDGs) at the City Level: a case study of Seoul in Republic of Korea

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The Sustainable Development Goals(SDGs) have been introduced by the United Nations as the next global goals and targets to be achieved by 2030 after the Millennium Development Goals(MDGs). The SDGs are broader and more ambitious than the MDGs, calling for participation of all the countries in moving towards sustainable development. The SDGs lay out 17 goals and 169 targets with qualifiable indicators, addressing the three dimensions of sustainability, namely social, economic and environmental dimensions, in the integrated manner. In achieving the goals and targets under the SDGs, cities have a significant role to play as a locus with concentrated population and economic activities. Thus, it is necessary to apply the SDGs not only to the national level but to the city level and encourage implementation of the SDGs at the city level. However, there is a serious lack of research in addressing the SDGs in the local context and analysing the implementation of SDGs at the city level despite the urgency of the matter. Against this backdrop, the study aims to apply the SDGs to the city level, analyze the current status of their implementation and, further, assess the relationships between the goals and targets to identify any conflicts or concurrence between the goals, for the city of Seoul in Republic of Korea. Time-series data for the indicators of SDGs at the city level have been collected and analyzed using a factor analysis to assess the implementation over time with indexation. In addition, a network analysis has been conducted to reveal the relationships between the targets and indicators. The preliminary results show that the current levels of achievements as well as their speed are diverse across sectors in Seoul, Republic of Korea. The results from the analysis as well as the methodology introduced in the research are expected to contribute to incorporation of SDGs into the local policy and facilitate the sustainable development in cities.

The pressures of population growth on Urban Areas

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Sustainable development challenges largely emanate from an increase in populations or correlated spin offs and can be mostly highlighted within the urban areas where the majority of the population resides. In 30 years time, urban areas would be denser and would have continued to expand at the expense of rural areas causing unfavourable pressures on the built and natural environment.

To further delve into the more specific sustainable development challenges originating from population growth, the country of Malta is being taken as a case study. Malta is a small island state in the heart of the Mediterranean and features in the eight place of the most densely populated countries' list in the world. With just 315 km² and a population of 417,400 (2011 population census), the country needs to find space to cater for the population's everyday needs; whilst allocating or safeguarding sufficient space which is required to sustain social wellbeing.

There are a number of concerns which Malta could have addressed differently over the past 30 years. The concerns and lessons learnt could be extrapolated to other countries with a view of pre-empting similar situations and hence addressing these in a timely manner prior to 2050. An increase in population numbers and densities exerts pressure on urban areas as these encourage sprawl onto adjacent rural areas; villages and urban areas risk losing identities as these conglomerate. Pressure to develop more open spaces and redevelop existing buildings into more compact high density residential areas increases. Urban fabric starts to change and historical buildings are lost. Commercial premises are on the increase to meet the increase in demand. Whilst traffic increases, the road network can be upgraded only in a very limited way. Public transport which is limited to the use of buses cannot improve because of the everyday traffic congestion. Vehicular parking also adds up to traffic congestion due to the narrow streets and the number of vehicles circling around in search of adequate parking.

Nevertheless, it is only 68.2% of Malta's total dwelling stock which is occupied at any point in time; 13.3% is categorised as secondary use and 18.4% are completely vacant.

The 1988 development boundary was too relaxed and this unnecessarily created new areas available for development. In parallel to this, the spatial planning system was flexible such that development planning applications were not seen within a context, but were assessed in a piecemeal fashion. The population had become very development oriented with little interest in urban open spaces. All this development and associated infrastructure on a small island resulted in the country with the highest percentage (33%) of built up area in the European Union. Environment resource depletion was on the increase particularly local stone used in the building industry; and loss of soil through soil sealing and through the abandonment of agricultural land. Soil sealing in parallel to the lack of adequate sustainable urban drainage systems had its toll on water conservation.

Addressing these issues in a timely manner would have prevented the negative impact of population growth on the country.

Sustainable Use of Water Resources

Sustainable Use of Water Resources in the Republic of Armenia

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Research Question: Challenging areas of water resources management, water supply and sanitation services in Armenia

Background: The challenges are mainly related to the targets set aside under the Protocol on Water and Health, which is currently in ratification process by the Government of Armenia. These challenges are the followings: to promote at national level the protection of life and health of the public both in terms of individual and collective aspects, as well as to improve the management and use of water resources, including the protection of ecosystems, to improve safe water supply and discharge (as of now 579 communities from total 993 settlements still don't have an access to water), and to control and reduce water-related diseases.

Over the last ten years the Republic of Armenia has recorded significant legislative and institutional achievements in terms of water resources management and protection, the main direction of which was introduction and application of the principles of integrated water resources management (IWRM) in the country. The Government of Armenia has strived to improve access, reliability and quality of the drinking water and its infrastructure with increased use of public-private partnerships (PPPs), which have changed the way it manages the sector and brought about improvements in quality and service to customers.

Currently the majority of the population of Armenia is served by three water and wastewater utilities under PPP arrangement. The water sector has improved but still has a long way to go. PPP Contract alone cannot resolve all sectoral challenges. The state of the infrastructure and assets is still very poor, with a need for major investments to bring it up to a reasonable condition as well as for expansion of service.

Institutional Structure/Framework

The assets and overall authority relating to use of resources and provision of water and water supply sanitation/wastewater services is held by the Government of Armenia, with the following institutions:

- The State Committee of Water Economy (SCWE) has general oversight for sector management and operation. The SCWE has responsibility for establishing the

- various PPP arrangements and maintains a function of continuing project management for all of them, and for development of new long-term arrangements.
- Other state entities have responsibility for ensuring compliance with environmental and other regulatory issues:
 - The National Public Regulatory Commission (NPRC) has responsibility for economic regulation and ensuring compliance with tariff setting in the water sector.
 - Water Resources Management Agency of the Republic of Armenia has responsibility to manage and protect the water resources.

This research aims to review the existing situation for Water Management in Armenia, with the objectives of providing guidance on improving levels of service, ensuring long term sustainability of the sector, and maintaining affordability of services to users. The recommendations to the key challenges affecting the development of the sector would provide with the following outcomes: more people use improved water supply, sanitation and municipal services; to increase the share of population connected to the centralized water supply system and sanitation system, to expand and improve water supply and sanitation systems in urban and rural areas, to increase average duration of drinking water supply per day, to construct and/or upgrade water supply infrastructure; to improve water utility management.

Towards a Pro-community-based Water Resource Management System in North-west Cameroon. Practical Evidence and Lessons of Best Practices

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This paper examines community-based water resource management (CBWRM) in three municipalities of North-west Cameroon as well as a review of literature focusing on some successful Community-Based Natural Resource Management (CBNRM) initiatives in sub-Saharan Africa. Using both empirical and secondary data collected through participatory research methods and a rapid appraisal of existing literature, it is argued that some aspects of best practice arising from the case studies can contribute significantly to promoting the development of effective community-based water management system in North-west Cameroon. This could partly be achieved through a resolute devolution and decentralization of power, active participation and empowerment of rural communities which will facilitate and invigorate a platform for capturing the views of diverse user groups and this in turn can bring about a people-centred and community-driven development process. It is important to note that in any natural resource management system, power becomes a crucial factor as it determines who has and does not have access to these common-pool resources. In this regard, it is argued in the paper that a more robust way to achieve efficient management of scarce water resources in Cameroon is by adopting a more bottom-up and integrated management approach through engaging and involving Community-Based Institutions (CBIs) and building of institutional capacity at the community level in decision-making and the management of resources that are in close proximity to communities of interest. This has been examined within

contemporary theoretical and practical discourses and approaches on CBNRM in developing countries.

Knowledge was power; now data is. Case studies of water resource development in Latin America

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Sharing knowledge through training, education, and building local capacity are essential ingredients for improving access to water resources. Large datasets are one form of knowledge today, and should be considered in water resource development.

The people who have access to and control of underlying data and statistical summaries thereof have the power that comes with a big picture perspective gained by that perspective. Columbia Water Center (CWC) research on water risks related to mining in the U.S. and Peru has found that mines have extensive environmental data, but disclose relatively little even to governmental regulating agencies. This limits the ability of the government, nearby populations, and other institutions from making appropriate watershed level decisions for remediation and water use allocation. Data generation and statistical analysis, when made widely accessible, can contribute to environmental justice and resource equity. Approaches to support this include participatory data gathering, in-situ testing, emerging technology for water testing and environmental monitoring, development of open-source databases, and training to understand results of water analysis and statistical trends.

These approaches are being implemented in a CWC project in a coastal town of Peru to develop best practices in combining field measurements, community engagement, and remote sensing. The region recently suffered major flooding, so data measurements and data-related capacity building are considered in the context of climate-related disasters. We found that water measurements and interest in environmental monitoring, which promotes long-term sustainability in water use, naturally declined after the disaster. Data-gathering systems that are resilient to natural variability provide more power to posterior analyses.

In the Bolivian Altiplano, a data-based approach improved access to water and led to more sustainable infrastructure and management practices. The typical training for water managers was regional conferences on how to set, collect and track fees, save for capital costs, and conduct maintenance. However, one regional government didn't just train, but first assessed. They started an initiative in 2013 to gather data on each town's capacities, water use, and access to resources. Supported by that database, the regional conference was an opportunity to settle transboundary water disputes, strategically allocate resources, and assign partner non-profits and development agencies to specific projects. All water-related development work has been tracked and documented since then, creating long-term accountability and eliminating duplication of efforts. As this regional

pilot program is expanded elsewhere in Bolivia, coordination between municipalities may expand beyond joint conferences to share lessons learned, but also joint databases for comparison of water-related data. Likewise, training must look different today. Rather than simply explaining concepts, water users and managers can benefit from continual access to information (e.g. through knowing how to do online searches, how to develop a database, and how to respond to test results). All types of knowledge- indigenous knowledge, modern era technology and systems, and twenty-first century “big data” approaches- have distinct roles in improving the use of water resources.

Potential for Aquaculture Integration with Wastewater Treatment Wetlands in Southern Iraq

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The city of Basra, Iraq, was once the thriving economic center of a vast marsh-dwelling community in the Tigris-Euphrates river delta, a region that has sustained civilization for 6,000 years. Over the last several decades, damming and draining have decimated those wetlands and the communities that depended on the ecosystem services they provided. The most significant ecosystem service lost was natural water remediation and filtration that the marshes provided. “MaRSHiI” (Maintaining and Restoring Sustainable Hydrology in Iraq), a collaborative project under the Memorandum of Cooperation between University of South Carolina and the University of Basra (UB), studies the sustainability impacts of wetlands collapse and the possibility for wetland restoration. Work is ongoing to establish constructed wetlands for wastewater treatment throughout the Basra Governorate, beginning at UB. The long-term goal is to create integrated wastewater treatment-aquaponics wetland systems that would both remediate wastewater and support carp and reed farming, which would create economic incentives to construct wetlands. However, questions remain about how bioproductive this system could be, how long it would take to be economically viable, whether fish raised in farms using treated water would comply with health standards, and how regulation will influence the development of wastewater aquaculture. This thesis project addresses those questions through discussing the collapse and present state of recovery of the southern Iraqi marshes, reviewing wetland restoration and management around the world with a focus on wetlands for wastewater treatment, investigating the potential for creating an integrated wastewater treatment-aquaponics system in Basra, and describing remaining questions and next steps for building an integrated wastewater treatment marsh and aquaponics system at the University of Basrah. This research serves as a reference for that process, providing context, an overview of the available literature and data, and necessary tests and additional data. The thesis document will be distributed to MaRSHiI participants, regional collaborators, implementing institutions throughout Iraq, and potential funders for the establishment of wastewater treatment marshes and aquaponics in Iraq.

Determination of the Intensity-Frequency Curves (IDF) for the city of Cartagena de Indias in Colombia During the Period Between 1970 and 2014

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The analysis of rainfall behavior in a geographic hollow is of interest for meteorological, edaphological, hydrological and hydraulic reasons, since it provides indexes that allow flood studies or the elaboration of precipitation-runoff models for an adequate design and sizing of works Civilians. Additionally they allow the interpretation of some variations related to the climatic change in a certain afferent zone.

Due to the above and given that in some cases, they do not have flow records updated or because they do not have sufficient duration to perform the required frequency analyzes, rainfall data should be used to estimate floods of a certain frequency. In that sense, when using the information of records of rainfall or rainfall stations, it is necessary to translate it into forms expressed in intensity curves in such a way that they remain in function of the duration and the frequency, thus allowing to contribute behavioral patterns of the Rains in such a way as to provide reliable and effective designs for hydraulic engineering by engineers and trained technical personnel, with the IDF curves becoming a tool for analysis in the short, medium and long term.

The present work shows the process of elaboration of the Intensity-Duration-Frequency (IDF) curves between the years 1970 and 2014 for the city of Cartagena de Indias in Colombia, based on precipitation patterns measurement reports of the Rafael Núñez Airport synoptic station, Code IDEAM 1401502 located at the coordinates $10^{\circ} 26' 9'' N$ and $75^{\circ} 31' 1'' W$ of the Colombian Caribbean coast at an altitude of 2 meters.

Design and Comparative Analysis Among Four Regions Intensity-Duration-Frequency Curves (IDF) in Colombia (1970 - 2014)

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The analysis of rainfall behavior among several watersheds is of interest for meteorological, edaphological, hydrological and hydraulic purposes, since it provides information that allows comparative studies of micro-climatic and flood phenomena from rainfall-runoff models. Additionally they allow the interpretation and correlation variations on the climatic change that happen in different zones of the same country.

In that sense, when using the information of records of storms, rainfall or Precipitation Patterns stations, it is necessary to translate it into forms expressed in intensity curves in such a way that they remain in function of the duration and the frequency, thus allowing to contribute behavioral patterns of the Rains in such a way as to provide reliable and effective designs for hydraulic engineering by engineers and trained technical personnel, with the IDF curves becoming a tool for analysis in the short, medium and long term.

The present work shows the process of elaboration of Intensity-Duration-Frequency (IDF) curves between 1970 and 2014 for the cities of Cartagena de Indias, Barranquilla, Neiva and Ipiales in Colombia, based on precipitation patterns measurements of the Synoptic stations of its Airports Rafael N'éez, Ernesto Cortizos, Benito Salas and San Luis respectively, and from the construction a sustained comparative analysis between the micro climatic phenomena of the mentioned regions.

The Development of 3R Water Filter to Solve the Problem of Arsenic Poisoning in Vietnam

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Arsenic contamination of drinking water has been spotlighted on global health, especially in a field of WASH. This is the current situation in Vietnam, whose legal arsenic concentration limit is 50 µg/L, five times higher than the WHO guidelines. In South-East Asia affected areas, substitution of drinking water source by a safe and easily available one may be very expensive. This paper introduces a new type of water purifier in achieving affordable, safe drinking water for the marginalized population in a rural area.

The goal of this project is to design an affordable and easily manufactured water filtration system for use in a rural area. At this point, the author focused on the basic principal of ceramic water filter which is produced by combining only rice bran and soil because of cultural characteristic that East Asia have in common. However, ceramic water filter shows several weak points like low durability (in a month), low flux(1~2L/h) and not being able to remove arsenic.

Villus shape to improve membrane flux during metabolism has been well known as expanding surface area. Round wave shape based on the principal of villus shape was applied to the design of the bottom of the ceramic water filter. As a result, a flux on the filter with round wave shape increase up to 280%(6.48L).

Iron oxide is the most useful arsenic removal technology and is more appropriate where very high arsenic levels are required. However, Iron oxide is more expensive than other arsenic removal options. In order to substitute rusty iron by-product for iron oxide which is used in industry, the rusty iron wire was combined with the bottom of the ceramic water filter. The experiment shows that the filters with rusty iron wire removed the arsenic up to 95.6% (1000ppb -> 46ppb).

This purpose of this study was to investigate the effectiveness and the performance of the 3R Water Filter, which is a ceramic filter with rusty iron wire and round wave shape. To achieve this, the author undertook a field trip to Hanoi in August 2016. The trip was made possible with support provided by the National Institute of Occupational and Environmental Health (NIOEH) and UN WHO Technical Officer in Environmental Health, the author spent 3 weeks in Hanoi - 7 days in the Bat Trang called pottery village that can manufacture our product, and 15 days in the Tam Xa district collecting water samples.

Fostering investments in water and sanitation sector: a veritable tool to human health and sustainable development in sub-Saharan Africa

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With population of about 800 million people in 2007, and current growth rate of about 2.3%, the UN predicts for sub-Saharan Africa region a population between 1.5 and 2 billion by 2050 (Wikipedia).

Meanwhile, the crucial role of water in achieving the region's development goals is widely recognized. But with almost all countries lacking the human, economic and institutional capacities to effectively develop and manage their water resources sustainably, the region faces endemic poverty, food insecurity and pervasive underdevelopment, (UNDCWS 2015). For instance, about two-thirds (273. 5 million) of the region rural population and one-quarter (45.6 million) of the urban population are without safe drinking water, and even higher numbers lack adequate sanitation (WBG 1996). By the year 2000, approximately 300 million people risk living in a water-scarce environment, and within 30 years, 20 countries in the region may be water-scarce. The greatest impact of this situation is felt by the poor, who often have the most limited access to water resources (WBG 1996). Also, according to Neira, WHO Director, Department of Public Health, Environmental and Social Determinants of Health, “Contaminated drinking-water is the trends in the region and estimated to cause more than 500,000 diarrheal each year and is a major factor in several neglected tropical diseases in the region which include intestinal worms, schistosomiasis, and trachoma.” (WHO Report 2017).

However, access to water supply and sanitation in the region has been steadily improving over the past two decades .For instance, access to improved water supply has increased from 49% in 1990 to 60% in 2008, while access to improved sanitation has risen from 28% to 31%. But it still lags behind all other developing regions as it was unable to meet the Millennium Development Goals of halving the share of the population without access to safe drinking water and sanitation between 1990 and 2015 (WHO Report 2017). The report also stresses that some countries may not meet global aspirations of universal access to safe drinking-water and sanitation unless steps are taken to use financial resources more efficiently and increase efforts to identify new sources of funding. Thus, a

large number of countries in the region will still face huge challenges in attempting to achieve the United Nations water-related Sustainable Development Goals (SDGs) by 2030.

Similarly, in the last two decades 70% of investments in water supply and sanitation in Sub-Saharan Africa are financed internally and only 30% are financed externally(2001-2005 average). Most of the internal financing is household self-finance which costs about \$2.1bn and primarily for on-site sanitation such as latrines while the public sector financing was about \$1.2bn and almost as high as external financing which was about US\$1.4bn. The contribution of private commercial financing has been negligible at about \$10 million only Wikipedia. However, in the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS 2017) report, most countries have increased their budgets for water, sanitation and hygiene at an annual average rate of 4.9 per cent over the last three years. Yet, 80 per cent of countries report that water, sanitation and hygiene (WASH) financing is still insufficient to meet nationally-defined targets for WASH services (WBG 2016).

This is because in most cases national coverage targets in their budgets are based on achieving access to basic infrastructure, which may not always provide continuously safe and reliable services. Thus, planned investments have yet to take into account the much more ambitious SDG targets, which aim for universal access to safely managed water and sanitation services by 2030 (WBG 2016).

“This is a challenge that has to be resolved in the region as according to Guy Ryder, Chair of UN-Water and Director-General of the International Labor Organization, “increased investments in water and sanitation can yield substantial benefits for human health and development, generate employment and guarantees that no one is left behind.”

The objective of this paper is to examine the issues and challenges facing the leaders of the countries in sub-Saharan African region in the provision of access to safe drinking water and sanitation for their citizens and unlocking financial opportunities that will increase private and/or public finance in the region water sector to achieve poverty reduction and sustainable development.

Effective Irrigation schemes as means of rapidly achieving sustainable food security in Nigeria

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The dominant occupation of rural dwellers in Nigeria is farming (usually smallholder). This kind of farming system is typically rain-fed, has low level of mechanization, capital, land and labour respectively. The country is endowed with underground and surface water reserves coupled with favourable agro-ecological conditions. These are resources which ought to be fully exploited as means of increasing net food production, availability and affordability through effective irrigation that will in turn help in achieving sustained

food security. Irrigated Agriculture has been an extremely important source of food production over recent decades. Irrigation will assume more importance over the next few years especially in the face of growing climate change. Cereal production through irrigation gives a yield of about 7,500 kg/hectare while the maximum from rain-fed crops is 3000 kg/hectare. Low input irrigation is still more productive than high input rain-fed Agriculture. While it is clear that irrigation has myriads of benefits; efficiency in the use of the water irrigated is perhaps of much more importance. This calls to question the system of irrigation deployed. High intensity irrigation for instance leads to water logging and salinization in some cases. The salinization of irrigated areas has been noted to reduce existing areas under irrigation by 1-2 percent yearly. Also, on a global scale, rain-fed agriculture is practiced on 83 percent of cultivated land and supplies more than 60 percent of the world's food. Drip irrigation and underground irrigation are two examples of localized irrigation. This is an increasingly popular form of irrigation in which water efficiency is maximized because water is applied only to the places where it is needed and little is wasted. Technological solutions are not all there is to it however. Such things as small-scale irrigation and the use of urban wastewater promise to increase water productivity as much as changes in irrigation technology. Efficiency of irrigation will almost certainly be improved by adopting some key practices. These include reduction of seepage losses in channels by lining them or using closed conduits, reduction of evaporation by avoiding mid-day irrigation and using under-canopy rather than overhead sprinkling, avoidance of over irrigation, controlling weeds on inter-row strips and keeping them dry, planting and harvesting at optimal times and frequent irrigation with just the right amount of water to avoid crop distress. Nigeria is well primed to adopt some of these effective practices which are both largely underutilized. Through a combination of adequate manpower development, timely provision of access to needed credit facilities and continuous extension services, judicious use of the seventeen dams and at least thirty rivers, Nigeria is well primed to achieve food security through effective irrigation.

“New Thinking in Sustainability: A System Dynamics Approach” Case Study: Karaj watershed, Tehran, Iran

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A sustainability assessment on socio-economic and ecological system requires a systemic perspective in order to address the close relationship between the environmental and socio-economic process. Among all complicated systems, watersheds have been widely acknowledged to be the appropriate unit of analysis for many water resources planning and management problems. Since many of the environmental processes and socio-economic activities within a watershed system are too complex, dynamic, and spatially variable, we need to take a systemic perspective in order to address the close relationship between the included sustainability indicators. The Karaj watershed with 1,070 km², is considered one of the most important water resources in Tehran, the capital and the most populous and strategic city in Iran. Recently the quality of water is one of the most important challenges in the study area inasmuch as the National Security Council has

passed some action plans to reduce and prevent the water pollution in this area. The aim of this research is the development of a new thinking with a system dynamics approach to deal with sustainability issues. Much research has been carried out piecemeal on different aspects of the Karaj watershed. However to disentangle drivers and dynamics of change in this complex system, we need to put these pieces together and analyze the system as a whole. In this research we apply a qualitative model of the Karaj watershed socio-economic and ecological system using Vensim PLE software. We then investigated the model system through loop analysis and finally examined effects of changes on the system state and structure. This model allowed us to investigate system-wide chain reactions resulting from disturbances. We found that in different sub-systems including environmental, socio-economic, and institutions there are disturbing parameters which are related together when we see them as an integrated system. Delays, policy resistances, and rule beating are three major system traps in the Karaj watershed system that bring the whole system in unsustainable situation. Also we discovered population has a dual balancing and reinforcing role with respect to sustainability of the Karaj watershed. This controversy comes from the migration out of area and high potential tourism activity especially during the spring and summer. By understanding different pathways that regulate a single process, we obtained multiple tools with which to manage changes. These changes in the Karaj watershed system have been discussed according to Meadows leverage points; places to intervene in a system. This model is simple and usable to assess system-wide effects of management policies, and can serve as a paving stone for future quantitative analysis of system dynamics at local scales.

Water supply decision-making for a sound prioritization of society's limited resources

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The main obligation of water utilities is to provide its customers with a continuous supply of safe drinking water. To fulfill their obligation, water utilities need to manage a variety of highly complex issues and future uncertainties. Climate variability, urbanization, ageing infrastructure and economic constraint add to other, ever present, challenges of water supply management. In an effort to meet demands, a growing number of water utilities initiate various forms of inter-municipal co-operations, creating a new regional level of decision-making. The motives for these co-operations include economies of scale of financial, human and technological resources; possibilities of joint source waters; balancing of socio-economic and spatial differences; and enhanced professional capacity. But there are also challenges such as risks of decreased transparency due to increased autonomy, loss of local knowledge and subsidiarity, and risks for increased vulnerability due to dependency of fewer facilities and source waters. So, taking these benefits and drawbacks into account, how do we make sure that decisions on inter-municipal co-operations and regional interventions are sustainable? And what aspects determine water supply sustainability on a regional level? There is a growing international consensus that water supply planning, design and decision-making needs to address sustainability, long

term uncertainties, system complexity, stakeholder involvement and coherent comparisons of alternative strategies. However, there is an absence of decision support tools on an inter-municipal, regional, level to compare socio-economic profitability with environmental and social aspects to support decisions with a sound prioritization of society's limited resources. Hence, this paper aims to provide and test a framework for assessing the sustainability of regional water supply interventions by combining cost-benefit analysis (CBA) with multi-criteria analysis (MCA). Specific objectives are to: (1) present a generic framework that incorporates risks and uncertainties and that enables to combine a fully monetized socio-economic analysis with criteria from the social and environmental domains of sustainability; and (2) test the framework in a case study. The framework, with a generic set of sustainability criteria, was co-developed and tested together with stakeholders from water authorities, municipal community planners, municipal environmental professionals, water utility managers, water resource organizations, fishing organizations, local politicians and representatives from the agriculture, transport and hydropower sectors. The Gothenburg region in Sweden, with its 13 municipalities, one million inhabitants and 30 water treatment plants, served as a case study area for which five alternative interventions were evaluated: (1) centralization of water supply production; (2) regionalization of water supply organization; (3) shift of the main source water; (4) maximization of groundwater usage; and (5) use of additional source waters and treatment plants. Each alternative was evaluated with time horizons from the present day to years 2050 and 2100, respectively, by assessing the expected environmental, economic and social effects. Uncertainties were represented by probability distribution functions and analyzed by means of statistical simulation (Monte Carlo). In conclusion, this study provides decision-makers with support to improve their ability to make well-informed, sustainable and transparent decisions to ensure the society a safe and reliable water supply for generations to come.

Eco-Service Quantification of Ecologically Engineered Urban Wetlands in Ait Campus

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This research qualified two wetland eco-services é wastewater treatment benefits and carbon sequestration service of ecologically engineered urban wetlands on AIT campus. Relationships between nutrient loading (N, P) concentrations, microphytes, macrophytes and zooplankton density in eco-engineered AIT wetlands were established. The effect of wetland macrophytes in polishing wetland water quality was realized. Macrophytes, mangroves and algae were found to be most promising technology to sequester CO₂.

Macrophytes (water lily, lotus, *Victoria amazonia*) introduction in AIT wetlands improved wetland water quality; reduced e-coli count from 1300MPN/100ml to 700MPN/100ml whilst N and P concentrations decreased to 0.08mg/l and 0.19 mg/l. *Spirulina* bloom in the AIT wetlands specially FP has sustained remarkable improvement, where the spirulina amount lessen from 98% to < 1%. High N and P concentrations

(3.4mg/l and 0.8mg/l) influence cyanobacteria (*Spirulina* sp) dominance in urban wetlands.

This research study demonstrated that Cyanobacteria (which, being bacteria, are ecologically more resilient and invasive microphytes, than other taxa, e.g. green microalgae), can be controlled and effectively eliminated in urban wetlands. Their invasions, frequently and incorrectly called “blue-green algal” blooms, are well-known detrimental phenomena both in rural and urban environments. The control can be exercised through an approach of an ecologically engineered introduction of diverse macrophytes with a broad variety of properties (emergent wetland plants of diverse speciation). The approach follows a basic ecological principle that diversity of ecological habitats/niches characterized by different environmental conditions inevitably leads to a corresponding species diversity. Increased concentration of microalgal feeders, rotifers (Rotifera) was observed in the AIT fountain pond, resulting from diversification of habitats/niches provided by macrophyte plants. Size of *Spirulina* frequently poses a major problem for potential microscopic predators. Depending of a number of factors, length of entire *Spirulina* spiral may potentially reach hundreds of micrometers. In case of the macrophyte-free Chiang Rak pond/canal system the length of the entire spiral was very high (5-6 spiral units, 200-300 μm) and this prevented predation, hence only low concentration (abundance) of rotifers was observed (20-50 individuals per L), and only one species (*Brachyionis* sp.), in contrast to much higher abundance and species diversity in the AIT Fountain pond/canal system after eco-engineered macrophyte introduction.

The STELLA model output of AIT wetland hydrology indicated that water volumes of the studied wetlands (hydraulically closed systems) without wastewater seepage fluctuated (70 to 80%) throughout the dry and rainy seasons (Figure 4.14). Pond volume (water level changed in pond as a function of time) depends upon rate of evapotranspiration, amount of precipitation and some extent water pump in and out. However, water volume of wetland with continuous wastewater seepage fluctuated insignificantly throughout the dry and rainy seasons: pond volumes varied by 15 to 25% only. This finding suggests that in the framework of AIT Eco-campus the hydraulically closed ponds and canals with the introduction of wastewater can be sustainable and stable water bodies where drying-up over the dry season are not a threat.

Wetland macrophytes and mangrove sequestration was estimated as 33.4% and 47.1% of %C respectively whereas as microalgae secluded 0.5 kg CO₂ d⁻¹. In spite of high CO₂ emissions, approximately 6246 tons C equ.yr⁻¹ of greenhouse gas discharge on AIT campus; wetlands are discovered as important ecological control system to lower these emissions.

Upgrading urban wetlands through ecological-engineering approach with macrophytes introduction boost their eco-service diversification and easy and sustainable approach to better urban wetland water resources especially the polluted ones.

Influence of Rural Women's Social Network on Attitude toward Water Conservation: Case Study of a Village in West Bengal, India

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Sustainable community natural resources include an inherent problem. In poor rural villages in West Bengal, India, public water pipe stands are being installed to supply safe water. On the other hand, another problem occurred: residents' lowered awareness of ponds along with the relatively newly installed public pipe stands. These ponds are regarded as residents' loose common water resources that represent neither private nor public. In most of those rural areas, adequate sewerage systems are not provided, causing drainage failure problems. In this sense, the water supply using technologies like pipeline projects has inextricable links to the water conservation.

The goal of this study is to seek a norm determines residents' awareness of water conservation. Additionally, the author examines strengths of rural women's connections and the tendency of homophily to conserve ponds.

As the results, the study found the norm causing the difference in rural women's individual senses of ponds was a traditional ritual and their individual voluntary behavior. Besides, even in a same ethnic, social network, there were different strengths of rural women's connections and various affections of individuals' attributes between social groups, which were interacted with homophily and social network structure.

In conclusion, a tacit norm and individuals' water environmental voluntary behavior were the key to prevent water resources. It can be suggested that before installing supply safe water systems, it is imperative to grasp some of the patterns causing the differences in residents' intimate interactions not to fall into local water resource depletion.

The Arts as a Tool to Raise Awareness of the SDGs

Symbiotic Relationship Between the Arts & the SDGs And the Existing Challenges In The Use of Arts In The Promotion of the SDGs In Nigeria

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Operating the arts and culture beat for the past three and a half years; including taking an active interest in environmental sustainability reporting and action in the past year, the topic Arts As A Tool For Awareness Creation on The SDGs strikes a personal chord for many reasons. First, the subject can inject a much-needed life in the arts circle in the city of Abuja, for another, the innate creativity of the Arts will present the SDGs in varied and pleasing forms for wider discussion.

However, just as art can serve up the subject in colourful and aesthetic ways, by virtue of its exclusivity and the limitations of the different art media - visual, performing and literary arts, it can restrict its audience and access to the intended messages.

To thoroughly examine the use of art in generating awareness of the SDGs, the paper highlights the symbiotic relationship between arts and environmental sustainability é a gradual but growing trend amongst Nigerian artist(e)s; artist(e)s unconscious and conscious address of the SDGs albeit in minute details; and the greatest obstacle to the use of arts in the promotion of the SDGs - the government.

The question also arises on how effective is art in galvanizing people to action? Some artists believe that the SDGs as a roadmap to achieving sustained development demands action over awareness creation. Art of itself is yet to induce action and change, both necessary elements to achieving the ‘state’ the goals envisioned.

Drawing from interviews and experiences of five or more artist(e)s of different art media, we journey through the past, present; we observe what worked or did not work as they experiment with their arts, and deduce recommendations of how best the arts can aid the global drive for sustained development.

What Art Can Do - Envisioning a role for artists in wicked problems

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As a composer I was able to find out how music is much more than nice sounds and melodies. I could see how it could give a voice to young people that struggle to find their identity. In Damascus, before Syria broke into chaos, I experienced how young artists pictured a rich and positive future through music. Later, I experienced how music enabled traumatized refugees to express their feelings and share their stories.

Besides all this, I experienced the reality of life as an artist, the daily struggle to get projects off the ground, to find funding and collect audiences. I am aware that attention and connection have become scarce resources in a world that is full of distraction, mere entertainment and noise. It struck me how often artists and their audience have a superficial relationship, lacking interaction. Their separate lives only touch each other during a performance, concert or exhibition, in a very traditional division of roles: the active artist on stage, and a passive receiving audience in seats, listening.

This division of roles is a problem. Idealism, imagination and creativity have become professionalised. These have become isolated values, bound to the artist practise, specific non-profits or enterprises with a dedicated target.

I believe the mindset of an artist has a role to play in all places that deal with complexity and so-called “wicked problems”. All professionals that strive for innovation and development in the field of sustainability need these three key aspects of the arts:

1. Imagination; the vision to see a better world.
2. Play; the capacity to experiment, to fail and try again.
3. Beauty; a recognition of the value of harmony, health and balance.

The challenges of our current time depend on an acceleration of solutions and ideas. Therefore, we need to dramatically increase the space for the artist mindset in places that deal with wicked problems.

This is not easy. Artists not only work different and use a different environment to develop and expose their work. They also think different from other professionals.

In a world that urgently needs solutions for pressing problems, there seems no time to waste and this pressure results in attachment to a familiar way of working, focused on clear expectations, linear predictions direct results. Experiments with imagination, beauty and play hardly take place because there is no space to experiment, no time, no room for failure.

In this way, The way we see the problem is the problem.

I propose to never work on solving wicked problems when there is no seat on the table for the artist mindset. When we only apply rational and functional thinking and processes, we desengage a whole hemisphere of the human brain. Without imagination, beauty and play, we miss an essential dimension to our human capacity. A loss that might turn out to be fatal.

It’s not easy to combine a conventional way of solving problems with the artists mindset. We might be lost in translation when we mix different languages and working styles. I have a few steps though that can provide a way to start working together.

First of all, the artists mindset is not a way to create art, but a way to see the world. Second, the artists mindset invites complexity into the picture. Instead of simplifying the situation, it allows a full spectrum to enter it’s perception.

And then: the essence of the artists mindset, is it’s dedication to the highest quality of questions. The artist may pose a remarkable query to research even a familiar problem. She might slow down and investigate a very personal or imaginative dimension for example, or bring non-verbal ways of questioning into the mix.

The artist journey is not trying to “solve complexity” but rather to accept complexity and become part of it.

A laboratory for “the art of beautiful questions” might be the place where science and art can touch each other. I present an online platform, organized around the 17 SDG’s, where artists share their creative questions that are the core of their projects.

In this new space, a breakthrough can be born as beautiful, imaginative and playful minds of both artists and scientists find each other.

The Role of Natural Resources in Peace-Building

The role of natural resource in conflict, environmental destruction and peace-building in the Ogoniland of Nigeria

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This paper is aim to identify, discuss and analyze the role oil wealth in triggering conflict as a result of despoliation of the environment by the oil companies in the Niger Delta region. The exploitation and exploration of oil severely contaminated the environment in the Niger Delta, which is one of the factors that sprung ongoing the natural resources conflict, social unrest and violence in the oil-rich region. The severe environmental damage occasioned by the oil companies activities affects human health and has destroyed many livelihoods across the delta region.

The paper will be divided into four sections to explore, examine and analyze the role of oil and gas in conflict, destruction of the environment and the consolidation of peace in Nigeria's restive Niger Delta region.

Firstly, the people and the oil industries are in disagreement, creating a landscape characterized by the lack of trust, paralysis, and blame. The situation for which the oil hosts communities’ well-being is worsening; the oil companies’ activities supported by the federal government of Nigeria have seemingly devastated the environment. Secondly, the reckless exploitation of the natural resources in the Niger Delta amounts to environmental devastation - ecological war. The Shell Petroleum Development Company and Nigerian state depend heavily on violence to maintain and sustain their interest to control and exploit those areas where oil discovered. Because of the environmental devastation, the Niger Delta youth formed militant groups to confront the Nigerian state and oil companies through violence means which includes kidnapping oil and vandalization of oil pipelines as well as killing the security forces and the region becomes the hotbed for both the state and oil companies. Thirdly, in other to address the militancy and bring peace to volatile oil rich region, the federal government of Nigeria declared amnesty to the Niger Delta Youth militants. As the result of the amnesty programme, the Niger Delta region for the past six years witnessed relative calm, again in 2016 new militant violence group called Niger Delta Avengers (NDA) emerged. The NDA whose activities have severely affected Nigeria’s oil output. The aggrieved Niger Delta youth -

fighters are arguing that the region has been environmentally destroyed and deprived of its development despite its enormous contributions to the Nigeria's economy. Fourthly, to bring peace to the Niger Delta region, the federal government of Nigeria and the oil companies accepts to clean-up the Ogoniland in order address the grievance of the Niger Delta people and to bring lasting peace to the resource-rich region of Nigeria.

Natural Resources and Resource Control as a Mechanism for Peace-Building in Problematic Federal States: Nigeria as a Prototype

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The Nigerian state after 50 years is deeply entrenched in multifarious problems characterized of praetorian polity. It is a state founded on faulty foundation of geographical amalgamation for ease of administration by the British colonial powers and remains desperately divided and deepened in internecine conflict on virtually every conceivable issue. Nigeria as a geographical expression on paper is more real than Nigeria in the minds or consciousness of the people. In other words, indigene ship takes precedence over citizenship, a situation whereby everybody is more attached to his tribe or race hence, it is illogical to talk of Nigerian nation, and so everything works in that manner: leadership, judiciary, institution name it. The rallying point of all these is corruption, greed, looting, regional hegemony, tribal domination, oppression of the minority, devastating underdevelopment, gross impunity and complete lack of leadership compounded by mono-cultural dependence on petroleum oil. And so, the slump in oil price in 2015 completely threw the country out of balance into depression, making the people wailing for restructuring, resource control and real federalism which they hope can effectively address the restiveness and restlessness of the nation. It is by addressing these myriads of problems and engage peace-building mechanism that the rationale of stepping up Natural resource exploration and exploitation by each state or region as applicable in true federalism can become a reality. Thus, this paper engaging historical, comparative and institutional methodology is positing from the standpoint of the role of natural resources in bringing lasting peace to Nigeria federation on the premise that Nigerian leadership jettison their primordial, selfish and self-centered sentiments and allow true federalism to take firm root in Nigeria where every state or region or people as the case may be, is allowed to take charge of its natural resources for autonomous and authentic development. This is the only veritable option for a true federalism and sustainable development

Equity in Collaborative Forestry in Nepal: A Case Study from Kailali District

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Equity is about the equal distribution of resources and opportunities to relevant stakeholders. In other words, equity is defined as fairness of treatment for all concerned

stakeholders and right holders during procedures to form and implement policies (procedural equity), and in the distribution of resources and costs associated with these policies (distributional equity), according to agreed sets of principles (McDermott, Mahanty, & Schreckenberg, 2012; RECOFTC, 2014). Inequity is commonly caused by the discrimination to the oppressed peoples by the power holders. There are many forms of discriminations arising from social differences such as based on dimensions of class, gender, caste, color, ethnicity, religion, culture, language, disability, region etc. Such social differences could lead to exclusion of certain individuals and group of communities from accessing resources, benefit and opportunities. In the case of forestry, issues of equity and justice are more important because it is the part of daily life of local communities. Especially in the case of community-based forest management, equity is one of the key issues that determine the success and effectiveness of forest management.

Many studies have highlighted how community-based forest management addresses issues of equity and justice. For example, Ostrom (1990) argues that community based natural resources can be managed by local people in equitable, efficient and sustainable way. Likewise, Richards and Kanel (2003) state that issues of equity and transparency have been handled and improved in Nepal's community forestry. There are different opinions among scholars about the equity in forest. Satyal (2006) observes the dominance of state rule and power in Terai forest management. According to Bampton et al. (2007) Collaborative Forest Management (CFM) is a unique forest management model in terms of inclusion of relevant stakeholders, distant users including women, indigenous peoples and Dalits in the structures and power. In contrast to this argument, Bhattarai (2005) claims that CFM is creating a gap between the users of the northern and southern belts and that a lot of investments were made to attract local people to CFM. On the other hand, there have been very limited empirical studies that focus on equity issues in Terai forest in general and CFM in particular.

The role of Natural Resources in peace-Building

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There is nothing as valuable in achieving sustainable development goals as the integrated, rational and democratic management of public goods. The question of the mobilization of natural resources in prevention and management of conflicts in Africa poses an anthropological non-place, an optical illusion. It is true not only that, the endowment of an immensely rich subsoil of gold, diamond and oil resources often arises as a cause of the crises or geopolitical tatum in which the metropolitan powers clash with unconfessed interests. But also because of the presence of conflicts over immaterial values that are difficult to adjust by gifts, and sometimes the indelicate choice of certain politicians to eliminate disputes by corruption, and to implement peace through repression or criminalization of adversary. However, a sensible and sustainable exploitation of ecosystem resources, taking into account the demands of riparian's populations, the investment of multinational firms and the aspirations of the future generations, would

undoubtedly constitute an element of consensus and communion between the various protagonists. Hence, such meritocratic governance would thwart the unfortunate prognoses and the potentially conflicting embitteredness of organized crime, the geological scandal or even the Dutch syndrome. This reflection can be carried out from several epistemological frameworks. However, the demands of methodological rigor will lead us to rationalize this object of study based on Thomas Obershall's theory of resource mobilization to account for the impact of the profitability of the "precious sesames" and the "ors" black, red, white, blue, in defusing, crisis management and sharing belligerents. In the first part, we can study the polemical perception and the cryogenic uses of natural resources in Africa. And in the second part, the irenological virtues of natural resources in the theoretical hypothesis of their rational management.

Governance of Oil Sector in the DR Congo on the Edge

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The UN member States and the African Union (AU) member States have to implement the 2030 Agenda and the AU 2063 Agenda to achieve sustainable and inclusive development. In line with the Addis Ababa Action Agenda (AAAA), securing sustainable financing is a prerequisite for investing in the 2030 Agenda and its associated Sustainable Development Goals (SDGs). In this context, a better taxation of natural resources is required to protect and broaden tax base. It contributes to improving Domestic Revenue Mobilization (DRM), which is critical for social protection financing and investing in public infrastructure. Therefore, it is a key factor for reducing poverty in conflict-affected developing countries and resources-rich countries, which experience difficulties in embarking in peace building process, such as the DR Congo.

The DR Congo is exposed to political, electoral, security, socioeconomic, and humanitarian crises. On the economic side, it remains a major rent-based economy in Africa. Besides mineral reserves, the country detains substantial hydrocarbons reserves. Yet, it is a small oil producer country with about 20,000-25,000 barrels per day in 2016. The paper examines challenges linked to improving the oil industry's governance in the DR Congo, a fragile State in turmoil.

First, on 1 August 2015, the country has implemented a hydrocarbon code in view of attracting Foreign Direct Investments (FDI) to further develop the extractive industries. However, the competitiveness of the said legislation is overshadowed by the business climate's deterioration and the difficult resumption of the international oil market following the Organization of Petroleum Exporting Countries (OPEC) output cut of 30 November 2016.

Second, President Kabila only signed presidential ordinances awarding 4 oil blocks in the Rift Albertine Graben (Eastern DR Congo) since 18 June 2010. However, the activities of the oil companies operating these blocks are hampered by the armed groups' presence.

Third, the DR Congo's neighboring countries, particularly Angola, Uganda, and Tanzania, are eager to develop their hydrocarbons sectors. However, political and security tensions are regularly observed between the DR Congo and some of neighboring countries (Angola and Uganda) due to the oil border disputes. This has led to affect the development of the country's oil sector. Angola (an OPEC member State) and the DR Congo rely on the United Nations (UN) to settle the maritime border dispute over major Angolan oil concessions (blocks 14 and 15). Despite the recent oil discovery along the Congolese-Ugandan border, notably Lake Albert, Uganda and the DR Congo have not yet implemented Ngurdoto agreement of 2008, a bilateral oil agreement. Overall, the oil sector's development has also led to reshape the DR Congo's foreign policy vis-à-vis Angola and Uganda. The oil discovery in Uganda has increased tensions within the East African Community (EAC). Tanzania will finally build a pipeline from Hoima (Uganda) to Tanga port (Tanzania), which will be critical for evacuated the oil production from the DR Congo in quest of sustainable peace and development.

Oil and the Challenges of the Niger Delta Development: Towards a New Outlook for Peacebuilding, Security and Development

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Mineral resources constitute the natural wealth of a nation and Nigeria is highly endowed in strategic resources to which oil is one of them. The exploitation of the resources to enhance the course of modernization is the means by which all nations and people of all races measure and relate the value and contribution of their natural resource, to the quality of life. The exploitation of the natural resources to nurture the well-being and development of any nation has both positive and negative externalities and thus, every nation takes measures to optimize the benefits from resource exploitation and minimize the many serious negative externalities associated with mineral resource extraction, particularly the incidence of environmental damage, pollution and ecological degradation. The Exploitation of oil and gas and the heavy industrial expansion to otherwise pristine environment threatens the security and the survival of the indigenous people and the biodiversity of the natural habitat, on which they depend. The exploitation results in environmental damage that threatens the ecological security and the survivability of the region's fragile mangrove ecosystem. The Niger Delta harbors most of the Nigerian oil industry operations.

International Oil companies mostly from Europe, America and Asia in partnership with the producer government of Nigeria have not taken adequate measures for environmental protection and stewardship to ensure and sustain the biodiversity and ecological security of the people and their land. This feature in oil industry operation is the real challenge for the attainment of sustainable development in the oil rich Niger Delta. The Niger Delta like other Deltas is a fragile domain of wetlands. The advent of the oil culture with its cash economy has destroyed the traditional value of the communities to such an extent

that traditional norms no longer hold the communities together. Where there was peace between the communities, the advent of the oil created competition, rivalry and destruction of lives and property. The estimated population of the region is about 25 million.

Nigeria's Niger Delta is bountifully endowed with oil and gas. Today, the area remains the hot bed of the oil industry's operations, which have had disruptive effects on the indigenous forms of Bio-resources management due to the dislocation of the ecosystem, environmental degradation, soil contamination and oil spillages which are characteristics of oil exploration and exploitation. The occurrences of these impacts and its negative externalities have been a major source of conflict between the oil communities and the oil companies for over fifty years. The existence of the observable political, economic and environmental anomalies and the quest for development that benefits the people remains a challenge. Therefore this paper calls for a new outlook for the promotion of sustainable development in partnership with the people of the area to ensure peace, security and realistic development for the oil region. It is in this light that we need to take another initiative or alternative outlook for peace building in the Niger Delta to promote harmony in development.

The Risk of Conflicts Over Natural Resources in an Era of Climate Vulnerability

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In adopting the 2030 Agenda for Sustainable Development the United Nations and its Member States adopted an ambitious agenda of 17 goals and 169 indicators to transform and improve the world that we live in and to ensure that “no one is left behind.” The 2030 Agenda recognizes that the three dimensions of sustainable development, economic, social and environmental must be addressed in a balanced manner, taking into account the inter-linkages and interdependent nature of our world and the SDG Goals. In this paper we will address the risk of conflicts over natural resources in an era of climate vulnerability, the impact that these conflicts can have on the promotion of peaceful societies and some suggestions on how to address this risk through capacity building, education and the integration of methods of managing these conflicts through mediation, technical peace building, conflict resolution training, integration of Climate Change data and the creation of a culture of peace to “promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.”

Agenda 2030 is transformational, requiring new ideas, redeployment of sound structures, tools, and concepts to make the SDGs a reality. Yet in order to support change people must recognize the reasons to do so and develop rationales and tools to make changes. The tools of peacebuilding and mediation are well suited to do this and to address conflicts triggered by Climate Change and disputes over natural resources where the interdependency and common vulnerability of our world are most evident. This paper will

provide examples of how conflict resolution tools allow parties, be they Countries, sub-regional areas, businesses, or individuals a means for reinterpreting a situation in a positive light-with a recognition that my humanitarian crisis is also your geopolitical problem and to serve as a defense against destructive, violent conflicts-especially where shared resources are involved.

The pressure Climate Change is putting on natural resources, especially in fragile States threatens peace and security. The use of community dialogues, community practitioners, mediation and facilitation can address behaviors and attitudes, in context, to help manage conflicts before they erupt, address it when it erupts into violence and to create long term stability and prevent the post conflict phase from spiraling into destructive conflict again. “Fragility, conflict and violence damage the social fabrics and social contracts of countries, impacting behavioral codes and trust in government and aggravating ethnic and religious friction” discouraging investments and triggering a flight of capital, often leading to shadow economies and the “rogue exploitation of mineral and natural resources. “ We cannot wait until violence occurs. To achieve the SDGs, we have to help inoculate vulnerable peoples from the economic, social and environmental destabilization that can erupt, especially as climate change puts pressure on the use and availability of natural resources. As recognized in Resolution A/RES/71/243, there can be “no sustainable development without peace and no peace without sustainable development. Climate Change and how natural resources are used needs to be supported by a Culture of Peace and Non-violence with skills development and leveraging of local resources and intuitions that support resiliency, peace and the SDGs.

The Role of Universities in the Implementation of the SDGs

Found in Translation: Facilitating University Interdisciplinary Research and Practice

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As we look ahead in the fields of international agriculture and rural development we find increasingly complex and wicked problems that can no longer be met by simple one size-fits-all solutions. The need for interdisciplinary research and practice is stronger than ever. Interdisciplinary research and practice must start with interdisciplinary partnerships and understanding. The International Agriculture and Development (INTAD) dual-title graduate degree program at Pennsylvania State University allows students throughout the College of Agricultural Sciences to gain valuable skills and experience working across academic disciplines to address pressing issues in global agriculture. At the core of the INTAD dual-degree program is the capstone course INTAD 820. The class has been co-taught by an interdisciplinary team -- a Plant Pathologist and a Rural Sociologist. INTAD 820 partners social scientists with natural scientists to enlighten each other’s understanding and bring about awareness of paradigms and perspectives previously

unconsidered in their home disciplines. Specifically, the course emphasizes interdisciplinary communication and sharing of discipline-specific knowledge via group activities to encourage consideration and integration of multiple perspectives. Integral to the course is the opportunity to visit a developing country and examine international agriculture and rural development in practice. This past spring the INTAD 820 course visited a partner, Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), in Costa Rica in order to apply the knowledge, skills and dispositions learned in class. CATIE provided a natural laboratory to address critical issues faced by local farmers from multiple disciplinary perspectives. By promoting rich learning opportunities and diverse, interdisciplinary partnerships we are able to better prepare the next generation to address pressing global challenges in international agriculture and development.

Operationalizing the SDGs in Mining for Emerging Economies

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As a result of unprecedented global participation and engagement, the UN's 17 Sustainable Development Goals (SDGs) were drafted and adopted in September 2015 providing a vision and framework for a transformed world. To achieve this unique opportunity of social inclusion, environmental protection combined with economic development, it is necessary to translate these aspirational goals into innovative, implementable and measurable activities. This is not a trivial task and requires participation of all levels and sectors in society.

Universities have been established over the centuries as spaces of transformation. This is achieved through the primary activities of education, research and engagement with the society to which they belong. They are places of creative and deep thought, where complexities and challenges are wrestled with, to develop the tools and technology for innovative solutions. They provide disciplinary expertise and thought leadership to train and equip the next generation of leaders and human capacity for the future. Universities, thus provide the ideal catalyst and platform to shape implementation or operationalising the SDGs.

The Minerals to Metals Initiative hosted by the Department of Chemical Engineering at the University of Cape Town, has recognised the critical role that minerals and metals play in modern society. The initiative is a key player towards the achievement of the SDGs. Together with its partners it undertakes cross cutting interdisciplinary research and has pro-actively embraced the imperative of operationalising the SDGs in the mining sector. It has set out to establish what mining companies already contribute towards the SDG objectives, in both quantitative and qualitative terms. It will also identify ways in which the sector can adapt and improve, implementing new operating procedures or methods to more effectively embed the SDGs in governance, management systems, organisational culture and disclosure.

In this case study, the contributions of a multinational mining company towards achieving the selected three SDG objectives 6, 7 and 9, which focus on water, energy and industry, innovation and infrastructure are shown to be dependent on the region or location of the mining operation. The work shows the importance of addressing region specific developmental needs and recommends additional perspectives and actions that should be considered.

Operationalizing the SDGs - from advocacy to action

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Subsequent to global adoption of the United Nations (UN) 17 Sustainable Development Goals (SDGs) in September 2015, much of the conversation has focused on advocacy to establish a sense of urgency and to mobilise commitment from a broad and diverse base of stakeholders to their implementation. Recognising the role that business should play in contributing to achievement of the goals, a range of groups and industry bodies across sectors have mapped the SDG themes and related performance metrics to sector interests and areas of impact. But while advocacy and the securing of commitment is necessary at the outset of what is really a shift in the collective intent and direction of our world é an early move from thinking and talking to doing is needed, as we seek to turn intentions into reality.

Against this background, AngloGold Ashanti and the University of Cape Town established a partnership in December 2016 which, amongst other things is focusing on demonstrating how the SDGs can be achieved through embedding them into the business strategy. In this way, outcomes which make sense and drive value to both business and society are achieved.

The partnership connects AngloGold Ashanti with the Faculty of Engineering, the Faculty of Law, the Graduate School of Business and the Hasso Plattner Institute of Design Thinking. The lead agency within the partnership is the Minerals to Metal Signature Theme of the Department of Chemical Engineering. While retaining independence within the partnership, the combination of partners will leverage off the two aspects of rigorous theory development and real world implementation, as we seek to collectively enhance our impact.

In demonstrating operationalization of the SDGs, the partnership is utilising the AngloGold Ashanti Strategic Framework which lends itself to ease of operationalization. This establishes a prototype for application in any company, across any sector. The key aspects of the architecture within the AngloGold Ashanti framework are a clear understanding of the sustainability challenges facing the business (material issues); a set of business aspirations which are congruent with the SDGs; and the use of strategy mapping and balanced scorecard (developed by Kaplan and Norton) as tools to enable a coherent set of actions.

The primary steps we have applied in designing the approach to operationalization and its subsequent implementation are:

- The company material issues are mapped to the 17 SDG themes é where a material issue has mapped to multiple SDGs this provides an indication where there may be opportunities for leverage;
- The SDG themes on which the company will focus are prioritised against the company's 2030 aspiration which is congruent with the concept of the SDGs é aspirations have been developed for the sustainability disciplines of Safety; Health; Environment; Community & Government Affairs; and Security & Human Rights;
- Each discipline then selects the most relevant metrics from the prioritised SDG themes and incorporates them into the company's sustainability strategy map and balanced scorecard. These have been designed to enable all disciplines within the sustainability portfolio to address the company sustainability challenges in an integrated way; and
- Within the balanced scorecards, company actions to achieve targets set are incorporated and performance is tracked.

Beyond its contribution to the base design and implementation, the partnership continues to play an active role in identifying innovations to enhance and accelerate performance. Further work envisaged through the partnership is the development of a model to weight / determine company and industry relative contributions to national performance.

Observatory for the Sustainable Development of Cartagena - OCARTAGENA Design of a web platform for the follow-up to the Sustainable Development of Cartagena - Colombia

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This work intends to show the experience of designing, developing and implementing an observatory for the follow-up to sustainable development that is born in the academic environment from research processes as an ICT solution for extension and linkage with the environment, seeking the integration of communities and Services beyond the cloister and as a project for an intelligent city. This document treats about the Observatory for the Sustainable Development of Cartagena -OCARTAGENA, a project that seeks to respond, among other things, to the commitment of social projection of a University Institution, with a view to making visible its insertion and real commitment in geographic environment of its direct influence. Specifically, it seeks to show aspects related to the technical design and determinants, flow and data structure, computerized software and sustainability of an intersectional experience, which from its conception has sought to become a living expression of the city by integrating on a technological platform ,

providing timely statistical information allowing socially, economically and environmentally reliable indicators and their interdependence to democratize in a reliable and up-to-date way to show the evolution of the city's sustainable development, thus contributing to decision making without losing sight of trends, meanings and meanings that Are glimpsed in national and international life.

Comparison of sustainable lifestyles of university students based on cultural characteristics in different geographical regions

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Sustainability has become one of the major issues that has to be taken into account in universities worldwide. In this paper, environmental sustainable lifestyles of university students in Turkey and selected East Asian University were assessed. SWOT analysis based on social aspects was carried out as a first step for comparison. In detail, cultural and traditional behaviors of the students was assessed in terms of sustainable life style by a questionnaire based survey. The answers were analyzed by using SPSS (Statistical Package for the Social Sciences). The results of sustainable lifestyles, road-map for future sustainable campus program together with challenges based on regional characteristics are presented in the study.

"Most of Them Do Not Quit:" Exploring Gender Norms and Student Persistence at a Tanzanian Teachers College

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A 2014 UN Women report on envisioning women's rights post-2015 defined gender norms as "the beliefs and rules, in a given community or institution, about the proper behavior of men and women" (Connell & Pearce, 2014, p.7). Although gender norms may differ based on the context and location, and are themselves evolving and mutable, norms can impact all aspects of daily life. Educational institutions can be a space for young minds to learn, reinforce, challenge and disrupt these norms. However, the formal education sector does not inherently act as a disruptive or empowering setting, and contextual and theoretical analysis is necessary to better understand the social construction of norms.

This paper presents findings from qualitative and quantitative data gathered at a Tanzanian teachers college to better understand some of the existing gender norms and stereotypes at the tertiary level that may affect female students' lived experience. Though literature on gender norms and narratives in the Tanzanian education sector exists, very little has been written at the higher education level, particularly using a mixed methods approach that seeks to elevate students' voice and participation. This paper seeks to answer the question: How do male and female staff and students at Dar es Salaam

University College of Education (DUCE) perceive and discuss barriers and opportunities for female retention and completion?

Through inductive research and investigation, the following gender norms emerged as key areas of concern: A. Pregnancy among female students leading to drop out or discontinuation of their studies; and B. Girls “shyness” or lack of confidence prohibiting their participation in class and their ability to seek help. This paper hypothesizes that though these narratives are discussed often by staff and students anecdotally, ultimately data at DUCE may not support that these have a significant negative impact on female students to the point that they disproportionately affect discontinuation and dropout.

The findings demonstrate a gap between staff and students’ perceptions of norms and other challenges to female student’s retention and completion versus the lived experiences and persistence of these women. Ultimately, further data is needed in the higher education sector in Tanzania and beyond to better understand these gaps and assess the ability for tertiary education to be a space for female empowerment and deconstruction of harmful gender norms. This paper recommends a policy agenda “anchored to the African reality” (UNESCO, 2000, p.30) driven by local researchers who are best positioned to gather and analyze these robust and contextually relevant data.

The role of universities for developing the farming system of Bangladesh through Training and Technical Education

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Bangladesh is the most densely populated least developed agriculture based country in the world. More than 90% people directly and indirectly involve with agriculture. Most of them are not enough educated and knowledgeable about agricultural activities. Farmers of Bangladesh generally practice subsistence farming. But due to lack of opportunity for education and training, inadequate teaching and research and extension services majority of the people depends directly upon their own farm production in resource base traditional farming system. Farming System is a set of organized conditions for production of crops, livestock, fish, agro forestry, etc. In Bangladesh several organizations develop different farming system but the beneficiary farmers are not conscious about the modern farming system. If we can establish a system for their skill development by arranging special training including the procedure of using the land, labor, inputs, and capital to manage farm, household, and consumption to meet its objectives and priorities under a certain physical, biological and socio-economic conditions. By which they can change their socio-economical condition and it will bring the real sustainable development. Supremely, institutions should set up permanent mechanisms for observations of the job-market and on the basis of that continuous adaptation of courses. The institutions to implement development outreach activities are by follow-up technical support to graduates working in agri-businesses or managing their own production enterprises. Also, short courses of continuing education can be designed

to acquire updated knowledge and to qualify extension staff for career advancement. However, due to lack of financial and human resources often makes this difficult to carry out. Some institutions are taking action to establish better contact with potential employers of graduates. The institution should initiate some activities through arrangements for attaching students to agricultural enterprises so that they gain practical experience and possible entry to jobs. In many parts of the world, the increasing needs of growing populations for food, fuel and fibers have led to deforestation, severe soil erosion, loss of water resources, and eventually declining crop production. It is clear that the loss of natural resources and environmental degradation affects food security. It is also clear that agriculture based educational institutions need to incorporate environmental and sustainable agricultural development issues into their curricula. Environmental and sustainable agricultural development problems require an interdisciplinary approach to curricula since sustainable development relates not only to technological concerns, but also to economic, social, cultural, ecological, and public policy matters.

Social and environmental commitment of the University U.D.C.A. In incorporating the ODS: Environmental Course and Integrated Environmental Management System

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The incorporation of the Sustainable Development Goals, is a fundamental and structuring subject within the University of Applied and Environmental Sciences (U.D.C.A for its acronym in Spanish), of the City of Bogotá, Colombia. The environmental theme is a transversal axis within the substantive functions of the University and the Institutional Educational Program. As a strategic part for the incorporation of environmental awareness and knowledge within the university community, the Environmental Course was created; a basic subject linked within each curricular program, whose purpose is to sensitize the students in the environmental theme, so that they approach from their approach and professional rigor socio-environmental situations and problems, with an interdisciplinary and multidisciplinary perspective. And it is from this academic space, where the Sustainable Development Goals have been approached as a fundamental axis in the application of each professional formation.

On the other hand, the University of Applied and Environmental Sciences - U.D.C.A., is located in the northern part of the City of Bogotá, Colombia; In an area of high environmental sensitivity. The University is surrounded and partially included within the Thomas van der Hammen Forest Reserve, near wetland areas - Guaymaral wetland and the Eastern Hills. On the other hand, this area of the city does not have a sewage system, which means that additional actions are required for the functioning of the University, including the implementation of a water treatment and reuse program, construction and Operation of a Wastewater Treatment Plant. Likewise, there is an Environmental Tree

Management Plan of the campus, which directs actions for the appropriate silvicultural, landscape and green infrastructure present at the University. In addition, strategies, actions and follow-up are established for other issues such as hazardous and non-hazardous waste. With these and other aspects, the UDCA within its organizational structure, created an administrative unit of senior management, called Technical Secretariat of the Integrated System of Environmental Management (ST-SIGA for its acronym in Spanish) in charge of defining guidelines in terms of management Environmental management of the university, adequately managing environmental aspects and strengthening environmental awareness.

Competencies Needed in the International Agricultural Development Community: A Modified Delphi Study

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The field of international agricultural development has steadily increased because of the expanding world population and demand for food. Increased awareness of international development worldwide has increased development and created a push for more accountability in the developed world. As a result, many college programs in international development are beginning to undergo programmatic changes and are reconsidering the philosophy underlying their missions in order to better prepare students for careers in international agricultural development.

The purpose of this research was to produce an inventory of competencies expected of master's degree-level graduates of international agricultural development programs based on the input of the international agricultural development community. This list of competencies will be shared with universities offering programs in international agricultural development so that curricula may be prepared accordingly to produce career-ready graduates. Objectives of the study were:

1. Identify competencies necessary for international agricultural development graduates to gain employment.
2. Identify personal attributes necessary for international agricultural development graduates to gain employment.
3. Identify key life experiences deemed necessary for international agricultural development graduates to gain employment.
4. Propose curricula for graduate-level international agricultural development programs based on findings of this study.

A modified Delphi Technique study was used for this research. A panel of 21 experts from the international agricultural development community participated in three rounds of questionnaires during spring and summer of 2015. Sixteen panelists from round one completed round two and 14 panelists from round two completed round three. Panelists identified 29 competencies deemed necessary for international agricultural development graduates to gain employment; 16 were determined to be critical competencies and 13

were determined to be secondary competencies. Among the 16 critical competencies were: project management, program design, communication, technical expertise, leadership, and decision making, cultural sensitivity, knowledge and creativity, ethics and integrity, planning and organizing, resilience, team player, adaptability and flexibility, positive attitude, and interpersonal relationship building and collaboration, project/program monitoring and evaluation, contracting, business knowledge, awareness of international agricultural development industry, grant writing, budget management, consulting, and change management. French was the only competency from the language cluster that was found to be a secondary competency. Last, four competencies emerged from the life experience cluster: long-term study abroad, volunteer programs abroad, Peace Corps, internships on farms or ranches.

Professional social work for sustainable development. Evidence from East Africa

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Social work is an internationally recognized profession whose main task is to help individuals, families, and communities to cope with social problems and life challenges. Its functions are remedial, preventive, and transformative. According to a widely accepted global definition, social work “promotes social change and development, social cohesion, and the empowerment and liberation of people”. (International Federation of Social Workers, 2014)

Despite the important role social work plays in contemporary societies, the profession is still rather weak in contexts of many developing countries, particularly in Africa. But it is in these contexts where poverty is most pervasive; where basic social, educational, and health services are in a constant state of crisis; where human rights violations are widespread; where ethnic clashes and political violence are prevalent; and where environmental degradation is affecting the very survival of the people. It is in these contexts where skilled social workers can play their part towards better societies and the realization of the Sustainable Development Goals (SDGs). Thus, the challenge lies with higher education institutions where social work education and training takes place.

Since 2010, a project called PROSOWO (Promotion of Professional Social Work in East Africa) has been implemented in countries of the East African Community in order to promote social work and strengthen its role in social development and poverty reduction. Institutional partners of the project are universities from Burundi, Kenya, Rwanda, Tanzania, Uganda, and Austria. The project consists of a series of intertwined activities, namely: empirical research; enhanced education and training; capacity building; and increased engagement of social work personnel in social policy and human rights advocacy. In the course of the project, perspectives of more than 2,000 stakeholders got involved in the research. Subsequently, the research findings were translated into social work curricula and into a series of publications which nowadays serve as key references

in virtually all schools of social work in the region. Additionally, a number of workshops, symposia, conferences, and social actions were held in order to raise awareness about the important role of this profession and reach out to the public and policy makers alike.

Currently, the project is in its second phase, with a focus on research on indigenous and locally relevant innovative models of social work practice. Social work educators must be familiar with culture-specific knowledge and ways of coping; social work students must learn these knowledge and corresponding skills at training level; consequently, social work practitioners will be better equipped when dealing with social problems at grassroots level. Coupled with further capacity building activities, the PROSOWO project has been designed to have a tangible impact on the lives of poor and marginalized people by highly qualified social workers and improved social services. It is an example of good practice which can inspire initiatives in other regions of the world.

Contribution of Smart Technologies to the Performance of Green Buildings in Social and Technical Aspects

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With the advancement in technology today, the implementation of smart city concept continues to enlarge in several fields such as; security, mobility, education, administration and environment.

In this paper, the effect of smart technologies to the performance of green buildings (in university campus) is assessed in terms of savings in global warming category based on created scenario. Possible savings related to smart technologies in energy saving and water consumption was calculated based on formed scenario on a LEED Gold Certificated green dormitory building. For the social impact, a questionnaire based survey was applied to the university students and the effect of smart technologies on sustainability behavior is analysed by assessing the data in SPSS Programme. The results of technical and social contribution of smart technologies is presented.

Role of non-formal youth-led educational societies for achieving SDGs in Quetta, Pakistan

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Issue

Formal education system is not in such capacity to architect SD in our society. In order to bring social change in any society, grass root level civil societies could play a vital role in educating and strengthening ESD and GCED learning. In this regard, more than 18 youth-led educational institutions have been working in English language education, ICT

sectors for promotion of peace education, non-violent social behavior change, human rights education to youth (12-35 age groups) in Quetta since 1998. Lack of proper educational system has led the youth towards extremism and violence.

Methodology

These have been providing formal, non-formal education, English language skills, ICT training, awareness on HR issues. The programs are designed to involve youth (male/female) from diverse communities for behavioral change, empowerment, inclusive sustainability; social entrepreneurship & HRE. Educational/ HR experts, intellectuals, NGOs members are invited to project concepts on peace education, social democracy, community participation, human rights protection & community development.

Program intervention

Information on social change and sustainable development. Distribution of literature regarding community development, teacher-students meeting, speech/scrabble/debate/spelling competitions, social gathering with community leaders, social-cultural/music activities and workshops on rights based issues.

Results

The ultimate objectives are to empower youth group for social behavior change from grass root level in different communities to promote/protect human rights, stimulate peace building and to enable youth for inclusive sustainable development process.

Recommendations

These institutions are making positive impact enabling the youth for their active participation in HRE, community and social activism thus minimizing violence at family and community level. For more meaningful involvement of positive youth needs ongoing process and resources. Follow up efforts will be directed towards the formation of positive youth groups. They shall be able to provide peer support and replicate the acquired skills, once trained in HRE/ESD/ GCED sectors.

Tertiary Language Learning: A new potential for sustainable education at universities as key actors

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The concept of multilingualism has become increasingly important in scientific research over the past three decades. But also in the political debates at European level, the interest of the promotion of a multilingual concept within the European population could be observed, for instance since 1995 with the aim of the European Union and the Council

of Europe on polyglotry. In addition to their mother tongue, EU citizens are to learn two other European languages. At the same time, discussions on the language policy level brought the relevance of multilingualism back into focus in foreign language didactics.

The Common European Framework (2001) highlighted the specific importance of a holistic view of all the language skills and cultural experiences of a person and multilingualism for the teaching of foreign languages. This involved both communicative as well as intercultural objectives. This is precisely where didactics of multilingualism and, in particular, innovative plurilingualism projects as the Tertiary Language Learning or the Multilingual Teaching through Intercomprehension are concerned – but have until now not been or only barely implemented in the educational systems. Why not promoting lifelong language learning through the educational landscapes? The desired language objectives have been formulated on the political level, now we have to act on the educational level. The universities – the catalysts and initiators for persistent innovations – are the ideal and sole promoters for implementing future-oriented multilingual concepts developing multilingual teaching study programs in order to train best qualified multilingual teachers and educators entrusted with the task to educate our youth at the highest linguistic and intercultural level. Language learning is lifelong learning and languages are our basic resource available leading to an open-minded globally-oriented and sustainable society.

This paper deals with the promotion of multilingual skills in society, and firstly presents a recently developed approach to language learning from multilingualism research. Secondly, it intends to outline a suitable approach how adequate innovative didactics of multilingualism can be implemented by the universities and which important role our educational institutions play in this process.

The Role of Thai Universities in the Implementation of the Sustainable Development Goals from 2012 to 2017

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This paper has two main aims: the first one is to find out about the understanding and awareness of the universities towards the Sustainable Development Goals (SDGs), and the other aim is to investigate how the universities had been implementing the SDGs and through various types of policies, strategies and techniques. The data collected are mainly from the influential and highly recognized Thai universities from the year 2012 onward, which was when the United Nations launched the SDGs up until the present day of 2017. The focus will be looking at these universities' roles, and their policies, management systems, also the curriculum and the outcomes achieved by such related programs. Also the extra-curriculum, and related outreach programs and as well as other non-curriculum activities will be looked at. The analysis will be drawn from the surveys, questionnaires and also from the archival records and the annual reports from those selected universities.

Discussion will be made among these universities, with some common similarities or differences on the success and failure of such role and implementation will be compared, in which some notable cases will be concluded. Also, some recommendations and limitations for the future role of the universities in fostering and implementing the SDGs will be suggested.

Boosting Youth Power Key to The Role of Universities

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In September 2015, the former United Nations Secretary-General Ban Ki-Moon announced a momentous set of 17 Sustainable Development Goals (SDGs), complete with a list of 169 specific targets at the UN Sustainable Development Summit. 193 member state representatives gathered together, and adopted the 2030 Agenda, including the Sustainable Development Goals.

Still, these ambitious SDGs are devoid of any meaning, unless an appropriate platform takes shape to properly implement these goals in a timely manner. Universities, as thought leaders with substantial and diverse resources, have a unique ability to provide a platform necessary to successfully implement the SDGs in our shared global society.

Regarding these SDG the question remains, who is going to take the lead? When thinking about the world in 2050, the answer is very clear. Nobody is qualified to lead this charge other than the youth. The youth with their passion, enthusiasm, curiosity, and creativity are key to the implementation of these SDGs.

My presentation will not only define the role of universities in achieving the SDGs, but also explain how universities can effectively organize and practice the implementation of the SDGs by tapping into their students' potential. Demonstrating the actual role of universities and showing examples of how implementation programs could work, will raise commitment, excitement, and a sense of fulfillment to complete this mission. Such an approach should be simple, youth oriented, realistic, and practical. I will also outline how universities can team with outside agencies to implement the SDGs.

In brief, the Fifth Annual International Conference on Sustainable Development (ICSD) is focused on practical solutions to achieving these SDGs, I want to define universities' unique role in meeting these objectives.

Tools & Technology to Improve Health in Rural Areas

Offline Internet Technology for Health Information in the Dominican Republic

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The Dominican Republic's health infrastructure is strained by a growing population and the rise of chronic diseases like obesity, diabetes and heart disease. The country also has frequent electricity blackouts and extremely limited internet connectivity, especially in the countryside. Researchers from SIPA traveled to the Dominican Republic in March 2017 to interview healthcare providers in rural and urban settings in order to learn more about the type of medical information that providers are able to access, assess the needs for medical information and whether they might be resolved by expanding access to offline internet technology.

The team interviewed health practitioners, medical students, government officials, NGOs, and electricity and communications companies, gathering qualitative data on telecommunications and electricity provision; smartphones and Internet penetration; health resources and priorities; access to medical information; and user experience with the device. The team confirmed that health practitioners in rural areas do not have access to Internet and to sufficient medical information. Moreover, they found that electricity and telecommunications companies do not have plans to expand connectivity in these areas in the near future.

Additionally, the team conducted preliminary viability testing of the medical modem device: an offline internet-enabled raspberry pi the size of a cellphone, capable of holding 128GB of information. Up to 30 users can connect wirelessly to the device from their smartphones or laptops, and do not need an internet connection. The device contains all of Wikipedia Medicine in English, Spanish, French and Haitian Creole, as well as additional medical information. 100% of the interviewees across sectors found the device and its content useful for medical practice and as an educational resource for medical students and patients, and the Dominican Ministry of Health expressed interest in piloting the device in rural clinics.

The team suggested moving forward with a pilot implementation with recent medical graduates in rural areas as first potential users, among whom the need for medical information is higher. In the summer of 2017, one of the team members is returning to the Dominican Republic to conduct an initial pilot with 5-10 of the devices in rural clinics, in partnership with the Universidad Iberoamericana (UNIBE) and other local partners. We hope to prove the concept of the device as a medical information resource, and are interested in the future possibilities for offline internet technology in other sectors, like education, and in other geographic contexts.

Using satellite observations to determine rural areas with higher health risks

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PM2.5 is particulate matter smaller than 2.5 microns of diameter, which is 20-28 times smaller than that of a human hair. Prolonged exposure to concentration levels above 10 Mg/m³ of this type of air pollution increases the risks of cardiovascular diseases by 95%, according to the World Health Organization (WHO).

Sources of PM2.5 include biomass burning and industrial activities. Rural households often burn biomass for cooking, which expose people to high concentrations of particulate matter. On the other hand, oil & gas fields, also tend to be located entirely in remote regions.

Often, the air quality of these remote locations are not monitored on ground, even in countries with the highest number of ground monitors -such as the USA. Satellite-derived observations can be particularly helpful for remote regions, since they allow to estimate the concentration levels of PM 2.5, identify the regions with highest health threats, and monitor progress.

This research supports the United Nations Sustainable Development Goal 3 (Good Health & Well-Being) & 11 (Sustainable Cities and Communities) -both of which specifically address air quality using PM2.5 concentration levels as an indicator. It was generated using the skills gained on recent certified NASA training on creating air quality data sets derived from satellite observations.

As a voluntary collaborative partner to the Monterrey Metropolitan Area Air Quality (OCCAMM) Citizen Observatory, and to the Team 54 Global Quest for Africa Project, the following countries were chosen for this case study: Nigeria, Burkina Faso, and my home country, Mexico. Figure 1 shows the annual mean estimates for PM2.5 concentration levels in Mexico, highlighting darker colors for areas with higher concentrations of this type of air pollution. Notice that the region around rural areas in the south east show alarmingly dangerous high levels of concentration, which pose a huge threat to the health of locals. These regions are also where major oilfields are located. Figure 2 shows the annual mean estimates for PM2.5 concentration levels in Nigeria, and demonstrates that rural areas have the worst air quality in the country. The same is observed for Burkina Faso in Figure 3.

PM 2.5 also contributes to global warming, and as such, to climate change, which poses the largest threat to humanity in history. We must be aware of the sources of greenhouse gas emissions around human settlements, monitor the quality of the air we breathe, and address the urgency of implementing new climate adaptation & mitigation plans around the world. There is an acute relationship between climate change & health, and not taking action comes at a cost far higher than the upfront costs of addressing the needs for clean technologies.

Using Icloud for Health Data Management in Rural Communities: Challenges and Opportunity to Sustainable Health Provision in Congo

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After more than two decades of civil war and violent conflict in Africa, the Democratic Republic of Congo (DRC) is one of the countries most affected by political instabilities which have led to the destruction of vital infrastructures including health facilities. Not only health facilities have been destroyed, there is also a limited infrastructure allowing to efficiently manage health data of hundreds of thousands of patients in rural DRC. In fact, many healthcare facilities register daily information of patients once they visit their facilities. While this practice helps to identify patients, health information are not often kept and the physicians find it extremely hard to monitor health improvement of patients. This lack of proper data management has a negative impact on healthcare delivery.

Hence, to improve healthcare service delivery and strengthen healthcare system, this paper presents an innovative project being developed by Lueur D'Espoir, a Non-Governmental Organization, based in the DRC. The project is aligned as an innovative approach that intends to use electronic database, in virtual space such as iCloud, to manage people's health data. This appears to be a low cost, yet very effective approach for physicians in rural areas. In fact, it has been proven that the lack of recorded medical history in many health facilities, especially in rural areas, physicians struggle to assess and monitor health status of patients. This lack of infrastructure is partially due to years of conflicts and also due to limited economic investment put in rural areas in the DRC.

This paper therefore argues that establishing a manageable iCloud health database in rural DRC, will improve considerably healthcare delivery. In addition, the implementation of this innovation will help to restore trust in medical staff and physicians who won't have to speculate on patients' health history any more. While this project presents positive trends toward improving health services, this paper also presents some pertinent logistical, systemic and structural challenges which will have to be overcome. Upon successful implementation of this project at a small scale, this project will present a huge possibility of scaling this innovation across the country and region.

Exploring the Ability to Expand Community Engagement for Open-Source Tools to Support Humanitarian and Development Applications

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The ability to use open-source tools in the humanitarian and development sector is not a new concept, as their very nature opens themselves up to incredibly innovative and wide-ranging functions. However, one aspect about open-source tools that receives less

attention is the work taken to create and expand the lively and committed communities that support and improve these tools. The Humanitarian OpenStreetMaps Team (HOT) has completed a qualitative and quantitative analysis of its community to identify the various factors that have led to both the growth and decline of user interactions and participation. Our community is vital as they take part in “Crowdmapping” efforts that create relevant and needed data for many humanitarian and developmental partners and projects. Considering the value of HOT as a tool, these findings are important as a data-driven understanding of an open-source community can lead to increased and expanded user commitment, interest, and participation, all of which flows into greater volumes of data for the NGO community. Extending beyond HOT, this information is also valuable to the broader development community and other open-source tools as it can lead to improvements in their communities, which would only further improve humanitarian and development goals. Additionally, making information readily available is the heart of the open-source mentality.

Identifying and characterizing health policy and system-relevant documents in Uganda: A scoping review to develop a framework for the development of a one-stop shop

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Background: Health policymakers in low and middle-income countries continue to face difficulties in accessing and using research evidence for decision-making. This study aimed to identify and provide a refined categorization of the policy documents necessary for building the content of a one-stop shop for health policy and system relevant documents in Uganda. The on-line resource is to facilitate timely access to well-packaged evidence for decision-making.

Methods: We conducted a scoping review of Uganda-specific, health policy, and systems relevant documents produced between 2000 and 2014. Our methods borrowed heavily from the 2005 Arksey and O’Malley approach for scoping reviews and involved five steps that include: identification of the research question; identification of relevant documents; screening and selection of the documents; charting of the data; and collating, summarizing and reporting results. We searched for the documents from websites of relevant government institutions, non-governmental organizations, health professional councils and associations, religious medical bureaus and research networks. We presented the review findings as numerical analyses of the volume and nature of documents and trends over time in the form of tables and charts.

Results: We identified a total of 265 documents including policies, strategies, plans, guidelines, rapid response summaries, evidence briefs for policy, and dialogue reports. The top three clusters of national priority areas addressed in the documents were governance, coordination, monitoring and evaluation (28%); disease prevention, mitigation, and control (23%); health education, promotion, environmental health and nutrition (15%). The least addressed were curative, palliative care, rehabilitative services

and health infrastructure, each addressed in three documents (1%), and early childhood development in one document. The volume of documents increased over the past 15 years; however, the distribution of the different document types over time has not been uniform.

Conclusion: The review findings are necessary for mobilizing and packaging the local policy-relevant documents in Uganda in a one-stop shop; where policymakers could easily access them to address pressing questions about the health system and interventions. The different types of available documents and the national priority areas covered provide a good basis for building and organizing the content in a meaningful way for the resource.

Clean Cookstoves Improve Community Health While Improving Environmental Conditions

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EcoLogic Development Fund, a US-based NGO, has been providing rural and indigenous communities in Central America with clean-burning, fuel-efficient cookstoves since 2002. After 15 years of monitoring and evaluation, accumulated program data indicates a high statistical correlation between stove access and two desirable development trends: (1) lower rates of health problems linked to household air pollution, and (2) decreased local deforestation due to lower household demand for wood fuel. The World Health Organization identifies household air pollution produced by traditional cookstoves as a major cause of illness and premature death globally, with approximately 4.3 million people a year dying as an indirect result of unsafe fuel combustion. Despite demonstrated health hazards, about 3 billion people worldwide continue to rely on open-pit stoves or other traditional cooking methods. Primary obstacles that have prevented the wide-scale adoption of safer, fuel-efficient stove technologies in Central America and elsewhere include the relatively high cost of new stoves, reluctance to abandon traditional cooking methods, and a lack of awareness or sense of urgency with respect to traditional stoves' negative health effects. EcoLogic Development Fund's experience with clean-burning cookstoves in Central America has yielded empirical evidence that confirms the long-term viability of community-level programs that use safe, fuel-efficient stoves as a means to sustainably improve public health while reducing the environmental costs of food preparation. This evidence suggests that the provision of new stoves tends to result in measurably improved household health and sanitation, and that this effect is enhanced when stove installation is complimented by instruction in proper stove use and maintenance. Furthermore, EcoLogic's work has demonstrated that a household using a fuel-efficient stove can be expected to consume 70% less fuel wood, on average, compared to a home that uses open-pit stoves or other traditional cooking methods. Communities in which new, efficient stoves have resulted in decreased dependence on fuel wood harvested from nearby forests report lower levels of deforestation and accelerated rates of flora regrowth. For rural communities, improved proximate forest health results in a number of indirect health benefits, including: (1) improved water

quality and decreased terrestrial pollution due to increased watershed health, (2) improved nutrition and food availability due to lower rates of soil erosion, and (3) reduction of incidence of vector-borne diseases caused by mosquito populations that benefit from deforestation. In 2017, EcoLogic will install 450 new fuel-efficient cookstoves in Guatemala, Honduras, and Mexico. This presentation will outline progress made to-date with respect to the stoves' community health and environmental impacts, as well as describe how data gathered during the first 15 years of EcoLogic's stoves program is now being used to inform the organization's newest strategies with respect to stove distribution.

Developing Monitoring Tools to Evaluate Emergency Response Systems in South Sudan

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This field practicum aims at monitoring and evaluating the Catholic Relief Services (CRS) Emergency Refugee Response (ERR) Water, Sanitation and Hygiene (WASH) initiative for South Sudanese refugees at the Bidibidi Refugee Settlement in Yumbe, Uganda. The field practicum will be conducted over a three-month period from May to August 2017. I will develop a Monitoring, Evaluation, Accountability and Learning (MEAL) operating manual for the ERR project to track and assess the effectiveness of WASH activities. In doing so, this field practicum will highlight the impact of the WASH initiative on the well-being of refugee beneficiaries. In addition, I will administer the ERR WASH Knowledge, Attitudes, and Practices (KAP) baseline survey to targeted refugee households. There are three immediate objectives for this field practicum. The first objective is to evaluate the impact of the ERR project and gather lessons learned to help improve emergency response learning. The second objective is implement a robust community feedback and response mechanism that will continually engage the refugee beneficiaries and host community members to help improve CRS programming and to hold CRS accountable to the beneficiaries. The final objective is to involve the target community in monitoring key indicators including water quality, water access, latrine use and access, behavior change and community participation, resulting in beneficiaries contributing to project management decision-making.

Towards Affordable and Clean Energy through Life Cycle Thinking

How Citizens Can Ostensibly Help Mitigate Climate Change, Enhance Sustainable Energy, and Make the Public Richer Through Free and Open Environmental Trade

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The scientific community is by now almost in unanimous agreement that the greenhouse gas effect is real. The level of GHG emissions in the atmosphere has increased. There are clear policy actions to tackle climate change: mitigation, adaptation and geoengineering. As a result of the Paris Agreement on Climate Change, new avenues to tackle climate change more effectively have emerged. One interesting case in point is the fact that mayors, governors and CEOs are involved.

This shift to what we describe as a ‘bottom-up approach’ in the democratic (in the true sense of the term) implementation of climate change mitigation plans, a creation of the Paris Agreement, the locomotive of climate action, is one of the mega-trends of the 21st century.

Since 80% of global economic activity takes place in cities and since 80% of GHG emissions comes from cities, this new mega-trend of climate action at the city-level is very promising. So why should cities take climate action? Because they are the main polluters and the main implementers of legislation, because today the majority of the world’s population lives in cities - and this trend to urban migration is on the rise - and because mayors of cities are pragmatic with global issues such as climate change, poverty or terrorism. Also because such issues are too big for nation-states and because cities arguably offer better governance on these matters. Furthermore, some of the greatest environmental and social challenges comes from cities: food, water, waste, infrastructure, transport. Moreover, mayors tend to come from the cities they govern and therefore have a much higher level of trust than politicians at the national level.

One very promising development in the twenty-first century is the empowerment of citizens on issues of common concern such as climate change, sustainable energy, and international trade. Citizens’ empowerment means that civil society can play an important role in the new challenges of trade diplomacy, such as the integration of non-economic aspects of trade in trade policy and in the inclusion of trade policies in the democratic debate. This approach makes the system of decision-making closer to the citizens and therefore less technocratic. Citizens’ empowerment could potentially help mitigate climate change, enhance sustainable energy, and develop a more democratic and transparent trade policy-making process. Moving forward, citizens need to contribute to finding more effective ways to obtain sustainable energy and mitigate climate change. Citizen participation is a promising way of providing better management of environmental issues.

This novel idea of greater citizen participation is very promising in helping achieve the Sustainable Development Goals (SDGs). The paper shows several areas where citizens can ostensibly help mitigate climate change, enhance sustainable energy, and make citizens richer through free and open environmental trade. Citizens’ empowerment can be achieved by allowing for more participation in the process of decision-making.

Water, Energy, and Agriculture in the Context of Climate Change and the SDGs

Scaling Up Climate Smart Agriculture among Smallholder Farmers in East Africa

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Climate-smart agriculture (CSA) puts the challenges of agricultural development at the heart of transformational change in agriculture by concurrently pursuing increased productivity and resilience for food security. Land tenure insecurity for millions of smallholder farmers, including women, declining soil fertility, degraded ecosystems, poor market access, inadequate funding and inadequate infrastructure development continue to hinder agricultural development in Africa. These challenges are expected to be further exacerbated by climate change which has emerged as one of the major threats to agricultural and economic development in Africa.

The proposed research work seeks to appraise the most promising CSA practices at the local level to identify the benefits and barriers to adoption using 5Q approach, identify gender perception of CSA practices as well as adaptation and coping strategies to climate change, assess the communication channels of CSA to the farmers, ascertain the feedbacks received from the farmers, assess the level of impact based on theory of change (change of interest, knowledge, attitude, skills and practice) and to communicate feedbacks to different stakeholders group in order to scale up climate smart agriculture among smallholder farmers in Uganda and Tanzania to improve food security and farming system resilience of mixed crop-livestock. A multi-stage random sampling method will be employed to survey 1200 smallholder farmers in the study area. Descriptive and inferential statistics will be used as analytical techniques for the study.

The findings are expected to reveal both the strength, area of weakness, opportunities and threats (SWOT) for scaling up CSA in Uganda and Tanzania. It will also proffer recommendations on how to maintain and further strengthen the practices in East Africa.

Wastewater Treatment and Reuse in the Moroccan Context

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In the water-scarce context of Morocco, wastewater reuse is emerging as a potential source of water for agriculture, municipal parks, and recreation areas. Over the summer, I researched the background of wastewater treatment and reuse in the Moroccan context while also conducting field visits to a cross-section of wastewater treatment facilities in the country and performing a landscape analysis around the practical issues that affect wastewater treatment and reuse in different contexts. This was done to inform the efforts of Dar Si Hmad, an award winning Moroccan NGO that has recently gained international notoriety for its fog harvesting project in the Ait Baamrane territory of southwest Morocco, to introduce wastewater treatment and reuse in the same territory.

Measuring the effectiveness of Biochar on agricultural practices in Rwanda

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In sub-Saharan Africa poor land use practices have led to an increase in soil erosion, land degradation, loss of vegetation, and an overall decline in agricultural productivity. This loss in productivity threatens existing nations facing rapid population growth, climate change, and food insecurity.

Of the various strategies designed to sustainably improve agricultural productivity, the use of a carbon-dense soil amendment called biochar, is an innovative way to improve soil composition. Biochar is a charcoal based fertilizer made of compost materials which has been proven to show improvements in soil composition, agricultural productivity, water absorption, and carbon sequestration (Lehmann & Joseph 2009). However, biochar is primarily researched in tropical climates rather than the temperate climates found in sub-Saharan African and most specifically Rwanda (Ahmed & Schoenau, 2015).

Whereby the common farming practices in Rwanda have left farmers vulnerable to climate change such as unreliable rains causing crop failure, widespread soil erosion and a decrease in agricultural productivity (Clay & Lewis 1996, Kagabo & Stroosnijder 2013).

Through the development of a small-scale biochar production system this agricultural trial measured the sustainability and applicability of biochar use. This project tested biochar on the common small-scale rain fed agricultural systems, measuring: soil composition, crop yield, and soil moisture throughout the growing season.

Having completed the trial in January 2017 the agricultural yields revealed biochar indeed has a potentially to improve the growth and stability of plant seedling, however biochar does not necessarily serve as a feasible alternative for the average subsistence Rwandan farmer. The production of biochar can potentially compete with valuable energy source as well as cause deforestation if not produced appropriately to the ensure the sustainable practices of biochar production. However, given the effectiveness of biochar it could serve as an opportunity for improved agricultural productivity and food security if conducted responsibly.

The political determinants of Adaptive capacity in coastal Bangladesh: A case of shrimp farming

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In this era of climate change it is important to highlight who are the most vulnerable and how their adaptive capacity is effected by external factors. So this paper looks at the political determinants of adaptive capacity of marginal farmers and impoverished women in the coastal region of Bangladesh. Impoverished women and marginal farmers are considered the most vulnerable to climate change in the region and using the the elite theory this paper analyses the relationship between shrimp producers in coastal Bangladesh and the two vulnerable groups. The shrimp farmers in this scenario are the minority elites while impoverished women and marginal farmers are the majority whose adaptive capacity is influenced by the minority. This analysis has resulted in showing that in the case of marginal farmers' adaptive capacity has been lessened while it has increased the adaptive capacity of impoverished women.

Efficient program of Agroindustry sustainability and renewable energy for vulnerable people

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This project includes the vulnerable people of many sites of our country with programs of food assistance, repair basic, sustainability, education, health, employment, housing, productive agroindustry and renewable energies.

Downstream Impacts from Upstream Actions: The Toll of Food Production on Water Quality

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The nexus of agriculture and water security is particularly relevant in Africa, where there remains a need for sustainable resource management that allows for access to clean water as well as other development needs, such as food availability. Agricultural activities, both smaller scale subsistence farming as well as larger scale irrigated crops, serve as the most widespread nonpoint source contributor to water quality issues worldwide. Nonpoint source pollution (NPS) due to agricultural activities presents a particular challenge as the effects on human and environmental health are not restrained by boundaries. Pollution occurring upstream results in downstream impacts, often leaving communities experiencing water quality issues unable to prevent the effects of upstream polluting communities. This is of particular relevance in developing countries where higher proportions of the population are involved in agricultural activities, where there is a lack of official standards to protect environmental health, and where there are limited resources to address these issues. Therefore, understanding the relationship between NPS pollution from agricultural activities and water quality issues is the first step in finding ways to prevent harmful impacts in the developing context. To do so, this paper

highlights several cases of NPS pollution within African countries as a means to depict the burden of the environmental and human health impacts that lie at the intersection of water quality and agricultural activities. Furthermore, potential solutions to address the increasing need for agricultural intensification are suggested in the context of the developing world.

Impacts of Climate Change on the indigenous Majhi community in Nepal

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Climate change is already being felt and is increasingly being accepted as a major issue facing Nepal (NCVST 2009; ICIMOD 2011; Xu et al. 2009; ICIMOD, 2013). Poor and marginalized people, in particular, are facing many difficulties because of uncertain food production, different natural disasters like flood and droughts, loss of land etc. This study looks at the impact of climate change on the Majhi community in Bodgaun village, located in Bhimtar Village Development Committee of Sindhupalchowk district in Nepal. The study, based on surveys and group discussions, identified three major aspects of climate change in Bodgaun village: extreme drought (prolonged, increased/more regular occurrence of drought), extreme rainfall (intensity - heavy rainfall falling over a shorter time, and increased frequency of heavy rainfall events and a prolonged summer season.

How far can Cellulosic Ethanol help India?

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In the world's second highest populated country, it comes as no surprise that we face shortages and rise in demand in various sectors of the economy, one of it being the great and increasing demand of energy resources. In India, like all other countries, one of the majorly utilized resource, apart from coal, natural gas, hydroelectricity, etc. are the petroleum products especially the transport fuels, of which the demand has further been accelerated by the of late decrease in the oil prices. There is a lot of research being done as to what can successfully replace gasoline as an equally efficient and more environmental friendly fuel. One of these alternative fuels being ethanol.

Ethanol fuel is trying to be increasingly used in our transport fuels, especially gasoline as an additive, despite its drawbacks. As of late, to reduce the pressure of ethanol production on the sugar and food industries, the government of India is looking forward to the formulation of Cellulosic ethanol, ethanol extracted out of agricultural wastes, on a large scale to be used in place of the traditional molasses based ethanol. The introduction of this cellulosic ethanol, also known as the 2nd generation ethanol (2G ethanol) could curb to a large extent the burden on the fossil fuels, and with the benefit of India largely being an agricultural economy there would be no shortage of raw materials. The first step

towards this initiative will be completed once the government manages to reach the 20% blending rate of gasoline mandate by 2030, which itself will bring about a significant decrease in the environmental consequences and costs previously levied due to increase in demand of the petroleum products. In this paper discussed is the demand and availability of raw materials for the 2G ethanol to fulfill the 20% mandate of ethanol blending, and the consequences of the thriving ethanol industry in the country which would positively impact and help India's international environmental obligations, petroleum costs and as well as the agricultural sector.

Towards Sustainable Cassava Agro-Processing Systems and Effluent Management Techniques in Southwest Nigeria: Challenges and Benefits

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Growing opportunities in cassava-root value addition through processing have resulted in increased number of small and medium scale processing factories which generate huge volumes of solid and liquid wastes that have detrimental effects on the environment. This study examines fresh water consumption patterns, effluent generation and wastewater disposal techniques among cassava-root processors in southwest Nigeria with the aim of highlighting their impact on the environment. Structured questionnaires were administered randomly to obtain data from 60 cassava processing centres scattered across the study area. This study observed that wet fufu paste processing centres were dominant (81%) and generates the highest volume of organic wastewater with high BOD (1750-1872 mg/l), COD (24,000-56,000 mg/l), HCN (0.26-0.64 mg/l) and low pH (3.73-3.81). Also, inorganic constituents like sodium, calcium, magnesium, phosphate and heavy metals were found in relatively low quantities in the effluents. About 3.586 m³ of fresh water is required to process one tonne of cassava roots with 91.5% of this disposed as wastewater. Of the methods of wastewater disposal examined in this study, land surface was 51.5%, while open drainage and nearby stream were 45.9% and 2.6% respectively. Land degradation, surface and ground water pollution, and high environmental risks were observed in the study area investigated. Finally, some processing practices and alternative sustainable solutions that can help reduce environmental risks and the menace of poor waste management and disposal among processors were proposed.

“Energy is indispensable for development.” Then what about for sustainable development?

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When we talk about sustainable development today, do we really attribute the same meaning? In 1987, the Brundtland report provided a broad way to conceptualize sustainable development, but since then, many actors have cherry-picked and adapted the

concept to their own reality and interests. Consequently, Canada, Greenpeace and the oil company Shell do not share the same definition of sustainable development. How can we achieve this goal if we do not speak the same language?

It goes without saying that energy, mainly fossil, is closely related to development; the importance of this relationship goes back to the 19th century. Energy is undeniably integral to our everyday life, our capacity to exploit it for our production is fundamental to our society. As the general director of the International Atomic Energy Agency, Yukiya Amano, said during the Summit on Sustainable development in September 2015: “Energy is indispensable for development”. Then what about for sustainable development?

In light of this close relationship between energy and development, this paper will analyze the role of energy in the framing of the political discourses on sustainable development heard at the UN Summit in September 2015. My hypothesis is that the ambiguity of the meaning of sustainable development is strongly related to the role played by the energy-development nexus.

Our study, based on a form of discourse analysis derived from Laclau and Mouffe, clearly demonstrates the marginality of energy in sustainability discourse but also the antagonisms concerning the way energy is articulated with sustainable development discourse. Only 20% of the 245 speeches discussed energy. A closer look reveals that the most developed countries and the oil producer nations mentioned energy in a similar proportion, but when you look at the BRIC’s countries and the less developed ones, it goes up, respectively, to 50% and 40%. Demonstrating the existence of diverging discourses in the international community about the role of energy within sustainable development can give a hint as to the complications we could encounter in the implementation of sustainable development. This antagonism could lead to a dislocation, an impossibility to accurately frame the signification of sustainable development and a failure to act. The fact that the meaning of sustainable development varies within the different political discourses may become an obstacle to a real shift in our way for prosperity.

If we really want to transform our world and not only add an adjective to development, we should start paying attention to the role the energy plays in our understanding of sustainable development.

Diagnosing impacts of climatic disasters on the global wheat network system: How do shocks propagate from a country to the globe?

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Crop yields impacted by climate extremes, however, there is insufficient understanding about how this impacts food production, food price and global trade network system. In

this research we focus on wheat as it is the world's most grown crop and a critical staple food crop. Using publicly available datasets, we analyse and visualize impacts of climate-related disasters in three stages: a diagnostic analysis of agri-economic factors in the top wheat exporting/producing countries and their importers confirms some of the key impacts. This helps us understand the inherent risk of disasters in wheat growing regions and their effects on export/import volume, stock changes, price and production. Our findings confirm that, in particular, trade volume and price is affected in Argentina, the Russian Federation, Turkey, the UK and the Ukraine in the climate disaster years. In the second stage, we diagnose rippled impacts of disasters using a multiple linear regression as well as structural equation modelling framework for individual selected country groups. In the third stage, a comprehensive analysis of the global wheat trade network confirms that most countries import wheat from at least two top producing countries as a possible risk management strategy. In order to reduce damage caused to the wheat network under extreme climate shocks, countries must have trade links selected ingeniously to buffer negative impacts on their agricultural production and economy.

Water Conservation

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Earth is known as a blue planet which holds around 71 % of water on the surface, Out of this huge percentage 96.5 % is in the oceans and 3.5 % is in fresh water lakes and frozen water locked up in glaciers and polar icecaps. There is only 0.3% of water which can be used by humans. (1)India is alarmed as one of the water stressed economies, due to an imbalance between water used and water available in the country. In India 22 of big cities are facing water scarce issues (2) and with the urbanization, we can see a drastic increase in the per-capita water consumption. It is observed that developed countries have more water consumption per person than the developing countries and this consumption will further increase due to more wastage of water and inefficient usage. In India water is cheap natural resource because of which it is misused by most of the users and it is undervalued at the available locations.

India is planning for future cities in which we are making everything smart and self-responsive, these smart cities will have a dedicated approach to address each and every equipment at remote locations. In this vision of smart cities, smart water management will be one of the most important practices to address our water problems and will open a new perspective of reducing our foot print and capacity building of our society.

In this paper the proposed structure of water distribution network in our future cities and addressing major issues causing huge loss of water. It will also include some new ideas to make a complete water balance or cradle to grave solution that will be helpful for planning of future cities, towns and localities. Smart cities will focus on smart management of water and resources with an approach of monitoring, analyzing and controlling. In this mechanism each component is operating on the information shared

from other components and can take decisions on the basis of inbuilt logics and intelligence.

Accès à la terre et aux moyens de production: Le chemin de croix des femmes du Sénégal

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C'est un partage d'expérience sur ma participation en 2010 à la campagne nationale dénommé "Kaa Konko Kélé" qui fut menée par le Réseau Activista de l'Organisation ACTIONAID dont j'étais activiste de 2010 à 2015. La campagne s'est basée sur la reconnaissance de l'alimentation comme étant un Droit fondamental et comme Devoir du gouvernement envers les populations. Elle vise à:

- Garantir un meilleur accès des femmes à la terre et aux moyens de production Les femmes effectuent 80% des travaux agricoles surtout dans les cultures vivrières. Elles participent ainsi à l'atteinte des objectifs de sécurité alimentaire.

- Amener le gouvernement à protéger les agriculteurs et les pêcheurs contre les intermédiaires pour un meilleur accès aux marchés Malgré le rôle majeur que joue les secteurs de la pêche et de l'agriculture dans notre économie par leur apport à l'amélioration de la sécurité alimentaire.

Elle est portée par les communautés à la base Renforcer le pouvoir d'agir des populations rurales est un pas indispensable vers l'éradication de la faim et la pauvreté.

Briquettes of sugar cane in Peru as an energy source

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Human development has always been associated directly or indirectly with energy use, and because of this sources of energy were dealt with in the recent past as fully available to human necessity. The importance of energy as an essential ingredient in economic growth, as well as in any strategy for improving the quality of economic growth, as well as in any strategy for improving the quality of human beings.

Biomass is the most important bioenergy option at present and is expected to maintain that position during the first half of this century and it is the fourth largest source of energy worldwide and provide basic energy requirements for cooking and heating of rural households in developing countries. Biomass resources offer substantial variety in terms of chemical and physical properties. So far agricultural and forestry systems operate in

such ways that people exploit only part of their production what is called “primary” product, while they leave unexploited significant “residual” quantities.

Considering the agricultural- based economy of much of the developing world, it is likely that situation is typical in many developing countries. The worldwide quantities of agricultural residues are vast, but is the location of waste generation that will largely determine their potential to be used as a fuel substitute. Utilization of agricultural and forestry residues is often difficult due to their uneven and troublesome characteristics. One possible means of making more efficient use of the biomass residues is by briquetting.

Biomass briquetting can be defined as the densification or compaction of biomass material by the application of pressure. Briquettes are distinguished from pellets by their size. Briquetting increases the bulk density of the biomass material increasing its energy density, which in turn reduces transport, costs and makes it much easier for the end user to handle.

In order to understand the feasibility of briquettes as an alternative fuel to wood in different parts of the economy, it is important: Firstly to appreciate the current demands for wood and who the consumers are. Secondly, the quantity, availability and location of residues needs to be taken into account, in order to determine whether there are sufficient biomass residues available to provide enough energy to reduce significantly fuelwood demand where it needed. Thirdly, social factors affecting the uptake of the fuel need to be taken into account, for example cultural and historical reasons for cooking in a certain ways. In summary, it is necessary to identify where briquetting is practically, economically and social and thus identify to whom it would be most beneficial and marketable as an alternative energy source.

In the case of Peru, the agricultural and forestry residues are resources that are not currently commercially exploited and have great potential as a primary energy source. Sugar cane is the largest crop produced in Peru, the greatest industrial use is given by the production of sugar and it is one of the most important in Peru.

Harvesting of sugar cane causes solid waste to be estimated to be 25% of the weight of cane clean. In the industrial phase, ecological impacts are caused by the burning of sugarcane and the burning of the waste from the integral sugar cane.

Likewise, the Ministry of Agriculture of Peru, established Supreme Decree No. 016-2012 -AG, approved the Regulation on the Management of Solid Waste in the Agricultural Sector, which states in article 1.c, to promote, regulate and Encourage the participation of private investment in the various stages of solid waste management, promoting in particular the eco-efficient reuse of resources that can be generated from non-hazardous agricultural and agro-industrial waste. This decree obliges to look for the agroindustrial companies to look for new forms of technologies for the use of their residues and to see their residues as a form of economic income.

The objective of the paper is to study the influence of compaction pressure, percentage of binder and granulometry to optimize the process of densification in the quality of the briquettes of sugarcane leaves to obtain a quality product to obtain briquettes quality.



Launched by UN Secretary-General Ban Ki-moon in August 2012, the Sustainable Development Solutions Network (SDSN) mobilizes scientific and technical expertise from academia, civil society, and the private sector in support of sustainable development problem solving at local, national, and global scales. We aim to accelerate joint learning and help to overcome the compartmentalization of technical and policy work by promoting integrated approaches to the interconnected economic, social, and environmental challenges confronting the world. The SDSN works closely with United Nations agencies, multilateral financing institutions, the private sector, and civil society. unsdsn.org



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