Abstract Book

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Oral Presentations

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Pillar One is to support environmental conservation of the natural ecosystem and thus, development of a sustainable infrastructure. Some successful examples of this initiative are: (1) conservation efforts at Tambling Wildlife Nature Conservation (TWNC) reserve, (2) Revitalizing Citarum river and Mangrove Forest, and (3) Sustainable Palm forest.

Pillar Two focuses on responding to natural disasters by minimizing the risk, quick response and post-disaster restoration. Pillar Three is focused on ''Social Affairs'' by providing food sustainability, education healthcare, and social welfare for the underprivileged and the elderly. Additionally, Pillar Four works to empower people through training, and supporting the development of SME's.

Finally, Pillar Five supports efforts to works with local and national governments to ensure that law and justice is upheld in the society.

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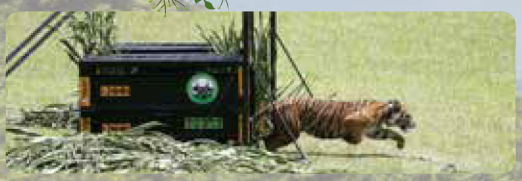
Citarum River

Palm Forest Conservation

Mangrove Forest

Tamblingwildlife Nature Conservation



Tambling Wildlife Nature Conservation (TWNC) is a conservation area operated and managed by the ARTHA GRAHA PEDULI Foundation. The main objective for TWNC is to protect, restore and promote sustainable use of terrestrial and aquatic ecosystems, properly manage forests, combat desertification, strive to halt and reverse land degradation and minimize biodiversity loss.

Tambling Wildlife Nature Conservation

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Oral Presentations

Economics and Demography of Natural Disasters

Flood Impacts and Trauma in Developing Countries: A Case Study of Nepal

Submitter: Bhushal Adhikary, Gita
Graduate Student, Montclair State University, United States, gitabhushal1@gmail.com

Additional Authors:
Pankaj Lal, Associate Professor, Montclair State University

Bernabas Wolde, Postdoctoral Fellow, Montclair State University

Pralhad Burli, Agricultural Economist, Idaho National Laboratory

Abstract:
Due to climate change and the changing geographical structure of the globe, flood-related disasters account for 40% of natural disasters and are considered the most damaging in terms of social, economic, and humanitarian losses globally. This research executed on Nepal, a developing country, focuses on the individuals' likelihood of recovery from emotional trauma after extreme flooding events evaluating both tangible and intangible loss, as well as the role of demographic and socioeconomic factors that affect the likelihood of an individual's emotional recovery. An in-person household survey conducted in 2017 found that approximately 89% of respondents had not recovered from trauma that they experienced due to a severe flood in 2014, which was the most recent high damaging flood at the time of the survey. Factors such as the size of land owned and the loss of livestock, agricultural land, assets, and/or houses were statistically significant in predicting the likelihood of recovery. The research findings from this study investigates the role of policy design to improve governmental assistance within disaster-affected communities in developing nations like Nepal. In these particularly sensitive regions of the world, it is essential that policy design help affected communities and overcome the emotional aspects following a natural disaster in areas that experience similar disasters.

Including Children and Youth with Disabilities in Disaster Risk Reduction and Management in Panama

Submitter: Lopez Anselme, Marina
Chief Technical Officer, RET International, Switzerland, m.anselme@theret.org

Abstract:
RET is an international INGO committed to protecting and meeting the needs of young people made vulnerable by displacement, violence and disasters around the world. One of RET's efforts to achieve this goal has been its active engagement in developing various approaches to Disaster Risk Reduction (DRR) in Latin America. Through its focus on the most vulnerable populations,

RET observed that the specific needs of persons with disabilities are often not adequately addressed in the response to natural hazards. In order to address this gap and to ensure that no one is left behind, RET is implementing a project in Panama to provide young learners with disabilities with the skills needed to mitigate and overcome disaster's risks within the school environment.

Driven by the paradigm that inclusion should seek the active participation of persons with disabilities acknowledging their specific capabilities and not only their special needs, RET, together with the Panamanian Institute for Special Adaptation (IPHE), has developed different measures to mainstream inclusive approaches in DRR within the education sector:

1. Strengthening community awareness and mobilization capacity of youth with disabilities, teachers, family members, caregivers, officials, and community leaders around their role in inclusive disaster risk management.

2. Building capacities to increase individual, institutional and community resilience for inclusive disaster risk management and first response in schools and other public facilities.

3. Developing the necessary tools to institutionalize inclusive disaster risk management in the education sector.

4. Increasing the education sector's resilience in line with Panama's national policies.

In terms of activities, RET project (1) conducted a series of workshops to strengthen IPHE's capacities as the lead agency for education for persons with disabilities in Panama. (2) In cooperation with national authorities and the extended educational community, inclusive school security plans were designed and subsequently expanded to all IPHE centers and other schools around the country.

As a result of the intervention, all centers have integrated a comprehensive inclusive risk management plan into their operational plans, which obliges authorities to commit a budget and staffing for their implementation. The intervention also contributed to ensuring compliance with relevant national legislation and strategies relating to DRR.

At present, RET aims to involve local governments in order to achieve a complete institutionalization cycle at all levels of the public administration which will ensure the sustainability of the process.

Several elements proved fundamental in this approach: firstly, all tools, risk analysis processes, mitigation measures and planning of activities were elaborated with the direct participation of young people with disabilities, their caregivers and teachers. Secondly, an analysis was done of all processes to be carried out, using the equal opportunities perspective. This led RET to develop the first ever "sign language" for people with hearing impairment in Panama dedicated to risk management and first response. Finally, RET implemented mitigation measures through the provision of adequate equipment and facilities with a focus on inclusiveness, eliminating physical barriers. This included the development of different forms of signage for different types

of disabilities. All these measures have allowed RET to increase the security conditions of inclusive schools in Panama.

Resilient Infrastructure for Natural Disaster: The Case of Mãe Luiza in Natal, Brazil

Submitter: Rezende, Julio
Researcher., Federal University of Rio Grande do Norte - UFRN, Brazil, juliofdrezende@hotmail.com

Additional Authors:
Álvaro Duarte de Oliveira, Professor, Department of Arts, Design and Architecture, Aalto University, Helsink, Finland Visiting Professor at IMD (Institute Digital Metropole, UFRN)

Irani Santos, Economist, Public Management Specialist and Innovation Master, Federal University of Rio Grande do Norte - UFRN.

Abstract:
This paper reports the research to analyze the population acceptance of Mãe Luiza resilience infrastructure built to reduce the risk of natural disasters. The paper will present the results supporting a methodology to overcome potential negative reactions of local population. Mãe Luiza community is part of a disorderly urban area constructed over coastal Aeolian dunes located on the Natal Dunes State Park bordering the Atlantic Ocean. The community started growing over 50 years ago, becoming very dense and without following any urban control criteria, accumulating environment, structure and social problems and generating deep changes in the geotechnical behavior of the dune, derived from several factors such as: slopes, permeability, relief, garbage, clogging galleries and improvised drainage. The rainfall triggering the landslide natural disaster in July 2014, achieved records of 340 mm in a period of 36 hours and impacted an area of 10.000 square meters causing a disastrous destruction of 30 houses completely destroyed and 78 partially impacted. In our research we have reconstructed the disaster environment using video and photos documenting the effects of the accident, news reports on the media, technical documents describing the area recovery and also personal interviews with members of the community. The disaster area was renovated with an impressive stairway and sidewalk based on a creative design, attractive aesthetics and functional usage as a gym for fitness activities. The resilient public infrastructure is well kept and became an attraction for the community and visitors. The main objective of our research is to understand the reasons for the success and to develop a methodology that may help the communities to approve resilient infrastructures and adopt behavior transformation towards a more responsible environment attitude. We are collecting and analyzing the results of a public survey which will be presented and discussed in our paper. The respondents to the survey below, will provide their assessment quantifying their answers from 1 to 5 and unstructured comments can be added. The questions were related to: 1) The staircase as a low-cost entertainment and exercise option for the user; 2) The staircase as a space for healthy practices and improving the health of the population; 3) Assessment of the frequency and respect for girls and women; 4) Infrastructure resistance to periods of rain and sun; 5) The staircase as an innovative infrastructure; 6) Evaluation of the city hall from the construction of the staircase; 7) Location and orientation for the correct disposal of garbage; 8) Partnership and integration of the staircase with the community of Mãe Luiza; 9)

Maintenance of interest in participating in physical activities in the staircase; 10) Development of more sustainable living habits from the use of the staircase; 11) Engagement of municipality engaging the population in the design and project of the staircase; 12) The attractiveness and effectiveness of the infraestructure; 13) The staircase decreases the risk of future landslides; 14) Current Feeling of safety; 15) Exam of population about to live in another location. The paper will provide the methodology and also recommendations how to engage the citizens in the participation of co-design and co-creation processes.

A Research based Implementation Process of Temporary Housing Preparations for an Anticipated Natural Disaster

Submitter: Sato, Keiichi
Professor, Senshu University, Japan, satok@isc.senshu-u.ac.jp

Abstract:
In the long human history, many cities have been attacked by various natural disasters, such as earthquakes, tsunamis, floods, and volcano eruptions. Although emergency responses such as evacuation are important problems immediately after a disaster, it shifts to long-term disaster responses phase as time passes. For victims who are unable to live their home due to a disaster, temporary housings are required. A countermeasure for temporary housings is required quickly, however, it has many limitations in the confusion after a disaster. Therefore, effectual preparations before disasters will reduce many life sufferings of disaster victims.

The Great East Japan Earthquake and the Fukushima nuclear power plant accident has brought many widespread migrations who have to leave far from their familiar residences. At the same time, the Japanese 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. According to this assessment in case of the anticipated Tokyo metropolitan earthquake, 610,000 complete collapse buildings were expected. It will 1,500,000 households if it converts into the number of households. Many citizens want to continue living in their present living area, and the shortage of temporary housings will be difficult concern.

The Tokyo Metropolitan Government started the "Project proposal system from university researchers" from 2019 in order to utilize the knowledge of universities. The authors proposed a policy project that will lead to concrete preparations for temporary housing in the anticipated disaster. The proposal was adopted by the Governor and it has been conducted under the agreement with the metropolitan government and Senshu university. The adopted project conducts several workshops among stakeholders including town officers, residential people, construction companies, welfare workers and so on using micro-simulation results of widespread migration. The interactions of each workshops are observed, and specialistic qualitative analysis will be performed by marketing researchers. And then, the project establishes an official investigative commission to recommends additional concrete preparations while learning workshop insights and knowledge from disaster affected area. In this paper, the details of the proposal and the implementation process of the above-mentioned project are reported.

Economic Impacts of Typhoon in Metro Manila Using A Multi-Week CGE Analysis

Submitter: Tuano, Randy
Acting Country Manager, SDSN Philippines, Philippines, randytuano@yahoo.com

Additional Authors:
Ramon Clarete, Professor, School of Economics, University of the Philippines

Marjorie Muyrong, Instructor, Department of Economics, Ateneo de Manila University

Abstract:
The adverse effects of extreme flooding caused by a major typhoon in the two major cities in the Philippine metropolitan capital are significant and are modelled using a multi-week, local economy computable general equilibrium analysis which assumes weekly market clearing. This paper estimates that both cities may have lost around half a billion US dollars (half of their total output) after a major flood that devastated the central portion of the largest island in the country in 2009. Estimates of willingness to pay, as measured by the equivalent variation of income to avoid the adverse effects of flooding, is largely positive for both cities. These results depend on how a metropolitan economy is modelled relative to the rest of the country and the rest of the world, and the exchange rate assumptions in the model. The model presents a possible method to assess the economic and financial impacts of a major disaster of an urban area which could also influence policy recommendations in reduce disaster risk in developing countries. Some suggestions for improving the methodology and a discussion ongoing work in refining the model in other cities in the country are provided.

A Hedonic Analysis of Combined Sewer Overflows (CSOs) in Northern New Jersey

Submitter: Wieczerak, Taylor
Doctoral Candidate, Montclair State University, United States, wieczerakt1@montclair.edu

Additional Authors:
Dr. Pankaj Lal, Associate Professor, Montclair State University

Dr. Bernebas Wolde, Post-doctoral Researcher, Montclair State University

Abstract:
Significant water pollution caused by flooding due to heavy precipitation and extreme weather events such as Hurricane Sandy and similar storms of the past have become a considerable problem, and changing weather patterns and sea level rise attributable to global climate change stand to further exacerbate the issue. During heavy precipitation events, combined stormwater and untreated sewage may diverted to adjacent water bodies, resulting in contamination and water pollution that can be harmful to human and environmental health. This contamination, especially in urbanized areas of northern New Jersey, is largely a product of discharge events from combined sewer overflows (CSOs). Though the effects of the contamination caused by polluted water discharge through CSOs has been studied by some researchers, the socio-economic aspect of these issues has not received much scientific attention. This study seeks to

understand the socio-economic facets arising due to of the continued use of CSOs in Elizabeth, Newark, and Paterson by using a hedonic analysis of homes near CSOs to evaluate its disamenity effect on the price of residences in these urban areas. We use real estate and county data in a GIS overlay to map residences and features in these urban New Jersey areas and undertake geospatial analysis to reveal the effects of household, neighborhood, and environmental attributes on sale price. We use the data from GIS analysis in logistic regressions in order to analyze the significance of a number of these factors, including proximity to the nearest CSO, and estimate the economic effect that each factor has on a residence's final price. This information is critical for revealing the socio-economic consequences of continued CSO operation, and can provide data for preventing the worst of CSO problems in these and similar urban areas. Further, these results can be used to inform CSO management strategies, including the use of green infrastructure, to understand economic impacts and intuit public perceptions of various strategies.

Changes in Public Risk Perception after a Large Disaster: Evidence from the Housing Market

Submitter: Yasuda, Shohei
PHD Student, Keio University, Japan, shohei.yasuda0403@gmail.com

Additional Authors:
Michio Naoi,Associate Professor,Keio University

Norifumi Yukutake,Associate Professor,Nihon University

Abstract:
The unprecedented damage caused by the Great East Japan Earthquake and nuclear disaster greatly altered people's awareness of risk not only in directly affected areas, but in unaffected areas as well. Changes in risk perception of future earthquakes can influence people's location choice, which in turn can be capitalized into the real estate prices. This study focuses on the relationship between earthquake risk and real estate prices in unaffected areas before and after the earthquake in order to explore how large-scale natural disasters influence people's perception toward disaster risk.

We use large-scale property transaction data covering periods both before and after the earthquake, together with the earthquake risk indexes by the Tokyo Metropolitan Government, to estimate a hedonic model. Three features are worth noting about our data. First, our property data includes exact location of each property, so that the data can be matched with the geographical index of earthquake risk that is measured at the fairly detailed geographic level. Second, our data spans from January 2001 to September 2017, covering periods both before and after the 2011 earthquake. Third, given our very large sample sizes, we can explore price responses to potential hazard at disaggregated levels such as region or property types. All three of these features allow us to explore whether and to what extent the relationship between risk information and real estate prices is changed after a large disaster.

Our empirical findings are summarized as follows. First, we found that after the 2011 earthquake

house prices are dropped more in relatively risky areas than in safer areas, particularly for condominium units sold in these areas. This suggests that people's perception of earthquake risk changed as a result of the earthquake. Second, post-quake price drops are particularly eminent for properties built under the old earthquake resistance standards. This suggests that people changed their risk perception particularly for properties susceptible to potential hazards. Third, price drops in risky areas are substantial for relatively large houses (three- or more bedroom houses). Since people in houses with three- or more bedrooms are more likely to have children, our results suggest that households with children could alter their risk perception after the disaster. Fourth, we found that significant post-quake price discounts can be observed for three to five years following the earthquake, after which price levels return to their pre-quake baseline.

Engaging Across the Generations: Children and the SDGs

Motivation for Engaging in Transactional Sexual Intercourse Among Adolescents in Nigeria in the Sustainable Development Goals Era

Submitter: Adeusi, Temitope
Lecturer 11, College of Health Sciences and Technology, Ijero Ekiti, Ekiti State, Nigeria, Nigeria, ethoxytopy@gmail.com

Additional Authors:
Dr. Ilesanmi Olatundun O, Associate professor, Ekiti State University, Nigeria

Mr. Sunmola K.A, Lecturer 11, Ekiti State University, Nigeria

Mr. Iyanda Ayodeji, Postgraduate student, Department of Geography, Texas State University, USA

Abstract:
As the Sustainable Development Goals (SDGs) begin to guide the global development agenda, Adolescent Sexual and Reproductive Health demand urgent policy and programmatic attention, especially in Nigeria where the plight of adolescents has vastly impinged on the achievement of the SDGs. This study therefore attempts to determine the variation of risky sexual behavior among in-school and out-of-school adolescents in Ekiti State; and evaluate the determinants of risky sexual behavior among adolescents in Ekiti-State, Nigeria. The study adopted a cross-sectional analytical research approach. Multistage sampling technique was used in selecting eligible respondents. The sample includes in-school adolescents drawn from Junior Secondary School 1 to Senior Secondary School 3. The out-of-school adolescents were selected from different groups such as the market boys and girls and Okada. Data were analyzed using univariate, bivariate and multivariate logistic regression to identify the predictors of transactional sex.This study revealed that out-of-school adolescents are likely to engage in sexual intercourse, non-consensual sexual relations and transactional sexual intercourse than the in-school adolescents. The study established that emotion and sex of the respondent are likely predictors of transactional sex while abstinence, age, education, ethnic group, religion, socio-economic and behavioural factors are not likely predictors of transactional sexual intercourse. There should be

urgent policy implementation strategies to address the high prevalence of transactional sexual intercourse among in- and out-of-school adolescents in Ekiti State and Nigeria as a whole.

Keywords: Prevalence, transactional sexual intercourse, emotional motivation, Sustainable Development Goals

Youth for Peacebuilding: A case study of the Establishment of Hemaya Schools for Children to Achieve the SDGs

Submitter: Almansoori, Mohmmad
Sustainability Officer, Dubai Police, United Arab Emirates, xalmansoori@gmail.com

Additional Authors:
Abdullah Al Marri, Commander in Chief, Dubai Police

Tamim Alhaj, EHS Director, Dubai Police

Rawdha Al Shamsi, Program Manager, Dubai Police

Faisal Abdullah, Sustainability Officer, Dubai Police

Mariam Maani, Chief Sustainability Officer, Dubai Police

Mariam Al Awadhi, Sustainability Engineer, Dubai Police

Abstract:
In September 2018, Hemaya Schools, an initiative by a Dubai-based government entity (Dubai Police) was founded with the aim to ensure that children of the entity's employees of all nationalities and races are provided with quality excellence education for free. Within just one year; over 1600 students aged between 5-16 years old have enrolled to date. After the successful first year, the school aims to increase the number of students by opening a new high school in the coming school year.

What distinguishes Hemaya schools from other schools within the region, is that the school management focuses on the Sustainable Development Goals (SDGs) as a target to achieving its own goals, with all its future activities and curriculums being oriented towards achieving the SDGs. To ensure this, the school is currently led by the sustainability team of the government entity, experienced in the field of sustainability, proving that by setting the SDGs as a target, a school can be run effectively.

By ensuring the implementation of the SDGs, the management has set the core focus of the school in three main categories: health & wellbeing, culture & arts, and technology & innovation. Recent studies have shown that ensuring good health and wellbeing of students, the students' performance and attitude in and out of school improves. With this in mind, the school has recently set up a nutrition program with an experienced nutrition consultant to provide nutritious meals for all students. In addition, to encourage inclusion, all school sports activities

are oriented around encouragement of tolerance and gender equality, with daily sports activates and occasional sports open days, to raise awareness of inclusion through sports, within a detailed sports program specified for the different age groups. Through the second main core, culture & arts, the school aims to further encourage tolerance and the acceptance of all. The school is adding further languages to its curriculum, in addition to Arabic and English, such as Chinese language and culture, to promote the idea of tolerance. In addition, the school aims to add Sign Language as a core module for all students, to encourage the idea of inclusion. Finally, through Involving technology in teaching methods, the school aims to promote creative thinking and innovation among students. To do so, the school has built an innovation lab open for all students, to promote hands-on experience and the concept of applying theory to practice through innovation. Furthermore, the school aims to add two modules by September 2020, artificial intelligence and robotics as elective modules for all middle and high school students.

Furthermore, after several successful SDGs workshops and the positive engagement obtained from the students, the school aims to add a core module in sustainability into its curriculum, with the aim of introducing the concept of tackling all the SDGs and embedding that into the students from a very young age.

Unleashing the Potential of Citizen Science as an Educational Tool towards the Sustainable Development Goals (SDGs): Quality Education for an empowered society

Submitter: Baïz, Imane
European Project Manager, Université Paris Descartes / Center for Research and Interdisciplinarity (CRI Paris), France, imane.baiz@gmail.com

Abstract:
This policy brief assesses the potential and challenges of citizen science (CS) as an educational tool and how it can contribute to achieving the Sustainable Development Goals (SDGs). While CS can address specific challenges across almost all of the 17 SDGs, this policy brief focuses on direct contributions to SDG 4, Quality Education and asks: ‘How citizen science can equip learners with life-long skills, knowledge, and attitudes that foster change-makers using a blend of nontraditional pedagogies ? ’ We demonstrate the roles that educational practices developed around citizen science can have by presenting a selection of inspiring initiatives currently taking place throughout Europe. Citizen-science-based education does not solely provide learners with an understanding of science and scientific methodology, but also develop social skills used to communicate, take part into or coordinate multi-stakeholder projects. In this way, this policy brief aims to support decision makers in education and science policy, including the European Commission, national and state ministries and other stakeholders in integrating these non-traditional educational practices into existing funding schemes, education policy and curricula towards a more meaningful, transformative learning and teaching.

Discovering the Ecological Self with Children

Submitter: Callas, Kimberly
Assistant Professor, Monmouth University, United States, kcallas@monmouth.edu

Additional Authors:
Dr. Megan Delaney, PhD, LPC, Assistant Professor, Monmouth University

Abstract:
In this paper, artist Kimberly Callas will discuss how she uses Social Practice Art as a way to bring youth back into relationship with nature, creating an emotional connection to nature that inspires participants to long term action around the SDGs that closely align with environmental sustainability.

Callas is an artist with over fifteen years of experience working with environmental issues. She built an eco-house, https://kimberlycallas.com/our-eco-house-in-brooks-maine/ and co-founded a sustainability institute, https://kimberlycallas.com/newforest-institute/ before coming to teach at Monmouth University in 2016.

Through her community work in sustainability, she realized that it is our emotional attachments to nature, rather than data, that are the real motivators to change. For example, despite political leanings, a person that fished in a stream as a child with their grandfather will go out of their way, working evenings and weekends and organizing others, to protect that specific stream.

In search of these meaningful attachments to place, Callas created Discovering the Ecological Self (D-Eco-Self), a Social Practice Art Project that brings science and meaning-making together through contemplative field research and art-making. (contemplative field research explores place through meditative practices and close observation). As part of D-Eco-Self, Callas gives workshops nationally (often with her students) that combine science and meaning through art-making. For more information on the project, please visit: https://discoverecoself.org/.

For the past three years, through classes and workshops, Callas and her students have been working with Aslan Youth Ministry, a local non-profit that works with at-risk children from Asbury Park to Red Bank, New Jersey. Callas will share work and results from this project, along with the results of a 2018 study on D-Eco-Self by Dr. Megan Delaney, PhD, LPC, a researcher on Ecotherapy. This mixed-methods study used both qualitative and quantitative data to look at how participants made meaning out of their Social Practice experience and if the project influenced the participants connection to nature. Results further emphasize how Social Practice can be its own high impact pedagogy.

Through the study, both Monmouth students and the Aslan Youth involved in D-Eco-Self showed a deep connection to the nature content, enjoyed high performing collaborations with a variety of disciplines, found they are able to engage across differences, and developed their ability to co-create. Callas views Social Practice as an important, relevant, and possibly simple way, to reconnect humans with nature and to introduce interdisciplinary collaboration across campus and with communities around environmental issue and the SDGs.

EduKid-CE: a Transnational Partnership for Inspiring the Young Generation with Circular Economy

Submitter: El Maadawi, Zeinab
Professor, Cairo University & the United Nations University (UNU), Germany,
zeinabelmaadawi@gmail.com

Additional Authors:
Anna Bogush, University College London (UCL), UK

Burcu Karaca Uğural, Ege University, Turkey

Levit Barry Nudi, Notonlab, Kenya

Jamal Mohamed Hassan, ShambaIntel Africa Limited, Kenya

Semih Erden, Ege University, Turkey

Adrian Jones, University College London (UCL), UK

David Greenfield, Circular Economy Club London, Soenecs, UK

Abstract:
What problem was addressed:

Sustainable Development Goal 12 (SDG12) aims at ensuring sustainable consumption and production by promoting resource and energy efficiency and sustainable infrastructures through "doing more and better with less" (1). A key element for achieving SDG12 is the circularity approach that embraces interventions for adopting closed material loops and enhancing resource efficiency. Circular Economy (CE) involves a paradigm shift that promotes economic welfare through innovative business opportunities while leveraging environmental and social impacts. To close the loop, translating global trends to national and regional pathways as well as facilitating peer-to-peer learning are two actions recognized by the World Economic Forum's 2019 Circularity Gap Report (2). In order to realize the transition to sustainable consumption and production patterns, educating the young generations about CE is a crucial mandate for generating a CE mindset paving the way for a societal transformative process.

What was tried:

EduKid-CE is a transnational project that promotes CE for kids. The main goal of EduKid-CE is to create a hybrid (electronic and traditional) educational platforms to promote the concept and values of CE to younger generation. EduKid-CE international project partners are academics and practitioners from UK, Egypt, Turkey and Kenya representing diverse background and expertise. EduKid-CE interactive workshops were conducted in the four respective countries in addition to the use of project website, social media channels, online educational content and games to facilitate global outreach. The workshops called on kid's abundant creativity and imagination and aimed at raising children's awareness about the concept of CE and getting their interest in complex issues such as recycling, biomimicry, climate change, water scarcity and pollution.

What was learned:

The workshops revealed a need to disseminate the message to the young generation not only about CE but also about the general concepts of sustainable development. Kids should be engaged in the learning process by group work, hands-on activities, games and self-reflections. Combining traditional educational resources with interactive digital content would maximize learning retention and promote international dissemination. However, localization of the learning context should be considered to address cultural diversity and country specific needs.

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2- World Economic Forum's 2019 Circularity Gap Report. Available at: https://docs.wixstatic.com/ugd/ad6e59_ba1e4d16c64f44fa94fbd8708eae8e34.pdf

SDGs VRPlay for KIDS: An education experience on local sustainable solutions using virtual reality to target vulnerable children

Submitter: Fernandez, Gabriela
Ph.D. Urban Planning, Design, and Policy, Politecnico di Milano, Department of Architecture and Urban Studies | Co-founder, Metabolism of Cities, www.metabolismofcities.org, Italy, gabfern86@gmail.com

Additional Authors:
Carol Maione, MSc. Environment and Sustainability, University of Michigan, Ann Arbor, Michigan, USA, cmaione@umich.edu

Abstract:
Lack of engagement of children in strategy design to achieve sustainable development is becoming a growing concern worldwide. This is especially evident and troublesome when tackling environmental challenges of the XXI century, such as climate change and resource consumption behaviors, conversations in which young activists are increasingly raising their voices to drive the attention of both mass societies and political leaders. While this appears to be a growing trend, there are knowledgeable gaps on the multitude of enabling factors and framing conditions that affect the planet's view from a child perspective.

This study aims to bridge the existing gaps and explore the Sustainable Development Goals Virtual Reality Play for Kids (SDGs VRPlay for KIDS) App for teaching children and youth about the SDGs in a simple and child-friendly way, 'through the eyes of children.' The SDGs must be brought down to local realities to successfully better the world by 2030. Children must internalize how the issues represented by the SDGs affect their own daily lives and environments through story-telling and data sharing. For example, improving health and nutrition, the importance of early learning and quality education, fostering peaceful communities where children live free from violence, or establishing more sustainable approaches to preservation of commodities (UNICEF, 2015). The SDGs VRPlay for KIDS App aspires to tackle these areas to

serve as a platform for children, educators, and young activists through virtual reality working groups, aimed at bringing people together to help build the global youth voice with the goal of creating community identity. This serves for developing capacity building and youth empowerment by sharing of cultures, story-telling, habits, beliefs, and sustainable development practices. When that understanding happens, communities can be inspired to take action, resulting in sustained progress on these goals and long-term shifts in social norms and behaviors. Finally, it has a role in processes related to the United Nations agenda for sustainable development by tackling SDG12, and indirectly SDG4, as well as other processes which are convened in the world on development issues related to children. The role of children in achieving the SDGs can be summed up as raising awareness, taking action and holding governments and other stakeholders to account on progress. Thus, through SDGs VRPlay for KIDS App children can learn and engage local changemakers on topics that affect them personally at home, school, and play.

Expected results include the development of an open-source prototype SDGs VRPlay for KIDS App platform to educate new generations of children. This platform allows users (disabled children, homeless, and refugee children) to learn about their own environmental dangers and human Anthropocene virtually while connected to a network of children users from all around the world. Platform activities include a process of data collection on children in their environments by employing real-time georeferenced photographic evidence and mapping applications. This study employs virtual reality technologies to educate children to view sustainable development solutions across the world through a lesson learned (pros and cons) and experimentation lenses across a sensory multitude ambiance experience.

A Model for Sustainability Education in Developing Countries: Case of Nepal

Submitter: Mathur, Ashima
Vice President, Global Network for Sustainable Development, Arizona, USA, United States, ashima@gnsd.org

Additional Authors:
Marek Wosinski, Sustainability Scientist, ASU Global Institute of Sustainability, Adjunct Faculty, Department of Psychology, Arizona State University, USA

Rudeep Rajthala, Masters Student in Conflict, Peace and Development Studies, Tribhuvan University, Nepal

Abstract:
One of the United Nations priorities is to globally promote Education for Sustainable Development (ESD). Two major indicators of realization of SDG 4.7 are: percentage of students by age group (or education level) showing adequate understanding of issues relating to global citizenship and sustainability, and percentage of 15-year-old students showing proficiency in knowledge of environmental science and geoscience. As schools are the major stakeholder in the implementation of SDG 4.7, different models and frameworks are available for schools to follow when it comes to ESD, however, each school in a region will have different requirements and capabilities available to them to implement SDG 4.7.

To understand the capabilities and barriers of the schools in Nepal and India, we conducted a preliminary study. Global Network for Sustainable Development (GNSD), then developed a model to disseminate this knowledge among schools of Nepal. Based on the principle of "learning by doing" GNSD created a plan of establishing Sustainability Clubs in schools. In form of extra-curricular activities schools are involving students in community projects related to the realization of SDGs. Through this model, schools from Nepal are creating partnerships with schools in developed countries (Sister Schools Project) to provide an opportunity for global communication regarding sustainable development.

During our presentation, we will highlight the barriers and capabilities of the schools in Nepal, introduce the model through which we can engage students on SDGs, and present the first set of data on the impact of the project.

The study highlights implications for both practitioners and researchers and is quite significant for developing implementation models in other countries.

Climate change, politcal (in)action and the intergenerational epistimic divide: the case of the emperor's new clothing.

Submitter: Murphy, Susan
Assistant Professor in Development Practice, Trinity College Dublin, Ireland,
Susan.P.Murphy@tcd.ie

Abstract:
Why is youth voice on climate action not being heard? How do we explain the epistemic intergenerational gap on the topic of climate change and political-economic actions that are required to remediate, reduce, and alleviate these threats? Why do we speak of youth empowerment through education and civic engagement through the SDGs at global level, and then ignore youth voice in deliberations on climate and sustainability policies and decision-making at national and local scales? Are climate activists and populist movements such as the gillet jeunes and gillet jaunes on a pathway to political collision? This paper explores the intergenerational epistemic divide that has emerged over the last decade in relation to understandings of climate change and calls for climate action, culminating in the Extinction Rebellion movement on climate action that has brought this divide to the forefront of political discussion in high income high-emitting states in 2019. Using content and discourse analysis of publicly available political debates in social and print media, it explores the epistemic divide that exists. Further, it examines the role and positioning of youth in traditional political theorizing and debate to explain the specific forms of epistemic harm and injustice that are inflicted upon younger generations who's voices are persistently ignore, patronized, and dismissed in the climate debates. Finally, it exposes the points of connection and shared concerns between the generations which should be the focus of political action, rather than the apparent points of contention that are currently being exploited for political gain and toxic political polarization evidenced in the rise of extremist political movements across the global.

Obesity and overweight in Mexican poor rural contexts. Effects of the School Breakfast Program in children population between 5 and 11 years old. An empirical evidence based on the National Health and Nutrition Survey results (2012-2016)

Submitter: Saucedo, Odra
Professor-investigator, University Anáhuac México, Mexico, odra.saucedo@anahuac.mx

Additional Authors:
Marcela De la Sota Riva, Professor-investigator, University Anáhuac México

Leovardo Mata, Professor-investigator, University Anáhuac México

Abstract:
Obesity and overweight are epidemic diseases that are due to multiple factors, several of them have their origin in childhood. Both conditions are characterized by an accumulation of body fat or adipose tissue higher than recommended and in relation to the body-mass index. This situation may place children under a risk zone for their physical and emotional health. Several studies give evidence about how obesity and overweight affections have a direct relation to depressive and anxiety disorders, this is because both generates dissatisfaction about body image and low self-esteem in the child population.

Data from the National Health and Nutrition Survey (2016), indicate that there is a combined prevalence of overweight and obesity in the population from 5 to 11 years old. Furthermore, other statistics from the same survey reveal a high incidence of this problem among children population living in poor households. That is why in Mexico this phenomenon is considered a public health problem.

In Mexico, food aid programs aimed at supporting poor households have been operating for several decades. Among the government strategies, for the attention to the vulnerable population, is the School Breakfast Program (SBP), which is operated all around the country through the National Federal Government, in coordination with the 32 state administrations.

The SBP may have an indirect positive effect to maintain or improve the nutritional status of the child population, when it is looking at having a positive impact on their cognitive improvement. This latter, due to a decrease in their malnutrition and anaemia condition. However, a study conducted in some primary schools in the United States of America, suggest that this type of food programs can also be a trigger for the development of overweight and obesity in adult life. This is mainly due to the inadequate design of the set menu, in terms of children nutritional requirements, as well as the type of food offered with them. This situation may constitute one of the main limitations on the positive effect of this government policy.

This article examines the impact of school breakfast menus, offered through the SBP, on the prevalence of overweight and obesity in children population between 5 and 11 years old, living in poor dwellings in rural Mexico. To this end, it is carried out an empirical panel data analysis based on the National Health and Nutrition Survey results published in 2012 and 2016.

It is expected that the research outcomes contribute to the debate about the efficiency of the SBP concerning Children obesity and overweight, whose the prevalence of this phenomenon tends to affect, increasingly important, the poor child population that lives in the Mexican rural areas.

Desired Future, Sustainable Paths: Social Development and the SDGs

Submitter: Spence, Cara
PhD candidate, University of Saskatchewan, Canada, cara.spence@usask.ca

Abstract:
As a global commitment to achieving sustainability by the year 2030, social development is recognized as one of the supporting pillars of the Sustainable Development Goals (SDGs). The SDG framework for social inclusion supports social development and integrated learning across worlds, sectors, genders, and generations. Social connectedness, and the inverse social isolation, are understood by the SDGs to be at the root of both the problem and solution for human development and survival. However, the capacity to act collectively is not just a matter of groups sharing interests, values, or goals, but also a shared understanding of the elements of the problem and possible solutions.

The values and practices that motivate social inclusion, collectivism, and connectedness were found among participants of of a 'Girls Group' – a capacity building program of the 'Mama Kwanza' ('Women First') social and economic initiative in Tanzania, Africa. The 'Girls Group' is a cohort of adolescent girls no longer engaged in the formal educational system, and are arguably one of the most vulnerable groups to shocks in the global economic and political structure. With gender as a factor of social exclusion worldwide, a descursive model of engagement allowed for the determinants and factors which preserve and uphold positions of vulnerability for the girls to be shared and understood. The discussion, in turn, provided a pathway of possibilities for social development and inclusion among the group. The removal from the formal educational system created additional vulnerabilities for the girls, who faced uncertainty in their desire for a sustainable life for themselves and their children to come. Enagement in skill development and informal knowledge translation was a well received development pathway for the adolescent girls.

A shared understanding of the nature of inequality and social exclusion, and the goals and means towards sustainability, provided an avenue for the transfer of informal teachings and learnings to the adolescent girls by intergenerational and intersectional community members. The identified vulnerabilities and capacities of the girls demonstrated that the value of informal knowledge transfer was critical for social development and for the potential of social inclusion for the adolescent girls of Mama Kwanza.

Good Practices at the Nexus of Water, Energy, and Agriculture

Community and Stakeholder Interaction and Engagement; a tool for propagating sustainability

Submitter: Adiele, Chioma Ihuoma
Master Student, Europa Universitat Flensburg, Germany, Germany, ciadiele@gmail.com

Abstract:
The concept of sustainable development is built upon 3 pillars: people, planet, and profit. However, the social aspect that involves dealing with people is often ignored or regarded with little importance. The sustainable development goals (SDGs) focus majorly on people and their activities inferring that there can really be no sustainability without interacting with people. This paper identifies stakeholders as anyone, group of people, or organization with an interest in the process and result or outcome of a project. A community is regarded as an important stakeholder in the sense that any project carried out within a specific area inhabited by people has an indirect or direct impact on the economy of that vicinity. However, this impact is felt by different people in the community in diverse ways , hence a community can be further sub-divided into groups with common factors such as age, sex, occupation, or even religious beliefs. The paper highlights the importance of community engagement at the as a starting point of any project, understanding how the community is made up as a first step to determining an approach for interaction. It further encourages the mapping of each stakeholder's potential power or influence on the success or failure of a project. Then it outlines methods for inclusion and feedback from the community and its stakeholders which can provide a benchmark or yardstick of the expectations of the project. It also shows how proper engagement of a community and its stakeholders can serve as creative ideas, feasibility studies, as well as information on blind spots not considered. This paper concludes by exploring an example using the mega city of Lagos state in Nigeria and how community and stakeholder engagement is playing an important role in developing sustainable housing for the well-being of its inhabitants, reduction of carbon footprint to the environment and growth of its economy.

Building Capacity for Evaluating SDG6 in Belgian Development Cooperation Programs: the Water Nexus Project.

Submitter: Alonso, Alice
Postdoctoral fellow, Catholic University of Louvain, Belgium, alice.alonso@uclouvain.be

Additional Authors:
J. Cools, Postdoctoral fellow, University of Antwerpen

L. Diels, Professor, University of Antwerpen

M.A. Eurie Forio, Postdoctoral fellow, University of Ghent

P. Goethals, Professor, University of Ghent

T. Ho Long, Postdoctoral fellow, University of Ghent

J. Huge, Postdoctoral fellow, Free University of Brussels

A. Marx, Deputy Director Leuven Centre for Global Governance Studies University of Leuven

P. Meire, Professor, University of Antwerpen

B. Muys, Professor, University of Leuven

M. Vanclooster, Professor, Catholic University of Louvain

B. Verbist, Postdoctoral fellow, University of Leuven

S. Vlaeminck, Professor, University of Antwerpen

Abstract:
Effective coordination of the water, energy and food nexus is burdened by a number of barriers, which often reduce the efficiency and effectiveness of development cooperation programs. In this presentation, we provide insights into such barriers with a focus on water for the 14 priority partner countries of the Belgian development cooperation program. The outcomes are used to develop a consolidated Belgian water strategy for development cooperation programs. Specifically, we provide policy support on how to best contribute to SDG6 in the Belgian partner countries. For doing this, we implement a policy support project, encompassing the following four specific objectives: (i) to synthesize current practices, barriers and opportunities for Belgium to more effectively contribute to SDG6 based on surveys of actors and workshop with the main Belgian organization active in the water domain; (ii) to design and implement an interactive online dashboard where information about the past and ongoing projects and actors in the water domains can be accessed, analyzed and visualized; this dashboard aims to enable well-informed decision when developing new programs, and provide support for more coordinated actions; (iii) to design a toolkit to support the assessment of the impact of Belgian DC projects and program on SDG6 prior, before and after their implementation; and (iv) to synthesize the big data (regional/global database of institutional and satellite data) opportunities for SDG6. In this presentation, we will present and discuss the outcomes of this policy support projects.

Leveraging Geospatial Intelligence to Predict Solar Photovoltaic Deployment Opportunities: Atlantic County, New Jersey

Submitter: Bevacqua, Anthony
PhD Candidate, Clean Energy and Sustainability Analytics Center at Montclair State University, United States, bevacquaa2@montclair.edu

Additional Authors:
Pankaj, Lal, PhD, Director Clean Energy and Analytics Center

Abstract:

We develop a methodology based on spatial analysis of social, built, and natural environment to predict community solar photovoltaic deployment. Community Solar is a new clean energy market in the State of New Jersey, which will remove barriers to entry of traditional residential net metering. This will allow for increased participation and additional environmental benefits by allowing more individuals to divest from the fossil fuel electric energy generation sector and adopt renewable energy. The goal of this work is to begin answering the larger question, can we reach our clean energy goals while preserving valued landscapes, serving environmentally disadvantaged communities, repurposing degraded lands, and utilizing optimal solar siting locations? To do so we develop a suitability model based on the levelized cost of energy (LCOE), recent community solar policy, and remote sensing data to identify optimal locations for adoption and estimate the potential photovoltaic capacity for these locations. Quantifying potential for renewable energy technology in this way supports clean energy policy development with considerations of natural resource conservation.

The methods used in this analysis include a raster-based weighted overlay suitability model which incorporates input spatial data representing parking areas, building footprints, and grid interconnection hosting capacity, environmental justice communities, landfills, flood zones, preserved farmland, and agricultural development areas, and county zoning. These inputs were weighted based on the New Jersey Community Solar Pilot Program evaluation criteria. Remote sensing techniques include an object-oriented image analysis, imagery interpretation, and a Light Detection and Ranging (LiDAR) derived digital surface model. This digital surface model was used to perform a solar radiation analysis which further quantifies suitable areas and anticipated photovoltaic generation. The results of this work yield a county wide suitability surface identifying optimal locations, and local solar radiation analysis of these locations. These results can be used to inform future policy development in the photovoltaic arena.

Analysis of the Extremes of Precipitation and Streamflow Using Standardized Index on Spring Reservoirs of Paraíba do Sul Watershed (Southeast Region, Brazil)

Submitter: Coelho, Andre
Master's Student, Federal Rural University of Rio de Janeiro, Brazil, andrecoelho22@gmail.com

Additional Authors:
Gustavo Bastos Lyra, D. Sc., Assistant Professor, Federal Rural University of Rio de Janeiro

Friedrich Wilhelm Herms, D. Sc., Assistant Professor, Rio de Janeiro State University

Marcel Carvalho Abreu, D. Sc., Assistant Professor, Federal Rural University of Rio de Janeiro

Abstract:
Reducing the impacts on water resources is necessary and urgent in order to maintain our way of life for future generations. In this regard, understanding water behavior and interactions on all scales is fundamental to achieving effective improvements in its management. Hydrometeorological extremes can cause big social, environmental and economic impacts on countries. Paraíba do Sul Watershed is located in the Southeast region of Brazil, and covers the states of Minas Gerais, Rio de Janeiro and São Paulo. This area has a large population density

and is relevant to the economy of the country. This study was carried out in springs of Paraíba do Sul Watershed, where there are three water reservoirs used for water storage for electricity generation, water supply and flood control. The reservoirs are called Paraibuna, Santa Branca and Jaguari. The monthly series used contain 45 years of observations, from January 1972 to December 2016. Seven meteorological stations and three fluviometric measurement points were selected. The precipitation series underwent treatment for data quality control and gap filling before analysis. The natural flow series were made available by Brazilian National Operator of Electric System, and show the sum of the observed flow rate and the withdrawals made by the hydraulic system for various uses. The Standardized Precipitation Index (SPI) was used to calculate precipitation anomaly and the Streamflow Drought Index (SDI) was used for streamflow anomaly. Both indexes were calculated at the scales of 3, 6 and 12 months, which allowed an accurate evaluation of the climatic extremes over the hydrological years, and the influence of dry and wet semesters and quarters on the annual series. In the hydrological year series 79 occurrences of precipitation anomalies were observed, of which 39 dry and 40 wet ones. There were also 37 streamflow anomalies, of 15 were dry and 22 were wet. Precipitation anomalies represent a higher frequency of occurrence in the basin. The SDI indices were correlated with the SPI indices in different scales using Pearson correlation coefficient (r). The SDI index calculated for Paraibuna has a high correlation ($r > 0.5$) with annual SPI for all stations and the wet season for the Redenção da Serra station. Santa Branca has a correlation greater than $r > 0.5$ with annual SPI, wet semester and wet quarter for all stations. For Jaguari the correlations between annual SPI, wet semester, dry semester and wet quarter and SDI were greater than $r > 0.5$ for all stations. Most of the years do not show significant anomaly and are characterized as normal in 74.3% of the years of precipitation and 71.9% of streamflow. It is concluded that in most of the series the streamflow anomalies correspond to the precipitation anomaly in frequency, but do not correspond to the intensity. In the region of the Paraibuna reservoir the humid streamflow extremes clearly correspond to extremes of precipitation in the stations around the reservoir, although the dry streamflow extremes do not present the same clarity. In the region of the Santa Branca and Jaguari reservoirs the wet and dry streamflow extremes correspond to extremes of precipitation.

Cities as catalyst for water-energy-food systems sustainability optimization

Submitter: Dias, Luis
Phd student, NOVA School of Science and Technology, Portugal, luismpdias@gmail.com

Additional Authors:
Júlia Seixas, Professor, NOVA School of Science and Technology

Abstract:
Human society development is intrinsically tied with the availability and access to three critical resources: water, energy and food (WEF). Current societal challenges as climate change and rising urbanization are intensifying pressure points in already fragile systems. Furthermore, the interconnected relation between WEF resources systems can act as effect multiplier and produce exponential negative effects across all systems chain components. The importance of WEF is also proved in the United Nations Sustainable Development Goals (SDGs) which target directly each of these resources: water (SDG 6), energy (SDG 7) and food (SDG 2). Although, increasing

attention in recent years has been dedicated to analyzing WEF nexus aspects little work focus on the relation and importance of WEF systems at city scale. Cities set, directly or indirectly, the WEF demand, distribution and supply conditions. Currently, cities are promoters of WEF systems related unsustainability, but at the same time are at the core of necessary transformations towards economic, social and environmentally sustainable development. Therefore, there is a need to reshape and design city integrated WEF systems considering all its interlinkages in order satisfy multiple goals: food security, access to safely managed water and access to affordable, reliable and modern energy sources. This work aims to present city sustainable visions reflecting WEF resource systems optimization towards sufficient and equal availability maximization. The city WEF systems identified configurations are based on current available and future technology literature in resource systems efficiency both supply and demand side. Buildings and/or district WEF integrated systems are included through defining, for example, energy (in electricity form) production capacity and the selection of its optimal destination: for household energy services (i.e. space heating and cooling) or for artificial lighting necessities for controlled environmental agriculture. The optimal synthetic WEF systems configurations are defined based on WEF production efficiency indicators. The result configurations show cities capacity to improve resource final use efficiency, but also potential for food and energy generation, namely by the deployment or transformation of residential or services buildings towards multipurpose infrastructures. Water and energy scarcity and inconsistent food supply and access can be mitigated by reshaping the way these resources are produced or extracted, distributed and consumed within cities. Possible technical configurations also require political and social transformations to achieve sustainability objectives.

A sustainable nexus in Mayan communities

Submitter: Medina Mejia, Aime
Communications Coordinator, International Renewable Resource Institute (IRRI), Mexico, aime@irrimexico.org

Additional Authors:
Monserrat Gonzalez Espinosa, PhD, IRRI Mexico

Abstract:
As the population continues to grow, the demand for food production is causing tremendous pressure on hydric and energy resources, by 2050 sixty percent more food will need to be produced in order to feed the world population. That is why the actions taken to understand and improve the water, energy, and agriculture nexus are key for achieving sustainable development goals.

Through this abstract, I will present a practical point of view of the nexus through a study case. I will perform in site recollection of qualitative and quantitative data from 599 agricultural households that have a biodigester; the analysis is focused on hard data and perceptions of the social, economic and environmental changes of the uses of energy, water, and food production in rural Mayan communities of the Yucatan Peninsula.

25% of Mexico's water supplies are in Yucatan, due to the karstic soil, shallow groundwater

sources and the lack of adequate sanitation infrastructure for agricultural waste, animal manure, and washed away fertilizers filter directly to the natural sources of water.

IRRI Mexico started the project in Yucatan in 2014, using agricultural waste as an input to produce clean energy through biodigesters. These eco-technologies are containers that use animal manure and water to produce biogas (a reliable source of energy), and an organic fertilizer that displaces synthetic fertilizers. The systems have treated 7,892 tons of organic waste.

The use of renewable energy has mitigated 1,922 mtCo2e of GHG produced by animal manure, mitigating climate change effects, that were affecting directly population whose income depends on agriculture. The 40 percent of Yucatan population use firewood to cover their basic energy needs, which causes pulmonary diseases, deforestation, and gender inequalities as firewood recollection and cooking activities depend primarily on women.

By having a new source of clean and renewable energy, the perception of families is that this has significantly improved their health, and it has also made some changes in gender roles; women don't have to spend most of their time collecting firewood and can invest their time in other economic and cultural activities, or in nurturing activities. At the same time, other family members can get involved in cooking activities due to the accessible use of the biogas stoves.

These results have a significant impact in the Mayan communities; agriculture is one of the main economic pillars of the region, they are the number one national producers of citrus and the fourth national meat producers. Therefore, the efficient management of agricultural waste is now producing more than 37 million liters of organic fertilizer, displacing synthetic fertilizers and well as nourishing the soil.

To prove the efficiency of the biofertilizer, IRRI Mexico created the Biofertilizer Resource Center in Yucatan named U ka Muuk Luum (the second force of the earth in Maya) where we do research for replicating good practices and lessons learned around the efficient use and long term results of the biofertilizer. One of the lessons learned is that local capacity building is a key element to ensure technology adoption. Farmers, woman, and men have to feel confident in their technical capacities in order to be able to manage efficiently the technology, and to make it part of their lives, adapting it to their culture and traditions. U ka Muuk Luum also functions as a capacity building center where Mayan communities are learning how to increase local food production in an organic and sustainable way.

The population is facing high rates of nutritional problems due to the lack of food literacy, 11.3 percent of the total Yucatan population suffer diabetes and 1 of each 5 kids in rural areas suffers malnutrition. In U Ka Muuk Luum, we identified the high potential of the biofertilizer as a tool for sustainable agriculture and food security, that can nourish the soil increasing food availability and diversity having a direct impact on the improvement of the environment, health, and the economy.

Therefore, providing farmers with ecotechnologies and local capacity building, the interaction of the nexus can be transformed into a sustainable model of development; protecting natural water sources, generating safe sources of energy and increase food production in a sustainable way according to cultural and local needs.

Food for Thought on Metric Determination for the SDGs at the Water-Food-Agriculture Nexus in Northern Senegal

Submitter: Murphy-Teixidor, Ana-Maria
MDP Student / Development Cooperation trainee (OECD), Trinity College Dublin, United States, anamaria56234@gmail.com

Additional Authors:
James Mulligan, MDP Student, Trinity College Dublin & University College Dublin

Abstract:
The Sustainable Development Goals (SDGs) were adopted in 2015 to mobilize efforts to terminate poverty, challenge inequalities, and combat climate change. To this end, the seventeen goals of the agenda set an indicator framework covering a range of topics including energy, water, agriculture, and governance. There has been increasing research linking the food, water, agriculture, nutrition, and energy aspects of the Millennium Development Goals (MDGs), and SDGs into the water-energy-food (WEF) nexus discussion following the 2011 Bonn Conference. However, research is lacking on how to monitor and assess nexus discussions at the regional and household level.

While the SDGs are determined at the international level, they require local implementation given the SDGs' call to 'Leave no one behind.' Context-based, regionally adapted agricultural, food, and water security indicators are a crucial element in discussions of achievement at the food-agriculture-water nexus as a subset of the larger WEF nexus. Metrics play a role within monitoring and evaluation, which in turn influences implementation, policy and strategy formulation. While metrics are rarely all-inclusive, they can provide a starting point for discussing needs to foster dialogue, promote inclusiveness, stimulate transparency and, increase awareness, to bridge SDG implementation gaps.

While agricultural and food security metrics have been more extensively developed in the literature, to date most scales examining water security at the household level do not demonstrate the true extent of local water security. Thus, poor understanding of household dynamics at the food –agriculture-water nexus provides a weak basis for policy at the international level. Specifically, there has been a call in the literature across the food, agriculture, and water sectors to further develop localized metrics evaluations which are informed by qualitative data collection to take into consideration the scientific inquiry through social and political frameworks which nexus discussions are inherently embedded. Applying more integrative approaches which use qualitative and quantitative methods to understand conjoint household agricultural practices alongside food and water security is a novel approach, and applying these newly developed metrics more broadly seeks to more accurately inform nexus discussions.

This research undertaken in 2018 employed quantitative data collection methods (i.e. household structured questionnaires (n=360)) and qualitative data collection methods (i.e. key informant interviews (n=27)), to understand the food-agriculture-water nexus at the household and community level within the Leona region of Northern Senegal. Ultimately with the newly developed metrics, a significant effect emerged between different facets of agriculture and water security on household food security (i.e. region, household diet diversity, and secondary water source type). The significance of these variables signals a need for experts to work horizontally and vertically within the agriculture, water and energy fields to collaboratively formulate accurate determinants for the nexus discussion from the household level. Creating a strong evaluative framework at the household level ensures that the achievement of the SDGs goes beyond a box-ticking exercise. By starting with the foundation of household surveying, nexus discussions can be localized, providing a template for future operationalization of the nexus across the global ecosystem.

Strategies for Effective Water Management in Health Care (HC) Sector in Sri Lanka

Submitter: Nazeer, Sabrina
Research Scholar, University of Moratuwa, Sri Lanka, sabrinanazeer@gmail.com

Additional Authors:
W.G.S.S. Priyalal, Student, University of Moratuwa, Sri Lanka

P.A.D. Rajini, Lecturer, University of Moratuwa, Sri Lanka

Abstract:
Health care (HC) facilities were the most water consumed industry in 2012 averaging almost 50 gallons per square foot per year. Water is an essential element for HC facilities and it is consumed for the purposes of medical treatments, washing surgical equipment, kitchen/dish washing, laundry, cooling and heating, domestic and restroom, etc. to create a soothing environment for patients, staff and facilities. The water and wastewater services cost is identified to rise above the consumer price index level in HC facilities. However, HC finds restrictions when applying water saving measures as maintaining quality of water is a crucial factor. Further, it is identified that, there is no single approach or solution for dealing with water quality issues within HC. Thus, the aim of this research was to investigate the current water management practices of healthcare facilities and propose suitable strategies to save water in Sri Lanka. Hence, this study reports on current water management practices of four case studies i.e. private sector healthcare facilities. The required data was collected through site observations and semi-structured interviews conducted among professionals who are responsible for water management in selected facilities. The findings revealed that the current water management practices are basically focused on technical measures and the human measures have been relatively neglected. The study proposed several water management strategies which will address both technical and human measures. Application of these strategies will enable the management of healthcare facilities to minimize the drawbacks of their current water management practices and reduce the water consumption of their facilities by a considerable amount.

Keywords: Water management; Health Care; Strategies

The Interconnection of Water-Energy-Food and Sustainable Livelihood. A Case Study on Pinglin District in Taiwan.

Submitter: Olasiyan, Folashade
Student, Trinity College Dublin Ireland, Ireland, olasiyaf@tcd.ie

Abstract:
One of the key objectives among others that the sustainable development goals (SDG) seeks to address in the developmental pathways is the interconnectedness of the 17 goals and 169 targets by 2030. The achievement of some goals at the detriment of others have been the dilemma of sustainable development as good practices have not been imbibed in most countries towards its journey for self-actualization. The provision of regional economic infrastructure such as dams, roads, airport, power etc.is meant to lead to the shared prosperity of all members of a country, however due to lack of good practices in terms of a comprehensive impact assessment on the developmental process some members of the communities are left out of the economic benefits meant for all.

This paper argues that the provisional of regional infrastructure does not necessary lead to the sustainable development of all townships that makes it up as was in the case of Pinglin Township in the Northeast of Taiwan. Pinglin is noted for the cultivation of Tea production and currently has one of the world largest tea museum center. This study examines the nexus of how the construction of Feitsui Reservoir and highway in the township has affected the economic sustainability of the people thereby posing a threat to tea cultivation both now and in the nearest future as economic activities are gradually shifting to other neighboring township with older people left in Pinglin.

The study canvasses that for sustainable development to be achieved as envisioned by the declaration of the United Nations in September 2015 by the various Heads of State there needs to be the introduction of good practices that connects the socioeconomic and environmental dimensions of development.

Achieving Food, Water and Energy Security by 2030 in Bangladesh

Submitter: Sultan, S M Tareque
International Student, Monash University, Australia, ssul0010@student.monash.edu

Additional Authors:
S M Tareque Sultan, International Student, Monash University

Abstract:
Being a densely populated country and one of the fastest growing economies of the world in the last decade, Bangladesh progressed remarkably towards achieving the Millennium Development Goals (MDGs), especially in reducing Child Mortality and Maternal Mortality rate. After the MDGs era, Bangladesh adopted Sustainable Development Goals (SDGs), a global plan of action.

The 17 goals and 169 targets of SDGs aim to bring positive change of people, planet, prosperity, peace and partnership intensively focusing on the economic, social and environmental dimensions.

In 1987, the concept of 'Sustainable Development' was expressed in Brundtland Report for the first time. After that, Earth Summit of Rio De Janeiro in 1992 adopted agenda 21 giving birth to UN Commission on Sustainable Development which emphasized the environment and development. The Rio+20 summit agreed to accept a global plan of action emphasizing green economy and institutional capacity development for sustainable development. Liverman (2018) explains socioeconomic and environmental indicators are key to the concept of 'development'. While, Mitchell (2002) argues that the object of development should be human and natural geographies. Accordingly, a post neoliberal development approach is integrated into SDGs considering the ecology, culture, geography and human environment. Thus, SDGs need to be implemented through good practices and capacity development of implementing agencies.

Consequently, Government of Bangladesh has assigned General Economics Division of Bangladesh Planning Commission as SDGs focal point and attached the post of SDG Chief Coordinator, an independent expert at Governance Innovation Unit (GIU) of Prime Minister's Office (PMO). GIU of PMO has undertaken the project "Strengthening the Capacity of Public Administration for Achieving SDGs" aiming to develop institutional capacity of government officers to achieve SDGs successfully. The project offers scholarship for Masters' program and PhD based on the relevant goals of SDGs. Being a civil servant of Bangladesh, I am studying Master of International Development Practice at Monash University under that project. Along with institutional capacity development initiative, Bangladesh is one of the 44 countries to present Voluntary National Review (VNR) report on the progress of SDGs implementation and integrated the indicators SDGs into 7th Five Year Plan (FYP) which will be implemented during FY2016-2020.

Moreover, Bangladesh has made sustainable progress over the past 40 years in achieving food security, despite frequent natural disasters and population growth (food grain production, tripled between 1972 and 2014, from 9.8 to 34.4 million tons). With one of the fastest rates of productivity growth in the world since 1995 averaging 2.7 percent per year, second only to China (World Bank 2016). Additionally, Power System Master Plan 2016 of Bangladesh has been prepared to achieve sustainable energy production and consumption. A World Bank press release recently states that a renewable solar energy park is going to be established at Feni district and 350 MW will be generated from solar panels in coming years. Recently, Bangladesh has formulated Bangladesh Delta Plan (BDP) 2100, a 100 years water resource management plan in 2018 aligning with SDGs. The Ganges, Brahmaputra and Meghna formed the largest dynamic delta of the world in linking around 700 rivers (57 trans-boundary). BDP focuses on water security, environmental security, food security and better livelihood; sustainable energy and power production; social and institutional development etc. However, climate change poses the biggest challenge for the successful implementation of BDP. BDP aims to improve six hotspots across the country based on water quality, salinity intrusion and arsenic contamination while preserving fresh water resources.

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Food-Energy-Water Nexus and Green Infrastructure: a Theoretical Connection

Submitter: Tebyanian, Nastaran
Ph.D. Candidate, Penn State, United States, nastaran.tebyanian@gmail.com

Additional Authors:
Lisa Iulo, Associate Professor, Penn State

Abstract:
In urban landscape planning and design, green Infrastructure (GI) has been increasingly considered as a climate change adaptation strategy. European Union has integrated green infrastructure planning as one of the main strategies to meet the eleventh goal (Sustainable cities and settlements) of the UN sustainable development goals. In order to optimize GI planning and design and maximize its role in cities adaptive capacity, it is crucial to understand GI’s tradeoffs and synergies with the relevant interconnected urban systems. Among frameworks that address the role of multiple interconnected urban systems in climate change adaptation is Food-Energy-Water (FEW) nexus. The framework, however, has remained largely conceptual due to different gaps in data and knowledge (Sperling and Berke, 2017).

While Food-Energy-Water nexus is not an urban design theory, the literature in FEW Nexus marginally has touched large scale urban landscape planning approaches. However, its implications have not been explored in the context of urban landscape design at smaller scales including the neighborhood/site. This paper aims to make the theoretical connection between FEW nexus literature and green infrastructure planning and design at multiple scales.

This paper provides a systematic review of both FEW nexus and Green infrastructure literatures and shows the connections form each side. Green Infrastructure has been mentioned in Water-

Energy-Food nexus literature in different contexts. There are direct calls for including natural infrastructure in the nexus (Ozment et al., 2015). For discovering the connections in GI side, conceptual clustering analysis of the keywords of the literature on green infrastructure has been performed. The literature pool was acquired from 1316 peer-reviewed search results that had" Green infrastructure" in their topic on Web of Science database. The embedded clusters on the GI literature have been semantically categorized in 4 main groups; 1) water management and flooding (water system), 2) urban heat island (energy system), 3) food production and urban agriculture (food system) and 4) community and social benefits of GI. The cluster analysis is performed with bibliometric library in R programming language and it is further polished manually.

The result of the cluster analysis shows already existing but not integrated pieces of FEW nexus aspects in Green infrastructure literature. The paper further provides recommendations on the areas that this integration is most needed and meaningful. In doing so the paper expands the context of nexus analysis that is mostly on large scale agriculture and policymaking (Wichelns, 2017) to other disciplines and scales such as urban landscape design at site/neighborhood scale.

The Design and Implementation of a Gravity-Fed Water System in Rural Peru: A Practical Approach to Addressing the Water Challenge in Developing Communities

Submitter: Wagner, Riley
Undergraduate Student, Princeton University, United States, rileyws@princeton.edu

Additional Authors:
Sydney Hsu, Undergraduate Student, Princeton University

Sofia Bisogno, Undergraduate Student, Princeton University

Sneha Iyer, Undergraduate Student, Princeton University

Abstract:
This paper analyzes the methods utilized by the Princeton University Chapter of Engineers Without Borders to ensure the sustainability of a gravity-fed water system in rural northwestern Peru. The system services over three hundred people by collecting water from a natural spring several kilometers away from the community and then directing that water to a centralized reservoir tank. The water is then distributed to each participating household via 15 km of distribution lines. The project is designed to be implemented in stages over a five-year partnership period, during which EWB-Princeton would design the system during the academic year and travel in-country for several weeks each year to work on system implementation. The team is inherently interdisciplinary in nature due to its unique subteam structure, ensuring a holistic approach to project sustainability.

To assist with the non-technical aspects of the project and daily operations during implementation, EWB-Princeton established strong partnerships with the local community and in-country non-profit organizations. Accountability and division of responsibilities among the partners created an effective network of support, ensuring that the community is involved

throughout the entire project.

Furthermore, due to the community's reliance on local agriculture, every effort was made to minimize the impact that this water project would have on the cropland and irrigation utilized not only by the community members, but by others in the area. Because the area lacks access to a reliable power grid, EWB-Princeton also designed the system to not require any electricity by utilizing the geography and topography of the region so that gravity would be the only driving force. Locally sourced materials were used throughout the project and the team trained community leaders throughout the construction phase of the partnership in the usage and maintenance of the system. The main objective of the Princeton Engineers Without Borders Team in this partnership is to ensure that the community has the knowledge, tools and resources to maintain the water system in a self-sufficient and sustainable manner at the completion of the project.

Imperative of Gender and Inclusion to urban water services: Prospects and Challenges

Submitter: Wuya, Mary Omble
Lecturer 1, Sociology Department University of Jos, Nigeria, Nigeria, omblewuya@gmail.com

Abstract:
The gender gap in access to water and sanitation services is one of the challenges Nigeria faces. Government have implemented policies towards bridging such gap but a lot needs to be done to bridge the gap which is absolutely necessary if sustainability is to be achieved. In making efforts towards bridging the existing gap, women, children and people with disabilities should be taken into account. The main objective lies in understanding their challenges and how they can be addressed. Women and girls are disproportionately affected by lack of access to water, sanitation and hygiene. Addressing the urban wash need of men, women and children can provide direct benefits and indirect benefits to the entire community such as good health, education and economic productivity. Women and Children are considered to be vulnerable in society people with disabilities are discriminated against. They are not included in provision of goods and services. Policies are not made that recognizes their dispositions. So when implementing projects their needs should also be taken into consideration. The research is a social survey in which data gathering was done using the questionnaires as instrument of data collection. The analysis was achieved through simple frequencies and percentages .The findings indicated challenges of women, girls and people with disability such as numerous adverse health effects due to lack of adequate access to water and sanitation and hygiene. When latrines are not available in households, women and girls will seek privacy after dark to defecate outside of their homes, exposing them to a greater risk of harassment sexual, and assault. Out of fear, women and girls may choose to ignore their needs which may increase the likelihood of urinary tract infections, chronic constipation or mental stress, access to affordable water services. Recommendations included government policies, availability of affordable water services and facilities and orientation on water management and payment for services others.

Keywords; Gender,access,inclusion,urban

A National Scale Sustainable Agriculture Matrix of Indicators to Inform Policy

Submitter: Zhang, Xin
Assistant Professor, University of Maryland Center for Environmental Science, United States, xin.zhang@umces.edu

Additional Authors:
Xin Zhang, Assistant Professor, University of Maryland Center for Environmental Science (UMCES)

Eric A. Davidson, Professor, UMCES

Guolin Yao, Postdoctoral Fellow, UMCES

Jing Zhao, Postdoctoral Fellow, UMCES

Srishti Vishwakarma, Ph.D. Student, UMCES

Tan Zou, Ph.D. Student, UMCES

Abstract:
The ratification of Sustainable Development Goals (SDGs) by all member countries of the United Nations demonstrates the determination of the international community in moving towards a sustainable future. To enable and encourage accountability, independent and transparent measurements of national sustainability efforts are essential. Among all sectors, agriculture is fundamental to all three pillars of sustainability, namely environment, society, and economy. However, the definition of a sustainable agriculture and the feasibility of measuring it remain elusive, in part because it encompasses both biophysical and socio-economic components that are still poorly integrated. Therefore, with a highly interdisciplinary team, we have been developing a Sustainable Agriculture Matrix (SAM) on a national scale in order to measure country-level performance in agriculture, and assessing the trade-offs and synergies among performance indicators based on the historical records (1961-2015) for countries around the world (about 160 countries).

First proposed by Swaminathan for agricultural research and policy in 1990s, SAM is a collection of indicators measuring sustainable agriculture from environmental, social, and economic dimensions. The environmental dimension evaluates various impacts of agricultural production on the environment, such as water consumption, nutrient pollution, loss of biodiversity, and climate change. The economic dimension assesses the economic viability of the agricultural sector considering agriculture productivity, agricultural support, global market access, farmers' access to resources, and farmers' financial risks. The social dimension measures the impacts of agricultural production on the whole society through resilience, health and nutrition, farmers' well-being, rights and equality. According to the framing of SAM for each dimension, about twenty indicators were developed and selected as the first edition of SAM, and trade-offs and synergies among indicators were visualized on both national and global scales.

Translating the illustrative concepts into measurable indicators will provide an independent and transparent measurement of national performance in the sustainability of agriculture production, which is at the center of Water-Energy-Agriculture nexus. Analyzing and visualizing the trade-offs and synergies will also provide timely information to help guide evolving national policies regarding agriculture, trade, environment, and national security.

Resilience of Ecosystem-Dependent Coastal Communities for SDG 14 in Indonesia

Submitter: Adi, Tukul Rameyo
Staff, Ministry for Maritime Affairs of Indonesia, United States, Lauren.barredo@unsdsn.org

Additional Authors:
Andreas A. Hutahaean and Jl. MH. Thamrin, Coordinating Ministry for Maritime Affairs, Indonesia

Abstract:
Coastal ecosystems of Mangrove and seagrass are significant for global climate change mitigation and adaptation, storing significant amounts of carbon, protecting coastlines, and providing essential environmental services to support the livelihood of millions of coastal communities across Indonesia. To date, conservation efforts in the country have focused largely on coral reef ecosystems. Increasingly, however, coastal wetlands dominated by mangroves and sea grasses are being recognized for their importance services. For examples, some studies have been done in North Coast of Java, Kaimana in West Papua and East Coast of Sumatra shows that coastal fishing is the primary occupation for 20-31% of households and the main source of monetary income for 29-45% of households, while also providing the vast majority of dietary protein for more than 70% of households.

This program was aimed to strengthen the resilience of ecosystem- dependent coastal communities by promoting nature-based solutions, in line with SDG 14 Live below water. Also recognising that well-managed healthy ecosystems contribute significantly to human resilience and livelihood as well as to mitigate the climate change through improvement of management and innovative local activities.

Good Practices in Climate Change Mitigation, Adaptation, and Resilience

Contribution of Bamboo Cultivation for Disaster Risk Reduction & Livelihood in Coastal Areas of Bangladesh

Submitter: Azam, Gholam
Master's Student, Lanzhou University, China, ahmed.bdnation@gmail.com

Additional Authors:

Liu Siyu, Undergraduate Student, Northwest Normal University, Lanzhou, China

Ahmed Md. Zahir, Doctoral Candidate, Northwest Normal University, Lanzhou, China

Abstract:
Bangladesh is the world's biggest delta, which is immensely vulnerable to climate change. It has a long historical experience of disasters. Although people's resilience made this copying with various disasters successful but recent climate change has changed all the equation. The resilience mechanism which was effective for the disasters is not befitted with the problems owing to climate change. From the ancient period, coastal zones were the worse victim of disasters and the problem sustains for climate change as well. 32 percent of the country's total land is coastal zone and the geo-physical characteristics of these areas are significantly different than other region. Apart from the geo-physical characteristics, the socio-political context makes the region worse. Along with climate change, cyclone, tidal surge, flood, erosion, rise in sea level, increased water salinity, inundation are provoking the extinction of biodiversity. Owing to climate change 35 million people from 47,211 square kilometers are facing the threat of life and living. Cultivation is very uncertain here because of salinity and rise of sea level in consequence of climate change which also destroyed forests and increased the level of erosion high. Hundreds of villages have become defunct because of this erosion and that is why the coastal people are forced to migrate to the cities. Livelihood and erosion- these two ambivalent issues can be potentially solved by cultivating bamboo. It has the significant bendability to reduce the intensity of cyclone also it's dense and wide- spreading root system holds more soil and prevent the erosion effectively. Besides, bamboo shoots are very healthy and expensive food and in Bangladesh predominantly bamboo made products are very valuable. Thus the coastal erosion can be lower with the bamboo cultivation which could be also a sustainable way to manage livelihood there.

So this present study will focus on the feasibility of reducing natural antagonism and manage sustainable livelihood of the coastal region of Bangladesh through bamboo cultivation as an indigenous technique.

Keywords: Climate Change, Resilience, Disaster Management, Coastal Areas, Bamboo Cultivation, Livelihood.

A model to address adaptation of agricultural systems to climate change

Submitter: Boggia, Antonio
Associate Professor, University of Perugia, Italy, antonio.boggia@unipg.it

Additional Authors:
Lucia Rocchi, Assistant professor, University of Perugia

Gianluca Massei, Postdoctoral, University of Perugia

Anna Laura Freschini, Postgraduate, University of Perugia

Luisa Paolotti, Research Fellow, University of Perugia

Abstract:
Among the production sectors, agriculture is the most significantly influenced by the effect of climate change. Agricultural systems will be subject to enormous risks if theories and predictions about climate trends are realised. Some examples are changes in average temperatures, rainfall, and climate extremes; changes in pests and diseases; changes in atmospheric carbon dioxide and ground-level ozone concentrations. The assessment of the impact of climate change on agricultural systems and food security, to support decision makers to set up adaptation measures in vulnerable areas, are key issues for researchers, development agencies, civil society, business and governments.

The objective of this study is to assess the impact of a set of potential climate changes on agricultural systems by focusing a case study on region of Umbria (Italy). More specifically, this study is aimed at understanding and measuring the changes that occur in agricultural systems due to climate, and at determining how changes in climate can affect sustainability of agriculture, considering agricultural productivity, as an indirect measure of the economic (farmers income) and social (food security) performance, and the resultant environmental impacts of agricultural systems. The CropSyst software was used, and a simulation model was generated and coupled to a Geographic Information System to obtain output linked to environment and plant productivity. The doubling of CO2 in the atmosphere during a time interval of 100 years, according to the hypothesis of the CCM3 model, was simulated. Productivity was measured using yield and biomass production as indicators. The indicators to assess the environmental impacts were run-off, deep percolation, nitrogen leaching, erosion and mineralisation of organic matter. The simulation of climate change scenarios and the graphical representation of the results were performed using a Geographic Information System. The results show that climate change can affect not only agricultural production, but also the environmental impact of agriculture. Environmental problems caused by agriculture, could increase. The model is useful both for the evaluation of the existing data, and for the simulation of future data. The information collected can be useful for decision makers, in order to promptly identify priority action areas, provide a warning for increased vulnerability, and develop adaptation strategies.

Blockchain enabled Carbon Emission Trading in India

Submitter: Dash, Dibyajyoti
Student, University of Petroleum and Energy Studies, India, djdashsrm230@gmail.com

Additional Authors:
Atul Rawat, Assistant Professor, University of Petroleum and Energy Studies

Ashish Ranjan, Student, University of Petroleum and Energy Studies

Abstract:
In today's world, every green environmentalist aims to promote policy and business that works for the environment. The most important greenhouse gas produced by the combustion of fuels

that is carbon dioxide, has become a cause of global panic as its concentration is increasing alarmingly in the earth's atmosphere leading to global warming. Despite increased calls to reduce global emissions in light of climate change, energy related carbon dioxide emissions worldwide went up by 1.7% last year. This has helped in creating a global market for the trade of carbon credits both within and outside of the regulated area. This is where the concept of carbon emission trading comes into the picture. Carbon emission trading is a method utilised by various firms or countries to buy or sell carbon credits and reduce emission production. Major limitation of carbon emission trading in India is the lack of a central resource framework for data acquisition, system for tracking emissions and infrastructure for market trading of allowances. Central Pollution Control Board (CPCB) has been setting strict guidance for industrial emissions and promoting trade of carbon credits to curb emissions. However, the enforcement and compliance of these guidelines has largely remained weak. India, being the largest beneficiary of carbon trading, still does not have a proper framework for trading of carbons in the market. There are certain areas that deserve due attention. These include technical readiness, policy readiness and institutional and legal readiness. Technical readiness would include coverage, monitoring and verification and establishing registries. Policy readiness would include setting clearer goals, choosing appropriate instruments and distributing benefits. Institutional and legal readiness would include establishing responsibility for collection of data, issuance of allowances or credits and handling legal compliance issues. It is in these areas that co-ordination and harmonisation might be necessary when it comes to integrating and linking any two market mechanisms. These issues can be addressed by implementing Block Chain technology in carbon emission trading. Block chain Technology is represented as a series of blocks chained to each other which provides credibility and security in various applications. Trading using block chain would ensure enhanced security, improved transparency and optimised efficiency. Reputation based Block Chain (BCRB) system acts as the foundation for the entire process of carbon emission trading. It is easier to implement in any environment. Reputation in the BCRB system is a function of past emission rates and participant's strategy to achieve the emissions reduction. The evaluation of past emission rates is quite straightforward, the less ratio of emissions per product an enterprise produced in the past, the better the reputation. Thus, reputation based transaction system improves performance and commits to emission reduction effort by setting a trade algorithm. Surprisingly, there has been no single evidence of firms implementing Reputation based Block chain (BCRB) Technology in India. This paper discusses how the block chain technology and reputation based trading system would affect the carbon emission trading in India and help the participants adopt a long term solution in emission reduction.

Place, Perception, or Politics? Measuring U.S. Urban-Rural Natural Disaster Resilience Capacity

Submitter: Fernandes, Titiksha
Graduate Student, University of North Carolina at Charlotte, United States, tfernan7@uncc.edu

Additional Authors:
Christina M. Danis, Graduate Student, University of North Carolina at Charlotte

Onah P. Thompson, Graduate Student, University of North Carolina at Charlotte

Abstract:
Natural disasters in the United States (U.S.) have caused a spur in conversations regarding best practices and solutions for preparing communities for the implications of climate change. Resilience practices specifically recognize the need to bolster socially vulnerable populations with increased technical assistance and planning capacity. Although efforts to equip socially vulnerable regions with the right resiliency tools have been underway, what is important to understand is the capacity of these communities to influence the effectiveness of natural disaster resiliency planning. Existing literature indicates that regional, economic and sociopolitical factors influence people's worldview, including their perceptions of the environment and vulnerability to natural disasters. Factors such as social capital conditions, natural disaster exposure risk, and political preferences have shown to be influential predictors in people's perception regarding the environment. Consequently, this affects their capacity for resilience. Therefore, the need to examine the capacity of communities in planning and implementing effective natural disaster resiliency measures is important. This study explores how urban-rural counties across the U.S. perceive the environment and climate change risk in the context of social capital and their political preferences. As a result, this study serves as a practical application tool for decision makers in allocating resources, given communities' capacity to prepare for natural disasters.

We use county-level data across the continental U.S. to examine if urban-rural perceptions of the environment, social capital characteristics, natural disaster exposure risk, and political affiliation vary across the 10 Federal Emergency Management Agency (FEMA) regions. The perception of the environment and the reception of natural disaster resiliency tools varies across urban-rural regions. This understanding provides for an innovative approach to allocating natural disaster-related resources to communities based on their risk perception. These varied perceptions, in some instances, could result in overly surplus or insufficient allocation of resources by public officials and planners. Hence, this study will assist stakeholders to understand the conditions under which individuals or communities may understate or exaggerate their need for natural disaster resilience resources. Additionally, exploring community perceptions of the environment, given their social vulnerability will highlight regions in need of resiliency education and capacity building tools. These tools are vital for informing strategies to safeguard communities from future natural disaster events and impacts.

Enablers of high climate change mitigation ambition

Submitter: Iacobuta, Gabriela
Researcher, German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE), Germany, gabriela.iacobuta@die-gdi.de

Additional Authors:
Prof. Dr. Niklas Höhne, Researcher, NewClimate Institute, Special Professor, Wageningen University and Research

Abstract:
The Paris Agreement adopted in December 2015 under the United Nations Framework Convention on Climate Change (UNFCCC) aims to strengthen global climate action by holding

the global average temperature increase to well below 2°C above pre-industrial levels and pursue efforts to limit it to 1.5°C. However, the aggregate GHG emissions reduction efforts committed by national governments for both pre-2020 and post-2020 periods are projected not to be consistent with the emissions pathways to stay on track to limit the global temperature increase within 2°C, let alone 1.5°C. As the submission of the next round of NDCs for the first five-year cycle is open until 2020, raising ambition for mitigation action is essential. In that regard, a good practice by each country is to define clear targets for GHG emissions reductions, as well as for the uptake of renewables and for improvements in energy efficiency. Being able to compare countries' climate-relevant targets in the context of their differentiated capabilities and responsibility can help identify role models and free riders and encourage countries to motivate each other. Yet, such a comparison is currently not available.

This study harmonizes GHG emissions, renewables and energy efficiency targets for the years 2020 and 2030 to provide an overview of (conditional and unconditional) climate pledges worldwide and the possibility to compare across countries and to the global targets required for the 1.5°C and 2°C pathways. Moreover, the study brings additional value by comparing not only international pledges under the Kyoto Protocol and the Paris Agreement, but also targets adopted through domestic policies, building on the database developed by Iacobuta et al. (2018). Nevertheless, simply comparing target values as improvements relative to a given point in time does not fully reflect countries' ambition relative to their capabilities and current development pathways. To better understand what makes countries pledge stronger commitments and to identify potential enablers and bottlenecks of high climate ambition, we seek correlations between target levels and various development-specific indicators such as: GDP/capita; GHG emissions intensity of GDP: trends in GHG, GDP and GHG per GDP: governance effectiveness; fossil fuel dependence (as share in energy use and as net exports); received international financial support; current shares of renewables in the energy system (and expected annual increase); energy intensity of GDP; and presence of overarching climate change legislation. When clear outliers emerge, we seek to understand their motivation through a more in-depth study of respective policy documents.

Reference: Gabriela Iacobuta, Navroz K. Dubash, Prabhat Upadhyaya, Mekdelawit Deribe & Niklas Höhne (2018) National climate change mitigation legislation, strategy and targets: a global update, Climate Policy, 18:9, 1114-1132, DOI: 10.1080/14693062.2018.1489772

Good practice policy menu for climate change mitigation policies and measures and its coverage in the G20 member states

Submitter: Iacobuta, Gabriela
Researcher, German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE), Germany, gabriela.iacobuta@die-gdi.de

Additional Authors:
Dr. Takeshi Kuramochi (Researcher, NewClimate Institute, Germany)

Prof. Dr. Niklas Hoehne (NewClimate Institute, Germany)

Hannah Fekete (Researcher, NewClimate Institute, Germany)

Abstract:
Raising the ambition of action against climate change is urgent. The Paris Agreement adopted in December 2015 at the 21st session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) aims to strengthen global climate action by holding the global average temperature increase to well below 2°C above pre-industrial levels and pursue efforts to limit this increase to 1.5 °C. While almost all countries around the world have submitted their (currently insufficiently ambitious) pledges as Nationally Determined Contributions under the Paris Agreement, the achievement of the Agreement itself ultimately depends on action on the ground, domestically. However, a comprehensive overview of key climate change mitigation-relevant policies covering all sectors and their adoption in a set of countries that account for a large majority of global GHG emissions is not available.

To overcome these limitations, this study first establishes a package of good practice climate change policies and measures across all economic sectors. Such a policy package provides a 'menu' of policies for policy makers to choose from and offers a comprehensive structure for the study of current climate action in specific countries or regions. The good practice policy menu was developed through an extensive literature review and is based on a definition of "good practice policies" as policies and measures that are generally agreed in literature to have substantial contribution to greenhouse gas emissions reductions and whose feasibility has been proven through country-level implementation. The good-practice policy package covers all sectors, as greenhouse gas emissions need to be addressed economy-wide in order to reach a pathway compatible with the 2/1.5°C limits. Moreover, included policies and measures from all sectors were categorized by specific policy areas (e.g. renewable energy, energy efficiency, non-energy) which encompass multiple types of policy instruments.

To gain a better understanding of how greenhouse gas emission are currently addressed domestically across sectors, we apply the developed good practice policy menu to the G20 member states, jointly accounting for approximately 80% of worldwide emissions. With the help of this menu and by using the Climate Policy Database (www.climatepolicydatabase.org/) we provide an overview of climate-relevant policies and measures that are currently in force in these countries, identifying gaps and opportunities to raise ambition. Here, we focus on the existence of the policy instruments, not on the effectiveness, ambition, or other criteria that could be applied to determine the quality of a policy. This study thus analyses the completeness of a policy package in comparison with recommended good practices. This work intended as a scientific journal article updates and further details a report published by NewClimate Institute in 2016, on the top 30 countries with highest greenhouse gas emissions.

The Sudarshan Kriya Yoga (SKY) breathing technique – its inclusion as a good practice to combat climate change

Submitter: Kanchibhotla, Divya

Executive Director & Research Head, Sri Sri Institute for Advanced Research, India,
divya.kanchibhotla@artofliving.org

Abstract:
Turning our focus to, adopting and spreading awareness on good practices to help mitigate climate change is gaining momentum. Our research answers the question if holistic, breathing and meditation based techniques could have an impact on climate change? The answer is a resounding Yes!. A questionnaire-based study was conducted to explore the relationship between Sudarshan Kriya Yoga (SKY), a breathing based practice and modification in people's behaviors towards environment and their connection with nature. The results were encouraging; a statistically significant difference with respect to environmental connectivity, environmental concern and environmental behavior were evident in assessments taken pre and post SKY sessions. 1200 people from 32 countries participated in the study.

Background: The environment needs our attention now more than ever before – the reason – environmental degradation and global warming. These issues have assumed alarming global proportions and require immediate action at not only at a policy level, but from each individual. Along with intervention and policy discussions, current efforts in environment conservation are also focused on behavioral aspects of humans and their responses to environmental issues. Several strategies are being implemented to achieve grassroots solutions using 'collective effect' of individuals, which may have a profound impact on environment conservation. Mental and emotional sensitivity towards the surroundings and connection with the environment is an important part of collective effect. It can enhance an individual's participation towards actions that mitigate environmental degradation. It has been observed that on regular practice of a Yogic breathing technique – Sudarshan Kriya Yoga (SKY), an individual not only improves self-awareness, but also develops human values with-in that reflect in the connection and sensitivity with environment as well.

Respondents: 1200 people from 32 countries participated in the study. Using scientifically accepted sociometric parameter: the Connectedness to Nature Scale, we have documented and analyzed the relationship between the effect of the practice of SKY and connectivity with nature, environmental concern and environmental behavior.

Results: Pre and Post assessments revealed a significant shift (p value 0.00158 x10-172, α = 0.05) in the participants' responses to questions that reflect connectivity with nature, environmental concern and environmental behavior. The responses shifted from the Neither Agree Neither Disagree category to the Strongly Agree category. Pre and Post assessments were conducted in person and through digital links of assessment form.

Conclusion: Investing in bringing about a big change/positive shift in human perception about environment and the global issues related to it, will help immensely in spreading awareness and people's participation. Through this unique study we have shown a positive correlation between holistic practices and an individual's sensitivity towards environment. Holistic practices might be key to behavior modification that enhances environmental conservation apart from adopting good practices. People's participation along with policy decisions to implement good practices locally will go a long way in containing the adverse effects of climate change.

Climate Change Litigation: Criticizing the Past, Perspectives of the Present, and Denouements of the Future

Submitter: Kannan, Ajeeth Srinivas
Student, School of Law, CHRIST (Deemed to be University), India, ajeethsrinivas@gmail.com

Additional Authors:
Ms. Varsha Karunananth, Student, School of Law, CHRIST (Deemed to be University), Co-Author

Abstract:
For the longest time, climate change has grievously been associated to be an ill wind on the sustainability of life on Earth. According to Article I of United Nations Framework Convention on Climate Change, climate change elucidates on how a substantial degradation occurs in the climatic conditions due to human activities, either directly or indirectly, in addition to natural variations in climatic conditions. The effects of climate change have been profound, especially in the discipline of sustainable development, and the efforts to contest the same have led to mediocre results at best. Climate is one of the many key ingredients in achieving the Sustainable Development Goals, under the United Nations Development Program. Therefore, the introduction of the tenets of climate litigation stand vindicated. This paper focuses on the purpose, aims, pros and cons, and possible policies related to the necessary interests of Climate Litigation. The first section of this paper initiates discussion on the meaning and wide interpretation of the term climate litigation, and its implications on the formation of novel policies around the globe. The second section of the paper delves into the imminent need for climate litigation policies, and analyses the plausibility of the introduction of the same in the legal frameworks in various jurisdictions. The third Section of this paper provides an independent and comparative analysis of the various alternatives to Climate Litigation. In doing so, it first critically scrutinizes the burning debate on the two major approaches to tackling climate change, Mitigation and Adaptation. Further, by critically evaluating two of the major climate change policies that exist in the world today, the United Nations Framework Convention on Climate Change's Paris Agreement of the year 2015 and the Kyoto Protocol signed in the year 1997, the paper establishes the loopholes in the current policies battling climate change, and therefore, further perpetrates the need for an adaptation based approach on the grounds of Climate Litigation rather than the current mitigation based approach. The next Section of this paper provides three case analysis, those of Bangladesh, India and the United States of America, thus offering an in-depth examination of the various contours of Climate Litigation, and offers to display the various disparities that exist in the Climate Change related policies in the under developed, developing and developed countries. The paper forges a step ahead in trying to propose a model for the Climate Litigation policies to be brought into existence in different countries. The final section of the paper studies the probable shortcomings and the short-term as well as long-term issues that might arise in Climate Litigation policies, and seeks to preempt efficient solutions for the same, thus concluding with the proposition of a need based global Climate Litigation policy that emulates and internalizes the vastly disparate needs of the world.

Indigenous Knowledge and Climate Change Risks among smallholder farmers: A Case-Study from Southwest Nigeria

Submitter: Kola-Olusanya, Anthony
Professor, Osun State University, Nigeria, anthony.olusanya@gmail.com

Abstract:
There is growing evidence that as a result of global climate change some of the most severe weather events could become frequent in Africa. At the same time, concerns regarding the reality of climate on the indigenous peoples of sub-Saharan Africa and continued impacts have continued to pose a great threat to the African indigenous peoples' livelihoods. Since indigenous peoples values revolve around the concept of territory, it, therefore, suggests that climate change impacts would be higher on them and their communities. This because indigenous peoples' conceptualization of territory is completely different from the 'western' notion of land; territory embodies a collective, spiritual, and sacred space, independent with nature (Stetson 2012). Crucially, these territories are the main source of indigenous existence, producing food, water, and medicine. To illustrate these connections, this main of this study is to examine indigenous knowledge and climate change risks among smallholder farmers (especially from Southwest Nigeria). This research examined smallholder farmers' narratives about climate change. There is no doubt there are a number of limitations to this study. Most importantly, the samples used are selected from the small local community and not representatives of the local population in southwest Nigeria. Another limitation is that the data collected was limited to a short period of about four week-five weeks. The third limitation of this kind of study lies in its subjectivity which is not strange to studies of this nature as Gould (1986) pointed out; subjectivity in the research of this type is unavoidable. These limitations do not, however, remove the merit of the findings in this study. Within the focus of the study, there were two patterns that emerged from this ethnographic work. First is that indigenous people of the local community are not informed about the scientific discussions and policies regarding climate change as evidenced in their narratives given the consistent discussion of weather. The main technique employed for data gathering in this study was an interview. I chose an interview method that was unstructured, informal, in-depth and open-ended (Clarke 2002) to encourage participants to freely express themselves as well as help me in facilitating my conversation with the participants. The findings indicate a general low-level understanding of the climate change phenomenon but this low-level understanding can be improved if the information is made available to those farmers who are more susceptible to impacts of climate change so they can be clearly aware of details of climate change. In relation to coping with the risks of climate change, it is very obvious that the farmers have, however, developed a wide-range of reactive management strategies to manage climate risks.

Climate Change Resilience and Adaptation: A Comparison of Three Stormwater Management Technologies Performances in Southern Ontario

Submitter: Maglalang, Alexus
Masters Student, Ryerson University, Canada, alexus.maglalang@ryerson.ca

Additional Authors:
James Li, Professor, Ryerson University

Darko Joksimovic, Associate Professor, Ryerson University

Abstract:
With increasing annual temperatures, due to climate change, in the province of Ontario, Canada, extreme weather events will be more variable and less predictable in the future. In addition to climate change, urbanization has been proven to have detrimental effects on the hydrologic cycle due to the increase in impermeable surfaces such as paved roads. As a result of these anthropogenic alterations, natural hydrological processes, such as infiltration, are decreased. High volume of polluted stormwater runoff on impermeable surfaces, enter storm sewer infrastructure and natural bodies of water. Storm sewers were designed with the expectation that historical patterns for precipitation events will be maintained including duration, frequency, distribution and intensity. However, under future climate conditions, the current storm sewers may not perform accordingly. Greater resilience to climate change can be achieved by using low impact development (LID) stormwater practices. LIDs use a sustainable approach for stormwater management that mimics the natural pre-development hydrology by improving water quality via increased infiltration and reducing surface runoff by retaining, treating and controlling precipitation volume on site.

The objective of this study is to compare the performance of three stormwater management systems: conventional stormwater infrastructure (curb, gutter and storm sewer), permeable pavers (a widely used LID) and a new LID system called CUPOLEXⓇ. The CUPOLEXⓇ system consists of a series of dome structures, placed within the paved road surface. This results in a reduction of concrete used and functions to reduce runoff volume in areas where vegetated soils are not exposed. CUPOLEXⓇ system's unique design maximizes the use of subsurface space for water storage and provides a stable structure for surface land use above ground. Whereas conventional stormwater infrastructure would simply include paved surfaces covered with concrete. In addition, once water enters the CUPOLEX® system, it disperses through the subbase and infiltrates the native soil, thus improving the site's hydrologic budget and water quality.

The study objective will be achieved through field monitoring, which includes water quality sampling and flow measurements, that will be taken at a re-constructed laneway in the City of Toronto. The laneway includes the three stormwater management systems, each spanning a 40m long section of the 120m long laneway site. The field monitoring data will be used to develop and calibrate the US Environmental Protection Agency Stormwater Management Model (USEPA SWMM) to simulate the water quality and quantity management performance of each of the three systems. During the simulations, the responses to various precipitation events, including predicted climate change scenarios, will be modeled to evaluate the climate change mitigation effectiveness of the three systems. The presentation will highlight findings related to field monitoring and hydrologic modeling of the site, resulting from the collaboration between the academic partner (Ryerson University), municipality (City of Toronto) and a technology provider (CUPOLEXⓇ).

Greenness and Resilience to Social and Built Environmental Issues

Submitter: Mancus, Gibran
Assistant Professor, University of Alabama, United States, gmancus@ua.edu

Additional Authors:
Andrea Cimino, Research Associate, Johns Hopkins University

Md. Zabir Hasan, Research Assistant, Johns Hopkins University

Catherine Carlson, Assistant Professor, University of Alabama

Jacquelyn Campbell, Professor, Johns Hopkins University

Phyllis Sharps, Professor, Johns Hopkins University

Jamila Stockman, Associate Professor, University of California San Diego

Abstract:
Background: Climate change (SDG 13) has the potential to dramatically effect nearly all aspects of life, including all other Sustainable Development Goals. One impact of climate change that deserves increased attention is the increase in global violence (SDG 1, 5, 16). By the end of the century, predicted changes in carbon dioxide emissions is estimated to increase global violence by a median probability of 1.5-5.4% (Climate Impact Lab, 2017). Carbon dioxide emissions raise the risk of abnormally high ambient temperatures, which is associated with violence, aggression, and other heat related stressors (SDG, 3). These stressors are known to affect physiologic hormonal mechanisms in the body. However, the biological mechanisms of the relationship between climate change and violence, and potential mitigating or exacerbating characteristics of built environments (SDG 1, 2), is understudied. The amount of living green vegetation in a given community, or greenness, contributes to sequestration of carbon dioxide and reduces ground level temperatures (SDG 15). In addition to mitigating temperature (along with air and noise pollution), greenness may increase physiologic resilience of individuals and communities exposed to violence and subsequent pathogenic stress response (SDG 11, 12).

Design and Methods: This mixed methods study examined the effect of greenness on stress and resilience among urban African American women with high exposure to interpersonal and community violence. Greenness was geospatially measured by remote sensing of chlorophyll at ground level along with factors of the social and built environment. Women (n=98) in the sample were between the ages of 18-44, living in an urban mid-Atlantic city of the United States, and at high risk of interpersonal and community violence. A multilevel regression model was used to determine the effects of greenness on physiological resilience (operationalized as the ratio of cortisol to dehydroepiandrosterone). Covariates in the regression model included sexual violence, crime, vacant property, traffic proximity, education, income, perceived stress and unprotected sex partners. We also utilized the analysis of interviews with key informants (n=10), observational field notes, historical records and images to understand the resilience potential of key communities within the highest and lowest greenness quintile of the sample.

Results: Multi-level analysis at the community statistical areas (n=55) revealed that one standard deviation (0.039) increase in greenness was associated with a 34% increase ($\beta\beta$= 7.5, p<.05) in physiological-resilience, adjusting for covariates. The analysis of qualitative data revealed that, according to key informants, green spaces have the ability to promote feelings of calmness. However, access to green spaces is restricted when traveling through social and built environments that are perceived as unsafe or unpleasant, potentially discouraging use.

Conclusion: This research highlights the relationship between climate change and violence, and demonstrates the capability of greenness to support the resilient potential of communities vulnerable to violence. The greenness of communities—in addition to being an indicator of climate change—has significant mitigation and adaptation potential for communities affected by violence and related stressors. Increased collaboration between community, government, healthcare, and other stakeholders to promote urban greenness can help support safe, resilient, and sustainable environments.

Future Climate Wealth of Nations' Winners and Losers

Submitter: Puaschunder, Julia
Post-doc in the InterUniversity Consortium of New York, Julia.Puaschunder@newschool.edu

Abstract:
Mapping Climate Justice proposed a 3-dimensional climate justice approach to share the burden of climate change right, just and fair around the globe. First, climate justice within a country should pay tribute to the fact that low- and high-income households carry the same burden proportional to their dispensable income, for instance, enabled through a progressive carbon taxation. Secondly, fair climate change change burden sharing between countries ensures those countries benefiting more from a warmer environment also bear a higher responsibility regarding climate change mitigation and adaptation efforts. Thirdly, climate justice over time is proposed in an innovative bonds climate change burden sharing strategy. All these recommendations are aimed at ensuring to share the burden but also the benefits of climate change within society in an economically efficient, legally equitable and practically feasible way. Future wealth of nations is introduced by the concept of climate flexibility defined as the range of temperature variation of a country. In a changing climate, temperature range flexibility is portrayed as a future asset for international trade of commodities but also for production flexibility leading to comparative advantages of countries. A broad spectrum of climate zones has never been defined as asset and comparative edge in free trade but climate change will require territories being more flexible in terms of changing economic production. The more climate variation a nation state possesses, this paper argues, the more degrees of freedom a country has in terms of GDP production capabilities in a differing climate. These preliminary insights aid in answering what financial patterns can we expect given predictions the earth will become hotter. Already now, the degree of climate flexibility is found to be related to human migration inflow and is predicted to determine future climate wealth of nations in a climate changing world. The previously defined climate change winner and loser index will be blended with the novel insights on climate flexibility, leading to an unprecedented outlook on future climate wealth of nations. Lastly,

future climate change induced market changes are pegged to scarcity of agriculture production and a prospect of commodity price spikes is given.

‘New Multilateralism’: An Obligation for Climate Change

Submitter: Sohi, Harmanjeet Singh
Student, Punjabi University Patiala, India, harmanjeetsohi@gmail.com

Additional Authors:
Sukhpreet Kaur, Student, Department of Economics, Punjabi University Patiala, India, Sukhwarraich94@gmail.com

Amarbir Singh Athwal, Student, Department of Public Administration, Punjabi University Patiala, India, Amarbir.athwal07@gmail.com

Jaspreet Kaur, Student, Department of Public Administration, Punjabi University Patiala, India, jaspreetahluwalia996@gmail.com

Abstract:
Climate change is one of the major challenges confronting by the world as a whole. Present projections of extinction danger due to climatic variations vary widely relying on the particular assumptions and geographic emphasis of every study. As not even a single country can escape from the impact of greenhouse gas emissions and from other like climate change solely, so the action to fight against it should also not be in isolation. Stresses on the climate framework are now causing effects on Earth's surface as this variation in climate is impelling a worldwide reorganization of existence on Earth, the survival of human beings depends on the living parts of natural and managed system and same is for other creatures. The primary response to varied climate is often a coinage in locality to remain within preferable atmospheric conditions. Species move pole ward at the cooler ends of their distribution, while at warmer ends the range limit contract. The rising surface temperatures also brings changes in common biological communities for example- prior blossoming of plants, thus the rate of response is different for distinct species. All of these progressions are inseparably connected to the well-being of different social orders in every country. Now there is necessity of a new and another vision that perceives the interconnected idea of worldwide difficulties affecting sustainable development and need of time is to evolve the aspect of new multilateral solution to climate change . In the new dimensions multilateralism must guarantee that we don't address worldwide difficulties in separation. The monetary emergency, the atmosphere emergency , the sustenance emergency and wretched destitution can't be settled now in piecemeal design. There is need of compelling and enabled instrument of administration equipped for meeting the prevailing worldwide climatic difficulties of the twenty-first century. So for the whole world the consideration is moving to harmony between the conceivable effects of climate change, the economic costs, mechanical advances and societal adjustments that are vital for relief . In this paper, various studies has been amalgamated in order to predict a global mean extinction rate, the need of new multilateralism that could provide the new vision towards the climate change solutions and to find out factors with greatest contribution in changing climate. This paper presents how two global attainments such as stabilization of climate and the evolution of multilateral actions are indispensable for sustainable

progress. In any case, the two objectives can't be considered in disconnection: they should be mutually handled through a coordinated procedure.

Climate Change Challenges in Urban Planning: The Role of Green Environment for Sustainable Workplace Engagement and Business Enterprise Growth

Submitter: Surma, Martyna
PhD Student, University of Reading, United Kingdom, m.j.surma@pgr.reading.ac.uk

Abstract:
The article examines the role of green environment, which on the one hand helps to adapt urban areas to climate change from environmental perspective, and on the other hand may catalyze sustainable workplace engagement of knowledge-intensive workers. This sustainable urban planning approach aims to achieve more resilient city in terms of improved environmental quality, business enterprise growth and better mental and physical health conditions of knowledge workers. All of these issues referred to green economy principles. The paper presents the overview of the research, which is conducted at University of Reading (United Kingdom), based on the case study of the most developed economic region in Great Britain (Central London and Thames Valley, Berkshire). The project aims to improve smart urban planning of the area, making it more entrepreneurial, and at the same time increase productivity of the region to be able to better cope with future challenges.

Good Practices in Sustainable Food Production

Land tenure, soil water conservation technology and household welfare linkages in Nigeria.

Submitter: Anyokwu, Ewere
Doctoral candidate, Center for development research, Nigeria, eanyokwu@ymail.com

Abstract:
Water is one of the most important factor for agricultural production. The challenges of climate change will exacerbate the problems of water availability for agricultural production especially in Nigeria where the predominant farming system is rain-fed. There are therefore, calls to promote soil water conservation (SWC) practices under the concept of 'conservation agriculture'. Yet, lack of land tenure security may hinder the adoption and continuous usage of prescribed SWC technologies. This study assessed the extent to which the land tenure security affects the farming systems and welfare outcomes of rural smallholder farmers, through the adoption of SWC technologies in South Western region of Nigeria. In contrast to the existing literature on conservation technologies adoption, the study differentiated between perceived and legal land tenure security. It also allows for joint use of several SWC technologies since these may not be mutually exclusive. Data was collected from 240 head farmers using structured questionnaires. Using structural equation and double hurdle models, the study showed that land tenure security in terms of legal documentation induced the adoption of more expensive SWC practices such as controlled irrigation while perceived tenure security induced cheaper SWC

technologies. Based on combined adoption, tenant farmers tended to adopt several SWCT but the cheapest ones such as straw mulching on ridged land. The study further found that farmers who adopted more expensive SWCT, cropped their fields at least twice yearly. However, these were dependent on their crop choices. Given the same crop type, adopting SWCT increased cropping intensity, use of other inputs and gross margin of the farmers. On average, farmers with secure land tenure and SWCT adoption, had better welfare outcome in terms of per-capita expenditure. This study thus concluded that agricultural innovation adoption driven by land tenure security has the potential to improve the livelihood of smallholder farmers especially in developing countries.

Industrial Agriculture and Rural Poverty

Submitter: Awad, Nagwa
Master's in Development Practices candidate, Harvard University, United States,
nsa1963@gmail.com

Abstract:
There is no doubt that there has been a rapid increase of industrial farming since 1960. It is evident that industrial agriculture has a direct impact on rural poverty. Looking at the maps of America side by side (Figure 7) shows a direct correlation between poverty, farm size and farm type (crop for feed or crop for humans). The economic impact industrial farming has on small rural farms has been devastating. But with the US imposing more stringent auto fuel efficiency, this can lead to more use for electric cars on the farm at a cost of $0.80 a gallon (Brown, 2012). Such measures can lead to economic benefits such as more food for humans being harvested and lower food prices (Brown, 2012). Other examples of government stepping in, is that oversight agencies have been established to manage water use in states such as California (Hanlon, Madel, Olson-Sawyer, Rabin, & Rose, 2013). These policies would ultimately lead to small farmers experiencing better economic prosperity. There are positive aspects of industrial farming and the use of GMO. With new technologies, industrial farming can mass produce food fortified with iron and zinc (Peralta & Hunt, 2003). Such is the case with golden rice which is fortified with beta-carotene (Bourne, Jr, 2015). These measures can reduce health issues with malnutrition and reduce hunger. Other positive steps would be to address issues with food waste. Currently, 150-300 billion pounds of food is wasted per year costing $165 billion annually (Hanlon, Madel, Olson-Sawyer, Rabin, & Rose, 2013). Food waste makes up 40% of total food output at the processing and consumer level in industrial countries (United Nations Sustainable Development Goals, 2017). But if we wasted 5% less we can feed 4 million more Americans per year, and wasting 15% less food would feed 25 million more people annually (Hanlon, Madel, Olson-Sawyer, Rabin, & Rose, 2013). Other options would be to encourage women farmers which would reduce hunger by half (United Nations Sustainable Development Goals, 2017). When food insecurity diminishes, global economic productivity increases by 2-3% annually (CLIMATE CHANGE GLOBAL FOOD SECURITY amd the AND U.S. FOOD SYSTEM, 2015).

Ending industrial agriculture requires studies beyond the scope of this paper, but we looked at ways to work with the existing system. We discussed ways to improve small farmers' economic position by managing water rights, reducing poverty and hunger. We presented ways to use

industrial agriculture to improve the health impact. We identified measures the US is requiring to reduce emission output. All these policies, while seeming minor, would have a large impact on the farming industry, food, water resources and energy output.

Social farming for sustainable development

Submitter: Bagnara, Gian Luca
Project manager, Cà Colonna srl, Italy, g.bagnara@agraria.it

Additional Authors:
Maria Teresa Mengarelli

Edoardo Bagnara

Carlo Bagnara

Abstract:
To create a sustainable value in agri-food value-chains it is necessary to introduce new models of governance aimed at increasing capital also by granting rights on shares based on the quantity of resources delivered. Value-chain innovations, focused more on process development than on product development, are designed to develop sustainable business models by addressing context-specific issues that meet both economic and social objectives.

Responsible innovation is increasingly being viewed by firms as a corporate and strategic necessity to ensure long-term sustainability. Thus, social agriculture is characterized by a multifunctional role, in the field of personal services, combining the traditional productive function with the ability to generate benefits for vulnerable people, giving rise to innovative services that can effectively respond to the crisis of traditional social assistance systems and the growing demand for personalization and qualification of social services.

Cà Colonna is an innovative agricultural start-up with a social vocation with the aim of organizing and innovating an integrated and sustainable agri-food supply chain for both the environment and the social role. In the first 3 years of activity, investments have already been made to fine-tune agricultural production in an innovative way: recovery and reintroduction of biodiversity such as alimurgical herbs and ancient grains; land settlement with the introduction of precision farming and new techniques for the irrigation system. Food products have been made from agricultural raw materials such as the ancient recipes of Artusi's book (the first book of Italian recipes: connected culture and crops. The whole production is carried out in the social agricultural supply chain with the collaboration of social cooperatives for the inclusion of people with fragility. The first disciplinary of agricultural-social production was adopted.

The same value-chain has been extended to African countries: achievement and management of three agroindustrial platforms to be implanted at Lukula in Central Congo Province (Democratic Republic of Congo). The African project is funded by the World Bank. The goal is to improve agro-industrial production in the Democratic Republic of the Congo. The country, while expressing great agricultural potential, is however decidedly lacking in the organization of the

integrated supply chain between agriculture and the final market, that is the urban area. On one hand, there is a traditional agricultural territory, and on the other an urban system in strong growth which is increasingly exposed to imports to achieve to food.

Partnering towards sustainable food systems: Sustainable Animal Protein

Submitter: Burian, Gabriela
Director, World Business Council for Sustainable Development, United States, gabriela.burian@bayer.com

Additional Authors:
Steven Brock, Council on Strategic Risks

Pipa Elias, The Nature Conservancy

Greg Gershuny, The Aspen Institute

Dr. Jerry Hatfield, USDA-ARS

Dr. Brett Kaysen, National Pork Board

Dr. Marty Matlock, Postdoctoral University of Arkansas

Dr. Dan Northrup, Associate, Booz Allen Hamilton

Dr. LaKisha Odom, Foundation for Food and Agriculture Research

Dr. John Reilly, Postdoctoral Fellow Massachusetts Institute of Technology

Dr. Chuck Rice, Postdoctoral Fellow Kansas State University

Dr. Mickey Rubin, Egg Nutrition Center

Dr. Alain Vidal, World Business Council for Sustainable Development

Dr. Ying Wang, Dairy Management, Inc.

Eric Witiw, MPH candidate UNC

Dr. Nick Goeser, USFRA VP

Abstract:
By 2050, the global population is expected to reach 9.8 billion , requiring a 70 percent increase in food production . At the same time, climate change poses serious risks for agriculture and food systems . Despite these challenges, we see potential to set a path for achieving a sustainable future food system and to build momentum for action across all sectors of society.

Agriculture has unique capability to spur innovation and provide climate-smart solutions and vital ecosystem services. Agriculture as a solution for ecosystem services is one of five pathways identified by the U.S. Farmers and Ranchers Alliance to create the sustainable food systems of the future.

Other pathways include collaboration with farmers across the food system to enhance shared solutions and further research on sustainable production; nourishing the global population by meeting the nutritional needs of a diverse and growing population recognizing food as a natural resource and working to reduce food waste and loss across.

Finally, there is the potential for mitigation and adaptation to natural resource constraints while improving production efficiencies for yield and quality including nutrient content, food safety, environmental outcomes, resistance to pestilence and climate shocks.

These pathways are crucial to:

• introduce agricultural contributions to ecosystem service solutions including soil carbon sequestration, water quality, and biodiversity

• provide context on how creativity and advanced knowledge of agricultural business dynamics can drive greater innovation, enterprise risk mitigation and supply chain resiliency in U.S. food production systems.

• improve understanding of investment opportunities through realized agricultural ecosystem service co-benefits and identify research and programming gaps

As the data underscores, we are underestimating agriculture's ability to store carbon and deliver other valuable ecosystem services. Investing in these services delivers environmental, social and economic benefits not only to food producers but also to a wide range of business sectors, to society and to our overall planetary health.

It is a critical to sustainably increase agricultural productivity and livelihoods; build the adaptive capacity and resilience of agriculture, and deliver ecosystem services, carbon sequestration, water resource management, and reduced or avoided greenhouse gas (GHG) emissions from agriculture.

Farmers play a key role towards achieving the UN Sustainable Development Goals (SDGs), to end hunger, achieve food security, improved nutrition and promote sustainable agriculture The agriculture sector is also crucial to meeting the ambitions set out in the Paris Agreement of the United Nations Framework Convention on Climate Change, to limit the increase in global average temperatures to "well below" 2 degrees C, no more than 1.5 degrees. Either scenario requires major changes to build resilience and enhance food security.

Housing a growing population while losing land to a changing climate will accelerate this rate of loss and society will have to produce more food, fiber and energy on the agricultural lands that

remain.

Even as farmers work to reduce GHG emissions, the effects of climate change are already being felt, creating unpredictability, disruption, and destruction. Increases in temperature, extreme heat conditions, heavy rainfall, droughts and extreme weather events contribute to excessive runoff, flooding, and soil erosion, loss of soil carbon and reduce the availability and quality of water.

According to the UN Food and Agriculture Organization, food prices have increased five times over the last 30 years . Prices paid to farmers have also changed over the last 30 years – but much often less than half. Further, the prices farmers are paying for inputs to produce food have increased substantially over the same period of time . The discrepancy in price increases for food and for commodities, coupled with increased in inputs required to grow food means farmers are receiving a smaller share of every dollar spent on food but paying more to produce it.

Despite challenges, data and science-based solutions demonstrate that we have untapped potential to bank carbon in soils, help improve water quality, and support biodiversity. By investing in the resiliency to advance sustainable agriculture we safeguard food security while combatting climate change.

Advancements in climate smart agriculture include integrated pest management, crop protection, harvesting techniques, animal care, diet and nutrition, advancement in technology and internet connectivity. These practices focus on input use efficiency , improving resiliency for climate shocks and predictive capabilities, and strengthening outcomes to food production and ecosystems services.

Promoting Agroecology as Good Practices in Sustainable Food Production

Submitter: Kaganga, John
Director, Kikandwa Environmental Association, Uganda, johnkaganga@gmail.com

Abstract:
The world facing challenges like poverty, hunger and malnutrition, the global society has unfair distribution of wealth and power, we lose biodiversity of life forever, the natural resources like soil and water are deteriorating and the planet's climate is changing. Based on evidence of successful practitioners in the field and in the trade around the world, based on the calls of world leaders in agriculture including from FAO and African Union, we believe that agroecology/ecological organic production systems are the true future Africa's food systems. These systems are very knowledge intensive and take advantage of both traditional knowledge and modern science through collaboration between farmers and researchers based on mutual respect, agroecology underscore the call for private and public decision makers to support food and agricultural systems and practices that are healthy, equitable, efficient, resilient, and culturally diverse, using renewable energy resources, emphasize and strongly support women's role in the production of nutritious food, recognizing the importance of engaging the women, youth and communities as active partners in sustainable food systems, endorse the right of people, communities and countries to define their own food systems, which are ecologically, socially, economically and culturally appropriate to their unique contexts, and empower

producers and consumers to make better decisions and choices, this paper will focus and expound on reducing synthetic fertilizers and pesticides and the impact of synthetic inputs, alternative environmentally based technologies and methodologies to reduce synthetic pesticide use and contamination, scaling up Agroecology, partnerships, networking and financing innovations, best practices towards food security, nutrition, consumption and health and the strengthening ecological organic trade, markets and economy.

Assessment of genetic variability and gene action in maize (Zea mays L.) testcross hybrids under nitrogen deficit tropical soils

Submitter: Lawal, Oluwafemi
Lecturer II, University of Ilorin, Nigeria, oluwatosin.lawal@kwasu.edu.ng

Additional Authors:
Gbadebo Olaoye, Professor, University of Ilorin.

Abstract:
Nitrogen is the most important limiting nutrient to maize plant. Tropical soils are generally low in soil nutrients and nitrogen in particular. More so, nitrogenous fertilizers are out of the reach of resource-poor maize farmers that dominant maize cultivation in sub Saharan Africa (SSA) and Nigeria. Breeding for low soil nitrogen tolerant maize provides a sustainable measure of coping with the low-N deficit nature of tropical soil without jeopardizing grain yield and attainment food security in SSA. Paramount in breeding for low-N tolerant maize are the need to assess the genetic variability and gene action in germplasm. Hence, 172 testcross hybrids were evaluated under low (30kgN/ha) condition in Mokwa (9°18'N, 5°04'E, Southern Guinea Savannah) and Zaria (12°00'N, 8°22'E, Northern Guinea Savannah), Nigeria. The field was laid in a 16 x 11 alpha lattice with two replicates. Data collected were analysed using SAS 9.4 version. The result revealed that combined ANOVA across the two stress environments showed highly significant ($P<0.01$) genotypic and environmental differences for all the measured traits except anthesis silking interval (ASI) among the genotypes. There was significant ($P<0.05$ or $P<0.01$) mean squares for grain yield (GY), plant height (PH), plant aspect (PA), husk cover (HC) and ear aspect (EA). Line x tester analysis revealed that GCA line and GCA line x environment interaction mean squares were significant ($P<0.05$ or $P<0.01$) for all the traits except ASI and EA and stem lodging. SCA was significant ($P<0.05$ or $P<0.01$) only for ears per plant, HC, PH and stay-green. Testcross hybrids revealed high genotypic variation and pool of favourable alleles pertinent in breeding for tolerance to low soil nitrogen. Only additive gene action control the inheritance of grain yield and most other traits, hence the population can be improved through selection procedure.

Glacier Frafting: A community based adaptation to climate induced food insecurity in the Himalayan and the Karakoram ranges of Gilgit-Baltistan, Pakistan

Submitter: Khayyam, Umer
Assistant Professor & Head of Department, National University of Sciences & Technology (NUST), Pakistan, dr.umer@s3h.nust.edu.pk

Additional Authors:
Tehzeeb Bano, NUST

Abstract:
Climate change has a profound and prominent impact on agricultural growth as of water scarcity around the globe. Freshwater, a finite natural resource, is depleting and to blame is non-sustainable methods of water consumption, thus leading the world societies towards a dead end. The mountainous ranges, which are sources of water provision through glacier melting thereby ensuring food security are also under threat. It is increasing atmospheric temperature that is increasing the vulnerabilities of the glaciers which is resulting in un-sustained water provision, prominently causing food insecurity in the remote area. Similarly, the phenomenon is affecting agricultural production in Gilgit–Baltistan, where farming is limited and is the main source of livelihood. The indigenous people of Gilgit–Baltistan, in the Himalayan ranges, using glacier grafting/growing to adapt the climate-induced food insecurity by using water from the man-made glaciers for irrigation purposes. This study has deployed both qualitative and quantitative research methodology for data collection on the field through questionnaires, focus groups discussion and observation to explore the process of community-oriented glacier grafting technique. It is further investigated how technology is helping to secure agricultural livelihood through glacier grafting. It is found that 77% of the respondents confirmed that grafted glacier secured sustained water for irrigation, followed by 81% of the respondent confirming securing of agricultural livelihood. The t-test result also confirmed the positive correlation of the three variable; water availability for agriculture, efficient water provision (crop/hour) and domestic water provision (at $p < 0.05$). The results further show that glacier grafting is highly significant in improving all the variables as the significant value is .000 which shows a strong correlation. It is also found that grafted glaciers are nourishing many of the leading waterways in Northern areas of Pakistan by self-help, thus declaring it a successful local level adaptation technique for water provision, agricultural production and securing of the mean of living.

Keywords: Glacier Grafting, Agriculture, Food security, Water, Gilgit Baltistan, Pakistan

Food Security And Agriculture, The Socioeconomic Footprint In Latin America: Guatemala, Colombia and Brazil

Submitter: Martinez, Maria
Food Security, Ag and Sustainability Fellow, Asset Procurement Group, United States, martinezm@cua.edu

Additional Authors:
Consultant, Mobilize Resource/Food System for the International Potato Center (CIP)

Abstract:
Amid the 17 Sustainable Development Goals (SDGs), we set to link SDG1 (Zero Hunger) and SDG2 (No Poverty) to unilaterally construct a sustainable food system and reinforce the interconnections of agriculture and the socioeconomic footprint. In turn, by enhancing knowledge and capacity building, particularly in the southern hemispheric nations such as

Guatemala, Colombia, and Brazil, we can increase both the economic outputs of a region while strengthening food security. While interfacing with the various goals, it is obligatory to work in tandem to satisfy the proximate and related goals, such as SDG 3 (Good Health and Well-Being), SDG6 (Clean Water and Sanitation), SDG11 (Sustainable Cities and Communities), and SDG13 (Climate Change). As the surmounting population increases yearly, it guarantees a growing global crisis of food, scarcity in natural resources, and sustained climate change and damage. Consequently, the austere relationship between global population and sustainable food surplus is both complex and compound. With the recent trend of the international political economy growing more isolated, multilateralism between private and public partners and government stakeholders must remain robust yet plastic to the flux and fluidic change of the market economy by encouraging capacity building and knowledge sharing of novel practices and responsible reliance of existing food systems. Currently, the Latin American region is facing tremendous contractions in both food and agricultural systems. Guatemala, Colombia, and Brazil, have a unique juxtaposition that includes extreme poverty, lack of governance and financial resources including investments, malnutrition, and regional transnational migration challenges. Here, we propose a vast package of strategies that could reinforce and provide better nutrition such as micronutrient supplementation to prevent pediatric wasting or stunting. With more than an 800 million hungry due to the inaccess of affordable, quality foods, it is imperative to identify and create additional sustainable food systems to reduce food loss and waste but to also insulate from economic and environmental shocks. The lens for the future beholds an integration of novel agro-ecosystems coupled with social well-being as the core of a sustainable global food system.

Key Words: Malnourishment, Poverty, Global Food Security, Sustainable Agriculture

Youth Participation in Sustainable Production and Marketing of Maize and its Influence on Household Poverty in Afijio Local Government Area of Oyo State, Nigeria.

Submitter: Odesola, Oluwafemi
Graduate Student and Researcher, Centre for Sustainable Development, University of Ibadan, Oyo State Nigeria., Nigeria, oluwafemiodesola@gmail.com

Additional Authors:
Oluwafemi Odesola, Graduate Student and Researcher, Centre for Sustainable Development, University of Ibadan, Nigeria

Omonona Bolarinwa, Professor, Department of Agricultural Economics, University of Ibadan

Abstract:
Youths are very important resources for every nation especially for sustaining agricultural productivity. They are stakeholders in the development process especially in view of their great resilience, resourcefulness and perseverance. However, youth unemployment is on the rise in Nigeria with 61.6% of youths unemployed. The study examined youth's participation in production and marketing of maize and its influence on household poverty in Afijio Local Government Area of Oyo State. Data were collected through structured questionnaires using a two -stage sampling procedure. Descriptive statistics, Foster, Greer and Thorbecke (FGT)

Poverty index and Logit regression model, were employed.

With a poverty line of ₦21515.61 per annum, the incidence of poverty (P0) of the respondents in the study area was 0.683 indicating that 68.3% of the respondents in the area were below the poverty line and were therefore relatively consumption poor. The poverty depth (P1) was 0.274 for the respondents in the study area indicating that poverty is not only persuasive but also deeper. The poverty severity index (P2) was 0.266 for the households indicating worsened income distribution among the poor. In addition, age, household size, contact with extension agents positively influenced the poverty status of the household while education, access to credit, access to market negatively influenced youth participation and marketing of maize.

Result further revealed that a unit increase in age, education, household membership, farm size, access to credit, contact with extension services, access to market and youth participation will reduce the likelihood of being poor. This is because as age rises above productive level, it leads to a reduction in the volume of farming operations with subsequent reduction in farming income and welfare. Farming households with larger farm holdings are expected to generate more income, which would enhance their consumption level and subsequently improve their household poverty status. Youth participation in production and marketing of maize was found to be statistically and significantly influencing household poverty. Also, households that had access to markets had lower probabilities of being poor than those that did not have, while those without access to market infrastructure had higher probabilities of being poor. Low level of production and entrepreneurship with decreasing involvement of youth in agriculture brought about low level of agricultural skills and limited access to financial resources.

Keywords: Youth, Sustainable Agriculture, Poverty, Participation, Production, Maize, Marketing, FGT, Logit regression

Climate Change and Productivity in Sub Saharan Africa

Submitter: Oduyoye-Ejumedia, Adebunmi
Adebunmi Student, Centre for Petroleum, Energy Economics and Law (CPEEL), University of Ibadan, Nigeria, Nigeria, babyjasb@yahoo.com

Additional Authors:
Patrick Efe Ejumedia, University of Lagos, Akoka, Nigeria

Abstract:
The issue of change in climate is a global experience with adverse effects on human lives, animals and the environment of countries. In addition, climate change can also be associated with low productivity in the various sectors (agricultural, manufacturing and service) in an economy. Existing studies on the phenomenon for Sub Saharan Africa (SSA) are scanty and considers agricultural productivity alone. On the other hand, to the best of our knowledge, there is yet to be any study on manufacturing productivity and a comparative analysis of both sectors in SSA. Hence, this study shall contribute to the existing literature and particularly tries to determine the impact of climate change on agricultural and manufacturing productivity in SSA. This study is important to SSA because most countries in the region rely on agriculture as

a source of income and employment creation. Besides, climate change may also have an adverse effect on manufacturing productivity as countries transform from agriculture to a manufacturing economy in the long-run. Climate change may result in low productivity because it could affect the health of workers, work hours and workplace in both the agricultural sector and the manufacturing sectors. This study intends to employ the Fully Modified Ordinary Least Square Method, which is capable of estimating the long-run effect. The study intends to use annual data from 1986 to 2016. On apriori, while climate change is expected to be inversely related to both sectors, in the long-run, the impact is expected to be significant in the manufacturing sector.

Keywords: Climate Change, Agricultural Productivity, Manufacturing Productivity and Fully Modified Ordinary Least Square Method

Effects of agribusiness support program on post harvest losses and food secularity among smallholder farmers in Sub-saharan Africa: Evidence from maize and beans value chains in Nyagatare District, Rwanda

Submitter: Omotajo, Olugbade
Graduate student, Centre for Sustainable Development, University of Ibadan, Nigeria, omonisomething@gmail.com

Additional Authors:
Prof. Olanrewaju Olaniyan, Centre for Sustainable Development, University of Ibadan

Mr Jean-Claude Mudahunga, Monitoring and Evaluation Officer, Single Project Implementation Unit, Ministry of Agriculture and Animal Resources, Rwanda.

Abstract:
Agriculture is key to the economy of most SSA States where it accounts for 34% of GDP, provides employment for 64% of the populace and contributes 75% to domestic trade. A major characteristic of the African agriculture is its low yield arising from a number of factors. This poor yield is further compounded by widespread losses occasioned by inadequate post-harvest handling practices. Estimated at 30% of annual crop production, Post-Harvest Losses (PHL) in SSA underlie rural poverty and frequently trigger a deadly cascade of food insecurity, widespread hunger, malnutrition, ecosystem disservices and many others. Addressing this problem has involved diversities in agricultural transformation paths among countries. Programs targeting gender, mobilization of private sector capacities, financial inclusion, innovation and technology improvements are, however, common to most States in the sub-continent. In Rwanda, the transformation pathway is built on an interplay of productionist and protectionist policy measures to raise output levels, reduce PHL and guarantee food security. As part of efforts to help the country in this direction and create a trajectory of definite impact, IFAD implemented a five-year complementary intervention project focusing on improved post-harvest management practices towards increasing labour efficiency, promoting food security and raising farmers' incomes.

This study is a review of project performance in Nyagatare District of the country aimed at

determining the post-project magnitude of PHL in the project area, impact of agribusiness investments on PHL and food security as well as the socio-economic factors underlying gender-based productivity. It surveyed a total of 272 smallholder farmers selected by stratified random sampling technique using semi-structured questionnaires. FGD, IDI and KII were also conducted for more information on cultural practices and social inclusion while complementary secondary data was obtained from a wide range of institutional sources. Total Factor Productivity Theory was employed to estimate the district agricultural productivity along gender lines. Aggregate data was analyzed using SPSS while underlying hypotheses were validated with the use of appropriate inferential statistics.

Amongst others, findings revealed: high level (56.1%) of PHL due mostly to crop failure from prolonged drought but appreciable reduction in product loss attributable to deficiency of post-harvest infrastructures (PHI), low labor efficiency with a district productivity of 0.1%, increased commercial orientation of agricultural practice with enhanced food security profile. Based on the foregoing, the following policy measures were recommended: greater focus on climate smart agriculture, interest rate subsidy, crop insurance scheme, and many others.

Key words: agribusiness, post-harvest losses, food security.

Soilless farming for fostering sustainable food production: Exploring economic opportunities for youth in Nigeria.

Submitter: Onwunali, Chinonso
Development Practitioner, University of Ibadan, Nigeria, chinonso_onwunali@yahoo.com

Additional Authors:
Samson Ogbole, Co-founder, PS Nutrac

Abstract:
Soilless farming is slowly gaining grounds among young persons in the agricultural sector to meet the rapid demand for food in Nigeria. With an increasing population in the country, there is the need to address the challenges in food production by seeking alternative sustainable medium.

Despite the vast amount of arable land in Nigeria, agricultural production remains below potential due to several factors some of which are the problems of soil degradation, declining soil fertility, soil erosion, flooding, desert encroachment and drought. Hence, this has become a major challenge facing land use for food production and has worsened by the effect of climate change.

Soilless farming possesses a potential method of growing plants without the use of soil; in which the nutrients required for growth are supplied through other means. Soilless farming is a sustainable way for youth especially in populated urban areas with interest in the sector to explore because it has proved to be less rigorous, more efficient, high yielding and supports non-seasonal food production- through the inclusion of technology and artificial intelligence. This will no doubt create more interest among youth in farming as well as be helpful in the actualization of SDGs Goal 1, 2, 8, 9 and 12.

This research paper will use mostly secondary data gotten from already existing studies and research work done on soilless farming. Also primary data will be collected through KIIs using a structured key informant interview guide from practitioners of soilless farming in Nigeria.

It will provide an understanding about the concept of soilless farming, how soilless farming can promote sustainable food production, what economic opportunities are available which youths can tap into so as to create income generating activities, the challenges and way forward for soilless farming in Nigeria.

Keywords: Soilless Farming, Sustainable Food Production, Economic Opportunities, Youth

Climate Change and its Impacts on Sustainable Food Production in Sub-Saharan Africa Region: Issues, Challenges and Options

Submitter: Owolabi, Abimbola
MDP Alumnus, University of Ibadan, NIGERIA, Nigeria, owolabisnr@gmail.com

Abstract:
Human civilization has been depending on agriculture right from the inception and has always been one of the fundamental methods by which humans have been surviving in the world. However, weather and the related temperature, light and water determine to a large extent the human society's ability to feed themselves and the animals they care for. When the weather changes due to variations in climate, there are very serious impacts especially disproportionate impacts on agricultural production which can result in reduction of crop production and these force the farmers to take up new methods of agriculture so that they can cope up with the new situation. Food security of is thus directly affected by the existing climate.

Climate change and its effects therefore directly affect agricultural processes and agricultural production. It is thus important to inform the people of the world about the changes being caused to agriculture due to climate change and the changes in climate due to agricultural processes.

That the climate change could potentially interrupt progress toward a world without hunger and robust and coherent global pattern is discernible of its impacts on crop productivity that could have consequences for food availability. Therefore, the stability of whole food systems may be at risk under climate change because of short-term variability in supply. However, the potential impact is less clear at regional scales, but it is likely that climate variability and change will exacerbate food insecurity in areas currently vulnerable to hunger and under nutrition especially the Sub-Saharan Africa region.

Likewise, it can be anticipated that food access and utilization will be affected indirectly via collateral effects on household and individual incomes, and food utilization could be impaired by loss of access to drinking water and damage to health.

The question now is: How does the Climate Change affect a Sustainable Food Production in Sub-Saharan Africa Region and what are the necessary actions to be taken to contain the

situation?

This paper examines the concept of climate change and its characteristics and the subject of food production as it affects the whole world but the Sub-Saharan African region in particular. It goes further to highlight the challenges of climate change impacts on food production and the issue of food security in the world and Sub-Saharan African Region.

Also, the paper discusses the concern of the United Nations Organization which led to the establishment of The Intergovernmental Panel on Climate Change (IPCC) which is an intergovernmental body of the United Nations dedicated to studying and providing the world with an objective, scientific view of climate change, its natural, political and economic impacts and risks and possible response options. This has led to its report which is tagged "Climate Change 1995 – The Science of Climate Change Contribution of the Working Group"

In conjunction with this, the paper makes reference to the relevant SDG goals which include Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture. When read with SDG13, 'take urgent action to combat climate change and its impacts', and Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss, we have a policy frame of goals, targets and evidence-based progress monitoring towards climate action at all scales.

This evidence supports the need for considerable investment in adaptation and mitigation actions toward a "climate-smart food system" that is more resilient to climate change influences on food security.

In 2015, the UN launched the 17 Sustainable Development Goals (SDGs). Adopted by 193 member states, the goals represent an important international step in setting humanity on a trajectory towards sustainable development.

Keywords: Climate Change, Sustainable Food Production, The Intergovernmental Panel on Climate Change (IPCC), Sustainable Development Goals, Sub-Saharan Africa Region

Sustainable Community Development Through Hyperlocal Food-Based Economies

Submitter: Pressman, Samuel
Graduate Student: MS Sustainability Environmental Systems, Pratt Institute, United States, spressma@pratt.edu

Additional Authors:
Larissa Lai, Graduate Student - City & Regional Planning, Pratt Institute

Raymond Figueroa, Visiting Professor and Mentor - President of NYC Community Garden Coalition - Nos Quedamos Org., Bronx NY

Abstract:

Urban agricultural has great potential to create resilience in underserved communities, resilience that mobilizes grassroot efforts. We examine this through the lens of sustainable community development: how equity can be achieved environmentally, socially, and economically at the neighborhood scale. In low-income communities, community gardens have served as both canvases for human expression that support cultural heritages and platforms that provide opportunity avenues for economic relief, for a larger proportion of residents who struggle to meet their basic needs. Historically acting as a key asset for peace and justice, it is there where neighborhoods residents have gathered and utilized its grounds as a center in which to collectively cultivate their own cultural resistance to being marginalized. Using case studies of existing urban agricultural projects in New York City, which have been providing access to alternative economic and regenerative means within individual communities, we further explore the conception of hyperlocal food-based economies as solidarity economies that can generate revenue for community members. These can be automated and achieved at scale through distributed food networks through coordinating community producers, small businesses, and local institutions with the use of digital platforms, and can be further facilitated by deploying local currencies. The development of such hyperlocal food-based-economies can promote equitable circularity of capital within vulnerable neighborhoods—where capital leakage is extensive and often unmonitored—as well as alternative reformations to the inequities of the conventional market economy. The efforts behind developing such a socio-economic system that has its roots in food security and cultural resiliency can be directly tied to the Sustainable Development Goals. The establishment of equitable food-based circular economies around community gardens, specifically in inner-city low-income communities, strongly address and reinforce the sustainable progression towards achieving no poverty, zero hunger, good health and well-being, decent work and economic growth, reduced inequality, sustainable cities and communities, response to production and consumption, climate action, life on land, peace and justice strong institutions, and partnerships to achieve the goal.

Achievements and Limitations of Commodity-Specific Approaches to Sustainability

Submitter: Sagan, Margaret
Post-Graduate Researcher, Columbia Center on Sustainable Investment, mrs2124@columbia.edu

Abstract:
Globally traded agricultural commodities often sell at low prices that are not sustainable for producers. This lowers the producer's profit margins, and makes it difficult for them to increase wages. Recent work on living wages by Richard and Martha Anker sets up clear guidelines about how to calculate a living wage, which is often higher than the national minimum wage. But knowing these guidelines does not guarantee that producers will have the means or the political will to increase wages. Given that only a fraction of coffee and tea will sell at specialty premiums, what strategies can buyers, national producer associations, and unions employ to direct more money to agricultural workers? What are the barriers that are commonly encountered? What methods actually drive more money down the value chain, and how scalable are these approaches? How can producer associations support smallholder inclusion and upgrade their agricultural production of goods intended for export? What strategies can improve strengthen regional participation in global value chains? This paper will explore the implementation of living wages and living incomes for agricultural workers and smallholders

within tea and coffee value chains. This paper will build on the author's original field research with stakeholders participating in Malawi Tea 2020, undertaken with the support of the Earth Institute's AC4 fellowship in 2018.

Sustainable food production: a contribution of the field of architecture

Submitter: Saraiva de Melo Pinheiro, Mariana
Student of Architecture and Urbanism., University of Fortaleza, Brazil, mariana.saraivamp@gmail.com

Additional Authors:
André Araújo Almeirda, Professor, University of Fortaleza

Abstract:
Historically, the role of architects was to create spaces (without the current distinction of urban and rural) where human activities would take place. Over time, with the specialization of functions and the change of social structure, there was overvaluation of urban life and devaluation of the rural, resulting, in many countries, in lack of investment to the countryside. As a consequence of this culture, architects also started to focus on cities, overlooking human life and production in rural areas.

Facing these facts, the professional field of architecture must change two critical understandings to effectively contribute to development — the first understanding deals with rediscovering the scope of its practice and bringing back a holistic perspective. The second relies on turning over the image of the linkage between rural and urban; it means to understand that a) the city rises from the rural production and not the inverse, and that b) it is not a relation of dependence but complementation.

In Ceará, a state in northeastern Brazil, familiar farmers encounter various obstacles to continue in the countryside, resulting in migrations to the capital: rural exodus caused 55% of Fortaleza's growth from 1900 to 1940 and 90% from 1960 to 1970. The lack of infrastructure is a barrier for development and is one of the major challenges familiar cashew farmers in the semi-arid Ceará face. As they are not able to correctly transport, clean and stock the cashew apple, cashew nut (in the shell) is the only product possible to sell, representing a waste of food and income. Along with that, the obstacles to reaching the consumption markets result in the exploitation from the middlemen: farmers get approximately $0.69/kg of cashew nut, while in Fortaleza it is sold for approximately $17,35/kg. Nonetheless, during the off-season, many farmers do not have any source of income, neither during the long periods of drought.

In this context, this work aims to identify and design a workspace for food production in a familiar cashew agriculture community in the semi-arid Ceará, promoting a pathway of sustainable development and well-being in the countryside. Started by academic motivations and improved by participatory process from both the community and the local government, the research counts with five main methodological steps: 1) literature survey about familiar agriculture, sustainable food production and politics for rural development;2) selection of the agriculture community;3) data collection;4) diagnostic;5) design as an architectural practice.

The research came to satisfactory results for what was proposed, tackling directly SDGs 1, 2, 8, 10, 11, 12, 15 and 17. The architectural blueprint of the cooperative production center contributes to the economic self-sufficiency, representing a possibility of leveraging the socio-economic condition, reducing extreme poverty and hunger. Also, the proposed framework considers a) ecological strategies to manage resources and waste; and b) tools to stimulate agroecology, creating a pathway to combat land degradation and desertification. Nonetheless, it encourages cooperativism within the community and with other villages/cities, among all scales of the production chain.

The role of public programs in the livelihood strategies of households in rural Brazil

Submitter: Specht, Gabriel
PhD Candidate, Giessen University, Germany, gabriel.specht@agrar.uni-giessen.de

Additional Authors:
Stephanie E. Domptail, Research Assistant, Giessen University

Ernst-August Nuppenau, Professor, Giessen University

Abstract:
Agriculture is one of the core activities characterizing livelihood strategies of smallholder farmers in the developing world. Agricultural practices and production are partly facilitated and mediated by public policies implemented in rural areas, in general by loosening investment constraints and by granting market access to agricultural producers. Program outcomes on rural households may vary, as public policies vary in scope and objectives. As an example, the outcomes produced by rural credit and cash transfer programs, concomitantly implemented in Brazilian rural areas, are not very clear. On the one hand, PRONAF, a credit program giving annual crop and investment loans for smallholder farmers, has participation biased towards asset-rich wealthier households involved in the production of cash crops, especially soybeans and maize. On the other hand, Bolsa Familia, a conditional cash transfer program for poor and extreme poor households, especially supports asset-poor rural households involved in subsistence agriculture. Yet, the question remains to what extent the concomitant implementation of public programs in a rural village shape overall agricultural production and agricultural practices, and how it influences household's choice of livelihood strategy. We propose to assess household livelihood strategies based on their agricultural production activities and to explore their determinants with a focus on the role of public programs. As such, we aim at unveiling the role of concomitant public program implementation in shaping agricultural production in rural areas, thus influencing household economic benefits from program participation. An activity-based two-step cluster analysis will be conducted to identify different livelihood clusters, and regression models are performed to determine the major factor affecting the choice of livelihood strategies. The analysis uses survey data from 2017 of 101 households of a rural village in Southern Brazil. The results are expected to show the importance of rural credit and conditional cash transfer for smallholder farmers in influencing their livelihood strategy, and the factors affecting their livelihood choice. The findings of this study shed light on the role public programs play in determining agricultural production and their role in households' livelihood

strategy, thus informing pathways out of poverty for smallholder food producers in Southern Brazil.

Adoption and Dissemination of Feeding Support App and Mastitis Control Technologies to Improve Productivity of Smallholder Dairy Farming in Nepal

Submitter: Trimono, Rio
MDP Student, University of Florida, United States, rio.trimono@ufl.edu

Abstract:
Sustainable food productions in smallholder livestock and dairy systems require proper animal feeding management and Good Husbandry Practices. Dairy smallholders in Nepal face at least two major challenges: 1) poor animal feeds and the sparse availability of green forages; and 2) the prevalence of mastitis causing lower quantity and quality of milk production and higher cost to care for sick animals. To address these issues, local to national dairy-related organizations in Nepal have promoted the adoption of a mobile-app based feeding support tool (FST) and technology package for effective mastitis control. These innovations were pilot tested by Heifer International Nepal in 2016-2018 with the support from Feed the Future Livestock Systems Innovation Lab funded by USAID. Despite the benefits of adopting these technologies, there are still knowledge gaps in the awareness and adoption of these innovations, and in the effectiveness of dissemination efforts. This research aims to better understand adoption behavior and the mechanisms by which the innovations spread to larger groups of smallholder dairy producers in Nepal. Data collection will examine awareness of the innovation, the stages of the decision to uptake the innovation, facilitating conditions and motivation, as well as constraints faced by farmers to adopt the innovations. Using semi-structured interviews, demographic survey, and focus group discussion, the study will be conducted for eight weeks between May and June 2019 in some districts in the Terai and Hill regions of Nepal. While many micro-adoption studies focus mainly on the users' perspectives, this research will also engage with other stakeholders such as members and non-members of dairy cooperatives, extension workers and livestock technicians, and the representatives of organizations disseminating the innovations. The farmer who owns more than three cattle/buffaloes, who is a member of a dairy cooperative, and who has experience in a development intervention program is predicted to be more likely to adopt the innovations. Several factors affecting the adoption may include observable economic benefit, technology's trialability, availability of labor, access to saving and credits, access to input, age, and education. In this study, adoption is seen as continuous measures which go through some stages of change—begin with being aware of the innovation (knowledge), forming an attitude towards it (contemplation), making decision to uptake or reject it (decision), adopting the use of it (action), and maintaining or modifying the use of it (maintenance). Since FST and mastitis control technology package have different attributes, the acceptance and the extent of use for each innovation will be compared to see if different, separate dissemination approaches are necessary. Research findings will contribute to the design and implementation of dissemination strategies so that organizations can better allocate their scarce resources in their intervention program. Widespread adoption of FST and mastitis control technology package will ultimately contribute to poverty reduction and nutrition improvement for smallholder dairy communities in Nepal.

Keywords: adoption, animal feeding management, diffusion of innovation, dissemination, dairy cooperatives, mastitis, mobile application

Advancing Sustainable Food-Water Security: Implementing Tanzanian National Policy at the Basin Scale

Submitter: Warner, Andrew
Senior Project Manager, CDM Smith, United States, warnerat@cdmsmith.com

Abstract:
Tanzania's contemporary national development priorities and related natural resource policies encompass objectives that include increasing food production by expanding irrigated agriculture and ensuring sustainable water resources management to provide a diversity of other social and environmental benefits. Collectively, these national policies and associated initiatives are designed to help reduce hunger, improve food security, strengthen local and national economies, improve water provision, and maintain a spectrum of freshwater-dependent ecosystem goods and services. These objectives align with several of the Sustainable Development Goals (SDGs; sustainabledevelopment.un.org) including 1, 2, 3, and 6.

Through national legislation, Basin Water Boards have been established under the Tanzanian Ministry of Water and Irrigation for each of the country's nine major river and lake systems and are responsible for managing water resources according to national law. Foremost among the responsibilities of the Basin Water Boards is determining water allocations to meet: i) basic human needs; and, ii) environmental flows to protect aquatic ecosystems and related goods and services. Collectively referred to as the reserve, national policy affords these two purposes the highest priority, after which water can be allocated for other socio-economic purposes such as irrigation and industrial water supply. Water allocations for the reserve provide quantified sustainability boundaries for water managers under which to implement their water allocation planning and permitting efforts. However, clear guidance is still being developed by the Tanzanian national government as to how Basin Water Boards should carry out the necessary steps to implement these national water policies and achieve the associated SDGs, and to do so under typically data- and resource-limited circumstances.

This presentation synthesizes results and lessons learned from a recent project funded by the U.S. Agency for International Development and carried out in collaboration with the Rufiji Basin Water Board and partners. The project successfully integrated design and construction of a large-scale irrigation scheme, improvements to the rural road network for enhanced farm-to-market crop transport, and definition of the reserve. Reserve-related tasks included field-based efforts, development and application of methods, tools, and practices, and associated training and capacity building for implementing sustainable water resource management. Lessons learned were fashioned into specific recommendations for clarifying and strengthening national guidance for defining and implementing the reserve, presented to and accepted by the Ministry of Water and Irrigation. The collection of these coordinated tasks will be synthesized in the presentation, along with the associated successes, remaining challenges and recommendations for achieving lasting and broader adoption.

The impacts of China's potential agricultural trade policies on sustainable food production

Submitter: Yao, Guolin
Assistant Research Scientist (Postdoctoral Research Fellow), University of Maryland Center for Environmental Science, United States, guolin.yao@umces.edu

Additional Authors:
Xin Zhang, Assistant Professor, University of Maryland Center for Environmental Science

Farzad Taheripour, Research Associate Professor, Purdue University

Wallace E Tyner, Professor, Purdue University

Abstract:
Agricultural trade policies, such as China's retaliation on the US agricultural products, can alter food production behaviors and thus affect its environmental sustainability associated with crop mix changes nationally and locally. However, much attention has been paid to its economic impacts but neglects its environmental consequences. Changes in US economic costs to abate nutrient pollution under such retaliation could reach over one-third of US economic welfare changes. Policies that motivate responsible food production is thus needed to address potential nutrient pollution and water depletion in local regions.

China's 25% tariff increase on US agricultural products could drastically reduce the US harvested area with farmers switching from soybeans to corn, wheat, other oilseeds, and other crops. South American countries will step in and significantly expand their harvested area with more soybean but less corn, wheat, sugar crops, and other crops. China's trade retaliation will spur its domestic demands in oilseeds with limited harvested area expansion.

The resulting shifts in crop production portfolio lead to varying impacts on nitrogen, phosphorus and blue water usages due to different intensity rates of diverse crops in different regions. Despite a total harvested area reduction, the US increases its total nitrogen pollution due to the reduction in its nitrogen efficient soybean production. South American countries and China benefit with a total nitrogen pollution reduction thanks to the increase in nitrogen-efficient soybean production and the decrease in all other crops. Luckily, the US is one of the most phosphorus efficient regions and its phosphorus pollution is less affected. However, Brazilian soybean production generates intensive phosphorus consumption and pollution. Intensive surface and ground water depletion by sugar crops and other agricultural products make the US worse off in its blue water usage.

The environmental impacts are often heterogeneous within a country given the unique distribution of crop mix in local regions. Nitrogen pollution increase in the US is mainly contributed by its soybean contraction in its Mid-west soybean belt, while those non-soybean area from western and southern coasts will be less nitrogen intensive but more water intensive with more nitrogen-efficient and water-consuming other oilseeds production. Soybean intensive Mato Grosso region in Brazil will experience less nitrogen pollution but more phosphorus

pollution while production expansion in other crops in other regions will increase Brazilian nitrogen pollution. China, with soybean and other crop production widely spread in its eastern coast, will lower its nitrogen pollution and its phosphorus pollution.

To engage good practices in sustainable food production and inform policy-making, we highlight those regions have already had the environmental impacts (i.e., nitrogen pollution, phosphorus pollution, and blue water usages) beyond the planetary boundary and will be further aggravated by the trade policy. Nitrogen alarming regions include the US south coast, Chile, Brazilian east coast. Phosphorus alarming regions are middle Brazil, Chile, Columbia, and Portugal. Blue water alarming areas have east and south coast and the northeastern US, Chile, and northwestern China. Targeted policies on a finer scale should help improve responsible food production and help achieve environmental sustainability.

Good Practices in the Energy Sector: Modeling and Simulation, Case-Studies, and Capacity Building

Economic feasibility of waste-to-energy project in the Philippines using real option approach

Submitter: Agaton, Casper
Postdoctoral Researcher, Copernicus Institute of Sustainable Development - Utrecht University, Netherlands, Philippines, c.agaton@uu.nl

Additional Authors:
Charmaine Guno, Mindoro State College of Agriculture and Technology, Philippines
Resy Villanueva, Saint Paul University – Manila, Philippines
Riza Villanueva, Saint Paul University – Manila, Philippines

Abstract:
Addressing the country's problems on increasing demand for energy and much dependence on imported fossil fuels, the Philippines is developing more sustainable sources of energy. Investments in renewable energy sources seem to be a better alternative solution that are rapidly growing in number of projects and spreading across different regions in the country. Another promising source to supplement the country's energy needs is a waste-to-energy (WtE) facility. Currently, the country is experiencing waste management problem as it produces an average of 35,000 tons of garbage daily with more than 8,600 tons per day coming from Metro Manila alone. Due to limited number of materials recovery facilities, most of the garbage are either disposed in dump sites or openly burned which further worsen the quality of heavy polluted air in the cities. Despite its large potential, there has never been any investment in WtE project due to lack of financing and management in the city level and the government's "Clean Air Act" that prohibits incineration of municipal solid wastes. The current study aims to offer an alternative solution to address the country's problems on waste disposal and at the same time, on energy sustainability.

This paper proposes an investment model to analyze the economic feasibility of WtE project in the Philippines using real options approach (ROA). Contrary with conventional valuation methods such as net present value (NPV); internal rate of return; payback period; and returns on investment, this approach considers additional characteristics that are crucial in making energy investment decisions. These include irreversibility of investment project, investment risks, uncertainty in the future cash flows, and managerial flexibility in the timing of investments. Applying the ROA, this research evaluates the value of WtE project and the optimal timing of investment under various uncertainties. The simulation results find that investing in WtE project in the Philippines is economically feasible using NPV and real option values. Results also identify that earlier investment in WtE facility reduces the risk of possible welfare losses from delaying or waiting to invest. Uncertainty analyses suggest that the government must support WtE program as it will significantly contribute in solving the problems of the environment (particularly air quality), waste management, and energy security and sustainability.

Keywords: Sustainability, waste-to-energy, real option, investment uncertainty

Exploring the implications of national innovation and technological capability in the assessment of climate mitigation.

Submitter: Apeaning, Raphael
PhD Student, Stony Brook University, United States, raphael.apeaning@stonybrook.edu

Abstract:
Recent criticisms of the stylized representation of energy investment decisions in Integrated Assessment Models (IAM) have raised concerns about the utility of these models. Critics argue that the representation of energy investment decisions as a rational and cost-optimal framework devalues the relevance of critical energy systems factors as geographical diversity, economic and social factors, innovation dynamics, and socio-political factors. Consequently, results from IAM are often overly optimistic and do not provide sufficient insights for extensive policy-making decisions. To resolve these issues proponents have called for analyzing the sensitivity of IAM assumptions against empirical observations to improve the fidelity of these models. Following recent attempts to improve energy technology representation in IAM, this study explores the effect of country and regional levels of technological and innovation capabilities on low-carbon investments under the assumption of a climate policy regime.

To capture the cross-country difference in the levels of technological capability, this study applies a weighted principal component analysis to decompose the sub-indices of the Global Innovation Index into the metrics of absorptive (AC) and innovation capacities (IC). Empirically, both technological construct (i.e. AC and IC) have been shown to mediate the process and intensity of local low-carbon technological change. To represent local low-carbon technological capabilities, a composite measure of both AC and IC is used to calibrate the regional technology learning for solar and wind using an IAM known as the Global Change Assessment Model (GCAM).

The model results based on stringent assumptions of climate policy provide two key insights. First, the investment inertia due to lower levels of technological endowment by developing

economies has a significant impact on the cost-effective of global climate policy. Secondly, higher levels of technological competencies enhance the flexibility and range of low-carbon technology investments. Taken together, the insights point to the importance of regional heterogeneity in the response to climate mitigation, due variation in local technological and innovation capacities. Overall, the study lends quantitative support to the UNFCCCs "technology transfer" and "technology management" protocols that aims to facilitate the deployment of local appropriate low-carbon technology projects.

Empowering Remote Himalayan Communities through Impact Tourism

Submitter: Asgotraa, Sonal
Community Lead - Global Himalayan Expedition (GHE), MDP Candidate at Regis University, India, sonal@ghe.co.in

Additional Authors:
Varun Loomba, Global Program Manager - GHE

Abstract:
There are more than a billion people in this world that are living in darkness. Out of which 161 million alone reside in the villages that are located in off grid remote Himalayan region. These communities still rely on expensive, unsustainable and polluting kerosene lamps or diesel generators for lighting purposes. Most of the people living in these villages live below the poverty line and can only sustain their basic livelihood from the crops they grow and animals they rear or through local livelihood opportunities generated through tourism. The remoteness and harsh terrain of these regions also make it difficult for the any conventional power lines to reach these villages. This lack of access to reliable light and basic power hinders economic development.

Global Himalayan Expedition (GHE), an Indian social enterprise, leverages tourism to provide clean energy access, through solar power, for the remote unelectrified off grid communities of Ladakh, one of the most elevated and coldest inhabited regions of the world. To make this possible GHE organizes impact expeditions to these remote villages where tourists, as part of their trip, not only experience the beautiful Himalayan trails but also help set up the solar micro-grids for these remote villages and bring them out from centuries of darkness – leaving behind a remarkable legacy of their visit – An Illuminated centuries old Himalayan Village.

GHE was founded in 2013 by Paras Loomba, with the intent to promote tourism as a vehicle for sustainable development of rural communities. The concept revolved around taking tourists and volunteers to these remote villages and setting up tangible social infrastructure that is community-owned and also maintained by the locals.

Solar Electrification is just the starting point. To enable sustainable development of these villages, GHE helps the local indigenous communities to create livelihood opportunities through setup of 'Mountain Home-stays'. A concept which promotes homes of these solar electrified villages as tourists' guests houses and provide the travelers with a cultural immersion experience. These villages that are also difficult to locate through Google Maps – are now promoted as

potential off beat tourist destinations on the online portal www.mountainhomestays.com. All the mountain homestays are run by local village women who are trained by GHE on Hospitality and Tourism etiquette.

By bringing in employment opportunities to their doors through electrification and tourism, GHE not only empowers the local women population but also prevents migration from these hamlets to the nearby towns for better job opportunities. This has not only reduced migration but have also led to the preservation of age old cultural heritage in these villages as the younger generation now tends to frequent the village more and acts as tourist guides to these villages thereby promoting the heritage.

In five years, GHE has electrified over 95 villages in Ladakh, impacted over 95000 lives, and installed 453 micro-grids for more than 2700 Households. Electrification through solar micro-grids of the villages has mitigated emission of about 1200 tons of carbon dioxide annually. GHE has conducted over 35 Impact Expeditions and provided unique experiences to over 700 tourists from 60 countries. Each tourist is able to impact more than 35 local lives by engaging with GHE on these expeditions. GHE has setup 50 Solar Homestays in these electrified villages where tourists can now stay and experience local culture. GHE has trained 45 village women in Hospitality who are now leading home-stay related activities. This Impact is measured through regular visits to these villages by our guides who take homestay tourists.

GHE has addressed the problem of energy access by introducing an innovative concept of merging tourism, and technology to provide a tangible impact in the form of Impact Tourism. Through GHE's approach of Impact tourism, tourists not only get an experience of a lime time but also enjoy an authentic experience of local culture and traditions while helping the community. Impact tourism leads to sustainable rural development and provides livelihood opportunities for rural communities. It is a win-win situation for all stakeholders and the income generated by the villagers is then used to maintain the grid infrastructure setup by the GHE, thereby making a holistic model of impact.

Hybrid Energy Storage Integration with Artificial Intelligence to support Remote Communities

Submitter: Bilodeau, Stephane
Chairman and Chief Technology Officer, Smart Phases Inc.

Vice-President of the Government Relations and Public Affairs Committee at Engineers Canada

Lecturer, Université de Sherbrooke, Smart Phases Inc. (DBA Novacab), Canada, sbilodeau@novacab.ca

Additional Authors:
Michael L. Carty, President & CEO, Novacab Inc.

Art Vatsky, P.E., Lead Engineer Northeast, Smart Phases Inc., and Professor, CUNY Bronx Community College

Abstract:
The presentation will be focused on an integrated solution that exploits the advantages of Hybrid Energy Storage (HES) and Artificial Intelligence (AI) to support remote communities. The highlighted project allows for improved resilience of the power infrastructure for future generations and operates responsible energy supply that benefits remote communities, improving environmental footprint and economic advancement, helping on many of the Sustainable Development Goals.

This low-carbon HES+AI solution is firmly aligned with smart community initiatives, such as Smart Buildings (Save energy and improve sustainability) and Distributed Energy Resources (DER to Improve sustainability, efficiency and reliability). This solution allows for financial mechanisms built on engaging end-users and the whole community through costs reduction and a shared savings approach while benefiting of Earning adjustment mechanism (EAM) or Platform service revenue (PSR).

While the hybridization is innovative and more "community-engaging" compared many other energy-related solutions in the field, it is based on 20 years of R&D and implementation in the field for more than a decade. Modelling of this integration has shown substantial benefits: Avoided Generation Capacity Cost (AGCC) with Environmental Value (Avoided CO2, SO2 & NOx emissions) for Onsite Emitting Generation and significant potential for Avoided Transmission and Distribution Capacity Infrastructure while reducing outages risks with the inherent Hybrid Storage capacity used as a backup. The Present Value of the Benefits has been compared to the net present value of the project for a B/C Ratio of 2.29.

An integrated load match analysis and life cycle assessment approach: the case study of reusing depleted batteries from electric vehicles in residential building

Submitter: Cusenza, Maria Anna
Ph.D., University of Palermo, Italy, mariaanna.cusenza@unipa.it

Additional Authors:
Francesco Guarino, Postdoctoral Fellow, University of Palermo

Sonia Longo, Researcher, University of Palermo

Marina Mistretta, Professor, University Mediterranea of Reggio Calabria

Marco Ferraro, Researcher, Italian National Research Council Institute for Advanced Energy Technologies "Nicola Giordano"

Maurizio Cellura, Professor, University of Palermo

Abstract:
The increasing use of distributed self-generation from renewable energy sources in buildings can become an issue in terms of power quality, stability, reliability and mismatch between the local

electricity generation and the building demand, since the local generation is highly variable and intermittent. The employment of battery energy storage systems (BESS) can be a solution able to match supply and demand of electricity in the building and to diminish the stress on the grid.

According to recent literature and technical analyses depleted batteries from electric vehicle have about 80% of their initial capacity at the point of substitution and can be used in stationary applications that are usually less intense than the automotive ones, before the final treatments at the end-of-life.

In this framework, a circular economy and industrial symbiosis inspired pathway is emerging between the building and the transportation sector, the so called “second life” for the batteries.

The study aims to assess the energy and environmental benefits associated to the reuse of depleted batteries from EV (reuse battery scenario – RBS) in substitution of new batteries (new battery scenario – NBS) as stationary energy storage systems coupled with renewable electricity generation technologies through a life cycle approach.

The system examined consists of a BESS made of a real battery pack removed from a Mitsubishi Outlander PHEV after 140,000 km of driving, a photovoltaic plant (20 kW) and the electricity grid that provides the electricity required by an existing residential building (25.000 kWh/year) located in Italy.

The authors identify the optimal BESS size, based on load match optimization and life-cycle environmental impacts considerations. The assessment of the environmental sustainability of the RBS compared to the NBS is based on comparing the associated energy and environmental impacts through the life cycle assessment methodology. Primary data on battery manufacturing are used and the use phase modelling of the stationary storage application is performed by a detailed energy model. In addition, since the proposed strategy involves both the building and the transportation sector, the analysis is carried out considering an expanded system including both the functions provided in these sectors.

For the examined building, the installation of a BESS capacity of 46.5 kWh (corresponding to the installation of five depleted batteries and four new batteries) is identified as the best solution.

The study shows that reusing depleted batteries as stationary storage systems in residential buildings can enhance the overall environmental sustainability of the system including both the building and the transportation sector. In particular, the environmental impacts decrease of a percentage ranging from around 2% (in cumulative energy demand) to 13% (in abiotic depletion potential). In addition, the study demonstrates that in order to avoid misleading results, in the assessment of the environmental sustainability, it is highly recommended to include all the economic sectors involved.

The study represents an original environmental assessment, combining the load match analysis and the life cycle approach and highlights the potential synergy inspired to the principles of the circular economy, between the household and the automotive sector.

Synthesis of low cast copper zinc tin sulfide (CZTS) materials using surfactant for efficient and sustainable solar harvest

Submitter: David, Nathan
Senior Lecturer, University of Nigeria, Nigeria, nathan.david@unn.edu.ng

Additional Authors:
Nnabuike Ezukwoke, Lecturer, University of Nigeria

Abstract:
Increase in power consumption and environmental pollution has necessitated research into alternative energy sources such as solar cells and other renewable sources. Within different types of solar cells, thin films which are considered as second generation technology has attracted a reasonable amount of attention in the last decade. This is as a result of a serious pursuit for clean, renewable and sustainable energy sources. Fossil fuels in the form of oil, gas, coal and other non-renewable sources are the major energy sources for human consumption in the last century and even today. However, their method of production and combustion have affected our ecological environment adversely as a result of carbon dioxide (CO2) emission, which is a major contributor to global warming. Recently, use of new materials and surfactant in thin films has shifted the interest of solar cell research and manufacturers from the use of rare and toxic materials to inexpensive, earth abundant and non-toxic materials. In this paper, development and characterization of low cost Copper Zinc Tin Sulfide (CZTS) thin films is proposed with the aim of growing cost effective nanoparticle thin films for solar cell application using earth abundant materials, surfactants polymers and chemical bath deposition techniques. However, CZTS has gained substantial attention because of its low cost, non-toxic nature with a good bandgap of 1.45eV and is environmental friendly.

Modelling the impacts of climate change on Canadian building energy demand

Submitter: Jafarpur, Pouriya
MASc Candidate in Environmental Applied Science and Management, Ryerson University, Canada, pjafarpur@ryerson.ca

Additional Authors:
Dr. Umberto Berardi, Associate Professor, Ryerson University

Abstract:
Large cities have been experiencing significant surge in urbanization that has led to increase energy demands and greenhouse gas (GHG) emissions. The building sector is accountable for a large share of the global energy consumption and the corresponding GHG emissions. At the same time, ongoing changes in ambient outdoor conditions have major impacts on building energy demand. In its most recent report, the Intergovernmental Panel on Climate Change (IPCC) has predicted that the global mean surface temperature will increase, in relation to the 1986-2005 period, by a range of 2.6°C to 4.6°C by the end of the 21st century. This temperature increase will affect the building indoor thermal comfort, leading to higher energy demand and emissions for space conditioning. Therefore, it is essential to evaluate and quantify the impacts

of climate change on buildings to allow for the development and implementation of adaptation strategies for the building sector in the future. This paper describes the results of climate change impact assessment on the energy performance of the Canadian building stock. To this end, given the changing climate and its impact on building heating and cooling demands, energy models based on historical weather data records cannot accurately simulate the performance of a building in the future. Accordingly, three future weather data sets are generated and applied to the energy simulation of 16 ASHRAE reference building models for Toronto, Canada. Both dynamical and statistical downscaling techniques are used to generate the future weather files for building performance simulation. The results indicate an average decrease of 1-7% in heating loads, and an average increase of 0.2-6.0% in the cooling loads, depending on the building type, leading to an overall decrease in energy use intensity (EUI) for the majority of the 16 reference building models. In addition, the GHG emissions associated with each building models for the future climate are presented and discussed. It is concluded that the application of future weather files for building performance simulation leads to a realistic quantification of building energy demand in the future. Furthermore, in response to climate change adaptation, the buildings energy demand forecast illustrates the need for consideration of future design options to increase energy efficiency and reduce GHG emissions.

Emissions mitigation by infrastructure improvement and increased renewables share on electricity grid.

Submitter: Karvounis, Panagiotis
Student, Politecnico di Milano, School of Industrial Engineering, Department of Energy, Milano, Italy., United Nations Major Group for Children and Youth, New York, USA., Greece, panos.karvounis12@gmail.com

Additional Authors:
Antonella Savarese, student, Politecnico di Milano, School of Industrial Engineering, Department of Energy, Milano, Italy.

Carla Sahori Seefoo Jarquin, student, Politecnico di Milano, School of Industrial Engineering, Department of Energy, Milano, Italy.

Negar Namazifard, student, Politecnico di Milano, School of Industrial Engineering, Department of Energy, Milano, Italy.

Domenico Gioffre, student, Politecnico di Milano, School of Industrial Engineering, Department of Energy, Milano, Italy.

Mohammad amin Tahavori, student, Politecnico di Milano, School of Industrial Engineering, Department of Energy, Milano, Italy.

Abstract:
In order to foster the development of the nations, it is of high importance to have a holistic approach towards sustainability, particularly the implementation of the UN 2030 Agenda of the Sustainable Development Goals (SDGs) is the key and, when it comes to energy, the grid

infrastructure plays a key role to ensure access to affordable, reliable, sustainable and modern energy for all (SDG 7) as it is stated by indicators 7.b; “By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all”; 7.b.1; “Investments in energy efficiency as a proportion of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services”. In this line, the aim of this study is to clarify the potential of emissions reduction through decreasing transmission and distribution losses in national grids in developing states, where the issue of losses within the grid is much more severe than in more developed economies. The study was carried out using the Integrated Assessment Model MESSAGE and the region studied involve India, sub-Saharan Africa, South Asia, South America, where the grid deficiencies are larger than 11%. Two main scenarios are simulated with different penetrations of renewables to the grid and compared with the “Business as Usual” case. The essential, direct investment needed for the grid infrastructure improvement is provided by developed nations and the propagation of CO2 emissions are reported. Simulating those different scenarios will assist in the quantification of the environmental impact as well as to policy implementation.

The OSeMOSYS teaching kit - an example of open educational resources to support sustainable development

Submitter: Kubulenso, Saga
MSc. Student, KTH Royal Institute of Technology, Sweden, saga@desa.kth.se

Additional Authors:
Eunice Pereira Ramos, PhD candidate, KTH Royal Institute of Technology

Mark Howells, Director and Professor, KTH Royal Institute of Technology

Abstract:
Important obstacles regarding energy systems planning in developing contexts include the limited access to knowledge of state-of-the-art modelling tools, the reliance on international organizations to lead strategic studies, and limited access to training or capacity building programmes promoted by international institutions. Effective knowledge transfer is necessary to fill the capacity gap. Granting national and/or regional experts with access to knowledge and tools that can be used for electricity expansion studies is crucial sustainable development and the achievement of national development goals.

The implementation of capacity building programmes on energy systems analysis in developing countries is not a novel approach. Several international organisations and consortiums have long experience in carrying out such type of initiatives across the globe. Yet, knowledge transfer, dissemination and application of newly-learned tools may not be realised to the ideal potentials since the training activities often target government officials which not necessarily continue using the tools in their work. Enabling long-term capacity building in energy systems analysis would not only contribute towards planning of sustainable energy systems but would also have a positive long-term impact at the social level.

This paper explores the role of open online educational resources as a tool for consolidated long-term capacity in energy systems analysis, particularly in contexts where knowledge and expertise in modelling tools is reduced.

An open teaching kit and online course on the open source energy modelling system (OSeMOSYS) is presented in this paper. The OSeMOSYS teaching kit derives from the extensive training and teaching experience on the use of the tool by KTH Royal Institute of Technology, the OpTIMUS community and partners. The educational resources are developed on G Suite for Education and are structured flexibly to allow the user to prepare multiple training courses, adjusted to the contents of interest and target audience. The course is an extension of the efforts of Summer School on Modelling Tools for Sustainable Development and other capacity building activities.

The OSeMOSYS open educational resources of the online course constitute a ready-made example of an energy systems analysis course that can be directly deployed at higher education levels. Its open essence promotes and facilitates the development of a network of practitioners who can participate in the development of other materials which can be shared and taken up by the community. In addition, it could encourage the development/emergence of capacity building programmes and reach audiences outside academia, contributing to bridging the gap between science and policy. In this way, knowledge is available to all and the user is empowered with the flexibility of taking the course according to its pace and availability.

Availability and access to open education materials in energy systems analysis / planning can contribute to the development of solid and long-term capacity, particularly in developing country contexts. This transformational process of access to knowledge can fuel the development of the energy sector in a sustainable manner, simultaneously supporting the development and strengthening of a network of energy systems experts.

An assessment of the potential of hydroelectricity to unleash development outcomes in Paraguay – Identifying policy synergies

Submitter: Pereira Bogado, Gabriel Eduardo
Research Associate, Universidad Nacional de Asunción - Facultad Politécnica, Paraguay, gabrielpereira2603@gmail.com

Additional Authors:
Cecilia Llamosas, Research Director, Energy Systems Research Group (GISE) Polytechnic Faculty, National University of Asuncion

Carlos Olmedo, National University of Asuncion

Gabriel Pereira, Research Associate, Energy Systems Research Group (GISE) Polytechnic Faculty, National University of Asuncion

Jazmin Suárez, Research Associate, Energy Systems Research Group (GISE) Polytechnic Faculty, National University of Asuncion

Abstract:
Paraguay has a great asset: its hydro energy wealth. It houses two of the largest hydropower dams in Latin America, a region notable for hydroelectricity production. The Itaipú Dam, co-owned with Brazil, is the largest in terms of generated hydroelectricity. In 2016, the Dam generated over 103,098 GWh surpassing the Three Gorges Dam in the Yangtze River (est. 90,000 GWh) and five times the North American Grand Coulee Dam annual output (20,000 GWh). 2 km downstream of Apipé rapids in the Paraná river is located the Yacyretá Dam, jointly owned by Paraguay and Argentina, has an installed capacity of over 2030 MW.

With a population of 7 Million inhabitants, this huge potential makes Paraguay one of the top five producers of hydroelectricity per capita, together with Iceland, Norway, Switzerland and Sweden. In contrast to both the regional average and its high performing hydro producer peers, the country has historically lagged in socio-economic development.

However, the Paraguayan energy system needs to undergo changes to turn this comparative advantage into tangible development outcomes.

We pose that for Paraguay, the energy sector can be a catalyser to reap well-being benefits. In the case of Paraguay, the energy sector not only benefits society through energy services, but by providing financial resources as all proceeds are destined entirely to the State. Changes are needed in many fronts. For this, policy coordination is paramount.

Although benefits were created through the Paraguayan energy sector, efforts are not aligned/coordinated. It is argued that for the energy sector to reinforce virtuous development cycle, policies have to be aligned. If not, the country runs the risk of not reaching its full potential to unleash widespread well-being. So, how can changes in the energy system reap well-being benefits? How can the policies be aligned to boost synergies?.

To identify potential interventions which can trigger a virtuous energy-wellbeing cycle, we address two questions. First, we ask which changes are needed at the energy system level to increase well-being through the provision of energy services. We operationalise wellbeing as health, education, equality and quality institutions . Second, we explore which policies can ensure that the identified needed changes are made in the energy system . To answer these questions, we use a methodology based in a semi-quantitative approach and an expert elicitation process, added to a performance analysis of the situation of Paraguay in the identified priorities of development related to the SDGs.

Our analysis positions hydro energy as both an enabler for the achievement of development outcomes (means) as well as a needs fulfiller (end).

Keywords: Energy, Sustainable Development Goals (SDGs), Policy Coherence.

Choosing energy supply options for rural communities: an MCDA approach

Submitter: Pires Neves, Luís

Coordinating Professor, Polytechnic Institute of Leiria & INESC Coimbra, Portugal, Portugal, luis.neves@ipleiria.pt

Additional Authors:
Oscar Mauricio Sigüencia Sigüenza, Instituto Superior Tecnológico del Azuay, Ecuador

Abstract:
Rural energy planning requires a rigorous analysis for the determination of the best energy alternatives for the supply of electric energy, either through the extension of electricity grids, or using local energy resources such as photovoltaic solar energy, wind energy or hybrid systems, including local micro-grids. Several selection criteria are considered for the evaluation of a set of defined alternatives, according to economical, technical, social and environmental objectives. The choice of an adequate tool to help in decision making for the selection of the best alternative, taking into consideration multiple criteria, is then a needed step, as well as the definition of the preferences of decision makers regarding how to use the obtainable information to make an informed and documented decision.

The presented work reviews multi criteria decision methods used in energy planning. The process of defining models to decide between complex or conflicting alternatives is presented, starting with the process of structuring the problem and choosing a multicriteria methodology adapted to the characteristics of the problem. A second part is dedicated to the effort of obtaining the information needed to define the preferences of decision makers, according to the chosen methodology and dealing with the implications of this choice. Finally, the results of applying MCDA methodologies to case studies regarding electric energy supply to rural communities in developing countries is presented, discussing alternatives and their implications.

The choice of convenient MCDA methods allows the use of both quantitative and qualitative criteria, avoiding the need to discard important issues due to difficulties in quantifying impacts or in measuring them in appropriate scales. Compensation effects can also be avoided by establishing the possibility of vetoing certain ranking/classification hypothesis due to poor performances in certain criteria, even when performing very well in other criteria. In the case studies, solutions with micro-grids and dispersed generation, namely solar based, got the general preference to other alternatives, namely to grid extensions.

Design framework for a climate responsive façade system: Design decision making and uncertainty analysis

Submitter: Soudian, Shahrzad
Ph.D Candidate, Ryerson University, Canada, shahrzad.soudian@ryerson.ca

Additional Authors:
Umberto Berardi, Associate Professor, Ryerson University

Abstract:
The increasing trend of energy efficient building design is directly linked with the adverse impacts of buildings on the environment, in addition to the implications posed by climate

change-related events on the resiliency of the built environment. The move towards energy efficient building design has often been characterized by targeting comfort related energy conservation methods. Addressing building energy demands to provide comfort is a key factor considering the large share of space heating, cooling, and ventilation energy use. Particularly, optimizing the performance of the building envelope as the main interface between the outdoor and indoor environments has been the focus for energy saving strategies in buildings. However, there is a need for a new paradigm in energy efficient and resilient building design to address the current energy and climate challenges. Climate responsive building envelopes present a considerable potential in this area to address comfort and energy demands in buildings through dynamic and adaptive performance. This is in contrast to the traditional approach of building envelope design that envisioned the building envelope as a static barrier and shield to environmental loads. In this paper, the design phase of two climate responsive façade modules are investigated. The multi-functional façade modules are proposed to dynamically regulate the flow of heat, air, moisture and light in buildings. A design framework based on decision-making principles is proposed. The intent of this design framework is to systematically compare alternative materials and systems to select the appropriate choices for the façade modules. For this purpose, a design matrix is created in which several factors are defined, namely the purpose of each module, objectives, response functions, adaptation strategies and design parameters. Based on these factors and specifically the design parameters that include the detailed range of functional parameters such as scale, stimulus, and environmental conditions, the alternative materials and systems can be selected. Multi-objective decision-making methods are used to select appropriate technologies for the façade modules, with particular focus on hierarchical selection based on the multi-functionality of the technologies to fulfill several objectives. As this design framework provides the foundation for performance evaluation of the façade, an uncertainty analysis is also performed to quantify the degree of flexibility of each module with regards to the system range of the technologies selected, and the design range defined for the corresponding response factors. The results of this study could lead to a generalized approach for informed decision-making and design prediction for transient responsive façade design with the potential to turn design concepts into engineering solutions.

Indigenous Approaches to Sustainable Development

Redefining Tourism Through an Indigenous Rights-Based Approach

Submitter: Alemneh, Henok
Graduate Student, University of Winnipeg, Canada, alemneh-h@webmail.uwinnipeg.ca

Abstract:
Based on a three-month field placement with the World Indigenous Tourism Alliance (WINTA) in Aotearoa New Zealand, and review of related literature, this paper argues that there is a pressing need to redefine the predominantly less-inclusive tourism approach, and to advocate for a rights-based approach that values Indigenous knowledge, culture and aspirations, and hence recognizes and practically addresses Indigenous human right issues in tourism.

The World Indigenous Tourism Alliance (WINTA) mandate to engage in Indigenous tourism advocacy, facilitation and networking activities was recognised by the World Tourism

Organization (UNWTO) in its endorsement of the Larrakia Declaration in 2012. One of WINTA's advocacy strategies is to engage in research and development projects that promote the rights of Indigenous peoples in tourism, and among the priority actions to deliver this strategy is to develop & carry out WINTA's Indigenous Tourism Engagement Framework (ITEF) through a rights-based approach. The framework is based on the principles of the Larrakia Declaration on the development of Indigenous tourism and is also aligned to a range of other international conventions, declarations & tourism industry guidelines.

The ITEF is a roadmap that has been developed to enhance respectful and reciprocal engagements between Indigenous communities and all other key players in Indigenous tourism. WINTA uses platforms like community gatherings, conferences, summits, seminars, workshops, research projects and consulting services to support rights-based Indigenous tourism engagements across the world.

Empowerment and Right-based Approaches for Indigenous Communities in the South American Gran Chaco

Submitter: Coria, Martin
Regional Director Latin America and the Caribbean, Church World Service, United States, sfaillace@cwsglobal.org

Additional Authors:
Silvana Faillace, Senior Director for Development and Humanitarian Assistance, Church World Service

Martin Coria, Regional Director for Latin America and the Caribbean, Church World Service

Agustina Ramos Mejia, Regional Representative for the South American Gran Chaco – Church World Service.

Gabriel Seghezzo, Executive Director - Fundapaz

Abstract:
Background

The Gran Chaco region is a large and semiarid region in the central part of South America. It covers almost 1 million square kilometers and stretches across northern Argentina, southwest Paraguay and southeast Bolivia. It is the biggest forest reserve of the continent after the Amazon and one of the largest dry forests in the world. A major eco-system, it is also a region with great cultural diversity, home to 25 different indigenous groups including Guarani, Wichi, Qom and Enxet Sur, who for centuries lived as semi-nomadic hunter-gatherers. Socio-economic and cultural inequalities are common in the Gran Chaco and affect most strongly the region's most marginalized groups – indigenous people, small farmers or campesinos, and those living in peri-urban settlements.

Because of the region's geographic isolation and low visibility of its inhabitants, human rights

violations, environmental degradation and alarming levels of deforestation (related to expansion of cattle and soy industries) have gone mostly unnoticed enabled by the region.

In this region plagued by social conflicts and human rights violations, effective inter-ethnic partnerships, multi-stakeholder advocacy models and genuine public-private collaboration are key to successful development and policy initiatives. These are proving critical to accelerating progress toward the achievement of the Sustainable Development Goals (2,5,10,17).

Model of Engagement

For the last 15 years, Church World Service (CWS) and the civil society coalition Semi-arid Platform (Plataforma Semiaridos) have contributed to a number of local, cross-border and regional partnership approaches. These included pilot approaches for indigenous communities to improve land tenure security, access to water and natural resources management, and to work towards the empowerment of women and youth, resilient livelihoods and food security. In each of the models used, indigenous community participation – and especially that of women and youth - and capacity-building have had unique features and offered multiple opportunities for learning.

The models and approaches advanced by CWS, Semiarid Platform and other local partners in the Gran Chaco have included: Integrated Trinational Program; Water roundtables to promote rainwater harvesting in Salta province (Argentina-Bolivia border); learning routes (semiaridos rutas de aprendizaje that facilitate cross-community information exchange; and inter-ethnic conflict resolution models in landmark land cases, such as Lote 55-14.

Indigenous community ownership and use of appropriate technologies -- such as Geographic Information Systems (GIS), community-led rooftop rainwater harvesting, participatory mapping – have been integrated with multi-stakeholder advocacy and diversified livelihoods. Key elements that have allowed these approaches to succeed include: confidence-building with multiple and diverse stakeholders; donors that support contextually specific thinking; model adaptability to local contexts, cultures and socio-economic conditions; and collective will and ability to design and champion ‘win-win’ approaches.

Expected Learnings

Presenters will discuss good practices, lessons learned and challenges from their decade-long experiences in promoting: (a) partnership models to foster capacity-building, and (b) the empowerment of indigenous peoples and communities, especially women and youth. These will highlight the importance of collaborative approaches and confidence building among diverse group of actors; and how indigenous approaches can address conflict resolution around land accessibility and natural resources management, and advance sustainable development policy initiatives.

Country-specific Approach to Sustainable Development: the Asian Pacific Funding Models for Social Enterprise.

Submitter: Emmanuel, Irimiya Arigu
Doctoral Candidate, Monash University, Clayton Campus Australia, Australia, arigu.emmanuel@monash.edu

Abstract:
Social Enterprise globally is gaining momentum amongst practitioners, policy makers and the academic as a more sustainable approach in dealing with intractable social problems. A recent report by the Social Enterprise UK – think Global Trade Social – with support from the World Bank has advocated the need for the Sustainable Development Goals (SDGs) to embrace the vital role businesses with social purpose can play in delivering sustainable and multi-level development. While this development is crucial and timely, it is worth knowing that the funding side of social enterprise is currently underdeveloped. Since social enterprise means different thing to different people across regions, it is worth exploring examples of funding models for social enterprise development based on country-specific indigenous practice. Against this background, this paper qualitatively review documentary reports of examples of indigenous funding models for social enterprises in Singapore, Hong Kong, Australia, Indonesia, Cambodia, Vietnam and Myanmar. The paper provides an in-depth understanding of why these models were developed, how they were developed, what global examples guide the development of these funding models, how the funding models impacted on social enterprise development in rural and urban communities, and lessons that can be drawn from the success and failure of these funding models. Insight from the review of the distinct indigenous funding models for social enterprises in the selected Asia Pacific countries provides insight into how country-specific unique circumstance determines the choice of social enterprise funding model. The review also shed light on how country-specific circumstance impacted on the approach to indigenous funding challenges and provides knowledge on strategies for inclusive funding in mainstreaming sustainable development. The lessons from this review suggest that a social enterprise model suitable for one country may not be suitable for another country hence, the need to study indigenous models only as examples that may be adapted with moderation to the uniqueness of each country circumstances.

The potential of pluralizing participation for Sustainable Development: Guatemala's Consultations of Good Faith

Submitter: Morán, Azucena
Research Associate, Institute for Advanced Sustainability Studies (IASS Potsdam), azucena.moran@iass-potsdam.de

Additional Authors:
Frederic Hanusch, Research Group Lead, Institute for Advanced Sustainability Studies (IASS Potsdam), Germany, azucena.moran@iass-potsdam.de

Abstract:
The Latin-American region has gone through key democratic transition processes upon which participatory forms of political experimentation have attempted to address the gaps and failures of representative democratic regimes. The region's current receding political landscape and the frequent collision between sustainable development and democratic decision-making leave space

to examine, in primis, the capability of Latin-America's representative governments to improve democratic qualities by institutionalizing and pluralizing policy-making processes. Moreover, they put into question whether participation constitutes not only an end in itself but also a potential means to address planetary challenges. Against these empirical queries, we use a contrasting comparison with different degrees of plural participation and map their respective influence on sustainability performance. This allows us to contribute not only to the conceptual debate on the enabling conditions for pluralizing participation, but also hypothesize about its potential impacts depending on its quality.

With the aim of addressing this conceptual gap, we will use Guatemala's Consultation of Good Faith in Santa María Cahabón, Alta Verapaz, as a case study. The unique dispute over the Oxec Hydroelectric Project and the participatory processes that followed avoid, on the one hand, the instrumentalization of the civil society that comes with legally-binding participatory processes. On the other, it lets us analyze participation within different levels of institutionalization, since the consultation was carried out two times: one by local indigenous leaders, and one by governmental officials following a ruling by the Constitutional Court. Furthermore, this case gives space to assess plural transformations of sustainability solutions due to its interconnectedness between the local and the global, indigenous and scientific knowledge, and imperfectly institutionalized procedures and CSO-led processes.

This paper will first define pluralized participation and develop a corresponding analytical scheme to evaluate the quality of pluralized participation processes. Secondly, it will delineate sustainable parameters based on the interlinkages of Sustainable Development Goal (SDG) 7 on affordable and clean energy with other SDGs and compare them with the results of the consultations. Based on a process-tracing method, we will map its meeting points. Results demonstrate that democratically embedded and genuinely plural participation has the potential to constitute a sine qua non driver for improving democratic quality and sustainability performance at the same time.

Indigenous Treaties and the SDGs: Lessons from Canada

Submitter: Harrington, Alexandra
Lead Counsel, Peace, Justice & Governance, Centre for International Sustainable Development Law, Canada, arharrington@gmail.com

Additional Authors:
Prof. Marie-Claire Cordonier, Senior Director, CISDL

Abstract:
Since the 1970s, over thirty treaties have been entered into between the Government of Canada and various indigenous communities. While these treaties do not include all indigenous communities in the country they do include communities across the country and with varying social, legal and cultural systems and concerns. These treaties are legally binding documents which establish a number of rights for members of the indigenous communities and obligations on the part of the Government of Canada. Although these treaties have been written prior to creation and adoption of the SDGs, the terms and requirements they contain are of great

importance to SDG analysis and implementation because of the innovative legal, societal and governance mechanisms they contain. This presentation will discuss the findings made the the presenters and their team as they have reviewed an analyzed these indigenous treaties against the SDGs. It will demonstrate how these findings can be used to support the implementation and achievement of the SDGs in Canada and beyond.

Sustainable Urban Living – Role of Eco-friendly Practices and People's Participation

Submitter: Kanchibhotla, Divya
Executive Director & Research Head, Sri Sri Institute for Advanced Research, India,
divya.kanchibhotla@artofliving.org

Abstract:
According to the United Nations, 68% of global population will reside in urban areas by 2050. In the past few decades the urban growth in many parts of the world has lacked sustainable practices and hence, contributed to a myriad of global problems. Sustainable urbanization on the other hand meets the needs of the present and future generations. Adopting a sustainable lifestyle inclusive of indigenous technologies by a select few to a majority of the population can be achieved through people's participation. People's participation is key for adopting a sustainable lifestyle, which happens when people consciously choose to reduce, reuse and recycle, thereby reducing their ecological footprint.

This study showcases the smart sustainable practices adopted by an urban community in Bengaluru: 'Silicon Valley of India' (urban population of 12.34 million, 2017).

Though situated in a busy metropolis, characterized by high foot traffic and a large floating population of approximately 30,000 visitors per month apart from 2000+ residents, this community has lush green covers, extremely rich biodiversity and better air quality.

A few sustainable practices include –

o Preservation: conservation of rich species diversity of flora and fauna comprising of 146 plant species plants, 102 butterfly species, eight bees' species, 69 bird species and 28 snake species

o Rainwater harvesting based on ancient yet scientific methods to recharge ground water

o Organic farming: 1,50,000 kg of organic vegetables are produced/month

o Natural fuel: waste plastic from campus and surrounding villages is collected daily and converted to fuel. 200 kg of waste plastic yields 100 liters oil

o Recycled paper: Waste paper/cotton is segregated and converted to handmade paper. 5 kg of shredded waste yields 100 sheets daily

o Permaculture: Uncooked vegetable waste from kitchen is converted to compost and is used to grow 35 plant species

o The cooked waste is used to create briquettes and LPG that are reused as fuel

People are now aware and accepting of the benefits of embracing a more sustainable and eco-friendly lifestyle. An underlying factor as Rau et al. (2018) report is how practicing ancient breathing techniques like the Sudarshan Kriya Yoga (SKY™) and associated meditation techniques make people more connected and sensitive to nature. The uniqueness of the community is that it is characterized by high foot traffic, has a high proportion of floating population apart from a residential community, and still able to maintain eco-friendly practices in a sustainable manner. Such practices are scalable and replicable owing to their sustainable nature.

Through people's participation, this community exemplifies the possibility to create an 'Oasis of sustainability' in the arid desert of urbanization.

Indigenous Sustainable Development: Lessons from Central America

Submitter: MacNeill, Timothy
Associate Professor, Ontario Tech University, Canada, timothy.macneill@uoit.ca

Abstract:
Culture and the natural environment are commonly interconnected in indigenous worldviews. Indigenous peoples therefore often put themselves at the forefront of environmental protection, or are called on by other groups to do so. The relationship between the sustainable development and indigenous peoples, however, is and uneasy one. Culture, broadly construed, and indigenous culture in particular, is sidelined in the Sustainable Development Goals. The SDGs, like the Millennium Development Goals before them, construe indigenous culture as a means to the end of sustainable development instead of as a valued end in itself. The flourishing of culture is not one of the SDGs, and culture is noted only five times in descriptions of the 169 targets of the SDGs. This move is contrary to forceful calls by Amartya Sen, other prominent development experts, and indigenous peoples themselves, to view culture as constitutive of development.

What would sustainable development look like, then, if flourishing indigenous culture were given primacy equivalent to the other 17 goals of sustainable development? This question is addressed via a study of development projects based on Maya Cosmovision in Guatemala, and on Garifuna culture in Honduras. The answer is not a simple one. When sustainable development is enmeshed with indigenous culture, it changes form based on local politics, economics, social and cultural realities. In the Maya case, this involves a re-statement of the meaning of development as oppositional to economic and employment growth predicated on the extraction of natural resources. In the Garifuna case, sustainable development requires territorial anatomy and a localized traditional food system along with limited, careful, interaction with national and international economic systems. This study, based on fieldwork over the past 15 years, suggests that once indigenous culture is featured as an end, the type of development that emerges may not be amicable with what many SDG advocates conceive as "development." It does become amicable, however, with what many indigenous peoples consider "living well."

Context-sustainability through conservation infrastructure in Africa

Submitter: Narh, Peter
Research Fellow, University of Ghana, Ghana, pnarh@ug.edu.gh

Abstract:
Within the theoretical framework of sustainability and the conceptual framework of citizen science, this paper draws from currently research to expound twin concepts of context-sustainability and conservation infrastructure towards conservation of natural resources and sustainability in Africa. On-going qualitative studies in Kenya, Eswatini, and Ghana continuously reveal that functional systems to harness the diversity of knowledge and experiences in particular local contexts to tackle environmental degradation are either non-existent in stark contrast to the immense endowments of environmental knowledge and experiences in communities, or where they exist are not suited to local conditions. The paper thus addresses the problem of a lack of context in environmental conservation and sustainability theory and practice, and responds to the question of how to harness the rich diversity of local environmental knowledge, agency, and experiential endowments to create context-sustainability. I demonstrate and argue that resource conservation in the study areas is unfit to local conditions, one-sided, narrow, and divisive, where state and corporate lead conservation efforts but paradoxically these efforts result in the erosion of capacities, innovation, and leadership of resource citizens (diverse local environmental resource owners and users) and contribute to degradation of their natural resources - an entrenched cycle of misguided exploitation of local natural resources while community people bear the brunt of resource degradation. Conservation infrastructure can draw from and build on a diversity of everyday knowledge and experiences of different organizations and individuals with interests in particular natural resources to guarantee sustainability within local environmental, economic, social, and political terns. Citizen science is a key conceptual approach for this paper. Yet, while citizen science currently seeks to address participatory challenges to natural resource conservation and focuses on knowledge production between stakeholders on natural resource conservation at the local level, conservation infrastructure, it will be argued in this paper, is a step forward, enabling resource citizens to collaborative and inclusively apply, test, and refine their science in local conditions through simple infrastructure for lasting environmental conservation and equitable benefits. To this end, the key goal of this paper is to contribute to redefining sustainability, emphasizing a shift towards context-based sustainability. The paper addresses the conference theme of indigenous approaches to sustainability.

Indigenous Traditional Approaches to Achieving the Sustainable Development Goals

Submitter: Olajoku, Folawiyo Kareem
Focal Person, Osun Sustainable Development Goals, Agency, Nigeria, folajoku@gmail.com

Abstract:
Sustainable Development (SD) is defined by the Brundtland Commission as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Authors often argue that sustainability is not to be defined but to be declared, since it is an ethical guiding principle. In addition, other authors argue that the depth of

sustainable development definitions has allowed the concept to succeed politically where restricted and plain concepts such as limits to growth failed. In simpler terms, sustainable development basically means preservation. It could relate to economic preservation which could lead to economic growth and development or environmental preservation, in which various procedures are formulated to create protection for the planet and it could also mean the preservation of wildlife and agricultural products and farmland.

This study focuses on how indigenous approaches can be used in achieving the sustainable development goals. In the context of the Federal Republic of Nigeria, the Millennium Development Goals lasted fifteen years and failed to achieve most of its objectives in Nigeria; poverty, economic inequality, gender inequality, lack of quality education etc. persists. Nigeria still experiences extreme hunger and poverty due to unemployment, unfavourable government policies and under-development. Malaria persists; education is at its all-time low with 69% failure in the West African Examination Council (WAEC) (2014) and 83% failure rate in 2018, environmental sustainability has not been achieved due to the existence of bush burning, poaching and oil spillage which disrupts the aquatic and terrestrial eco-system making land farming and fish farming difficult and pollution imminent.

The study revolved on indigenous approaches, by synergising the locals through traditional and religious institutions with the sustainable development goals thereby tackling needs on a community by community basis. In the state of Osun in Nigeria, a survey was carried out and out of the 17 Sustainable Development Goals (SDGs) Goals 3 – Good Health and Well-being and Goal 4 Quality Education was of paramount importance to the populace. With the implementation of the study by the Osun Sustainable Development Goals Agency through the construction and rehabilitation of middle and elementary schools and furnishing them with learning implements as well as the construction and rehabilitation of primary health care facilities with functional equipments and availability of drugs, school enrollment increased and infant mortality decreased thereby having a healthy and educated population which aids development.

The study concluded by showcasing a positive correlation using indigenous approaches such as engaging the traditional and religious institutions thereby accommodating their cultural values and heritage using that as a link in advocating the sustainable development goals and also having a positive effect on economic growth and development.

Sustainable Territories for a Good Life: Biocultural Heritage, Resistance and Socio-Ecological Transformative Processes Among the Nahua Peoples in Mexico

Submitter: Olarte-Sánchez, Lorena E.
Ph.D. Candidate, University of Vienna, Austria, lorenae.olarte@gmail.com

Abstract:
Despite centuries of colonialism and a more recent escalation of neoliberal capitalist projects that embrace an imperial mode of living, alternative models of sustainability have resisted and thriven in many indigenous peoples' territories across the world. This paper presents findings from an empirical case study based at the Sierra Norte of Puebla (SNP). Located in east-central

Mexico, this region is characterized by a vast biocultural heritage, where the Nahua or Maseual and Totonakú peoples have maintained a way of life that favors communal organization, subsistence agriculture, and solidarity partnerships, whereas being respectful to Nature.

Relying on traditional agroforestry systems that have adapted coffee crops with native and introduced polycultures (Kuojtakiloyan), their practices have played an important role in providing with the conditions for sustainable livelihoods while helping to rescue and guard a rich biological and cultural diversity. Thus, relevant approaches and techniques promoted by the locally-based organizations, such as Tosepan (UCTT), are reviewed, focusing on the innovative aspects that address the environmental concerns of food insecurity, climate change, land degradation and ecosystems deterioration. In addition, as current mega-projects that aim for intensive and polluting resource-extraction jeopardize their sustenance, the papers analyses from a political ecological approach, the social processes that have led the Maseual peoples to organize the protection of their territories and the advancement of their traditional knowledge and ways of living. In this sense, an approach to the notion of Good Living or Buen Vivir from the Nahua perspective (Yeknemilis) is introduced as well as an envisaged input towards the bourgeoning debates of a socio-ecological transformation.

Finally, the paper concludes with an outlook on the current social movements in the region that seek to defend the historically sustainable territories and their biocultural heritage, as well as a reflection upon how these organized synergies become intrinsically a key contribution for the ultimate goal of environmental conservation and the defense of a good life for all.

From instrumental rationality to the rationality of Good Living: An analysis of the Bolivian case

Submitter: Pacheco Arreaño, Marysabel
Full-time student of PHD in Economics, Universidad Autónoma Metropolitana, Mexico, tebiteco@gmail.com

Abstract:
The orthodox economy bases its theoretical construct on the axiom of rationality, which despite having different assertions, seems to converge towards the explanatory point of the behavior of economic agents. "... Economics texts begin almost invariably specifying useful functions or individual preferences, and affirming that human beings are rational in the sense that their behavior seeks to maximize their utilities" (Basu, 2013: 70). Thus, economics as a discipline, in the transmutation of its construction, has been nourished by Newtonian physics, by Cartesian duality; replicating exact science methodologies. With the introduction of these elements, the so-called homo economicus was molded, which has been characterized as the construction of an ideal type (according to the Weberian category) that represents the person as rational and selfish, as an abstract construction emptied of empirical content, as a pure type molded beyond the limits of reality.

Faced with this instrumental rationality of the dominant economy, another kind of rationality seems to born, the which one belong to the original peoples of Bolivia, a country where more than 60% is indigenous and that population is dispersed in 36 nationalities. This rationality is

under the mantle of the principles of Good Living, which emphasizes the construction of an environmental rationality.

The objective of this paper is to put in foreground, the empirical presence of an alternative rationality that deconstructs, in turn, the economic rationality. This, from the epistemology of Good Living, which adheres to the construction of an environmental rationality, as a re appropriation of nature and as a path to sustainable development. This will lead us to ask ourselves about the changes in the economic action, product of the incorporation of Good Living in the Political Constitution of the country.

This research will begin with the search and approach to the specialty literature. It will try to follow the inductive and deductive method in terms of the analysis and systematization of the information, likewise being a case study will be informed by an analysis of facts, making use of historical, empirical and comparative material regarding the last two economic cycles in Bolivia.

Keywords: Rationality, Good Living, Ecological Economy.

OSDI's Poverty Alleviation Model

Submitter: Siddiqui, Aasim
Founder Trustee, Organization for Social Development Initiatives, Pakistan, fizza@osdi.org

Abstract:
Pakistan is a third world country with 24.7%1 of its total population living in severe poverty. Amongst the 207 million population, 63.6%2 of the people live in rural communities.

Being landless farmers, and illiterate, these rural people live under inter-generational debt traps, economic shocks, feudal systems, natural catastrophes, political instability, etc. It is very difficult for them to lift their families out of the debt cycle and so they remain in debt and misery all their lives. To add on lack of opportunities and availability of resources also deeply effects these rural communities. To curtail these challenges and pave the way for sustainability by driving mechanisms for poverty alleviation is the only solution that can improve lives of these susceptible people.

OSDI aims to uplift these rural communities from poverty by providing suitable guidance and enhanced capacity for livelihoods, along with limited intervention to the under privileged communities. OSDI has a two pronged approach which caters to the basic needs of these people by increasing their income levels and decreasing their living expenses; lowering the risks of external shocks. OSDI believes that communities grow progressively only when they are empowered. This means by increasing their efficiency and effectiveness the people cheerfully accept change.

The poverty alleviation model indigenously designed by OSDI; aims to provide prospects of holistic development to the rural communities so they may uplift themselves from poverty without compromising on their integrity. By engaging the focused communities, OSDI intends to create long term partnership with these people. Since 2009, OSDI has been actively engaged in

various projects such as agriculture & livestock development, small rural enterprise project for income generation and asset creation; education, health-care, water, sanitation & hygiene (WASH), natural resource management (NRM) and infrastructure development for capacity building, awareness raising and lowering of monthly household expenses. Another key aspect has been ensuring food security through kitchen gardening and provision of livestock to beneficiaries.

We will discuss on how positive impact was created in the lives of more than 39,000 people through our advocacy, capacity building and timely interventions in the 6 focused districts of Pakistan; from Sindh, Baluchistan and Khyber Pakhtunkhwa province. Case-studies and success stories of how lives of our beneficiaries have evolved over the years shall be unfolded in our presentation. Moreover, we shall also share details of need based projects initiated by OSDI and along with the support of the focused rural communities.

Indigenous Governance of Development in Australia: Sustainability, Innovation and Self-Determination

Submitter: Smith, Diane
Senior Research Fellow, HDR Program Convenor, & Assoc Dean (Education & Research) at The National Centre for Indigenous Studies, The Australian National University, Canberra ACT Australia, Australia, Diane.smith@anu.edu.au

Abstract:
Effective governance is arguably a powerful predictor of success in sustaining socioeconomic development and so has direct impacts on the well-being and cultural vitality of Indigenous Australians. Having secured unique property rights and resource endowments in lands and waters, cultural heritage and intellectual property, many First Nations in Australia are focussing their attention on how best to govern those assets to secure tangible outcomes from development and make life better in ways they desire. But major gaps in our knowledge hamper practice and outcomes in Australia. In particular, what constitutes 'effective governance' and 'sustainable development' for Indigenous peoples are hotly contested. Yet, while stories of disaster and deficit still dominate many public discussions of Indigenous issues, new stories of Indigenous resourcefulness and resilience are surfacing. A multidisciplinary, applied research project in Australia – Indigenous Governance of Development: Self-determination and Success – is working in partnership with six regional Indigenous First Nations to explore their understandings of 'sustainability'; how they are determining local development priorities; and the kinds of innovations they are making to governance in order for it to be fit for their purposes of governing development. This paper describes several Indigenous initiatives in Australia where the project is seeing development being reframed as intercultural and relational, and where 'sustainability' is shaped by Indigenous understandings that prioritise 'development with culture and identity' (UNPFII 2016). The broader significance of this is threefold. It directs attention to:

(i) the repertoire of Indigenous capabilities and knowledge that collectively empower inclusive, informed Indigenous choice;

(ii) the subtle Indigenous understandings of governing development in intercultural and

intergenerational contexts;

(iii) Indigenous people as being 'innovation agents' who strategically redesign and adapt their governance arrangements to secure desired development outcomes.

Early project insights suggest there are powerful positive implications for the sustainability of development outcomes when these local conditions directly inform how Indigenous Australians generate and then govern their own self-determined development agenda.

Conflict and Sustainability: A Case Study of the Trio Indigenous Peoples from the Suriname Amazon

Submitter: Smith, Gwendolyn
CEO, Perspectives of Freedom Foundation, United States, info@pofteam.org

Additional Authors:
Elena P. Bastidas, Director

Abstract:
Indigenous peoples often depart from the western concept of sustainable development, which promises to develop a modern and technologically advanced society from natural resources. They engage in an organic process of social change, which includes their needs and interests that are founded in the values and ethics they uphold to take care of their surrounding environment.

Indigenous peoples' goals and aspirations have been studied for centuries by the fields of anthropology, sociology, environment and development, using diverse methodologies. In this paper, we argue that using the lenses of conflict to study indigenous people provides a more comprehensive and insightful understanding of how they view sustainable development.

A conflict analysis framework allows a researcher to analyze the relationship between indigenous peoples and other actors in a system. The focus is put on the conflict itself, analyzing a set of complex problems between the actors with the ultimate goal of improving each actors' capacity to learn and collaborate. Most importantly, a researcher looking through the lens of conflict can acknowledge the structural power differences between indigenous peoples and other actors, such as NGOs, GOs, local and international companies, and other indigenous groups. With this holistic approach, one can depart from theories of rational choice and exchange and gain a better understanding of the worldview held by indigenous peoples.

In this paper we present a case study of the Trio indigenous peoples as they are facing climate change and are requested to participate in the national REDD+ development efforts in Suriname. A framework called VIEW is introduced, as an alternative to the conventional methods of researching views and decision-making in indigenous communities. Based on systems' approach, the VIEW framework guides a researcher to move away from the post-positivist, sometimes paternalistic, way of thinking and discover how a community judges new information against the values, which originate from their embedded historical knowledge, how they will create meaning by selecting the knowledge that makes sense in the present reality and

how they create a discourse that conveys its decisions for the future.

The case study demonstrated how using a conflict analysis framework like the VIEW, to understand sustainable development approaches can guide researchers to look beyond western concepts of sustainable development and understand the actual journey of indigenous people in the territory they inhabit through time. Outcomes from the study can help researchers and policymakers to maintain a healthy relationship with indigenous peoples, promoting equality, transparency, adaptation, time sensitivity and ethics.

Tâpwêwin "great and careful consideration": An Indigenous Partnership Research Protocol

Submitter: Wilson, Taylor
MDP Student, University of Winnipeg, Canada, taywilson260@gmail.com

Additional Authors:
Ashley Saulog, MDP Student, University of Winnipeg

Nontokozo Ndlovu, MDP Student, University of Winnipeg

Rachel Kalaba, MDP Student, University of Winnipeg

Abstract:
Over the past 15 years, there has been an expanding movement of Indigenous research in academia and sustainable development. With an increasing amount of research dollars to support research on Indigenous populations and issues, there has been a push for more Indigenous involvement. The push for Indigenous-led research is in direct response to a history of research and development on Indigenous peoples rather than with them. Many global Indigenous movements, such as the Special Rapporteur on the rights of Indigenous peoples, argue to establish an approach of 'nothing about us without us.' Much research and development still being done with Indigenous populations is designed and constructed through a Western paradigm with Indigenous peoples as the objects of rather than the subject of their own research and development priorities. This often involves research and development questions stemming from non-Indigenous researchers, with little to no Indigenous involvement at all stages of the projects, and often does not acknowledge Indigenous self-determination and data ownership (OCAP, 2019). All of which can be detrimental to these populations for the sake of academia and development. Maori scholar, Smith (1999), believes that research should enable, heal, educate, be self-determining, and be informed by and respect the community. In an effort to embody Smith's directive and to counter harmful and extractive research practices, the authors propose the use of a research partnership protocol: Tâpwêwin. Tâpwêwin is a research partnership protocol that centers Indigenous knowledge, self-determination, reconciliation, and research accountability. The title of this framework, Tâpwêwin, was chosen by the authors for two reasons. The first reason is based on its translation. Tâpwêwin is a Cree word meaning "speaking the truth" or "speaking with precision and accuracy." The second reason is based on its context. It is often used to speak in relation to treaties or partnerships. When treaties are signed, signatories are obligated to speak with Tâpwêwin (Cardinal & Hildebrandt, 2000). The protocol

is aimed at two research and development outcomes. The primary outcome is to ensure that Indigenous peoples are involved at all stages of projects – from inception to design, from data collection to interpretation, and from dissemination to ownership. The secondary outcome is to create a reflective and reflexive research and development design process where both non-Indigenous and Indigenous researchers may form an understanding of their ideologies and their position in relation to the research and development they are doing. The protocol is embedded in reconciliation, self-determination, and hopes to ensure that Indigenous peoples are at the forefront of the research and development process. Tâpwêwin was created specifically for these kinds of processes to consider Indigenous epistemologies, ontologies, methodologies, and axiologies when it comes to partnerships involving Indigenous peoples. A protocol such as Tâpwêwin is imperative when seeking to understand and conceptualize the Sustainable Development Goals in a way that reflects the lived realities and self-defined priorities of Indigenous peoples globally.

Exploring Risky Decision-making Under Threat Conditions: How Fish Poisoning Challenges the Food System of Indigenous Communities in the Pacific?

Submitter: Zheng, Lingfeng
PhD Candidate, The University of Tokyo, Japan, Japan, lingfeng.zheng@s.k.u-tokyo.ac.jp

Additional Authors:
Aya Suzuki, Associate Professor, University of Tokyo, Japan

Joeli Veitayaki, Associate Professor, University of The South Pacific, Fiji

Abstract:
For the Pacific Island communities, fish provide the primary source of animal protein and micro-nutrients. However, food shocks led by occasional fish poisoning outbreaks have put the health and sustenance of local communities under threat. As the most prevalent food-borne disease in the Pacific affecting up to 20,000 people each year and rising, ciguatera fish poisoning (CFP) is caused by ingestion of a wide spectrum of coral reef fish that contain bio-accumulated marine toxins. Climate change is altering the patterns of environmental factors including temperature and cyclone events - which act as accelerators for toxin growth and abundance and hence a higher risk of CFP. Once poisoned, one will avoid consuming fish, replacing this natural food source with other food source for differing lengths of time. Though education campaigns regarding the danger of fish poisoning and risky fish species have been launched, risky consumption behavior still exists for many islanders.

This research combines quantitative data and models to understand food choice and utilization under the risk of fish poisoning, and impacts of these food shocks on household-level food security, based on original data obtained from Gau island of Fiji. Our results reveal the significant role of traditional knowledge and practices, as well as risk perception and risk preference on the repetitive risky consumption behavior, after controlling the food poisoning experience of indigenous islanders. Temporal to long term change of food choice after the food shock is explained by the financial and food constraints among local households.

The results of this study could contribute to better understand the vulnerability of indigenous islanders' food systems, and develop more effective intervention programs on food literacy and public health. Moreover, as current research on food security issues are mainly concentrated in the least developed countries and food-scarce areas, research on food choice and security in the Pacific Islands could offer a glimpse of food availability and utilization globally, and provide policy frameworks to tackle the food security issue, and supplementary evidence to develop climate-resilient livelihoods.

Achieving SDG 6: Reflections on models, methods, cases and practices

Low Impact Development and the Sponge City Model: Planning for the Sustainable Future of Urban Water

Submitter: Bilyk, James
MDP Student, Waterloo, Canada, lswatuk@uwaterloo.ca

Additional Authors:
Ivana Jaciw-Zurakowsky, M.Eng Student, Waterloo

Rebecca Cheskes, M.PACS Student, Waterloo

Abstract:
Water is the most important resource, and with the rapid spread of urbanization, human needs for water are increasing while urban water management is becoming increasingly difficult. Sustainable Development Goals 6.3 and 6A have prioritized clean water and sanitation and decreasing the negative human impacts on the environment. Low impact development (LID) is a practical means by which cities can bring back aspects of natural hydrology that have been lost through urban infrastructure development, on both small and large scales. By intensively introducing green infrastructure on a city-wide level, the recently emerging concept of the sponge city is one example of how LID can be applied on a mass-scale. This paper provides key information on LID and makes recommendations for successfully applying such processes to urban settings. It argues that LID is the right path forward for tackling urban water management towards SDGs 6.3 and 6.A, but that the sponge city model may be too ambitious for most municipalities to feasibly implement.

Gender Specific Vulnerabilities to Water Insecurity

Submitter: Fleifel, Eliana
MDP Student, Waterloo, Canada, lswatuk@uwaterloo.ca

Additional Authors:
Jodi Martin, MDP Student, Waterloo

Affiah Khalid, MDP Student, Waterloo

Abstract:
Water is an essential resource for both men and women. Despite the ample amount of water available in various forms, both men and women continue to experience unequal rights to water on the grounds of access, distribution, collection, and quality. This paper examines the particular vulnerabilities and burdens faced by women and girls in rural regions in Sub-Saharan Africa to conditions of water insecurity, taking a particular look at the disproportionate dangers and health risks associated with fetching water, sanitation, and hygiene (WASH) access, and water governance. Outcomes of the research indicated that water insecurity among rural women and girls in Sub-Saharan is attributable to inequitable responsibilities around water-related tasks that invite exposure to violence, opportunity cost, disease, and female disempowerment. To address these issues, water interventions and key pathways for positive change have been recommended for rural regions in Sub-Saharan Africa to progress towards achieving greater gender equity around water.

Agenda 2030 - Challenges and Opportunities of Transboundary Water Governance: From the General to the Specific

Submitter: Latif, Farhan
MDP Student, Waterloo, Canada, lswatuk@uwaterloo.ca

Additional Authors:
Mahmoud Abdelhay Radwan, MDP Student, Waterloo

Peter Kiiru Kariuki, M.PACS Student Waterloo

Abstract:
SDG 6.5 aims to implement integrated water resources management (IWRM) at all levels, including through transboundary cooperation as appropriate. This is a very broad target and, therefore, hardly actionable. Most, if not all, of the world's transboundary river basins exhibit a wide range of existing water resource issues that are local and unique, so demanding particular actions to ensure that SDG 6 is achieved. Model building and top-down approaches to manage, distribute and govern water are less likely to improve fair, sustainable and equitable distribution of these resources. Thus, to achieve SDG 6.5 in a manner that benefits all stakeholders, it is imperative that stakeholders move from the general goal of treaty-based inter-state cooperation to highly specific, localized, generally accepted policies, procedures and practices. Many studies show that institutional fragmentation is a barrier to the evidence-based collaborative decision-making that is essential to achieving SDG 6.5, safeguarding the environment (SDG 6.6), and advancing socioeconomic development (e.g. SDGs 1 through 12) among transboundary river basin states. Transboundary basin-based initiatives such as the Nile Basin Initiative (NBI), the EU Water Framework Directive and the Mekong River Commission (MRC) show that there are different but related pathways to achieve IWRM in a river basin. However, success is much more than simply signing treaties and agreements. Current challenges among various transboundary river basins show that water agreements and treaties are often considered timeless while the geopolitical environment, demand for water, and consumption patterns within transboundary countries are constantly changing. In this context, 'timeless' looks more like 'inflexible'. If there is not a process for ongoing adjustment in agreements, it can lead to conflicts and gaps that give

rise to less equitable water governance practices. Increasing operational arrangements for water cooperation in water basins through agreements are less likely to be meaningful unless the operational arrangements are equitable and promote sustainable mutual growth for all stakeholders at all levels. In this paper, we draw on different case studies - with a specific emphasis on the Nile River - to illustrate necessary and viable ways and means of moving beyond the general goal of getting to agreement toward actionable elements that will ensure environmentally sustainable, socially equitable and economically efficient water access, use and management in transboundary settings.

Analyzing the Biophysical Characteristics of the Grand River Watershed and Evolving Impacts: Protecting Watershed Health Through Strategic Management

Submitter: Lebelo-Almaw, Ruth
MDP Student, Waterloo, Canada, lswatuk@uwaterloo.ca

Additional Authors:
Sarah Doyle, MDP Student, Waterloo

Serena Pelka, MDP Student, Waterloo

Samantha Linton, MES Student, Waterloo

Abstract:
SDG 6 Target 6.6 places emphasis on the protection and restoration of water related ecosystems. The assumption is that for SDG 6 itself to succeed, the resource base must be treated as more than simply a source for human wants and needs. Nature's intrinsic value must be recognized and respected. However, watersheds face a variety of challenges as social and environmental variables transform their biophysical characteristics. The health of a watershed is directly impacted by the associated activity taking place within its region. Based within the Kitchener, Waterloo, Guelph, and Cambridge region, almost a million people live within the Grand River watershed in Southern Ontario, Canada. The region has seen an exponential increase in urbanization and agricultural practices, all variables which have affected the health of the Grand River watershed. This paper analyzes the biophysical characteristics found within the Grand River watershed and uses those findings to highlight the environmental and socio-economic variables that have influenced the health of the watershed. It outlines how the Grand River watershed and its management strategies work in tandem with SDG 6, particularly targets 6.5 and 6.6. The findings of this paper show that while the Grand River Conservation Authority lays the basis for achieving Targets 6.5 and 6.6, success is hampered by fragmentation of authority, limited human and financial resources, and information gaps. The paper concludes that the coordinated pursuit of cross-sector partnerships can help overcome these challenges.

Climate change impacts on current WEF Nexus challenges: A comparative assessment of WEF Nexus adaptation in developed and developing countries

Submitter: Mansoor Pal, Fatima

MDP Student, Waterloo, Canada, lswatuk@uwaterloo.ca

Additional Authors:
Claudia Lesage, M.ClimChange Student, Waterloo

Benedicta Quaye-Kumah, MDP Student, Waterloo

Abstract:
With global projections indicating a growing demand for freshwater, energy and food, the formation of the Water-Energy-Food Nexus approach seeks to cohesively address causes and effects and promote sustainable solutions. However, with climate change impacts threatening to exacerbate vulnerabilities and further disrupt ecosystem services, the pre-existing challenges of the WEF nexus are expected to worsen. This paper examines current resource use efficiency challenges across the WEF nexus and how climate change may intensify these challenges. To help understand effects and adaptation strategies, the paper comparatively investigates climate change related adaptation strategies across developed and developing countries and regions. It concludes that grand strategies are likely to fail no matter how rich the country or region. Coordinated, small scale approaches that simultaneously aim to align resource uses across sectors and toward appropriate developmental targets may better assist achievement not only of SDG 6 as a distinct goal, but water security across sectors, users and interests.

Toward SDG 6: Exploring the Potential for Wastewater Reuse in Nairobi, Kenya

Submitter: Swatuk, Larry
Professor, Waterloo, Canada, lswatuk@uwaterloo.ca

Additional Authors:
Lesley Rotich, Graduate Student, University of Waterloo

Abstract:
SDG 6, Targets 6.1 and 6.2 focus on delivering and ensuring drinking water and sanitation for all people. There is considerable possibility for achieving SDG 6 and these targets in particular through improved use and management of water currently available to people both as blue water (rainfall and accessible groundwater) and as grey water. Put differently, there is great potential to make more of the water that we already have. Waste water reuse is proving to be an economically and environmentally sound demand management strategy, especially with climate change uncertainties. To establish the current use and possible uptake of greywater reuse in Kenya, 27 in-depth interviews were conducted with the main stakeholders of water recycling within Nairobi and its environs. They included government officials, technical experts of recycling systems and formal and informal greywater users. Results indicate that grey and waste water recycling can not only reduce fresh water demands, but the systems are also important in reducing the amount of untreated waste water being discharged into the environment. Public authorities and implementers need to engage with other stakeholders to provide regulation and standardization of the industry. Improving the level of knowledge of these systems among members of the public would also build trust and increase the uptake of these systems.

Ensuring Water Security in Indigenous Communities throughout Canada

Submitter: Ugwuegbula, Lateisha
MDP Student, Waterloo, Canada, lswatuk@uwaterloo.ca

Additional Authors:
Alexander Wightman, MDP Student, Waterloo

Darlene Coyle, MES Student, Waterloo

Abstract:
In Canada, Indigenous communities suffer disproportionately from the lack of access to safe drinking water. The government of Canada has committed significant investment into improving infrastructure aimed at ending long-term boil water advisories. This paper argues that the real issue lies in outdated and insufficient water resource management. Water resource management has become a fragmented issue between federal, provincial and municipal governments in Canada. The problem is worsened by age-old colonial governance models that have, and continue to, exclude Indigenous peoples from decision making and ignore the use of Indigenous Traditional knowledge in understanding water as an invaluable natural resource. Therefore, in order to create long-term solutions to water security in Indigenous communities, Canada needs to remodel how water resources are managed. Inclusive and equitable solutions will not only improve water security across Canada it will also aid in the pursuit of reconciliation.

Pedagogy & Delivery Methods for Sustainability Education, Training, and Outreach

Inclusive Education and the unique experiment at KISS Odisha

Submitter: Ahya, Nikita
Research Scholar, Deputy Director, Networking, KIIT University and KISS University, India, fearlessniki@gmail.com

Additional Authors:
Achyuta Samanta, Founder, KIIT and KISS

Abstract:
The Indian Parliament introduced Education as a Fundamental Right in 2002 and Right to Education (RTE) Act in 2009. While the Gross Enrolment Ratio (GER) of students has improved considerably, the Annual Status of Education Report (ASER), 2018 brings out the poor learning outcomes and a considerable gender gap in the indigenous communities. The paper seeks to highlight the unique experiment of a social entrepreneur Dr. Achyuta Samanta called Kalinga Institute of Social Sciences (KISS) to usher holistic education to the alienated tribal students of Odisha and its best practices and how it seeks to achieve SDGs. KISS is a residential school providing free education, room and board, medical care, vocational, athletic and artistic training to 27,000 indigenous children from 62 different tribal groups. Located in Bhubaneswar, the

capital of the state of Odisha, it is funded primarily by profits from its sister institution, the Kalinga Institute of Industrial Technology (KIIT), a well-respected for-profit university; both institutions were founded by him. Bereft of any public funding, the model has ensured holistic development of the students in academics, sports and skilling, has done away with gender discrimination, brought dignity to the girl child and inculcated lifetime skills with an indigenous control of Education. The paper seeks to present how KISS is the blueprint of 5P's in action- " People Partnering for Peace and Prosperity on the Planet". The unique challenges of quality, underlined by Sustainable Development Goals (SDG) at the Oslo summit, can be achieved through sustained societal commitment and allocational priority by the government. As education is a significant launch pad for improving Human Development Index (HDI), the role of girl child education, vocational training and thrust on extracurricular activities as the public policy leitmotif for the socially deprived sections of the society is indispensable.

Sustainable development tertiary education and training: Strengthening the transformative learning experience

Submitter: Bedi, Gitanjali
Lecturer / Senior Learning Coordinator, Monash Sustainable Development Institute, Monash University, Australia, gitanjali.bedi@monash.edu

Additional Authors:
Assoc Professor Annette Bos, Monash Sustainable Development Institute, Monash University

Abstract:
The need for sustainable development education and enabling pedagogy to create transformative learning and change for a more resilient future has long been acknowledged and is gaining traction around the world. Consequently, the diverse array and number of tertiary education programs featuring sustainable development and / or the Sustainable Development Goals (SDGs) has increased. However, concern is growing amongst sustainability educators around observations that following participation in these programs students are still being 'left without real insight, commitment or a sense of their position regarding meaning, beliefs and action related to sustainability' (Ceatter & Ceulemans 2017).

Concerted efforts are being made by many within the sustainable development education community worldwide to address these concerns, including at Monash Sustainable Development Institute (MSDI). MSDI is a leading interdisciplinary research and education institute for sustainable development and is driven to find real solutions to some of the most significant challenges facing our world today. Its education team offers formal (accredited) courses, executive education and extra-curricular training programs that enable people and organisations to engage with and respond to some of the biggest environmental, economic and social issues facing our world today. Through its academic and professional courses, MSDI is creating a global network of leaders and thinkers who have the capacity to collaborate, lead and deliver positive societal change.

MSDI's pedagogical approaches draw strongly on Education for Sustainable Development principles and pedagogy (UNESCO 2014) enabling transformative learning and the building of

capacity for the SDGs. It does this through: drawing on learners' prior knowledge; encouraging active participation thereby engaging learners in contributing to each other's learning processes; establishing the foundations for critical and analytical thinking; and laying the groundwork for collaborative, interdisciplinary problem-solving and decision-making. MSDI educational design integrates systemic thinking, problem-based learning, interdisciplinary learning, 'real world' engagement, skills and competency training, case studies and field work, peer to peer feedback, teamwork, and reflexivity.

MSDI educators continuously review and revise teaching and learning approaches to suit different contexts, engaging learners in providing feedback on what works and what doesn't. Over several years, MSDI has gained insights into effective pedagogical approaches and skill sets that provide students with increased capacity to recognise, understand, and address the complexity of sustainable development.

This study focuses on three distinct sustainable development education programs (masters, undergraduate and extra-curricular training) designed, developed and delivered by MSDI. The first program is a masters unit on interdisciplinary sustainable development with teams of learners working in collaboration with external industry partners on consultancy projects addressing complex organizational challenges; the second is an undergraduate 'capstone' unit requiring students to work alongside businesses undertaking sustainability impact assessments and interview businesses creating positive SDG impacts; and the third is an extra-curricular sustainability leadership experiential training program culminating with students working on real life on-campus sustainability projects with Monash University.

Overall the study reveals a range of pedagogical approaches and delivery methods suited to differing contexts all involving collaboration with external and internal partners. The study highlights challenges in designing real world learning and provides insights into overcoming these to create enabling learning environments for transformative change towards achieving the SDGs.

The SDG Impact Assessment Tool - a free online tool for self-assessments of impacts on Agenda 2030

Submitter: Eriksson, Martin
Network Manager of SDSN Northern Europe, Gothenburg Centre for Sustainable Development, Sweden, martin.eriksson@chalmers.se

Additional Authors:
Anders Ahlbäck, Project manager, Gothenburg Centre for Sustainable Development

Mathias Gustavsson, PhD/Project manager, SWECO Sweden

Nina Silow, Communications officer, Gothenburg Centre for Sustainable Development

Jan Pettersson, Professor/Director of Gothenburg Centre for Sustainable Development

Abstract:
Agenda 2030, with its Sustainable Development Goals (SDGs), is one of the most ambitious and important global agreements in recent history. While the Agenda first and foremost is a political framework aimed at national governments, the SDGs is also a framework towards which the sustainability of almost any activity can be evaluated. As emphasized by the UN – the SDGs are interlinked and interconnected into one 'whole'. Evaluating SDG impacts is a complex task that requires multidisciplinary thinking and a holistic view. Hence, tools that employ a structured approach to SDG impact evaluation are needed.

The SDG Impact Assessment Tool is a free online tool that visualizes the results from a self-assessment of how an activity, organization or innovation impacts the SDGs. It aims to stimulate users to get a better understanding of the SDGs, the complexity of sustainable development and how different activities in society impacts the SDGs. The tool helps the user to take on the SDGs in a simple and structured approach, and outputs a graphical visualization of a SDG Impact Assessment.

The SDG Impact Assessment Tool methodology involves five steps. As the SDGs spans a wide competence spectrum, the first step encourage users to involve a group of people with different competencies and perform the assessment in a workshop format. In the second step, a description of the object of the assessment needs to be provided. The description should give the background of the object under assessment and provide the explanations needed to fully understand it. The description should also define and frame the object being assessed. Typical framing questions include the components of the assessment, the actors and stakeholders involved, and the spatial and temporal limits of the assessment. In the third step, the users should sort the SDGs in terms of relevance for the object under assessment. This step aims to stimulate thinking about the relations between the object and the SDGs and enable the user to subsequently assess SDG impacts in order of relevance to the study object. In the fourth step the impacts of the study object on each individual SDG is assessed. The self-assessed impacts are categorized as Direct Positive, Indirect Positive, No Impact, Indirect Negative, Direct Negative or More Knowledge Needed. For each SDG, the selected impact category must be motivated and explained. Here the rationale for the categorization should be given, and qualitative or quantitative arguments, as well as references, can be included. The last step in the methodology encourages users to formulate a strategy on how to further improve the sustainability characteristics of the object.

The tool has successfully been used by SDSN Northern Europe to map SDG impacts from innovative Solutions in the Solutions Initiative Forum (SIF) events (https://www.unsdsn-ne.org/our-actions/solutions-initiative-forums/) and the accompanying Solutions Reports. These events and reports has been gaining positive evaluations from participants and from the owners of the Solutions. In follow up surveys, the Solution owners have reported that the knowledge gained from the SDG Impact Assessment has helped them improve and formulate their sustainability thinking and their business case.

Furthermore, there are ample opportunities to use the tool in Sustainability Education. When students evaluate how an activity, organization or innovation impact the SDGs, they learn more about Agenda 2030 and the opportunities and difficulties of implementing the SDGs. The tool is a user-friendly resource for teachers when arranging case study exercises or workshops, and

represent a starting point for deepened discussions about sustainability and SDG Impact Assessments. Students, or any other user, can create their own assessments and work on them at any time.

Since the results from the tool are dependent of the knowledge level and ambition of the users, they should not be used as a sustainability label of a product or service, nor be used for promotion or as sales arguments for one product or service over another. Through its systematic approach, the tool provides a structured method to assess complex questions about sustainability and map impacts on the SDGs. The result of an assessment can be a strategic background to make informed decisions on actions to reduce negative impacts, or to seek additional knowledge or verification of results. As such, the tool can contribute to strategic work on sustainability.

Cultivating Peace through Teaching History in Rwandan Secondary Schools: Opportunities and Challenges

Submitter: Fried, Brittany
Undergraduate Student, School of Foreign Service, Georgetown University, United States, blf32@georgetown.edu

Abstract:
Education has the ability to cultivate a Culture of Peace or Violence. In Rwanda, pre-1994 formal education became a tool for inciting violence by presenting a discriminatory and identity-based view of history. In the 23 years since the genocide, the Rwandan government has propagated education that promotes national unity and decreases division amongst students. The 2015 national competence-based curriculum (CBC), which incorporates the holistic idea of Education for a Culture of Peace (ECOP), is one pertinent example. This study addresses: (1) the historical narrative portrayed in the secondary-level national curriculum and how it is taught, and (2) the opportunities and challenges to cultivating a Culture of Peace in secondary-level Rwandan history students. Data collection in this study occurred first through the creation of a unique framework for ECOP based on existing literature and assessment of the curriculum against its indicators. Second was a case study of one public and one private secondary school in Kigali, which included: interviews with NGO and government stakeholders in CBC development, teachers, and school administrators; focus groups with students and educators; and class observation. It was found that ECOP content and pedagogy are widely prevalent in the CBC, however their implementation is severely hindered. In large part that is due to insufficient resources and teacher training. This study provides recommendations based on these findings.

Mindscapes and Landscapes: Grounding Sustainability Learning and Socio-Ecological Systems Education Under the Feet of Africa's Youth

Submitter: Offei Manteaw, Robert (Bob)
Research Fellow, Center for Climate Change and Sustainability Studies, University of Ghana, Ghana, bobmanteaw@yahoo.com

Abstract:

Human-environment interactions are inevitable and have defined Africa's socio-ecological development processes for many years. However, despite growing evidence of climate-induced environmental changes and associated risks and impacts in Africa's different communities, most people, especially young people, living in their different 'places' seem to lack awareness, knowledge and understanding of current environmental changes in their communities. Perhaps, even more worrying is the fact that many young Africans do not know and understand how their individual and collective engagements with nature influence current socio-ecological systems changes.

There seem to be a total disconnect between the 'mindscapes' of Africa's youth and the landscapes they occupy. This, undoubtedly, makes both climate change and current socio-ecological systems changes an educational issue and a learning affair which requires pragmatic and innovative pedagogies that are efficient and effective to influence the thinking, knowledge and dispositions of Africa's young people towards sustainable actions. The reality, however, is that even though the learning imperative is urgent, both formal and non-formal educational systems in most of Africa remain ill-equipped and have been too slow to provide the requisite educational response to current sustainability challenges.

Educational thinking and practice in Africa, for the most part, have focused on narrow economic rationalities that have so grievously contributed to our unsustainable present. Young people, as products of current educational philosophies in Africa's schools, especially higher education, lack the awareness, understanding the requisite skills to address sustainability challenges in their local communities. Simply, the mindscapes of Africa's youth are totally disconnected from the landscapes that support their very existence. This disconnection has contributed significantly to the lack of leadership in current climate and environmental change challenges in many communities.

This paper foregrounds critical place-based education as an innovative teaching and learning approach to sustainability education. Using examples from Higher education in Ghana, the paper demonstrates how teaching and learning could be 'grounded' in local realities and under the feet of learners to facilitate the making of creative connections between intellect and experience. The paper therefore discusses students' experiential and field –based learning programs and how those processes ultimately influence students' socio-ecological knowledge development as well as their dispositions to lead and act for sustainability.

More importantly, such processes bring students into contact with local realities while providing them with the needed knowledge and skills to explore transformative solutions. The paper concludes that current socio-ecological systems changes require pragmatic responses from education and this can only happen through intentional teaching and learning efforts to connect learners' mindscapes to the landscapes that support their existence.

Habitat Marte as a tool to promote the SDG in higher education

Submitter: Rezende, Júlio
Researcher, Federal University of Rio Grande do Norte – UFRN, juliofdrezende@hotmail.com

Additional Authors:
Davi Alves Feitosa de Souza, Student, Federal University of Rio Grande do Norte – UFRN
Dalmo Múcio Silva dos Santos, Student, Federal University of Rio Grande do Norte – UFRN

Abstract:
In Brazil is operating a very innovative experience related to promote Higher Education connected with Sustainable Development Goals: Habitat Marte, a Mars, Arid and sustainability research station based in Brazil (www.HabitatMarte.com).
In Habitat Marte happens research missions connecting possible technologies that would be applied to arid an semiarid regions, but also to Mars and Moon space habitats. Habitat Marte had received organized groups from public and private schools and researchers from universities. In April 2019, was applied a survey to evaluate how the visitors evaluates how the initiative can be perceived as a place of Sustainable Development Goals practices applied to children and youth.

This study aims to measure the impact of Habitat Marte actions in the development of empowerment for the 17 SDGs.

Was applied a questionnaire containing 12 questions to a group of 24 students from local public school, in the age group from 14 to 18 years old.

As result was possible identify based on the survey: 65% are women and 35% are men, a good indicator of participation of women in education activities, but also a worry about why boys are not participating in school activities. Some results related to Sustainable Development Goals were: 1 - All visitors realized that Habitat Mars is a space that contributes to quality education (Goal 4); 2 - 96% realized that girls should be stimulated to scientific careers (Goal 5 – Gender equality); 3 - 91% considered Habitat Marte activities as very innovative (Goal 9); 4 - 83% were interested to participate in a mission of Habitat Marte; 5 - 87% were interested in the aerospace area when visiting the Habitat Marte; 6 - 91% considered Habitat Marte partnerships with the school are positive (Goal 17).
Was possible observe that Habitat Marte is contributing to spark the interest of youth to Science, Technology, Engineering, Arts and Math (STEAM) careers and build more strong ties integrating the academia community to Sustainable Development Goals. Frequently the SDGs had been presented in all lectures done by Habitat Marte representatives. The practices of SDG operated by Habitat Marte are contributing each day to higher popularization of 17 Goals inside the academia.

Was possible identify that Habitat Marte is promoting knowledge, skills, and motivation to address the SDGs. The initiative had done lectures in schools, universities and events stimulating the audience be committed with a Quality Education (SDG 4) and scientific careers. University students former participants of Mars analog research missions also present a higher commitment to develop a researcher career through masters and doctoral programs.

The Sustainable Development Goals can be a strategic tool to students from fundamental, high schools and bachelors perceive how their process of learning and scientific

career development would be connected with a meaning of life and a higher purpose of responsible action in the planet.

Integrating a Social Change Skills Framework in Higher Education with a Systems Perspective of the UN SDG's

Submitter: Schulz, William
Director, Center for Social Change, Walden University, United States,
william.schulz@mail.waldenu.edu

Abstract:
This proposal will illustrate how Walden University is integrating our Social Change Skills Leadership Framework with a more systems-oriented approach to the United Nations' 17 Sustainable Development Goals (SDGs) framework to assure that our curricula help our higher education students enhance their skills as social change leaders. We will describe a research-based systems view of the UN SDG elements, and then show how our Features for Social Change Skill Development Framework can help higher education curriculum designers and faculty make direct connections between what students are learning and how they can exercise those skills to improve the world and meet the UN 2030 goals.

Walden has begun a process of formally integrating our Social Change Skills Leadership Framework with the United Nations' 17 Sustainable Development Goals (SDGs) framework to assure that our curricula help students enhance their skills as social change leaders. We have formally integrated our skills framework with our program assessment and revision processes, and are beginning to socialize the integrated framework with our faculty, our course development subject matter experts and the learning community more generally.

We are at the beginning of this process, but we have been able to successfully integrate the Social Change Skills Framework within our formal governance and assessment process (which required faculty input and approval), and we are now using the integrated framework (with SDG's) to help inform both new and revised curricula, so that our students can see how their knowledge and skills can be deployed within the United Nations 2030 goals.

This effort is directed to help students integrate their day-to-day learning and skill development in their programs, within a larger narrative of what they can do with these skills to help affect positive social change in the world. As such, our integrated framework is one that can be used to frame learning assignments during course design, to help students "close the loop" in reflective learning, and to help us with formal assessment of learning and skill development.

Because we've embedded the skills framework within our formal assessment processes, it is scaled to cover all programs and courses. We are designing a "workbook for curriculum designers", based on the skills framework, to help them further embed and make the integrated framework accessible and usable across the entire university.

As the framework is deployed within course design, we hope it will assist faculty in helping students connect their work/new knowledge with real, tangible opportunities to exercise their

skills as social change scholar -practitioners, increasing faculty's effectiveness and satisfaction with respect to social change skill development and, in the long run, to helping affect change towards the UN's 2030 goals.

Analyzing Student Perceptions of Success in Sustainable Development MOOCs

Submitter: Sharma, Neha
Education Manager, SDG Academy, India, neha.sharma@unsdsn.org

Additional Authors:
Amber Webb, Head of Program and Partnerships, SDG Academy, sdgacademy@unsdsn.org

Abstract:
Massive Open Online Courses (MOOCs) provide an effective platform for providing access to high quality and wide-scale education at a significantly lower cost. Over the last several years, the promise of MOOCs has mobilized movements to 'democratize' learning and transform global education. However, lower completion rates of these courses have time and again, raised a question on the effectiveness or success of open online courses. Data from courses offered on edX, Coursera and Udacity illustrate that the majority of MOOCs have a completion rate of less than 10% with a median average of 6.5% (Jordon, 2014) and these low completion rates have not improved over the past 6 years, as was demonstrated in a recent study on 565 courses offered by MITx and HarvardX on edX (Ruipérez-Valiente et al., 2019).

Whether completion rates should be used as an indicator for determining the success of a MOOC has also been discussed and frequently debated (DeBoer et al., 2014, Koller et al., 2013). MOOCs provide an open learning environment that is primarily driven by the users' choices and preferences. Learners from diverse environments and backgrounds join the courses with different motivations and hence have different ideas of 'success' with respect to the MOOC. They aim to gratify heterogeneous desires such as meeting new people or general curiosity. Obtaining a completion certificate is only one of the intended objectives. In a study on learner motivations by Stanford University (Kizilcec et al. 2015) only about half of the learners reported enrolling with the intention to earn a certificate of completion.

Learner behavior also varies between technical and non-technical courses. While technical courses such as in the field of computer sciences, data analytics and statistics are more skill based and have immediate vocational impact, non-technical MOOCs provide knowledge for future academic or professional capacity building. There is a gap in the research literature on why the most popular MOOCs are the ones technical in nature and what motivates learners to opt for online courses in social disciplines.

This study aims to investigate whether the learner motivations--and hence their definition of 'success' in a MOOC--changes from those identified in prior research when considering courses in the field of Sustainable Development. It uses SDG Academy courses on edX as a case study. It also aims to analyze learner performance on the identified success indicators and provide recommendations on how a MOOC's 'success' should be defined in order to be inclusive of all populations of learners. The study also intends to quantify how enrollment and learning in

Sustainable Development courses are impacted by different variables of an online learning environment, suggesting strategies that can be implemented in the MOOC design to enhance the learner experience and improve perceptions of 'success'. While the focus of this research is specifically on MOOCs in the field of Sustainable Development, insights gained from this study may be applicable when considering learners' motivation, success, and completion in other areas of study.

Can theory-U be a valid model to design a university course for transdisciplinary SDGs education? A retrospective view on the "Value Creator" course in the Bachelor of Business Administration at Windesheim Honours College.

Submitter: Sonetti, Giulia
Assistant Professor, Politecnico di Torino, Italy, giulia.sonetti@gmail.com

Additional Authors:
María García Alvarez, Lecturer, Windesheim Honours College

Abstract:
Sustainability, human rights, global health, social responsibility, circular economy, global warming, poverty and education themes are firmly connected, with complex and still unknown trade-offs. Capacity building for students enrolled in business programs at higher education institutions requires appropriate pedagogy combining theory and practice, project and change management, business and research with the UN Global Sustainable Development Goals (SDG). One of the approaches for teaching how to embrace complexity, change and transdisciplinarity are the Theory U as propounded by Otto Scharmer (2009). This revolutionary theory urges the leader to suspend superficiality, judgmental attitudes, and preconceptions and propose practical tools to enhance deep and empathic listening with an open mind, open heart, and free will to 'presence' the emerging future even as it occurs. This paper reviews a critical aspect of leadership education —that of responsible change makers - and applies it to key canons of Otto Scharmer's Theory U. The venture takes the Value Creator course in the "Global Project and Change Management" Bachelor of Business Administration (Windesheim Honours College, NL) as a case study to look retrospectively into its design and student's impact about SDGs literacy. The paper analyses the course programme through the lens of the Theory U phases and methods, considering real projects with companies and organisations from the first year onwards, the international internship and professional career counselling and the coaching by fellow students and teachers on how to lead a project team and how to put innovative ideas into practice. During the Value Creator semester, students are expected to link their ideas and value to the SDGs. In the beginning, they follow several workshops and different MOOCs to learn new tools and methods to address the complexity and deal with uncertainty. After a few weeks, they are engaged in professional networks outside the college to create a real societal value, based on the 4 E-Model: Explore, Engage, Elaborate and Evaluate. This model is overlapped with the Theory U one, which entails travelling along the stages from 'downloading' to ´co-creating', and from 'seeing' to 'prototyping'. Conclusions of this explorative exercise draw methodologies and criteria on how to ensure a long-term contribution of academia to sustainable futures, including how to fill the "knowing-doing gap" (a disconnect between our collective consciousness and our

collective actions) to bring this tension to the foreground, especially starting from ourselves and how we live, and reaching the current leaders of tomorrow.

Whakawhitinga kōrero: Interdisciplinary video dialogues on sustainability

Submitter: Sweet, Tonya
Senior Lecturer, Design for Social Innovation, Victoria University of Wellington, New Zealand, tonya.sweet@vuw.ac.nz

Additional Authors:
Dr. Andrea Milligan, Associate Dean (Teacher Education)

Dr. Meegan Hall, Assistant Vice-Chancellor (Mātauranga Māori)

Abstract:
The learning and teaching resource, Whakawhitinga kōrero: Dialogues on sustainability, entails a series of videos that introduce the SDGs as they relate to local and global sustainability challenges, with a prioritisation on addressing the place-based context. A staff-driven collaborative production of Victoria University of Wellington in New Zealand, this resource was developed in response to the need to educate students in holistic concepts of sustainability while encompassing diverse interdisciplinary perspectives and that reflect regionally and culturally-significant sustainability issues. The SDGs function as the framework for the videos where they reinforce the inherent interdisciplinarity and interconnectivity of broad-reaching sustainability concepts – from poverty to climate action, and from gender equality to the requisite partnership for the goals themselves. Each video centres on one-to-two specific SDGs, and these are addressed via dialogue between university staff, alumni, and local business and government representatives from across fields and sectors. The interjection of multidimensional viewpoints affords a balanced and democratic frame of reference in understanding the SDGs, while also offering an interpretation of the goals in a manner that more accurately mirrors the complexity and universality inherent in the SDG framework. Within the place-based context, students are introduced to cultural concepts that foster an understanding of sustainability as they relate to Māori (the indigenous people of New Zealand) values, including: mātauranga Māori (indigenous knowledge of native New Zealanders), kaitiakitanga (guardianship, care and conservation of nature, people, and ideas), and whanaungatanga (the close relationships that are formed through collective experiences, as evidenced through the interdisciplinary and collaborative learning and teaching environment).

By inviting engagement through these lenses, students are given the opportunity to reflect on and identify with the wider challenges of sustainability through a more personalised, multi-faceted understanding. This interdisciplinary approach was selected as a means to offer an alternative to the disciplinary-specific curricula that, while offering valuable expertise within a given subject, entails a risk of educating students according to a limited understanding of sustainability. The intention of developing this learning and teaching resource is to enable education on the SDGs to be embedded into existing and new courses and to provide students with opportunities to learn reflexively through exposure to differing visions for sustainable development, including indigenous perspectives. Used in this way, the video dialogues support critical and creative

thinking as well as dimensions of global competence. Based on student interviews and written reflections, research regarding the impact of the video dialogues was collated with positive results. Critical success factors include increased engagement, critical thinking, and supported understandings of interconnectedness. This paper examines this case study inclusive of notable values, research findings, and challenges associated to the development and implementation of the video resource. It concludes with thoughts and reflections on enhancing the transformative potential of sustainable development education through the use of pedagogical tools and approaches that support students' critical openness to addressing sustainability concerns.

Achieving sustainability one student at a time

Submitter: Villarroel, Milton
Teacher, North Gaston High School, United States, mvillarroelsc@yahoo.com

Abstract:
The speaker will take the audience on a motivational tour around different methods of teaching and learning languages and will present his audience with his new English as a Foreign Language (EFL) textbook, Bolivian Adventures, which is scheduled to be launched in 2020. Having been involved in teaching of foreign languages since 1984 and in the publishing industry since 2000, Mr Villarroel concluded that the best way to achieve Sustainability across all areas of the SDGs will have to be through Primary and Secondary school education. An avid learner of foreign and native languages himself, Mr. Villarroel will demonstrate how foreign language teaching has a special characteristic that few other subjects have, the intensive use of cross-curricular material to cover a vast area of any given language. Based on his experience as a learner (and a teacher) of English, German, French, and Chinese, his new textbook will demonstrate how educating children today will help all countries achieve SDG goals on time and meet the 2030's sustainability deadline. The presenter will use the current Bolivian Educative Reform as the basis to align living well concepts with sustainable objectives and will base each learning activity on each one of the SDGs. Students will be immersed on foreign language learning as they navigate the SDGs and make them part of they everyday life. Not only will they acquire an ability to speak a second language, but they will also adopt and adapt the SDGs to their personal, professional, and community lives.

The audience will explore sample activities of the book Bolivian Adventures and its potential to teach all languages and in that way reach all students, one at a time, in time to meet the Sustainable Development Goals agenda timeline.

Mr. Villarroel will caution his audience to act soon in order to meet the deadlines and have all young people ready for the next global challenges.

Technology for Development: A Solar Powered and Open Source ICT Training Proposal for Rural Namibia

Submitter: Wolf, Cedar

Graduate Student - Master of Development Practice, Regis University, United States, cswsk8@gmail.com

Abstract:
In the current Information Age, possessing a basic digital literacy is a necessary skill for achieving the 2030 Sustainable Development Goals. This paper analyzes lessons learned from past efforts to provide technology education in Namibia and proposes a new model for rural off-grid penetration of information and communication technology (ICT) training that emphasizes job skills development, environmental conservation, and gender equality.

From communicating, to learning, to performing essential job functions, computers are a fundamental tool of global commerce and education. It is for this reason the Namibian government has declared its goal of becoming a knowledge-based economy in its Vision 2030 national development plan. As a young country emerging from a history of colonization and apartheid oppression, Namibia is making great strides towards the education of its citizens. With over 20% of its national budget directed towards education and 95% of school age children attending school, it is evident Namibia believes education is the path to success for its citizens. Within this context the Namibian government wishes to close the digital divide between its rural citizens and the rest of the world through ICT education programs funded by the government or provided by private organizations.

From 2016 to 2019, the Namibian founded and privately led Institute of Accounting and Economic Development (IAED) has been attempting to provide computer training programs to students in rural secondary schools. This paper outlines strategies IAED has used to engage communities in the introduction of computer technologies, including providing information on return on investment for participating in training and agreements that must be maintained by various stakeholders involved. Challenges in computer maintenance, training, and funding are discussed. Interviews with principals, students, and trainers provide additional insight into proposed solutions. A literature review was also conducted to assess positive and negative aspects of previous ICT training programs in the region.

Due to the distributed nature of the Namibian population, many rural communities do not have access to electricity. This makes ICT education all but impossible. Of those who do possess access to electricity, men are more likely to be the owners or operators of ICTs. This paper concludes with a proposed training program that utilizes affordable solar powered Raspberry Pi computer kits to close this gendered digital divide.

Experiences of an NGO Advancing Education for Sustainable Development in Rural China

Submitter: Yang, Pat
Chairperson, The Zigen Fund, United States, zigennews@gmail.com

Abstract:

The introduction of Education for Sustainable Development (ESD) into formal and non-formal education in rural China is being led by the China Zigen Association for Rural Education and Development (Zigen), a non-profit organization that is among the first fully registered NGOs in China.

In the past 30 years, Zigen has witnessed tremendous change in China. Economic growth has improved living standards, but in the meantime, China has paid a great price, including environmental degradation, widening income disparities, and the disappearance of local traditional culture. Many rural villages are disappearing and include only left-behind children and the elderly as the young work in cities as hired labor. The school education is academic-oriented and urban-biased, has little relevance to daily life, and is focused on test scores and preparing students for entering university and leaving the countryside. Together with the merging and closing of rural schools, the educational policies are extremely unfavorable for the sustainable development in rural China.

In order to achieve sustainable development, promoting education for sustainable development is key. It is lacking, but it is urgent and necessary.

In collaboration with local governments, UNESCO China ESD National Committee, Beijing Normal University and China Agricultural University, Zigen has undertaken the development and implementation of training programs including rural teachers' training, China NGO leadership training and rural leadership training programs. The content of the training programs is closely related to ESD, emphasizing integration of ESD topics -- including environmental education, local cultural preservation and innovation, poverty issues and gender equality -- and teaching methods and content that are student-centered, locally relevant, and aim at cultivating students' critical and innovative ability and awareness of social responsibility. The purpose of training programs is to cultivate knowledge, attitudes and actions of teachers so they will integrate training content into classroom teaching, school activities, and the family and village activities.

Village leadership training includes integration of ESD topics into lifelong learning and village development.

Zigen's projects promote ESD through the establishment of rural green eco experimental schools. Schools that have gone through the relevant curriculum training, development, and implementation are named rural green eco experimental schools which will also serve as the model schools for others in the possible expansion of the ESD program. In experimental ESD schools, all teachers are required to participate in training programs.

In 2019, 10 rural green eco experimental schools supported by Zigen were awarded as the ESD experimental schools in rural China by UNESCO CHINA ESD National Committee. Zigen has supported local educational bureaus to establish 100 green eco experimental schools in 18 counties of 9 provinces and to integrate ESD topics into the school curriculum. To further promote ESD in China and to identify ESD best practices, Zigen has also established a China Rural Education for Sustainable Development Center.

Drop the PPTs and pull out the board game: An educational tool to bring the 2030 Agenda to life

Submitter: Zubillaga, Diego
Graduate student, University of Oxford, Mexico, dzubillaga@colmex.mx

Abstract:
How do we ensure that people move towards the Sustainable Development Goals (SDGs)? How can we bridge that gap between the 2030 Agenda and decision-making at all levels? One way to answer these questions is by focusing on individual change. What we do, and how we do it has a profound social, environmental and economic impact. Furthermore, it is at the individual level that decision-making takes place and that cultural transformation begins. But facilitating individual change requires appropriate pedagogy and impactful methodologies to share and communicate knowledge.

This paper reports on the use of the education tool Sustainable Ideas Game (SIG) as a good practice in teaching and training for sustainable development, designed to encourage action in the implementation of the 2030 Agenda. The two-fold purpose of this tool is to enhance the appropriation of the SDGs and to contribute in closing the gap between awareness and action at the individual and collective level. To achieve this, SIG focuses on triggering behavioral change through an innovative methodology that combines components of storytelling, gamification, social interaction, and project prototyping.

SIG is a life-size board game that stimulates participants to use their creativity as well as their personal knowledge to develop feasible solutions to address concrete sustainability challenges. Key to this approach is reversing traditional top-down learning processes. Therefore, SIG encourages bottom-up knowledge creation and action; an element which has shown positive effects in the appropriation and localization the 2030 Agenda.

This novel and inexpensive methodology has been used to facilitate workshops in Germany, Mexico, Brazil and Qatar among various communities of experts in the field of sustainable development, young people, students, children, and civil society organizations. The results of these workshops indicate the effectiveness of this educational tool to stimulate reflection and action. Furthermore, the rapid dissemination of the game as a resource for educators and trainers, and the positive feedback from participants has revealed the importance of resourcing to fun and dynamic interventions to trigger behavioral change and foster awareness around the SDGs. Some of the learning outcomes of SIG include: developing practical knowledge on how to implement the 2030 Agenda at the individual and collective level; understanding the linkages, synergies, and trade-offs of sustainable development; and using SDG-indicators to design solution-oriented projects.

Population, Sustainability, and Intergenerational Transfers

Feminized Poverty and the Challenges of Operationalizing Sustainable Development Goal 5 in Nigeria: An NGO Experience

Submitter: Emeribe, Ijeoma
Founder/President, Women Africa International, Nigeria, womenafricainternational@gmail.com

Abstract:
In 2018, a new report by The World Poverty Clock indicated that Nigeria has overtaken India as the country with the most extremely poor people in the world. The report suggests that 86.9 million Nigerians are now living below the poverty line and this figure represents nearly 50% of its estimated 180 million population. However, this prevailing poverty is not gender-neutral, as demonstrated by its incidence which is greater among women than men. Also, Nigeria currently contributes 10% of global deaths for pregnant mothers. Equally, girls disproportionately suffer more than boys in terms of missing out on education as demonstrated in the north-east of Nigeria where only 41% of eligible girls receive a primary education, and it is 47% in the north-west. Thus, given the projection which suggests that Nigeria will become the world's third most populated nation by 2050, this feminized poverty is likely to worsen and deepen the gender inequalities and the vulnerability of women and girls.

Against this background, this study presents the challenges of operationalizing the United Nations Sustainable Development Goals (UNSDGs) goal 5 in Nigeria as experienced by an international NGO named Women Africa International. Four of the major projects were selected for a closer analysis: Alter of Mercy (three days women and girls empowering program, 10th – 13th April, 2019); Women's Camp Calabar (three days women and girls empowering program 22nd – 25th February, 2018); Women Africa Empowerment Conference, Abuja (1st – 3rd June, 2017); and Vocational Skill Training Program, Abuja (20th – 23rd February, 2016). Apart from the assessment of the four focused projects, other short term individual projects such as women relieve outreaches delivered to improve the lives of the community between years 2016 to 2019 were also included as results. These projects were examined based on an open ended interviews which was conducted with four respondent groups namely; i) "Development Experts" from outside the NGO; ii) general participants of the programs including men; iii) volunteers and workers of Women Africa International and iv) beneficiaries of the different projects of the NGO. The interpretation of the data gathered reveals that women and girls are vulnerable in Nigeria due to a complex of factors, among which patriarchal norms, poor level of education, lack of vocational skills plays a significant role in their vulnerability to the prevailing feminized poverty and it deepens the existing gender inequality. Also, the poor knowledge of the concept of sustainability itself was prevalent among the beneficiaries as demonstrated by consistent preference for immediate hand-outs without considering long term sustainability. Thus, this paper present a replicable framework developed by Women Africa International to approach the identified challenges for effective operationalization of the SDG 5 in Nigeria and developing countries with similar socio-cultural context.

Keywords: Population, Sustainable Development Goal 5, Feminized Poverty, Women Africa International, Nigeria

Impacts of Population, Climate Change and Governance on Economic Growth and Sustainable Development in Nigeria

Submitter: Foye, Victoria
Lecturer 2, University of Ibadan, Nigeria, vickieomod@yahoo.com

Abstract:
The Problem: Despite the fact that attempts to conduct a national census of international standard have failed in Nigeria and the country's population is not known with precision; still, it is a consensus globally that the population is mostly young and the country is the most populous in Africa. This leads to much economic pressure, as high dependency ratio implies lower prospects for sustainable development. Hence, the need to exploit the demographic window of opportunity to the country's advantage. Researchers have opined that building the capacity of the populations via positive intergenerational transfers like growing knowledge, health, technology, capital stock, good governance, strong institutional framework, among others is paramount. Nevertheless, the effects of climate change , weak governance and poor institutional framework which are tagged negative intergenerational transfers could constitute demographic disaster for the nation. While climate change is able to exacerbate poverty, weak governance would entrench poverty and, both intra and intergenerational inequities. Studies have shown that the combination of dynamic efficiency and intergenerational transfers make up sustainability; and none is individually sufficient to address sustainable development.

Objectives: The specifically conceptualises the diverse pathways of population, climate change, and governance in relation to sustainable Development Goals (SDGs) and also investigates the direction of causality between population, climate change, governance, economic growth and sustainable development in Nigeria for the periods of 1980- 2017. In addition, the study analyses the impacts of population, climate change and governance on economic growth and sustainable development in Nigeria for the same periods.

Proposed method: The study employs both macro and micro-founded growth theories to capture economic growth and development, respectively. The proposed methods of analysis are both descriptive and econometrics; precisely figures and Toda and Yamamoto (1995) and Dolado and Lutkepohl (1996) Granger-causality test which is based on augmented vector autoregression (VAR) modeling and a modified Wald test statistic. This method is superior to ordinary Granger-causality test since it does not require pre-testing for the cointegrating properties of the system and thus avoids the potential bias associated with unit roots and cointegration tests.

Preliminary results: The preliminary results suggest both one and two-way causalities among the variables of interest. Further, findings show that economic growth and development are affected by both positive and negative intergenerational transfer variables. Although, the relative effect of the negative is found to be stronger.

Keywords: Climate Change; Economic Growth; Governance; Population; Sustainable Development

Harnessing a Dividend for Africa's SDGs: A Conceptual Extension and Policy Guidance

Submitter: Giroux, Sarah
Lecturer and Research Associate, Cornell University, United States, sh104@cornell.edu

Additional Authors:
Dr. Parfait Eloundou Enyegue, Chair & Professor, Department of Development Sociology, Cornell University

Dr. Michel Tenikue, Research Associate, LISER, Luxembourg

Abstract:
The world's sustainable development goals are an ambitious commitment, and the "demographic dividend" is increasingly heralded as an opportunity to support these goals in Africa. In general, a dividend can be secured when the size of the working age population becomes large relative to the dependent population. Between 2020 and 2050 age-dependency will decline to .80, making it possible for the region to earn its "demographic dividend," much as was the case in Southeast Asia and Latin America. Yet, whether African countries can effectively leverage this opportunity remains an open question. While early signs of dividends are reported in parts of sub-Saharan Africa, their full impact on socioeconomic development remains incompletely measured, and the corresponding policies require refinement. The central thesis in this paper is that African countries can better harness their dividends if policy analyses paid greater attention to the dividend's underlying processes, including the production of dividends, the resource flows involved, and distributional concerns.

The production of dividends: A dividend is not automatic. Many analysts use a "black box" approach, with fertility decline at one end, and the dividend in the other end. We propose a theoretical expansion using a Markov chain conceptual model, and overlay data from the World Bank to estimate how individual countries fare across each step in the dividend production chain. Our findings show wide variation in countries abilities to convert fertility declines to dividends, allowing us to create country-specific and step-specific policy guidelines to increase the likelihood of securing a dividend.

Intergenerational resource flows: Second, we propose that dividends are more effective in meeting other SDG goals depending on how resources are transferred across generations. In theory, working adults can use their dividend-induced resources in three main ways: they can engage in luxury, non-productive consumption; they can invest in short term economic growth; or they can transfer resources across generations. These transfers can occur in two different directions: aimed downward, they support the formation of human capital (education) of youth; alternatively, they can be transferred to the elderly (i.e., investments for healthier life). Using data from the World Bank, we find that age structure has played a vital role in shaping the educational resources available for children in many sub-Saharan counties. Our findings suggest that between 1990 and 2005, downward transfers were instrumental in raising educational outcomes; for the region as a whole-- a third of the growth in educational spending on children was tied to trends in age dependency.

Socioeconomic distribution of the dividend: Finally, we recommend increased attention to the extent to which the dividend is shared. The fertility declines that initiate the dividend production process tend to be examined as an aggregate phenomenon. However, using data from the DHS, we find evidence of rising fertility inequality across the region—essentially meaning that the reproductive burden is concentrating among families with fewer resources. This finding suggests that absent explicit policy action, the dividend may increasingly be captured by the elite, and lessen countries abilities to meet SDG goals related to equality.

Responsible Consumption and Production

International Law for the Sustainable industry of Ship-breaking and its Application in Bangladesh: An unwavering battle between Environment & Development

Submitter: Ahmed, Ishtiaque
Chairman & Head of the Department of Law, North South University, Bangladesh,
ishtiaque.ahmed@northsouth.edu

Abstract:
Ship-breaking or recycling is a process of dismantling End of Life vessels after their useful lives are over usually done after 25 to 30 years of operations at sea. It is an inseparable part of global shipping industry. For about last three decades, ships are being dismantled almost manually and exclusively on the inter tidal zones of three countries of the world namely India, Bangladesh, and Pakistan. Ship-breaking initiated from western industrialist countries in 1950s , traveled through Eastern European countries and and now firmly established only in these three developing countries. Ship-breaking is one of the most dangerous occupations in the world and widely known as a pollution haven industry. Currently there is no enforceable international law that directly governs this international industry. Bangladesh is currently the largest producer of iron from End of Life ship recycling. Bangladesh's ratification to the recently adopted international convention on ship recycling namely the Hong Kong Convention (Not yet enforced) is extremely crucial for the enforcement of this convention based on its three-stage entry into force criteria. On the other hand, Bangladesh law on ship-breaking has recently undergone a stringent review by its supreme judiciary which ultimately has led to the enactment of Ship-breaking and Recycling Rule 2011 and Hazardous Waste and Ship-breaking Hazardous waste Rule 2011 in Bangladesh. The international law, Bangladesh constitution, domestic policy, national economy and regional politics have made important contributions leading to a dramatic and disparaging shift in Bangladesh environmental jurisprudence pertaining to ship-breaking. Ship-breaking and Recycling Rule 2011 and Hazardous Waste and Ship-breaking Hazardous waste Rule 2011 are currently the governing national framework legislation for end of life ship recycling in Bangladesh. The paper starts with an overview of the long-standing and prestigious environmental jurisprudence of Bangladesh as well as the position of its constitutional law. Endeavor has been taken, using doctrinal and comparative research methodology, to assess the efficacy of the current legal and institutional framework of Bangladesh attempting to ensure a sustainable safe and environmentally sound recycling of ships and its preparedness to ratify the recently adopted Hong Kong Convention. The research reveals that numerous legislative

attempts of Bangladesh designed to ratify the Hong Kong Convention have been too little too late to create a sustainable domestic ship-breaking industry. Building a sustainable industry of ship-breaking in Bangladesh through adequately addressing the safety and environmental concerns in its domestic law making continues to be a deep-rooted concern of the environmental and labor activists not only in Bangladesh but throughout the globe. Curbing the catastrophe in coastal environmental from ship-breaking in Bangladesh through these questionable framework legislation remains a far cry. The research has ended with recommendations for both the Government of Bangladesh and the International Maritime organization who adopted this much debated International Convention in 2009 amidst serious criticism of environmental activists.

Circular Communities: Melrose Commons - A Circular City Vision Plan for a Low-Income Residential Neighborhood in the South Bronx

Submitter: Akgul, Isil
M.S. Sustainable Environmental Systems Candidate (Pratt Institute, graduating 2019), Pratt Institute, United States, isilakgul@gmail.com

Abstract:
Housing is becoming increasingly unaffordable in New York City, particularly for working class and vulnerable communities. This is due to increasing rents in urban areas and lack of affordable housing. Due to a need to develop more affordable housing, quantity has often been prioritized, resulting in a lack of holistic design and planning around the long-term wellbeing of residents and communities by integrating ecological systems and designing sustainable environments, especially in low-income communities. Coupled with the effects of climate change, communities have to be prepared to meet growing challenges related to health and the built environment. Another reason for the lack of affordability is the inadequate salaries of the service sector. In New York City, as in many urban areas, manufacturing is declining, as well as the skilled jobs with higher salaries that this sector provides. The Circular Economy concept advocates for new modes of (re)-production that reduces social and environmental inequities generated by a traditional linear economy and could bring back the benefits to the communities, through circular growth. Circular Economy principles consider overall systems health in relation to long-term sustainability and resiliency across social, economic, and environmental realms.

Cities in the world are currently considering learning from Circular Economy to become circular cities. Europe has advanced on the Circular Economy transformation in a way that there can be generated revenue from the alternative loops that were created. The future for Europe is looking at applying the Circular Economy concept to cities by making comprehensive site-specific plans according to the Circular City framework. There is a need for comprehensive circular planning for New York City and all cities in the world from the perspective of the Circular City framework but it has to be established through an extensive process of stakeholder engagement and also iterative analysis, visioning, and design. Circular City master planning is a long term approach that can be adjusted with feedback over time and can be implemented through pilot projects.

This study explores the Circular City framework in the context of in New York City and the South Bronx and proposes an innovative and circular approach to the Melrose Commons

neighborhood master plan, building on the assets of the community that will ensure a holistic new vision for the neighborhood.

Water Stewardship in the Textile Sector: Lessons Learned from Projects in China, India, Turkey, and Vietnam

Submitter: Cordeiro Ortigara, Angela Renata
Water Stewardship Manager, WWF Germany, Germany, ANGELA.ORTIGARA@WWF.DE

Additional Authors:
Alexis Morgan, Water Stewardship Lead, WWF DE

Laila Petrie, Cotton and Textile Expert

Abstract:
Stewardship is the management of public goods, like freshwater, on the premise that we are all accountable for their preservation. Water stewardship provides business with a practical framework to address the risks they are exposed to, implementing better water management within the fences and reducing water-related impacts outside the fences by ensuring collective action with other businesses, governments, NGOs and communities.

The textile industry is already today the second largest water polluter worldwide and the demand for clothes is estimated to experience a 63% increase by 2030. Hence, making this sector greener is a crucial step towards the implementation of the 2030 Agenda, with special reference to the enhancement of water quality and quantity (SDG 6, SDG 14), and the protection of ecosystems (SDG 15). This can be done by following two distinct paths. The first one is to raise the awareness of consumers on the impacts generated by the fashion industry, whereas the second one is to work in the basins where textile production takes place to reduce environmental impacts and improve the overall water governance framework.

WWF has been actively working along the second path since 2010 through the implementation of Water Stewardship in the textile sector. With the support of international brands and local partners (i.e. governments, textile associations, NGOs), projects are being put into practice in the following river basins: Buyuk Menderes (Turkey), Mekong Delta (Vietnam), Taihu Lake (China), Noyyal and Bavani basin (India), and Lahore (Pakistan)

The projects, which are at different stages of implementation, may offer valuable lessons for similar initiatives in other contexts. In Turkey, WWF and the brand helped assess the technological interventions needed to improve water and energy management, and is supporting factories in obtaining funds for the implementation of the technological changes needed to improve water quality and efficiency. In India, brands are supporting the restoration of large areas of the basin as well as helping improve water management inside the factories. In China, a large stakeholder forum is being organized to gather the attention of government, brands and suppliers, and a capacity development activity is being proposed through the adoption of an online tool and in-person training for factory workers.

Starting from the experiences acquired in the above-mentioned basins, this paper aims to highlight how a positive partnership between brands, NGOs and local-level offices and suppliers can help change the textile industry. While the results are not always easy to quantify, the work conducted by WWF so far shows that a transformation of the sector is not just possible, but that in fact it is slowly taking place right now.

Ethical Issues in Food Marketing Towards Children

Submitter: Dang, Quynh
Student, St. Francis College, United States, quynht.dang@gmail.com

Abstract:
An increasing number of companies are paying closer attention to producing their goods more responsibly, keeping in mind their own sustainability and the sustainability of the planet. How their products are consumed, however, usually is not addressed. That responsibility is delegated to consumers, who are assumed to have the necessary information to make responsible consumption decisions and the ability to process that information effectively. This is a tenuous assumption, especially when one takes into account the power of advertising to shape consumers' perceptions of and desire for a product. Think about food, for example. Can consumers evaluate effectively the difference between 'organic' meat and produce and their (by inference) 'non-organic' meat and produce? Should consumers be expected to understand how the dizzying array of ingredients in food, especially processed foods, might be affecting their health? Sure, consumers might be told that a food is 'good for you,' but how do they really know for sure, and can they really trust the producer? It is likely that even a highly health-conscious consumer would have difficulty. So imagine how hard it would be to make healthy choices for children toward whom a wide range of tasty foods with dubious health benefits is marketed. It may be good for business to entice children (and their parents) to purchase these foods, but is it really ethical for companies to sell products that can hurt children's health?

This paper examines the marketing tactics of three giant food companies: McDonald's, Mondelez, and Orion. It will examine how McDonald's Happy Meals and Orion Choco Pie have used toy premiums to entice young children. McDonald's is argued to play a role in spreading this childhood obesity because they use artifice to work around the laws restricting promotion of unhealthy foods and use step counter Happy Meal premiums as a "leanwashing" campaign. In addition, the paper will show how Oreo and Orion Choco Pie have used "emotional marketing" to manipulate young children so the food companies can exploit them as life-long customers. The paper will also look at the regulations of food marketing to children and the way some companies try to lobby lawmakers and bypass regulations. In the process, the paper challenges our views of what responsible production and consumption should be.

The Production-Consumption Dilemma: What It Is and What To Do About It

Submitter: Dilyard, John
Professor, St. Francis College, United States, jdilyard@sfc.edu

Abstract:

Over the past several years, books such as Andrew Winston's The Big Pivot and Freya Williams' Green Giants, as well as numerous articles, have touted the idea that by striving toward sustainability a company can be successful, that achieving a profit and protecting the planet are not mutually exclusive goals. At the same time, more and more companies, particularly large multinational enterprises (MNEs) have chosen to adopt the sustainable development goals (SDGs) and have gone beyond reporting about their corporate social responsibility to include what they are doing to achieve sustainability. Many of these sustainability reports even include metrics that are tied to specific SDGs, marking progress toward their achievement.

At the end of the day, however, the financial health of a company still is dependent on the consumption of what the company produces. And even though a company may do its best to make sure what is produced is done so in a 'sustainable' way, or contributes to the achievement of an SDG, how often does it ask the question 'should this product even be consumed'? For example, in Brazil Nestle has engaged local entrepreneurs (mostly women) to sell its snack foods in rural areas, which has helped raise the income levels of these women. But at the same time, obesity and diabetes rates are on the rise, thanks to increased snack food consumption. Another example is Coca Cola, which tries to use the water that is the basis for its products responsibly, but should some of its products, particularly those high in sugar, even be produced? By not addressing these production-consumption dilemmas, these companies are leaving the glass half full when it comes to how much they really contribute to the SDGs.

This is to not say that companies like Nestle or Coca Cola are acting hypocritically, but rather to point out that the potential ethical or moral dilemmas that can arise between the production of something and its consumption need to be addressed more thoroughly. The purpose of this paper, then, is to identify instances in which this production-consumption dilemma arises in SDG-conscious firms and to suggest how they could be resolved.

SENSE: Systemic Enquiry,Norm for Sustainable Equity

Submitter: Kamireddy, Sai Dharani
Independent Socio Sustainability Strategist, N/A, India, sai.dharanik@gmail.com

Abstract:
Principled Decision-making for SDGs is a crucial concern. Despite the importance and the efficacy of various ways in promoting "Sustainable Consumption and Production patterns"-SDG12 doesn't have comprehensive frameworks/methodologies to accomplish the needed transformation for sustainable growth.Its development is a process and cannot be achieved with one action- assessment as presently approached with The New BellagioSTAMP guidance principles and SIA tool for 3Ps.
In a world with precious resources, right priorities must be set and implemented. Such a scenario needs a holistic strategy from design through planning to implementation and evaluation.

The paper proposes SENSE - A Systemic Decision-Centric Action Framework and Methodology to design, plan, monitor, evaluate and map the chosen solution for SDGs in conformity to the Six Sustainability Dimensions/5Ps. Based on Systems Thinking it seeks to reinforce and balance processes for sustainability transition at every outset. Further illustrates Water conservation and

reduction of Fertilizer usage for Agriculture - Rice, India; the
step-by step process of how SENSE allows to focus on the right set of parameters by whole- of-society to perform sustainable actions for protection and enhancement of Sustainable Equity or Larger Good – Planet species and resources.

Achieving Sustainable Development Goals through Social and Solidarity Economy: Case Study of South Korea

Submitter: LEE, SUYEON
Research Analyst, UNRISD, United States, sy81sunshine@gmail.com

Abstract:
The implementation of the Agenda 2030 for sustainable development requires all states to adopt policies and mobilize resources to advance sustainable development at national as well as local levels. Identifying and strengthening means of implementation that address the social, economic, and environmental dimensions in an integrated manner is crucial.

Over the last several years, social and solidarity economy (SSE) has received increasing attention from policy makers, researchers and practitioners worldwide for its potential in addressing today's major challenges – including poverty, unemployment, social exclusion and climate change. As an integrated, people-centred, and planet sensitive approach, SSE is a sustainable and innovative form of business. SSE aims to generate values for the local communities and people based on the principles of equity, inclusion, cooperation, solidarity and democracy. In fact, its activities are primarily focused on meeting the needs of the community and creating an inclusive and sustainable society where socially vulnerable groups are also empowered.

South Korea has been one of the countries where SSE has been of great interest and importance. The Korean government established various supportive legal frameworks and policies for SSE in the past decade, and as a result, and a large range of SSE organizations and enterprises (SEOEs) has rapidly appeared in the country. The key sectors they engage in range from health-care, housing, education and other forms of social service provision to environmental protection.

While there is growing consensus that SEOEs in South Korea are potentially well-positioned to address the SDGs, it is less clear how well it is doing in practice.

This study uses the existing data and analysis to put together an assessment of the economic, social and environmental impacts of SEOEs in South Korea, and relates these impacts to the SDGs. Specifically, this study looks at SEOS in urban agriculture and circular economy sectors to examine their role in building sustainable yet innovative business and helping the country adapt to climate change. This study presents a number of evidence that SSE can be a key means of the achievement of SDGs, particularly 1, 2, 3, 8, 11, 12 and 13 by making social and environmental improvements in people's lives while contributing to economic development.

Pathway to Transition to a Circular Textile Economy in Australia

Submitter: McCallion, Aleasha
Project Manager, Monash Sustainable Development Institute, Monash University, Australia, aleasha.mccallion@monash.edu

Additional Authors:
Julie Boulton, Project Manager, Monash Sustainable Development Institute, Monash University

Abstract:
The aim of this research is to contribute a first step in identifying a pathway, including strategies, interventions and incentives, that would shift the fashion industry in Australia to a sustainable development circular economy (Kircherr et al.2017) model of production.

There are significant impacts from the current take-make-waste linear model of production and consumption within the global TCF sector. Globally, the Textile, Clothing and Footwear (TCF) industry is the third highest emitter of carbon, its production is responsible for 20% of global water waste and has a high impact on pollution of natural resources. In addition, less than 1% of the materials used to produce clothing are recycled into new clothing and of the 100 million garments produced every year, an estimated 30% go to landfill within the first year of purchase (Ellen MacArthur Foundation 2017).

Against this backdrop, how can we transition the TCF sector to achieve SDG 12, responsible consumption and production, in the Australian context? What practical strategies can be offered to industry that they will take up, and are there government policies that need implementing or changing so as to lead change across the sector?

The Australian TCF industry is actively engaging with sustainable initiatives and research and there is a heightened awareness of the effects that particularly production and waste are having on the environment, and some brands are actively taking steps to effect change. However, despite this enthusiasm, there is a gap in the knowledge around strategies and interventions. While the end goal is a circular TCF industry, can we identify the starting point and practical steps for this to occur and, in the process, develop a transitions pathway for the Australian TCF industry.

The development of transitions pathway requires a collaboration between industry, tertiary and government sectors with a focus on how to support industry transitions initially and identify the key leverage points. This research is a practical starting point for the local Australian industry, and thus undertaken in partnership with the national TCF sector industry membership body and local state government policy agency.

A transitions pathway contributes to greater evidence-based decision making during the state policy development stage as well as the industry sector's business strategy development stage. This research provides a valuable first step in operationalising transitions pathways in the TCF sector toward realising SDG 12.

Ellen MacArthur Foundation, 2017, A New Textiles Economy: Redesigning Fashion's Future

Kircherr, J, Reike, D, & Hekkert, M, 2017, Conceptualizing the circular economy: An analysis of 114 definitions. Resources, Conservation and Recycling, vol. 127, pp.221-232.

Integrating the SDGs into core of corporate sustainability

Submitter: Muff, Katrin
Director, Mission Possible Foundation, Switzerland, katrin.muff@gmail.com

Additional Authors:
Dr. Barbara Dubach, Director, Engageability, Switzerland

Abstract:
Companies can consider the SDGs either as a significant business opportunity or as one more reporting burden. If we want to ensure that the Global Goals are achieved, it is critical to have companies and their innovation power on board. It is hence critical to provide companies with a hands-on, pragmatic and effective approach to translate the SDGs into new business opportunities resulting in additional revenue streams. The SDGXCHANGE does just that. It has been developed and tested in close cooperation with half a dozen Swiss-based of companies of different industries and size. In the addition of the SDG-focus, the strategy process builds on a number of key concepts:

• Business Sustainability Typology: The SDGXCHANGE aims at enabling organizations to embrace 'true business sustainability'. This is the most advanced form of business sustainability, according to the Business Sustainability Typology. The focus shifts from reducing the negative impact of business to making a positive impact in critical and relevant areas for society and the planet. Only true business sustainability holds the promise to overcome the big disconnect between issues our society is facing and business contributions.

• Doughnut Economics: SDGXCHANGE uses the Doughnut Economics concept as a playfully serious approach to framing today's societal challenge. The doughnut lies between social and planetary boundaries and indicates an environmentally safe and socially just space in which humanity can thrive. It sets a vision for an equitable and sustainable future, but is silent on the possible pathways for getting there. So the doughnut acts as a convening space for debating different pathways forward.

• Gapframe: The Gapframe is an easy-to-use data visualization tool designed to give practical support to everyone working towards a sustainable and safe future. It is an essential tool within the SDGXCHANGE GRIPS process, helping organizations to identify issues that are a threat or critical in countries or regions where the organization operates. Within the process, organizations learn how to turn these issues into concrete business opportunities.

• Planetary Boundaries: the planetary boundaries concept presents a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come. SDGXCHANGE uses the concept as foundation, ensuring that identified business opportunities

stay within these boundaries.

The SDGXCHANGE methodology differentiates itself through the GRIPS approach, which addresses not only the knowledge dimension like most other methods, but also offers hands-on support and solutions in the activity's dimensions. While there are indeed a few other emerging tools that build on knowledge and data sources, the GRIPS approach is the only existing SDG-related methodology that also addresses and embraces the behavioral change dimension. Integrating this third dimension is critical to ensure a true transformation of any organization that seeks to embrace and embed the SDGs into their core activities. The GRIPS process consists of the following process steps: Getting started, Reframing, Ideating, Prototyping, and Sharing.

We shall present not only the methodology but also best practice examples from existing case studies of companies in different section.

Life Cycle Assessment (LCA) of the Hard Apple Cider Production System

Submitter: Smith, Meghann
PhD Candidate, Montclair State University, United States, smithm85@montclair.edu

Additional Authors:
Dr. Pankaj Lal, Associate Professor, Montclair State University

Abstract:
Improved accessibility and availability of fresh produce has allowed the general population to rely heavily on corporate agribusiness, which has forced small farms begin to seek other means of profitability. This trend is reflected within orchard management, where farmers are beginning to produce hard apple cider as a means to increase profit through product sales and agritourism. The increasing popularity of high-value artisan products as demonstrated by the craft brewing industry has allowed a path for cider to enter the craft beverage market. This business venture represents a potential method to improve inter-generational transition of land ownership and management by engaging new markets. While entering the cider market may be a step towards revitalizing private orchards, as with any industry growth, there is potential for increased pressure on the environment and natural resources. In order to evaluate agricultural and cider production methods that may have environmental impacts, life cycle assessment (LCA) can be used to identify opportunities for improvement in production systems. LCA will be applied to multiple management scenarios (such as organic and conventional growing techniques), fermentation and product storage techniques, packaging type, and final product distribution to assess areas of high and low impact. The cider's impact can be examined from cradle to grave. In the agricultural phase, nutrient exchange, irrigation, fertilizers, pesticides, herbicides, supplies and fuel are considered. In the cider production phase, cold storage, water and detergent/sanitization needs, pressing equipment and energy requirements, filtration, yeast, and preservative agents are considered. In the packaging and distribution phase, cleaning and sanitization needs, primary and secondary packaging, labels and marketing material, transport equipment and fuel requirements are considered. Within each of these phases, waste disposal must also be considered to fully quantify the environmental impact of cider production. The application of LCA will help to identify improvement opportunities within the cider production

system to reduce environmental impacts, which can be useful for the development of regional legislation to could support orchard's attempts to seek other means of profit in a manner that ensures environmentally conscious practices.

SDGs in Action in Agroforestry Systems in Indonesia

Submitter: Sritaba, Elim
Director of Sustainability and Stakeholder Engagement, Asia Pulp & Paper Group, United States, Lauren.barredo@unsdsn.org

Abstract:
Since the launch of the SDGs in 2015, Indonesia has been one of the early actors in integrating the goals and associated targets into national development planning. Part of this has included close collaboration with private sector actors in order to identify how climate and poverty objectives – among others – can be met jointly.

Asia Pulp & Paper (APP) has been working in close collaboration with the Government and a range of other stakeholders to develop an Integrated Forestry & Farming System (IFFS) programme designed to address some of the drivers of deforestation by empowering communities – particularly women – to develop climate friendly livelihoods. APP has committed USD 10 million over 5 years to roll out the program in 500 villages located in the areas where its supply chain operates. In ensuring that the program will continue even after the company's assistance has ended, the IFFS implement a bottom-up approach to determine the programs that will be implemented in each specific villages, as well as develop micro-financing initiative managed by village cooperative to ensure that more and more community members are engaged in the IFFS program.

The program is now in its fourth year of implementation and early indications show promising results. On top of general welfare improvement, 85% of the villages that have joined the program since 2016 are able to reduced fire incidences in 2018 compared to 2016, and maintain the forest condition in the area where these villages are located. The impacts of the program contributes to many of the SDGs including no poverty, food security, climate change, women's empowerment, biodiversity, and many others.

In this discussion, APP will focus on integrated approaches and experience in achieving the SDGS identifying strengths and weaknesses, as well as sharing key lessons and recommendation for increasing and improving collaboration.

Value Chain Analysis in Lampung Province, Indonesia

Submitter: Teleposky, Emily
Masters of Development Practice Candidate, University of Minnesota Humphrey School of Public Affairs, United States, eteleposky@gmail.com

Additional Authors:
Sara Zaghloul, MDP Student

Zoe Masterpole, MDP Student

Joshua Thompson, MDP Student

Abstract:
Our presentation will explore the early and final steps of the value chain through the lens of forest-product certification and the relevant stakeholders. Our team has researched how various certification schemes -- such as Forest Stewardship Council (FSC) certification and Sustainable Forest Initiative (SFI) certification -- affect stakeholders at various points along the supply chain. Our focus concentrates on smallholder producers in Sumatra, Indonesia and on forest product retailers and consumers in North America. Our presentation will explore the research methodology that has led us to conclude various limitations, risks, and benefits of forestry-product certification.

Our research is split into two parts. The first part, which was just completed, is an analysis of retailer and consumer behavior in North America, as it related to certified products. We have analyzed consumer behavior to understand why some people choose to purchase certified forestry-based products, and why others choose not to. This analysis explores both conscious and subconscious thought patterns that drive consumer habits with regard to certification. Much consumer behavior is tied directly to retailer behavior as there is a strong symbiosis between consumer behavior and retailer marketing. Our analysis also looks at the power dynamics of forestry product retailers and their control of consumer and producer relations with certification.

The second part, which will be completed this May through July, will be an evaluation on the effects of certification on smallholder forestry producers in South Sumatra, Indonesia. Our research group will explore the early stages of the forestry supply chain for two months in the Lampung region of Sumatra. Farmers in this region primarily grow acacia wood, which is used in furniture and packaging products in North America. Farmers in this region also grow other forestry crops such as coffee and rubber. Our aim is to understand the livelihoods of these smallholder farmers and analyze how their livelihoods are potentially subject to change with certification. This analysis will show the unique relationship between consumers, retailers and producers across the globe, and how the trend of certifying commodities is changing lives.

This project was initially developed in a partnership between an NGO and a major forestry product retailer. This retailer is currently working on getting smallholder forest producers in Lampung, Sumatra FSC certified. We will be in Lampung, Sumatra in as during the certification implementation process.

We aim to understand how programmatic interventions like certification can be introduced for maximized, positive impact. Certification schemes are one of the many ways that corporations and producers coordinate to ensure sustainable production patterns, as per SDG 12.

SDG Partnerships and Whole-of-Society Engagement

Multi-stakeholder Partnerships for the Sustainable Development Goals: The Case of Ireland

Submitter: Banerjee, Aparajita
Post-Doctoral Research Fellow, University College Dublin, Ireland, aparajita.banerjee@ucd.ie

Additional Authors:
Enda Murphy, Professor, University College Dublin

Patrick Paul Walsh, Professor, University College Dublin

Abstract:
Multi-stakeholder partnerships (MSPs) are critical to achieving 17 UN Sustainable Development Goals (SDGs) with Goal 17 having a target for national governments to promote and encourage partnerships within nation states. Though partnerships with a combination between government, the private sector, or civil society may not be new, the emphasis placed on MSPs within the SDGs is without precedence. To achieve the SDGs, national governments may need to create innovative ways to engage with stakeholder groups linked with social, economic, and environmental dimensions of sustainable development to create conditions for MSPs to emerge. In this paper, we present the case of a government-led initiative currently evolving in Ireland to engage with stakeholders for implementing the SDGs. Based on government reports, participant observations, and initial interviews with members of stakeholder groups we present a critical evaluation of this process pointing towards the key benefits and challenges of such a process for promoting MSPs. In this regard, the purpose of the paper is to document an initiative to implement SDG-mandated stakeholder engagement undertaken by a national government and to critically evaluate the possibilities of effective MSPs evolving from such activities. Our findings suggest that such forums to engage with stakeholder groups may provide the government an opportunity to interact with the stakeholders and understand their views on implementing SDGs and for the stakeholders to express their opinions to the government. However, the possibilities for such arrangements to promote and encourage MSPs to evolve is limited.

Developing a framework to identify priorities for climate services at national scale: A top-down approach for the agricultural sector

Submitter: Dinh, Dannie
Program Officer, The International Research Institute for Climate and Society, Columbia University, United States, dannie@iri.columbia.edu

Additional Authors:
John Furlow, Deputy Director for Humanitarian and International Development, The International Research Institute for Climate and Society, Columbia University

Abstract:

As countries begin taking action to meet their commitments to adaptation or climate resilient development, many are finding that the information they need to inform decision-making is not available or not useful. The importance of "Climate Services"— the production of useful climate information, as well as the translation of that information for use by decision makers—will continue to grow. Given limited time and resources, investments in climate services and adaptation have to truly support decision-makers' needs. The International Research Institute for Climate and Society (IRI), under the Earth Institute at Columbia University, is implementing the Adapting Agriculture to Climate Today, for Tomorrow (ACToday) project, a Columbia World Project, in 6 developing countries. In Vietnam, we are collaborating with the DeRISK project implemented by the International Center for Tropical Agriculture (CIAT) on methodologies to identify climate service needs, and prioritize them to maximize investment results and improve project results. We are working with government officials to identify where climate variability and change pose risks to the successful implementation of these strategies. We are also working with decision makers and the Vietnamese Meteorological Service to develop services that can alleviate climate risks and improve the effectiveness of national strategies. Together, ACToday and DeRISK are working both from the top-down and from the bottom-up to ensure that national policies support local action, and that local actors have the resources they need to succeed, in turn feeding into the success of the national policies.

Data for Good: Innovative ways the UAE is joining hands for a better world

Submitter: Elkabbany, Marwa
GIS Lead, Federal Competitiveness and Statistics Authority, United Arab Emirates, United Arab Emirates, marwa.elkabbany@fcsa.gov.ae

Additional Authors:
Christiaan Coetzee, Projects Executive, Federal Competitiveness and Statistics Authority, United Arab Emirates

Abstract:
The Federal Competitiveness and Statistics Authority (FCSA) serves as the Secretariat to the United Arab Emirates (UAE) National Committee on Sustainable Development Goals (SDGs). The UAE National Committee on SDGs, established in January 2017, consists of 17 Federal Government entities.

SDG 17, Partnerships for the Goals, is at the centre of success of the SDGs. Therefore, global and local partnerships is a key pillar to achieve the SDGs. However, the SDGs will not be met without significant public awareness. To address the challenge, the Federal Competitiveness and Statistics Authority (FCSA) established a multi partnership engagement with private- and public sector, and the UAE society.

A partnership with Esri Global Inc., the world leader in developing geographic information systems (GIS) solutions, address the SDGs through the UAE SDGs Data Hub (The Hub: http://sdgsuae-fcsa.opendata.arcgis.com/) that connects the multiple partners addressed across public-private sector and UAE society. The Hub, which is integrated with the United Nations Statistical Department (UNSD), promotes open data, sustainable partnerships and serves as an

educational tool that address the lack of public awareness of the SDGs through open data, SDG related stories and initiatives. The integration of the Hub feeds the UNSD global data hub--Federated System for the SDGs -, with SDG indicators data, stories and mainstream initiatives.

The Hub inspires numerous partnerships from the public- and private sector whilst taking advantage of the web GIS principles allowing data connections from multiple sources and organizations that boosts open data between the government, sectors and the society that assist policy makers, decision makers and ultimately, the SDGs.

Additionally, SDG implementation demands proactive engagement across all sectors, including the society. The FCSA introduced a world pioneering initiative element to the Hub that encourage all sectors to actively engage and share initiatives directly to the UNSD. The initiatives module of the Hub serves as a tool to translate aspirations into initiatives, whilst creating awareness on the SDGs. Each initiative reflects how UAE is addressing a specific SDG, can be adopted by any country or organization worldwide. Moreover it reinforce public participation through calls for action within the initiatives which is established through either public surveys or other data interaction tools offered within initiatives pages.

In conclusion, with a progress of 6 initiatives, 25 indicators, 9 data stories, the Hub proved that there is a hunger to sector wide engagement and having a centralized system showcasing SDGs progress and achievements and this will only happen established partnerships and open data implementation.

Exactly How to Build Hyper Local Conservation Action into Greater Regional Momentum

Submitter: Ferrara, Clayton
Executive Director, Rollins College, United States, clay@ideasforus.org

Additional Authors:
Chris Castro, Director of Sustainability, The City of Orlando, Florida

Abstract:
In an increasingly global landscape of multinational laws, polices, and ordinances, conservation best practices can be compounded into regional successes by focusing on hyper-local action aligned with the United Nations Sustainable Development Goals (UN SDGs) and the sharing of solutions across a network of frontline communities. Over the last 11 years, IDEAS For Us has organized the public, private, and independent sectors in over 30 countries for conservation and sustainable development using a unique methodology for citizen engagement that is demonstrably translatable into polices and ordinances for energy, water, food, waste, and ecology development. Through a metric-rich matrices of key performance indicators, outcome, output, capacity, capability, and impact have been strategically implemented to boost biodiversity and remove anthropomorphic stressors on the environment. This has resulted in local wins for conservation across the state of Florida but most importantly, this model is being shared and utilized across the United Nations, Pontifical Academy of Science, and over a dozen institutions of higher learning in both developed and developing countries to advance

sustainability overall. I would like to engage the audience in a workshop OR presentation demonstrating exactly how to replicate our model and implement these best practices in their own conservation efforts.

Localizing the SDGs at the Governorate level in Egypt

Submitter: Girgis, Hanan
Executive Vice President, the Egyptian center for public opinion research (baseera), Egypt, hanan.girgis@baseera.com.eg

Additional Authors:
Magued Osman, Professor, Cairo university and Director of the Egyptian center for public opinion research (baseera)

Abstract:
Introduction:

In September 2015, the global community adopted the 2030 Sustainable Development Goals (SDGs) and Egypt was one of the countries that committed themselves to achieve the SDGs. The MDGs give some lessons learned that should be taken into consideration while planning to achieve the SDGs in Egypt. The study of the MDGs achievement at the governorate level reveals that the performance of different governorates has differed, while some have achieved their goals, others have not. This indicates that in order to achieve the SDGs in Egypt, it is essential to set goals at the governorate level and to assess the challenges and opportunities of the governorates to achieve these goals.

Methodology:

Population size of each governorate was projected, then a set of indicators of the SDGs were selected to calculate quantitative targets for them at the governorate level to be achieved by each governorate by 2030. Two scenarios were considered; the first scenario assumes that the rate of change in each target indicator at the national level will be applied to all governorates. The second scenario assumes that there is a limit for the value of the indicator that cannot be exceeded by the governorates and therefore any further improvements are distributed to the other governorates. To determine the limit of the indicator (lower limit if the target is to decrease the value of the indicator or upper limit if the target is to increase the value of the indicator), the country that currently have a value for the indicator that is very close to the target value for Egypt in 2030 was studied and the higher value or the lower value achieved by its provinces was considered the upper or the lower limit to be achieved by the Egyptian governorates. Thus, after applying the 1st scenario, the governorates whose target value in 2030 exceeds the limit was set at that limit in 2030 and the further needed improvement was distributed on the remaining governorates. The rationale behind this is that if at least one of the provinces achieved that limit value, this provides evidence that this value is achievable and that the Egyptian governorates can reach it and no evidence that the Egyptian governorates can exceed it.

After calculating the targets, the localization roll-out phase started. Workshops were conducted

on the central levels with the line ministries and on the local level in 5 governorates to assess the challenges and opportunities of the governorates to achieve these goals

Results:

Quantitative targets were calculated for the selected set of indicators at the governorate levels. The calculated targets took into consideration the differences and gaps among different governorates and aimed at closing these gaps.

The roll-out phase showed that the planning staff in the governorates and the ministries directorates have a limited knowledge about the SDGs. They assured on the importance of having clear and announced quantitative targets not only for the SDGs but for all the other strategies and objectives. The discussions reflected lack of the capabilities needed for planning in the governorates. There is a need to establish information centers in the ministries' directorates in the governorates instead of statistics department to provide planning staff with the indicators and information they need.

Challenges for Sustainable Development in the Post Conflict in Colombia

Submitter: Gutiérrez Jaraba, Prof. Johon
Scientific Director, Fundación Universitaria Antonio de Arevalo - UNITECNAR, Colombia, johon.gutierrez@tecnar.edu.co

Additional Authors:
Fabio Perez Márquez, Researcher, Fundación Universitaria Antonio de Arévalo - UNITECNAR

Gina Angulo Blanquicett, Academic Subdirector, Universidad Jorge Tadeo Lozano - Cartagena

Libis Valdez, Engineering Dean, Fundación Universitaria Antonio de Arévalo -UNITECNAR

Abstract:
The environmental challenges of the post-conflict in Colombia are related to the incorporation of environmental sustainability considerations into their planning and implementation. In that sense, it will depend that the construction of peace becomes an opportunity to develop sustainable models; Not knowing that aspect could lead to the deterioration of the nation's natural heritage and a possible economic and social failure. In the first place, because the priority zones for the implementation of the actions show that around 90% of the municipalities with priority in the post agreement, have some figure related to protection or regulations of their use. Additionally, because the implementation of rural reforms imposes many challenges to the management of forest reserve areas in which it is necessary to avoid promoting productive activities other than those that their vocation allows. Third, because it is essential to consider extractive activity and its implications for peacebuilding, in order to avoid the migration of socio-environmental conflicts to areas with mining potential. The existence of these natural resources can constitute an opportunity for rural development if institutional issues, benefit distribution and management of environmental liabilities are resolved. Finally, because peacebuilding implies rapid responses from the environmental institutional framework so as not to generate bottlenecks in the

implementation of the nine (9) agreements defined. This paper analyzes the risks, impacts and opportunities of peacebuilding for territorial sustainable development around issues related to issues such as land use planning and local development opportunities that can be proposed if a sustainable use of natural heritage is made.

Evaluation of a project performance in terms of the SDGs

Submitter: Kanie, Norichika
Professor, Keio University, Japan, kanie@sfc.keio.ac.jp

Abstract:
As the Sustainable Development Goals acquire attention and interests by multiple stakeholders, there is a growing interest in measurement and evaluating companies' action on sustainability in terms of the SDGs. In particular, financial sector is trying to measure those actions. In Japan, Ministry of Economy, Trade and Industry (METI) together with Nagano prefecture launched a scheme where companies committed to the SDGs are registered. Those registered companies received different kind of benefits. Potential benefits include benefits in a public procurement process and eligibility for applying for a new financial instrument. Companies applying for this scheme submit an application form including their 2030 targets, indicators to measure them, and report of around 40 performance indicators.

In order to scale up this kind of certification scheme for an "SDG Company", and to deepen actions on the side of companies towards sustainability, we develop a web-based tool for self-evaluation of an SDG project. By using this tool, a project performance, or a company performance, could be evaluated in terms of the SDGs. This will facilitate for stakeholders to understand how their actions could be contributing to the SDGs. From evaluators' viewpoint, this kind of tool can serve as a first step towards companies' performance evaluation towards sustainable development.

This presentation will first present the METI/Nagano scheme, and then show how the web-based tool looks like, and how the evaluation of actions are made.

SDG Partnerships and Whole-of-Society Engagement: The Case of Bangladesh

Submitter: Khasru, Syed Munir
Chairman, Institute for Policy, Advocacy, and Governance (IPAG), Bangladesh, munir.khasru@ipag.org

Additional Authors:
Avia Nahreen, Senior Research Associate, The Institute for Policy, Advocacy and Governance (IPAG)

Md. Sadat Anowar, Research Associate, The Institute for Policy, Advocacy and Governance (IPAG)

Abstract:

The Sustainable Development Goals (SDGs) are highly relevant for a developing country like Bangladesh. Bangladesh has been standing in good stead for its excellent progress in the areas of poverty reduction, food security, primary level education, and reduced maternal & infant mortality rates among other achievements. Buoyed by the successes of the Millennium Development Goals (MDGs), Bangladesh became one of the forerunners in embracing the SDGs. According to the "SDG Bangladesh Progress Report 2018," the country is already performing well in poverty alleviation, gender equality, access to sanitation & electricity and annual GDP growth.

Unlike the MDGs, the SDGs are much more comprehensive covering almost all aspects of development. But the scale of the SDGs makes them difficult to be achieved by the public sector alone. Reaching all the SDGs on time would require all hands on deck. Bangladesh has had an established practice of holding wide-ranging consultations across the government, leading economists and academics of public universities, chambers of commerce and industries, non-governmental organizations (NGOs), civil society organizations (CSOs), researchers, and development partners in preparing its long-term (10 years) and medium-term (5 years) development plans. The GOB has adopted a "Whole of Society" approach for implementation of the SDGs.

As part of this approach, several consultations on stakeholders' engagement on the SDGs implementation in Bangladesh have been held with representatives from NGOs, INGOs, CSOs, businesses, development partners, ethnic minorities, professional groups, labor associations, women networks, and the media. The consultations have sought to raise more awareness, interest, and commitment to create more engagement from all stakeholders towards attaining the SDGs.

Civil society in Bangladesh has already been an active partner of the government in its development endeavor. The critical role of the private sector in driving economic growth and employment has been well proven and both the government and the private sector now recognize the crucial role of the private sector in attaining many of the SDGs.

Acknowledging this approach as a prerequisite for Bangladesh for achieving the SDGs, this paper will begin by reviewing the current framework of the "Whole of Society" approach undertaken by Bangladesh. It will identify the key non-state actors included under the 'whole of society approach' to achieve the SDGs. The paper will then explore the different dimensions of engagement with the government for different stakeholders. It will also identify some major SDGs which can be attained at a faster pace if this approach is undertaken more effectively by Bangladesh. Moreover, the paper will explore and catalogue the best practices from the Bangladesh experience that can be applied in other developing countries. Key challenges in adopting this approach will also be identified. Finally, some recommendations will be presented on further policies and initiatives that can be developed in Bangladesh for a strong multi-stakeholder engagement so that more effective and innovative solutions can be formulated for attaining the SDGs.

Mapping an Ecosystem of Minnesota Organizations and Corporations in Alignment to the Sustainable Development Goals

Submitter: Laferriere, Elizabeth
MDP Alumni, Humphrey School of Public Affairs, University of Minnesota, United States, lafe0013@umn.edu

Additional Authors:
Yujing Cai, MPP, Humphrey School of Public Affairs

Yuan Dai, MPP, Humphrey School of Public Affairs

Tyler Vogel, MDP, Humphrey School of Public Affairs

Abstract:
Adopted in 2015, the United Nations defined seventeen Sustainable Development Goals (SDGs) aimed at mobilizing efforts to end all forms of poverty, combat inequality, and protect the planet. The SDGs are presented as a common framework for addressing global issues not just multilaterally or across nations, but also at a local level. Public and private sector collaboration is viewed as an important vehicle for driving instrumental sustainable development, yet comparable metrics for joint action have often been lacking. Corporations, universities, and nongovernmental organizations (NGOs) have widely embraced the SDGs as a point of synergy to coordinate this joint action in helping address the world's most dire challenges. Understanding the importance of collaboration, many corporations and organizations have started to evaluate and coordinate their work and mission to the SDGs.

Minnesota serves as an ideal location to better gather insights into the culture of SDG understanding and implementation in the private and NGO sectors due, in part, to its urban/rural divide and globally-focused organizations from Fortune 1000 companies to small-scale International NGOs. This introductory work investigates more than 200 Minnesota-based NGOs, universities, and corporations in an attempt to illuminate trends in the culture of sustainable development in Minnesota and propose recommendations to further support a local-to-global sustainable network. This study highlights Minnesotan organizations and corporations connected to the SDGs through four pillars: synergy; internal focusing of initiatives and goals; assessing current status; and community action. These themes address the different approaches that organizations and corporations have taken in regards to the SDGs, based on interviews, surveys, panel discussions, and external research.

Based on the results of our research, we propose an introductory framework for an ecosystem map identifying organizational SDG goal alignment and key insights. This visualization will be an interactive tool to highlight the relationship between organizations and the SDGs in order to facilitate future collaborations and partnerships across the state, country, and world. With more groups working together towards the SDGs, Minnesota can serve as a case example to best support private and public engagement in facilitating responsible business practices and sustainable development.

Learnings and reflections from Sustainable Antioquia: A Colombian pioneer experience of SDG localization

Submitter: Melo-Velasco, Jenny
Ph.D Student, University of Missouri, Sustainable Antioquia, Colombia,
jmd9d@mail.missouri.edu

Additional Authors:
Sergio Andrés Tobón O., Proantioquia, Sustainable Antioquia

Laura Villa, Sustainable Antioquia

Jorge Andrés Calle, Sustainable Antioquia

Nataly Hernández, Sustainable Antioquia

Viviana Restrepo, Sustainable Antioquia

Maria Isabel Arango, Sustainable Antioquia

Nicolás Molina, Universidad Pontificia Bolivariana, Sustainable Antioquia

Carlos Viviescas, Corporación ProSUR, Sustainable Antioquia

Abstract:
In early-2016 a cross-sectoral group of organizations launched Antioquia Sostenible (Sustainable Antioquia) intending to promote the Sustainable Development Goals (SDGs) agenda at a local level. Antioquia Sostenible was conceptualized as an open space of learning and articulation on sustainability and the SDGs, and as a shared management platform in which Antioquia as a territory and everyone from their sectors, could report the contributions made to achieve the SDGs.

During these three years, Antioquia Sostenible has been explored different lines of action to boost SDG local appropriation in five of the nine subregions of the department. In the first-year efforts were focused at Valle de Aburrá Metropolitan Area on the consolidation of a learning community on five SDGs pillars (planet, people, prosperity, peace, and partnerships). As a result of these learning cycles, two milestones were achieved — first, a regional and collective vision for 2030 which prioritize the SDGs more relevant for Antioquia; second, a baseline of indicators to measure the SDGs in Antioquia.

In 2017 Antioquia Sostenible unfolded actions mainly in two different territories: East and Uraba, purposefully selected by their contrasting socioeconomic characteristics. During this year institutional network to promote SDGs in each region was identified, best business practices at the local level were identified, and a Vision 2030 for East was collectively created. In this year, year-one report of indicators to track the Antioquia process towards SDGs was released.

In 2018, leveraging on learnings and achievements Antioquia Sostenible consolidated its Model for the Dynamization of Territorial Sustainability (MDTS), a four-phases approach to generate and transfer capacities to local actors for a collective work around SDGs. Through a new partnership with a multisectoral initiative with presence in another two subregions of the department (North and Northeast) further actions were unfolded, visiting directly 14 municipalities for the co-creation of a collective vision for each region based on an appreciative inquiry of their capacities, network, and common objectives. Also, during this year two new reports focused on local data were release: business and NGO contribution towards SDGs. For 2019 the vision is continue growing and consolidating the MDTS.

For all this path, Sustainable Antioquia (Antioquia Sostenible) has been acknowledged by Colombian branch of UNDP as the most significant experience of SDG localization in the country.

This paper written by the Lead Team of Sustainable Antioquia presents the Model for the Dynamization of Territorial Sustainability, synthesizes milestones and pitfalls of this three-year experience on governance, cross-sectoral collaboration, and SDG localization, and reflects on the replicability conditions of this initiative across similar territories.

Women Empowerment Issues in Indonesia's Coastal Areas

Submitter: Panjaitan Sjahrir, Nurmala Kartini
Senior Advisor for Climate Change to the Coordinating Minister for Maritime Affairs, Government of Indonesia, United States, Lauren.barredo@unsdsn.org

Abstract:
Indonesia is the largest archipelagic country in the world, with 17,000 islands, spanning across 5,000km of area and a 95,180km2 coastal area. Any changes in the global climate condition will affect the country dramatically. Indonesia also has 3 million hectares of mangrove forests, which is 20% of the world's total mangroves, and 3.1 million hectares of seagrass meadows, making it the island nation with the largest diversity in coral life.

Poverty in Indonesia is oftentimes identic with women, especially in the fishing industry along the coastal regions. In fact, in the fishing industry there seems to be a feminization of poverty. Numerous intensive field studies clearly shows a woman's peripheral position in the fishing industry, despite their being just as active as their male counterparts in the field.

In accordance with the Sustainable Development Goals (SDGs), the Indonesian government has released a Presidential Decree, stating national and regional action plans to achieve SDGs. To attain these goals, we must implement capacity building programs in local communities and villages, especially for women.

This presentation will discuss women's role and activities in 5 coastal regions of North Java and Sumatra, illustrating their role in pursuing and executing initiatives to reduce carbon emission.

Empowering women is an ongoing process. Giving women their power back involves changing

their mentality from that of being a powerless person into someone who has full authority of herself. She is aware of her responsibilities and duties. She can self actualize and reach her fullest potential in the professional and public space. She has access to education, work training, health resources, bank loans and access to natural resources.

To help us get closer to empowering all women, we must pursue a series of initiatives and instruments, including the Gender Related Development Index (GDI), Gender Empowerment Measure (GEM) and Gender Action Plan (GAP) and community development activities to bring our goals to fruition. This presentation will look at the objectives and effectiveness of these programs.

Modelling and Assesing Multi-Stakeholder Relationships: The Case of Collaboration in Global Public-Private Partnerships

Submitter: Reyes, Antonio
PhD student, University College London, United Kingdom, antonio.reyes.16@ucl.ac.uk

Abstract:
Along with the increased attention to the proliferation of global public-private partnerships (GPPPs), as multi-stakeholder networks of hyper collective action to address pressing development problems in a myriad of issue areas generally related to the Sustainable Development Goals (SDGs) of the United Nations, there has been recognition of their particular managerial challenges. That is, managers face the dilemma of being expected to work more in networks of diverse actors where they have less authority while at the same time increasingly being held more accountable for performance and improved outcomes. Scholarly guidance on strategic options for network management remains considerably underdeveloped, especially since the scholarship still yielding more theoretical questions than empirical investigations. This is reflected in a lack of consensus typology of approaches to network management that address the diversity and complexity of partnerships in practice.

Current scholarship tends to presume multi-stakeholder partnerships functioning as it is established by its formal organisational design regardless of its membership composition, structural differences and changes over time. This overlooks informal relationships that weave complex webs between members and internal divisions at different levels of the organisation. Given that partnerships are archetypical examples of layered multilevel social systems with multiple and partially nested levels of action, a question remains unanswered: How independent managers are in the formulation of network management strategies considering the formal institutional design of the partnership? And, how are these management strategies shaped by these conditionalities?

I argue that management strategies are conditional on the presence of relational ties at the higher and lower-level of the partnership. Then, if this is plaussible, management strategies would be essentially shaped by the articulation of formal macro-level organisational interactions between divisions and the informal micro-level interpersonal interactions of actors between stakeholders and the managers rather than being motivated and shaped exclusively by individual characteristic of the partnership's leadership or its formal design, as it has been implied by a large extent of the

literature.

For this methodology paper, I propose multilevel exponential random graph models (MERGMs) to study the organisational phenomenon in multi-stakeholder partnerships. MERGMs provide the possibility of testing hypotheses about how the presence of social relations among micro-level actors depend on the presence of ties among macro-level units. GPPPs are suitable for this analysis since they have at least two levels of agency: that of the members (staff, implementers, managers and/or directors), and that of the internal divisions (secretariats, board of directors, and general assemblies), where members are affiliated.

This paper pretends to extend the multi-stakeholder network scholarship empirically by clarifying the social and organisational mechanisms affecting the likelihood of partnerships configurations that permits the formation of network management strategies employed by managers to activate, connect, arrange and agree processes with members despite the formal organisational boundaries surrounding the formal divisions in the partnership. This objective is analytically crucial since GPPPs are widely assumed to be horizontal organisations with the ability to cut across different jurisdictions and reduce power and sectoral disparities among members.

Bringing Forward the Left Behind: Impact of Male Out-migration on Women in Hill Districts of Uttarakhand

Submitter: Sharma, Prakriti
Masters' Student (graduating June 2019), TERI School of Advanced Studies, India, prakriti.sharma@terisas.ac.in

Additional Authors:
Dr. Smriti Das, Associate Professor and Head of Department of Policy Studies, TERI School of Advanced Studies

Abstract:
An intermix of push and pull factors in rural agrarian economies have led to high rates of out-migration and abandonment of agriculture. This phenomenon is causing to have multiple repercussions on these economies, they tend to – affect the sociocultural organisations that sustain agriculture, restrict space for agricultural innovation and tend to overburden those left-behind (who are mostly women). Overall, this shift which is slowly being observed in multiple rural contexts has led to an imbalance between labour needs and availability, overall food production of an area and the production systems at large.

While multiple studies have focused on migrant status and remittance flows, there has been less emphasis on the impact of out-migration on women and children, and how it impacts the rural production system in general. Situated in the unique context of hills districts of Uttarakhand, much of which is affected by the phenomena of ‘ghost villages’, this study aims to assess the impact of out-migration on the reproductive and productive role of women left behind. Further, it aims to assess how IFAD – funded Integrated Livelihood Support Project (ILSP) has helped women cope with uncertainties in the context of male out-migration. Using the Sustainable

Livelihood Approach, the study design adopted a case-control approach choosing three villages of Almora district. Mixed method was used for data collection which included household surveys, interviews with 80 women, focused group discussions and participatory rural appraisal tools.

The preliminary analysis of data revealed that women and young girls were overburdened with reproductive roles that left them with no time to invest in productive activities. Although women were engaged in farm activities, in the absence of property rights and recognition as 'farmers', they were seldom able to exercise control over means of production. Their access to economic decision making was limited. The only difference was where women from households with out-migrated male members considered themselves as 'temporary household head' with the power to make decisions pertaining to household expenditure. The ILSP project, through its association with the vulnerable groups, helped the farmers connect to the market. But this association was slow to scale up in the absence of adequate processes. The women respondents perceived some benefit from the group association through enhanced social capital that could help them cope with stress condition, particularly in the absence of male counterparts. However, the overall beneficiary satisfaction with the project was low. This was attributed to failure to contextualize the project and lack of accountability.

The assessment of good practices, learnings and shortfalls of the project and coping strategies employed by women in these villages highlight the importance of stakeholder engagement at all levels while planning development interventions. Local actors can nuance contextual physical and social vulnerabilities for sustainable livelihood interventions that can check male-outmigration while also addressing gender-specific vulnerabilities.

Keywords: out-migration, women, sustainable livelihood, development project

Analyzing Middle Actors' Influence on Land Use Policy: A Case Study in Central Kalimantan, Indonesia

Submitter: Soubly, Kevin
Graduate, Master of Science in Environmental Change and Management, University of Oxford, United Kingdom, kevin.soubly@gmail.com

Additional Authors:
Dr. Kaysara Khatun, Marie Curie Fellow, The Environmental Change Institute, University of Oxford

Abstract:
This paper applies Parag and Janda's Middle-Out Perspective (MOP) as a complementing analytical alternative to the dichotomous options of top-down vs bottom-up strategies of international development and commons governance. Using a case study approach in Central Kalimantan, Indonesia among a village of indigenous Dayak, this study explores how middle actors influence local land use and livelihood capacity, as well as the associated governance and decision-making impacts.

Influences from both internal and external middle actors are analyzed within the context of environmental change, utilizing established social science research methods to interrogate qualitative empirical evidence, incorporating field-based interview responses from multiple members of 25 village households and 11 key stakeholders.

Through application of the same factors of "agency" and "capacity" originally used by Parag and Janda in the MOP, this study demonstrates middle actors' unique capabilities and criticality to change due to their influence across various levels of decision-making. Results indicate that middle actors play a large role as determinants of action, both passively and actively, both directly and indirectly, across various levels of decision-making, perception-shaping, and commons governance.

In addition, results denote that the prominence of novel "passive" middle actors, such as the internet, can provide communities themselves with a level of agency comparable to that provided by other middle actors such as NGOs and palm oil industry entities – which often operate at the behest of the "top" or out of self-interest.

Further, the paper posits that existing development and decision-making frameworks may misidentify the "bottom" as the "middle," raising questions about functional levels of local ownership and stakeholder inclusion in traditional development and livelihood discourse, strategies, and support. This includes a discussion around the appropriate levels of confidence in customary models of sustainable development research design and evaluation, with implications for funding and policy decisions that follow.

In conclusion, this paper provides recommendations including that current policy preconceptions be reevaluated and reimagined in acknowledgement of the unique role middle actors play in community decision-making. By engaging middle actors in a locally-adapted, integrative manner, sustainable development efforts and governance design may be more broadly effective.

Comparing practical SDG partnerships in Wales and Sweden

Submitter: Waters, Rafael
Full professor, Uppsala University, Sweden, rafael.waters@angstrom.uu.se

Additional Authors:
Peter Sävblom, LL.M, international Counsel and expert development structure advisor to public organizations and government as well as the financial investment and corporate sector, at senior board and director level, and co-initiator of The Blue Arena, peter.savblom@lawbase.org.uk

Abstract:
We believe that a hole-of-society approach and partnerships are required to efficiently seek to fulfil the SDGs, and collaborative networks play a key role in mobilizing sustainable development stakeholders into action, as well as fostering and coordinating action both within and between sectors. In this paper we present two cases for comparison – Marine Energy Wales, originating from Pembrokeshire, Wales, representing the support structure of marine energy development and generation, and the case of STUNS originating from the city of

Uppsala, Sweden, constituting part of the city's innovation support structure for sustainable development. Both organizations represent successful examples of local development and have, independently of each other, adopted similar approaches and actions. The fact that both organizations have community interest as the overarching goal, and not the maximization of profit, may indicate that organizations charged with a community wide responsibility and perspective could be more efficient to spur successful collaboration between sectors and for achieving long term development and prosperity.

Tracking the SDGs at Whole-of-Society Levels: A Systems Thinking Approach

Submitter: Wright, Alaphia
Technical Adviser, Former Director UNESCO Liaison Office to the African Union and UNECA, and Representative to Ethiopia, TwynBrain Ltd., Zambia, alawright@gmail.com

Abstract:
This paper draws from research and development (R&D) work in the use of Systems Thinking in the design, strategic planning, implementation, and monitoring and evaluation (M&E) of development initiatives.

A ground-breaking book based on findings from the work was published in April 2015 . It was shown that the performance of an individual is to be considered in the context of the entity in which he/she is engaged. The entity can be a project, a programme, a department, an institution, an organisation, or even a country. A synthesised African country, Africania, was introduced and its performance profile given by means of a one-page Results Based Management Logical ScoreCard (RBM-LSC)©. This depicted the intervention logic / theory of change of development in just one-page. In particular, the vision for development in Africania was given as: 'Increasing number of Africanians enjoying dignity, peace and prosperity'. Further, it was shown that for the vision to be achieved, Africanians would have to be responsibly engaged in seven interrelated areas of value-added activities. The seven areas identified were: gainful employment, health, food security, enterprises, utilising intellect, sustainable use of the natural and built environment, and governance with integrity. These seven areas depicted the mission of development in Africania. It is not surprising that these areas are interconnected / interrelated, since Africania is indeed a system. A subsequent study covering the first of the value-added human endeavours, namely gainful employment, was published in July 2018.

Important knowledge that has emerged from the R&D work includes the fact that the RBM-LSC© is consistently applicable across all walks of life: from the individual project level, through country level, and even up to the continental level and beyond. For instance, it has been used to interrogate findings from the well-publicized recent assessments for reform of the African Union in the context of both Agenda 2030 (The SDGs) and Agenda 2063 (The Africa we want) . It has also been used to examine the performance of entities at various societal levels – households, primary schools, secondary schools, universities, informal sector, and formal sector. The paper highlights the use of the RBM-LSC© to track performance in the SDGs. The frameworks and modelling used are presented for cases from various societal levels. The exciting implications of these in reducing the efforts necessary for monitoring and evaluating progress in achieving the SDGs, while enhancing delivery, are highlighted.

SDGs: Making Trade-offs and Synergies Transparent

Exploring trade-offs among the SDGs with dynamic modelling: experience from the iSDG-Australia model

Submitter: Allen, Cameron
Researcher, University of New South Wales, Australia, cameronallen01@hotmail.com

Additional Authors:
Professor Graciela Metternicht, UNSW, Sydney

Associate Professor Tommy Wiedmann, UNSW, Sydney

Matteo Pedercini, Vice President and Chief Operating Officer, Millennium Institute

Abstract:
Key attributes of the SDGs include their broad scope and complex interlinkages between goals and targets, the long-term and uncertain planning horizon, and the level of ambition that calls for transformational rather than incremental change. Scenario and pathways analysis and modelling are well-designed for managing such complexity and uncertainty. Recent modelling studies highlight that the comprehensive scope and inherent trade-offs between SDG targets may undermine their achievement. However, many gaps remain in terms of our understanding of the complex feedbacks between SDG targets in different country contexts, as well as deficiencies in the adequacy of global scenario frameworks and integrated models in addressing the broad scope and multiple scales of the SDGs.

This presentation will provide a brief overview of the results from a new study which contributes to addressing these research gaps through a national SDG scenario analysis and modelling exercise for Australia. The study develops four alternative 'pathways-oriented' scenarios based on different approaches to development (green, inclusive, neither or both) that are nested within global reference scenarios (the Shared Socioeconomic Pathways), each with a plausible set of assumptions and a coherent package of policies and investments. The four alternative scenarios (1. Growth at all costs; 2. Greening growth; 3. Inclusive growth; and 4. Sustainability transformation) are compared against a Business-As-Usual scenario projection which maintains existing policy settings.

Integrated assessment modelling using the iSDG simulation tool was used for quantitative projections to 2030. This represents the first application of the model in an advanced economy. The performance of each scenario was evaluated on a consistent framework of 52 SDG targets and 97 indicators across all 17 goals.

Overall, the results highlight that significant advancements towards the SDGs can be made through a set of balanced and coherent policy and investment settings. However, achievement of the SDGs in Australia will be extremely challenging due to trade-offs between targets as well as the scale and pace of the transformation needed. The 'Sustainability Transformation' scenario

(Scenario 4) performed the best, with overall progress towards all goals and targets assessed at 70% (on an index scale), while 46% of individual SDG targets were assessed as achieved. This was well-ahead of scenarios that focused on economic, social or environmental objectives in isolation. The study underscores the importance of integrated approaches and policy coherence in SDG implementation, also highlighting several priorities for further scenario and model development and analysis.

Mapping urban segregation in Brazil: Implications for conservation, housing, and value capture

Submitter: Bridges, Allison
Postdoctoral Fellow, Columbia University, United States, alb2303@columbia.edu

Abstract:
Cities throughout the world are developing and implementing sustainability plans that aim to accelerate an increase in the concentration and accessibility of natural amenities such as parks, recreation facilities, and bike paths. Amenity-rich cities with green programs such as these, however, can contribute to an increase in the cost of living and subsequent inter-urban migration in metropolitan regions. This research is a case study analysis of land conservation and spatial equity in Florianópolis, Brazil. Overlaps between low-income settlement areas, conservation areas, and decreasing rental prices are analyzed based on open access data to help visualize the geographies of income-based segregation. Growth in the city's tourism industry in the 1990s increased demand for low cost housing for service sector workers who migrated to the island. The steep slopes ringing the city center, which are federally protected conservation areas, are increasingly populated with hillside favelas. With a relatively large percentage of land restricted from residential occupation, the city is unable to comprehensively monitor land and prevent the construction of illegal housing. Steadily rising real estate values throughout the island have led to a locked-in socio-spatial development pattern that concentrates favelas and forces encroachment on preservation areas. With investment in the luxury market exacerbating the housing deficit, socio-economic polarization is becoming more apparent. As the gap widens between the cost of land in affluent neighborhoods and the cost in low-income neighborhoods, the city has the potential to follow similar patterns of growth that have occurred in larger Brazilian cities such as Rio de Janeiro and São Paulo. The visualizations indicate decreasing rental prices in certain neighborhoods bordering conservation areas and suggest there is a need to adopt (1) urban land use planning tools and policies, such as land value capture, that have the potential to offset socio-spatial polarization, and (2) integrated planning strategies for the assessment of the social and environmental impact of land markets.

Indicators and Targets of the Agenda 2030: do they all play on the same team?

Submitter: Cavalli, Laura
Senior Researcher

SDSN Italia Manager, Fondazione Eni Enrico Mattei, Italy, laura.cavalli@unibocconi.it

Additional Authors:
Sergio Vergalli, Feem, Università degli studi di Brescia

Mia Alibegovic, Università degli studi di Brescia

Abstract:
The interlinkages and integrated nature of the Sustainable Development Goals are of crucial importance in ensuring that the purpose of the new Agenda is realized. Most of the Sustainable Development Goals (SDGs) have the potential to bring progress in other SDGs, but some of these synergies are stronger than others. At the same time, advancement in some goals could negatively affect progress in other areas without careful policy design.

The present work provides a comprehensive literature review both of the methodologies that have been employed to study the phenomenon and of the results that have been obtained through the analysis of the specific SDGs.

Moreover, applying the most suited methodology and relying on more than 150 elementary indicators related to all the SDGs, the paper focuses on the Italian Regions, in order to study the correlation between the Goals and to check if the quantitative results are aligned with those presented in literature referring to other Countries.

From the policy perspective, this exercise is crucial: actually, starting from the business-as-usual scenarios that traditionally depict the development of the socio-economic systems without considering the introduction of new policies, we only consider a reference benchmark, a macro-dimension of the specific SDG. On the other side, the policy counterfactuals provide the ex-ante assessment of costs and benefits of planned actions and strategies aimed to achieve the SDGs, as well as their feasibility and potential trade-offs/interactions with other sustainability dimensions not directly considered by the policy intervention.

Leave no one behind? Seeking transparency in UK Aid for Trade

Submitter: Melvin, Jennifer
Senior Lecturer, University of Roehampton, United Kingdom, jenmelvin64@gmail.com

Abstract:
As the Commonwealth celebrates its 70th birthday, many of its member states continue to face significant challenges to sustainable development. These include increasing marginalisation, economic and environmental fragility, particularly amongst its least developed countries. Paradoxically, the Commonwealth is home to some of the largest economies in the world while its levels of poverty are nearly twice as high as the global average and more jobs are needed than are currently available for its young population. The Commonwealth prides itself on high levels of inter-state cooperation for development fuelled by the cultural and historical connections of its members. These connections are purportedly strengthened by shared values and visions of democracy, good governance, human rights, and rule of law. This paper examines the form and function of this cooperation and the multilateral partnerships that shape it. It focuses primarily on the UK's Aid for Trade partnerships with Sub-Saharan African countries in the

Commonwealth. These partnerships are highly relevant in the context of SDG 17 as they seek to enhance capacity-building, reject protectionism, and promote more equitable multilateral trading amongst a wide range of actors. The UK's Aid for Trade programme is a rich area for research given the conflicts and complexities of putting the poorest and most marginalised first while ensuring that aid works for Britain in the uncertainty of a looming Brexit. This research is informed by interviews with members of stakeholder organisations including the Commonwealth Secretariat, the Department for International Development, the CDC and officials from recipient states as it takes a range of examples from Sub-Saharan African countries. This data is triangulated with analysis of policy and programme documentation produced by relevant organisations including the Secretariat and African recipient governments. It concludes by making transparent what is sacrificed and what is gained by all parties in the pursuit of purportedly value-led trade partnerships which seek to leave no one behind and create a sustainable, fair, secure and prosperous future for all.

Romancing the SDGs: Matching concepts with implementations (Case study Indonesia)

Submitter: Sari, Dwi Amalia
PhD Student, James Cook University, Australia, dwiamalia.sari@my.jcu.edu.au

Additional Authors:
HanShe Lim, Lecturer, James Cook University

Ikhtaria Syaziah, Auditor, Supreme Audit Board of Indonesia

Abstract:
The United Nations' Sustainable Development Goals (UNSDGs) is a powerful concept, yet, the implementation is problematic. The 17 goals to be achieved by 2030 are broken down into 232 interrelated indicators. Some goals such as (1) poverty elimination, (2) zero hunger (3) better healthcare, and (4) quality education support each other. Yet, simultaneous achievement of some other goals seems to require unavoidable trade-offs: improvement in one goal requires some compromise in achieving another goal. Accomplishing goal (9) industry, innovation, and infrastructure, for example, will likely have to involve sacrifice in the achievement of (6) clean water and sanitation, (14) life below water and (15) life on land, or vice versa. Thus, good governance in balancing the implementation of the 17 SDGs as a holistic exercise is pivotal.

We assessed the implementation of the UNSDGs using Indonesia as a case study. The UN has suggested Working Groups and Divisions for coordinating and managing each of the 17 goals. Adopting this, Indonesia has established some organisational structures including SDGs secretariats and working groups at both national and local levels. Indonesia also has issued regulations to cascade down the 232 SDGs indicators into its national and local long-term development plan. Such a task, however, is challenging. Indonesia consists of 543 local governments and 43 ministries located on more than 13,000 different islands spanning 5,150 kilometres. Each institution is obliged to implement the 17 goals. Synchronisation of regulations among these government agencies is not well established, and connectivity across the widespread archipelago can be limited. Effective implementation of the SDGs in Indonesia

requires a thorough assessment of these complex governance arrangements.

We conducted a landscape-based governance audit to assess the effectiveness of the implementation of the SDGs in Indonesia. We applied commonly accepted auditing standards. We used Gephi 0.9.1. to illustrate the regulatory coordination, or the lack of it, among public institutions. We traced the SDGs implementation and the existence of trade-off patterns within five landscapes: Riau, Jakarta, Lombok, Malinau and Central Maluku. VISA, multi-criteria analysis software, was used to produce alternative recommendation for more objective prioritisation of SDGs.

Our study concluded that the UNSDGs platform is lacking some important features if it is to be effectively implemented in Indonesia. Managing 17 goals under different working groups fails to grasp the significance of both budget driven trade-offs and the interconnectedness among some of the goals. Moreover, goal-oriented working groups are unable to capture different priorities among widely diverse landscapes.

We propose some recommendations for implementing SDGs in Indonesia. Implementation should be organised by regions and landscapes instead of by working groups and divisions because social, political and ecological conditions vary across the country and the implementation of SDGs will have to vary accordingly. The SDGs secretariat should be authorised to liaise among SDGs stakeholders. Government, companies, communities, and NGOs need to form partnerships not only during the measurement of indicators but also the process of implementation.

Keywords: SDGs, trade-off, governance audit, Indonesia.

Stakeholder and Community Engagement for Sustainable Urban Change

Pathways to Generative Urbanism? Insights from the Western Cape, South Africa.

Submitter: Carmody, Pádraig
Associate Professor, Trinity College Dublin, Ireland, carmodyp@tcd.ie

Abstract:
One of the legacies of apartheid in South Africa is extreme uneven development. This is a result not only of market or private sector led processes, but also state engineering. Under apartheid one mechanism of "deconcentration" was forced removals of "non-whites", sometimes to new industrial growth points, such as Atlantis in the Western Cape. With the withdrawal of subsidies with the end of apartheid many manufacturers based in Atlantis closed down or withdrew. However, there is now an attempt to revive this flagging industrial centre through a designation as a "green-tech special economic zone" in 2018. Based on primary fieldwork this paper seeks to interrogate the nature, continuities and contradictions of this incipient urban redevelopment. Using a socio-technical regimes perspective it seeks to understand the drivers of this project and whether or not it constitutes a potential pathway towards generative urbanism for the region.

Co-producing urban knowledge in Angola and Mozambique through community-led data collection: towards meeting SDG 11

Submitter: Croese, Sylvia
Researcher, African Centre for Cities, South Africa, sylvia.croese@uct.ac.za

Abstract:
The need to make cities in Africa more inclusive, safe, resilient and sustainable (SDG 11) is undisputed as rapid urban growth rates will make the African region a key hub in the global transition to a predominantly urban world. This will not only necessitate new and more transformative public policies, but also data to inform such policymaking. However, in many countries and cities in Africa urban data is scarce and generally not collected, managed or monitored in a participatory and accountable manner. This paper presents findings from a research project conducted in the cities of Luanda, Angola and Maputo, Mozambique which aimed to generate data on the indicators of the urban SDG and use this data to inform more inclusive, sustainable and participatory urban planning and policymaking. The research took place in three selected peri-urban settlements in each capital city. The research process was designed to be trans-disciplinary, with members of the main research team representing academia and an NGO, while on-site research teams included university students, local NGO representatives, community members and local resident committee representatives. The research process included stakeholder meetings, workshops, presentations, research trainings, surveys, participatory mapping exercises, focus groups, key informant meetings, interviews and cross city learning and explored the interlinkages between SDG 11, SDG 5 (gender), SDG 13 (climate action) and SDG 17 (partnerships). In doing so, the project aimed to contribute to: the establishment of a methodology for the implementation and monitoring of the SDGs; a baseline for the formulation of new or the implementation of existing urban policies; and the creation and strengthening of mechanisms of local knowledge (co-) production and experience sharing amongst different actors and stakeholders within as well as between the cities of Luanda and Maputo. The research was supported by the LIRA 2030 Africa Programme, which is implemented by the International Science Council (ISC) in partnership with the Network of African Science Academies (NASAC) and the International Social Science Council (ISSC) with support from the Swedish International Development Cooperation Agency (Sida).

Toward Understanding the Convergence of Researcher and Stakeholder Perspectives related to Water-Energy-Food (WEF) Challenges in a Rapidly Urbanizing City: The Case of San Antonio, Texas

Submitter: Daher, Bassel
Research Associate, Texas A&M University, United States, bdaher@tamu.edu

Additional Authors:
Bryce Hannibal, Research Scientist, Texas A&M University
Rabi H. Mohtar, Professor, Texas A&M University; Dean, American University of Beirut
Kent Portney, Professor, Texas A&M University

Abstract:
Water, energy, and food resource systems are multi-dimensional and interconnected. These resource systems do not exist in a vacuum, but are governed, managed, and consumed by various actors who in turn interact with one another. The past decade witnessed growth in research on interconnected resource challenges that primarily focused on quantifying the physical resource interconnections. More recently, the social, economic, and policy dimensions of these interconnections are receiving increased attention. Despite the move toward inter- and trans-disciplinary research that fosters increased collaborations between research groups in this area of study, relatively little is known about the extent to which the perspectives of researchers and stakeholders in a given hotspot converge around interconnected resource-related challenges.

This paper reports on the water-energy-food nexus hotspot in the region of San Antonio, Texas, and the work of research groups at Texas A&M's Water Energy Food Nexus Initiative in developing a better understanding of the disparities between researchers and stakeholders in their perceptions about the resource challenges and identifying existing areas of convergence. Specifically, the paper 1) evaluates the level of convergence of perspectives between researchers and regional stakeholders regarding San Antonio Region's water, energy, and food challenges; 2) quantifies existing levels of communication of both groups of respondents (researchers and regional stakeholders) within identified WEF organizations of the region; and 3) identifies barriers to and opportunities for improving communication between the WEF organizations and the researchers involved.

The San Antonio Region is home to a growing, rapidly growing, urbanizing population with major agricultural activity around the city, and situated above the Eagle Ford shale play - with its growing production of oil and natural gas due to hydraulic fracturing technology. The region represents a resource hotspot whose stakeholders compete across sectors for the same limited water, land, and financial resources and whose projection trends indicate continued growth across those sectors. The Texas A&M Water-Energy-Food Nexus Initiative (WEFNI) was created in 2015 with the goal of initiating an effort to better understand the complexities of the regional resource hotspot and catalyze a multi-stakeholder dialogue towards addressing them. A questionnaire was sent to 370 researchers and other stakeholders representing governmental, non-governmental, and business organizations working in the region's water, energy, or food sectors. The intent of the exercise was to better understand the level of convergence between the perspectives of the two groups regarding various resource-related issues in the region. Seventy-one responses were received: 31 from researchers, and 40 from other regional stakeholders. Using the questionnaire results, methods for quantifying levels of convergence between both groups based on convergence theory, as well as social network analysis method and metrics were used to address the study objectives.

The authors found aspects of convergence between surveyed regional stakeholders and researchers. Similarly, aspects of convergence between both groups exist regarding the potential of different Texas Development Water Board strategies to address future water challenges. Modest levels of communication were reported between surveyed researchers and regional stakeholders with other identified WEF organizations. Both groups converge on the potential roles of "increased communication" and "sharing information between agencies" as a means to

improve cooperation to address interconnected resource challenges. To make this possible, institutional mechanisms and resource allocations for such activities must be revisited.

As researchers continue to work toward a better understanding of interconnected resource challenges, it is important to ensure a high level of communication and engagement with stakeholders throughout different stages of a project. This is especially useful in shortening the research-policy feedback cycle and when rapid recommendations to address timely challenges are needed. Both, increased communication between cross-sectoral stakeholders, and increased exchange of information, potentially allows for greater coherence in their strategies as they manage the future of these interconnected resources. In an effort to ensure that issues are addressed early on and to create research and solutions of greater value, the survey developed in this study allows the identification of possible areas of convergence or divergence between researchers and regional stakeholders. It also provides a methodology that can be replicated in areas with similar resource challenges within the US and in different resource hotspots globally.

What Makes a City Sustainable: The Importance of Stakeholder and Community Engagement

Submitter: Dilyard, John
Professor, St. Francis College, United States, jdilyard@sfc.edu

Abstract:
It is no secret that the world is rapidly becoming more urbanized, especially as economic opportunities shift from rural toward urban areas. So it therefore should not be a surprise that increased urbanization brings with it the need for these rapidly growing urban areas to be more cognizant of the implications rapid urbanization is having on their ability to grow and function in a sustainable manner. At the same time, many cities have realized that they can play a major role in achieving Agenda 2030 in ways beyond just Sustainable Development Goal 11, Sustainable Cities and Communities. Doing both requires careful planning involving multiple constituencies, as well as the exercise of best practices.

But what are these 'best practices'? One way to identify them could be to see what those cities that are recognized as being more sustainable are doing that make them sustainable. A few years ago, Arcadis, the leading global design and consultancy firm for natural and built assets based in the Netherlands, began ranking cities on their sustainability, focusing on how they perform along three dimensions – people, planet and profit. Broadly speaking, these dimensions refer to what cities are doing (a) to make the lives of the people in them better, (b) to reduce their impact on the planet, and (c) to provide opportunities for their citizens to earn a decent living.

Achieving all three objectives, of course, involves input and participation from multiple stakeholders, including government, non-government institutions, planners, regulators, job-creating institutions and, perhaps most importantly, citizens. Indeed, Arcadis' last sustainable cities report, published in 2018, is devoted to citizen centric cities, focusing on what different cities are doing to meet the needs of their citizens.

This paper will track the 'most sustainable' cities identified by Arcadis over the last few years,

discuss if, how and why they have changed, and describe the factors – or best practices – that cause a city to be sustainable. A focus will be placed on ways in which stakeholders are both identified and encouraged to participate, and how the disparate communities found in cities are engaged.

MultipliCity and SDGs: Community Management and Engagement Platform

Submitter: Fernandez, Gabriela
Co-founder, Metabolism of Cities, Metabolism of Cities, Brussels, Belgium, www.metabolismofcities.org, Italy, gabfern86@gmail.com

Additional Authors:
Paul Hoekman, Co-founder, Metabolism of Cities, Cape Town, South Africa, p@ulhoekman.com

Carolin Bellstedt, Member, Metabolism of Cities, Lisbon, Portugal, carolin.bellstedt@gmail.com

Abstract:
Metabolism of Cities (MOC) is an open source website with the aim to group together tools, publications, and data related to urban metabolism. Urban metabolism studies vary widely in terms of scope, methodology, choice of indicators, and research aims. Their results are published in a variety of formats such as scientific papers, administrative reports, and technical publications. This variety of scopes and formats makes it difficult to compare urban metabolism studies and identify urban metabolic patterns across different cities.

Through the MultipliCity Project, Metabolism of Cities seeks to develop an open source urban metabolism platform in which a great number of urban metabolism publications, data, visualisations etc. are collected to examine patterns and trends in urban resource use, waste generation and pollution across the globe. MultipliCity enables stakeholders to find metabolic data for their city and compare with other case studies for which data is available (for the same metabolic flow, year, region, etc.) in order to put in perspective and contrast data across cities. MOC makes sustainability of cities a key concern in the field of city planning, sustainable development, ecology and shares information and tools around urban metabolism with anyone interested in this field. By indexing and cataloguing publications from many journals, technical reports, books, by explaining the basics of urban metabolism, and by centralising figures and research results into one central hub, this platform aims to provide an open, community-led resource that can help save time and encourage interest for those (citizens, academia, policymakers, urban professionals and industries) looking into understanding more about the metabolism of cities through data sharing.

A key component of MultipliCity is its crowdsourcing nature. The platform was developed so that information can be uploaded by academics, students, city officials, and residents alike. This distributes the workload - in “traditional” research settings each researcher would engage in data collection with little outside assistance - and it also creates a greater sense of involvement and

collaboration for all the stakeholders involved. This will allow a community to collect and use data in a way that's best for them, based on their evolving needs, in a process that emphasizes collaboration and advocate for the change they want to see. Metabolism of Cities has organized a number of "data-thons," which are data gathering and uploading events (generally half- or full-day events), often organized in collaboration with local community groups or universities. During these events, participants are taught about urban metabolism and invited to find environment, social and economic data, photos, maps, reports, and other useful pieces of information that are available on their city of choice. MOC does not hold rigid guidelines, nor one size fits all solutions. Instead offer practical, adaptable mechanisms and instruments, which address various development challenges. The resources empower local actors and channel global goals into local actions.

The search for the most appropriate tools and strategies for localising the SDGs is critical to the design, implementation, review, and success of the 2030 Agenda for Sustainable Development. The platform focus is to be simple, providing applicable guidance in changing environments through raising awareness, advocate to create an enabling environment for the localisation process, to support and ensure the SDGs integration in subnational strategies and plans among local and national actors. MultipliCity provides practical direction to stakeholders in assessing, planning, implementing and monitoring local policies, in accordance with the SDGs attainment strategies. The goal is to facilitate an articulated set of tools to support local stakeholders and their networks, under the leadership of local, regional, and national governments. By pointing out the best practices that are reliable and replicable in order to efficiently design, implement, and monitor policies through data management and engagement.

Integrated Project for the Management of the Maritime Waterfront of Fortaleza-Orla Project 2018

Submitter: Gadelha Ponte, Ticiana
Phd student in University of Lisbon-ISEG, Architect and Urbanist in Fortaleza Municipal Secretary of Urbanism and Environment (First Author), tcnpnt@hotmail.com

Ana Cecília Serpa Braga Vasconcelos, Architect and Urbanist, Phd in Mackenzie University - São Paulo, Professor at University of Fortaleza, anaceciliavas@unifor.br

Abstract:
It is important that local governments build public policies focused on the implementation of the 2030 Universal Agenda for Sustainable Development. City's urban plans should consider the Sustainable Development Goals (SDG's) targets in their elaboration phase, allowing access to national and international funding and collaboration, as well as the engagement of community stakeholders in the achievement of a sustainable development. Despite of many municipality actions, projects and policies that contribute to the achievement of Fortaleza's sustainable development, few mention the SDGs or localize the SDGs targets.

Fortaleza is located in Northeast Brazil, in the State of Ceará. Its maritime waterfront is endowed with great natural beauty. However, over the years, like several Brazilian capitals, it has been occupied in a disorderly and irregular manner, both by the high-income population and by low-

income communities that have poor housing conditions. Necessarily prepared with social participation, Orla Project is considered an effective tool that can evidence and promote actions carried out by the municipalities in their coastal systems in an integrated manner, reconciling environmental development and preservation in the coastal region.

The 2018's Integrated Project for the Management of the Maritime Waterfront of Fortaleza (Orla Project 2018) was the first urban plan of the city that localized and aligned its actions with the SDGs targets. For each action established, the correspondent Sustainable Development Goal (SDG) target was localized, making possible the future publicization to society of how exactly each established action contributes to the achievement of Agenda 2030. The Fortaleza Orla Project 2018 is been considered a reference for other municipalities that are elaborating it's Orla Project in the State of Ceará. It brings several innovations, starting with the fact that Fortaleza was the first city in Brazil to set a review of its Orla Project starting in 2017, with no defined methodology or reference document for review, which made the technical team develop its own methodology. That includes the integration of Orla Project 2018 through the alignment of the proposed actions with the objectives of Fortaleza 2040 Strategic Plan and the SDGs targets, in order to enhance the scope and effectiveness of the proposed actions, as well as to facilitate the means of managing, controlling and financing the plan.

This article aims to identify innovations, lessons learned and achievements of Fortaleza's Orla Projects 2006 and 2018, to enable all the potential of Orla Project in order to contribute to the achievement of the local objectives established and the aligned global objectives of 2030 Agenda (SDGs), describing guidelines for improving its elaboration methodology.

SDG Spanish Cities Index

Submitter: García López, Javier
PhD Student / Candidate, Technical University of Madrid, Spain,
javier.garcia@smartandcity.com

Additional Authors:
Raffaele Sisto, PhD Student / Candidate, Technical University of Madrid

Inés Sánchez de Madariaga, Professor, Technical Univerity of Madrid

Carlos Mataix, Professor, Technical University of Madrid

Julio Lumbreras, Professor, Technical University of Madrid

Abstract:
Spanish cities appear in diverse international quality of life rankings and stand out for their extensive urban public transport network, their universal offer of basic services such as health and education, and the safety and quality of their public spaces, especially in the urban centers. However, for many people living in our cities, access to decent employment and job opportunities are limited, particularly for young people, the long-term adult unemployed and women; Innovation in the industrial sector is limited; and the forms of growth adopted in recent

times have been unsustainable from the environmental point of view, with excessive occupation of new land developments, oversized open spaces, and the consequent pressure on limited natural resources and negative impacts on natural ecosystems.

The Sustainable Development Goals (SDGs), universally approved by the governments of the world, establish a framework for action in economic development, social inclusion, and environmental sustainability. This report "The Sustainable Development Goals in Spanish cities" on the implementation of the SDGs in one hundred cities and twelve metropolitan areas in Spain aims to help urban leaders to identify the sustainable development challenges that affect their cities. The study covers a hundred Spanish cities that integrate those with more than 80,000 inhabitants and all provincial capitals, in addition, twelve metropolitan areas composed of more than one city center with a population of more than 80,000 inhabitants according to the list of urban areas of the Spanish Ministry of Development. It synthesizes the existing data through 85 indicators referring to the 17 SDGs for all those agglomerations.

The collected data provides the most comprehensive assessment of the challenges of sustainable development facing Spanish cities to date. The results show that Spanish cities, even those with better results, are still far from reaching the SDGs. The common challenges to cities that require greater attention are decent work and economic growth (SDG 8), gender equality (SDG 5), sustainable cities and communities (SDG 11), responsible production and consumption (SDG 12) , the reduction of inequalities (SDG 10), industry, innovation and infrastructure (SDG 9), and zero hunger (SDG 2). Progress in the social, environmental and economic dimensions of sustainable development will require from local leaders a look at the sources of inequality in their cities and neighborhoods, as well as a reconsideration of urbanization and growth patterns. None of the cities analyzed has achieved SDG 8 (decent work and economic growth), SDG 11 (sustainable cities and communities), and SDG 9 (industry, innovation, and infrastructure). On the positive side, more than half of the cities studied, a total of 61 have already reached SDG 16 (peace, justice, and strong institutions), and 46 cities have reached SDG 3 (good health and well-being). To address these structural environmental inequalities and impacts, urban leaders and other levels of government must adopt long-term economic, social and environmental policies, and produce more disaggregated data to identify better specific areas of action.

Success and failure in governance of the Flint, Michigan Food System

Submitter: Gerard, Andrew
PhD Candidate, Michigan State University, United States, gerarda1@msu.edu

Additional Authors:
Maria Claudia Lopez, Assistant Professor, Michigan State University

Abstract:
In recent decades, Flint, Michigan, residents have faced difficulty in accessing nutritious food due to the exit of grocery stores, a weak transportation infrastructure that makes it difficult to access food, high levels of poverty and unemployment, and a city government unable to provide basic services. In addition to these problems, in 2014 and 2015 residents were exposed to significant amounts of lead and other contaminants in their drinking water in what became

known as the “Flint Water Crisis”. Beyond the lack of safe water, the crisis created an acute, difficult-to-meet demand for lead-mitigating foods (those rich in iron, vitamin C, and calcium), especially important for children and pregnant women. Despite the severity of these problems, local government has not played an important role in organizing the city’s food system. Efforts to cope with food system problems emerged from civil society, including community organizations and houses of workshop. These actors have been crucial in attempts to govern the system.

Substantial analysis has taken place on determinants of nutritious food availability in North American cities. However, little is known about the dynamics that predict success or failure of community based collective efforts to govern food systems in shrinking, post-industrial cities. This study seeks to understand perceptions on the success and failure of approaches taken to collectively organize the Flint food system over the past decade, both before and after the Water Crisis. We interviewed 15 individuals who have been involved in such efforts. Respondents hail from houses of worship, community-based organizations, a university extension service, urban farms, and other organizations. Respondents shared their memories and perceptions on challenges that spurred action, the actions that met with success, those that were unsuccessful, and how external shocks have influenced their efforts.

Initial findings suggest that collective action efforts have met with some success, but have also faced difficulty due to Flint’s continued economic decline. In addition, Flint residents’ perceived lack of trust in city, county, and state government was exacerbated with the water crisis. In response to a continued deterioration of grocery options, religious organizations and informal networks have been more successful in providing healthy food, through soup kitchens and urban farms. Flint residents have organized networks of urban farms, a mobile fruit and vegetable market, and other grass-roots initiatives. The Flint water crisis catalyzed this work, both through highlighting the need for lead-mitigating food and by attracting external funds for healthy food initiatives.

This paper provides a case study of collective action aimed at improving food system governance in a shrinking, post-industrial city. It provides insight into structural challenges facing such efforts and on the potential of collective action approaches when government is unavailable or not trusted. This study relates to Sustainable Development Goals 2, 3, and 11: Zero Hunger, Good Health and Well-being, and Sustainable Cities and Communities, among others.

Campus forest as a target of urban open space preservation: a case study

Submitter: Joo, Hogyeum
Master's Student, MS in Sustainability Management, Columbia University, United States, Republic of Korea, hogyeum.joo@gmail.com

Additional Authors:
Sharon Pochron, Professor, Sustainability Studies Program, School of Marine and Atmospheric Sciences, Stony Brook University

Abstract:

This year, the Ashley Schiff Park Preserve, a 26-acre nature preserve on Stony Brook University, celebrates the 50th anniversary of its dedication as a 'forever-wild' preserve. The Preserve has rich historical, geological, and environmental values. The area where the Preserve is currently located remain untouched through the development of the university campus and the rapid urbanization of Long Island. However, the Preserve doesn't have legal protection from future development.

The functions of the facilities and the social phenomena/events that take place on a large-size university campus, like Stony Brook University, has many similarities to those of a city with small population size. As the rate of both the urbanization of the region and the development of the university campus are expected to increase in the future, the ecosystem service values of the green-infrastructures, an untouched urban open space in this case, will become more important. Also, the unique feature of the Preserve being on a university campus can provide many opportunities for the younger generations to contribute building healthier environment and more sustainable societies by being involved and educated about the values of local open space preservation.

We acknowledge the undergraduate and the graduate students of the university as one of the main stakeholders in this case, along with the university administration, faculty and staffs, and the Preserve itself. Recognizing the current and the potential values of the Preserve, this project aimed to quantify the students' awareness level of the Preserve and their views on natural environment both in general and on their university campus. Additionally, questions regarding the willingness level towards possible preservation efforts targeting the forests on Stony Brook University campus, including the Preserve, were asked. Based on increased activities that involve the Preserve (classes, research), I hypothesized that the awareness level regarding the Preserve has significantly increased within the undergraduate student body at Stony Brook University over the past three years.

A campus-wide survey was conducted twice, in 2015 and 2019, targeting the undergraduate students of the university. Out of 16,831 and 17,522 students, 310 and 331 students responded respectively with 5.52% and 5.34% margin of error. The survey findings indicate that nearly half (42.1% in 2015, 50.5% in 2019) of the respondents are not aware of the Preserve. The chi-square test found that the change was not statistically significant.

Both in 2015 and 2019, majority of the students (83.2% and 86.4%, respectively) expressed their interest in supporting the protection and preservation of the forests. A significant number of the respondents (85.4 % and 90.5%) answered that their general environmental consciousness level is above average. The results suggest that increased academic use of the Preserve has not increased awareness. Public engagement program may increase the level of awareness regarding the Preserve within the students.

Community engagement and adaptive regulation: Analyzing the case of Juan Bobo's intervention in Medellín, Colombia

Submitter: Mejía-Dugand, Santiago
Senior Researcher, Universidad EAFIT, Colombia, smejiadu@eafit.edu.co

Additional Authors:
Edwar Calderón, Ph.D., Senior Researcher, Universidad EAFIT, Center for Urban and Environmental Studies-URBAM

Carlos Cadena-Gaitán, Ph.D., Professor, , Universidad EAFIT, Center for Urban and Environmental Studies-URBAM

Abstract:
Rapid population growth produced a variety of housing challenges in Medellín. Between the 1950s and the 1970s, a search for improved opportunities led to a spike in migration into the city. These new dwellers often encountered great challenges in finding housing, prompting the proliferation of invasion neighborhoods, outside of the official city land demarcation. Such neighborhoods were typical examples of non-formal city neighborhoods in the Global South, defined by self-arranged and self-built homes, usually small, and organized around small streets and alleys, often located in areas along the creeks and streams with significant landslide risk, and a serious lack of public services, transport infrastructure and public spaces. Although the central motivations for migrating have dramatically changed during the end of the 20th century–with violence and internal displacement having a prevalent role–the trend continued.

The key intervention tool implemented in the context of Social Urbanism around the Juan Bobo area is the Northeastern Integral Urban Project (PUI, for its acronym in Spanish). This strategy proposes an alternative approach to dealing with non-formal settlements, by intervening in an integral way all components of public space, environment, housing and transport, with high architectural standards. The latter was done with the aim to promote pride and self-esteem in the local community and fill the void left by social segregation, poverty, violence, and the lack of effective government presence.

It is precisely in this context that the Juan Bobo Housing Consolidation was designed and implemented with the intention of becoming an intervention with high replicability in areas with similar conditions. The chosen area was one which was directly influenced by the first public gondola lift system in Medellín (built between 2002 and 2004).

Some of the most disruptive elements of the intervention have to do with the low levels of displacement generated by the Juan Bobo consolidation. While the key principle for the strategy was to maintain the entire community in the same site, the territory was also officially "frozen" by agreement with the community. This means that new families would not be allowed into the new housing consolidation, but neither would a family already living in the area be expelled. These low levels of displacement, and the related official recognition of the high value exhibited by self-arranged and self-built neighborhoods can be understood as direct contributions to the Right to the City for previously marginalized communities.

The success of this strategy rests firmly on its governance mechanisms. First, both planning and execution were done simultaneously, in order to avoid inoperative planning in the territory. Second, social work and public communication layers were performed in direct articulation with the local community, during the full duration of the project. Third, every design and physical

intervention was guaranteed to serve to the highest standards, in order to allow the architectural elements to become leverage projects that lead towards more profound transformations.

The definition of the SDGs has brought about debates about appropriate governance forms and mechanisms, and how competencies have been and can be reordered, from national, to subnational levels. Through these cases, we want to find answers to two questions: which governance mechanisms emerged to deal with the challenges faced by the city? And how community-oriented transitions can trickle upwards and benefit the whole city?

Community Engagement for Sustainable Neighborhood Transformation: the Case Study of VIVA O CENTRO – Natal – Brazil

Submitter: Oliveira, Alvaro
Department of Arts, Design and Architecture, Aalto University, Helsink, Finland Visiting Professor at IMD (Institute Digital Metropole, UFRN (Federal University of RN), Federal University of Rio Grande do Norte - UFRN, Brazil, juliofdrezende@hotmail.com

Additional Authors:
Julio Francisco Dantas de REZENDE, Professor, University of Rio Grande do Norte-UFRN, Fundação de Apoio à Pesquisa do Rio Grande do Norte – FAPERN.

Irani SANTOS, Economist, Public Management Specialist and Innovation Master, UFRN

Abstract:
This paper reports the research to diagnose the economic, social and cultural recovery of the main neighborhood Cidade Alta of Natal (The Capital of Rio Grande do Norte State in Brazil). Due to poor planning the fast change of urban local commerce to shopping centers led to a sudden degradation of the most lively neighborhood of Natal, which concentrated most of the commercial, cultural and social activities. We will report the vision, strategy, action plan and activities of VIVA O CENTRO movement which brought back the vitality to Cidade Alta neighborhood. It is an extraordinary successful movement involving all the Cidade Alta stakeholders from business owners to citizens engaged in an enthusiastic partnership with the public authorities and other institutions. The analyzed activities will be described and a methodology has been derived to be part of the Human Smart Cities co-design and co-creation tools. Cidade Alta is considered a Human Smart City case study, developing and applying the good practices for urban requalification and sustainability public policy through innovation and participatory involvement of all the stakeholders. We will describe the following activities from ideation to deployment and assessment of impact: 1) Creation of a common vision and strategy based on the community WINs (Whishes, Interests and Needs) methodology. 2) Action plan to implement the chosen activities. 3) Selection criteria for partnerships and negotiation strategies. 4) Stakeholders engagement and creation of a "Wave of Sustainable Enthusiasm". 5) The fundamental role of culture as a driver for people attraction and active involvement. 6) Strong marketing and communication plans. The role of mass media namely the social networks for awareness and interactive discussions 7) Urbanistic requalification of buildings and infrastructure. Selection criteria, design, planning, licensing, public and private funding and opportunities. 8) Training activities to support better services quality. 9) Organization of a large

number of culture events covering music, dancing, ballet, poetry, theatre, street entertainment, gastronomy. 10) Large number of exhibitions of paintings, photos, handcrafts, ceramics, traditional objects, antiquing, books, cinema. 11) Urban arts. 12) Urban maintenance of streets and other public spaces. Streets dedicated to people only. Cycling lanes. 13) Strong and trustful collaboration with security authorities. 14) Development of partnerships with the municipality and other institutions creating a common vision and strategy for VIVA O CENTRO. 15) Activities towards the integration of Cidade Alta innovation ecosystem. Partnership with local University – IFRN and ITCART the Culture and Art Incubator. 16) Street public lighting improvement and maintenance as well as decorative lighting. Streets cleaning. 17) Awareness and coaching aiming at citizens behavior transformation. 18) Encouragement of social interaction and support to the organization of common interest groups activities. The diagnostic and analysis of VIVA O CENTRO activities allows us to conclude that a very effective model, methodologies and tools have been implemented, allowing to achieve the main objectives of the VIVA O CENTRO mission: revitalization of local commerce, urbanistic requalification, cultural recovery and enrichment, effective security. The outcome of our research is a very effective methodology for the Human Smart Cities implementation.

Urban Aesthetics: the Cost of Beautifying Sheger

Submitter: Wube, Bitania Tadesse
Senior Researcher and Director of Programs, Amani Africa (but applying in my personal capacity), Ethiopia, bitaniatadesse@gmail.com

Abstract:
Africa has become the world's most rapidly urbanizing continent. From 2018 to 2035, the UN predicts that the world's 10 fastest growing cities will be in Africa. Among these cities Addis Ababa, Ethiopia's capital city is one of the prime examples. The last census that was undertaken in 2007 estimates the population of the city was more than 3.3 million. In recent years the numbers are considered to be increasing up to 3.8%. Availability of relatively better job opportunities, infrastructure and health care system as compared to the rest of the country will continue to drive the migration into the city. This rapid urbanization is certainly placing immense strains on the existing political, economic and social systems. One result of the physical expansion of the city, which displaced a number of farmers and households that lived around the city, was violence which brought about political reform.

Against this background this paper aims at analyzing the most recent and ongoing urban development policies that are designed and implemented by the current administration. The increasing economic liberalization which Ethiopia's current political administration has embarked on for the past one year had immense impact on the urban development landscape. Ambitious urban policies are currently underway with the central aim of creating a clean, environmentally friendly city as well as expanding employment opportunities. Urban policies have received the attention from the highest decision making body of the government. The paper will look closely at the recently launched mega project, the Addis Ababa riverside project initiated by the Prime Minister of Ethiopia. The project has the objective of elevating the city into a tourism hub, enhancing the well-being of residents and nurturing a green economy.

This project is innovative and if implemented properly has the potential of addressing long standing challenges of sanitation, waste and sewage management in the city. Based on this premise the paper will attempt to critically analyze the implication of such initiative and will elaborate on ways in which the projects can be more responsive to the needs of the urban dwellers and on mechanism in which the initiative can be well positioned to navigate the political sphere. It will highlight some of the considerations that require government's attention particularly around challenges that may occur in terms of addressing the practical and immediate needs of the residents or the adverse effects it may have on economically disadvantaged section of the urban population. Another potential threat is also around the exacerbation of inequality between Addis Ababa and major towns and cities in the country. By shedding light on the potential risks the paper concludes with policy recommendations that are aimed at mitigating risks and creating an inclusive, sustainable and people-centered urban project.

The Role of National and Transnational Knowledge Cooperation in the Implementation of the SDGs

SDGs Embrapa´s Network: contributions to Agenda 2030

Submitter: Diniz, Fabio
Research Analyst, Embrapa Dairy Cattle, Brazil, fabio.homero@embrapa.br

Additional Authors:
Loiva Maria Ribeiro de Mello, Researcher, Embrapa Grape and Wine

André Carlos Cau dos Santos, Researcher, Embrapa Grape and Wine

Valéria Sucena Hammes, Researcher, Secretariat of Intelligence and Strategic Relations, Embrapa Headquarters

Abstract:
Research, innovation and leadership will be essential in helping society to transform into pathways of sustainable development. Due to its intrinsic characteristics of creation and dissemination of knowledge, research institutions can contribute to the implementation of the SDGs by providing know-how and best-practice examples to support implementation and by integrating issues of sustainability into their operations, research, and science-society interactions. As such, research institutes have a critical role in the achievement of the SDGs and will also greatly benefit from engaging with them. From this reason, research institutes, such as the Brazilian Agricultural Research Corporation (Embrapa), have been encouraged to implement sustainability in their core operations, contributing to the achievement of SDGs. Embrapa is a governmental technological innovation enterprise focused on generating knowledge and technology for Brazilian agriculture, with 2,444 researchers distributed in 46 research centers spread throughout the country. In Brazil, the importance of agriculture to achieve the SDGs is even greater, considering the extension of the areas occupied with crops, forests and pastures, the expressive contingent of agribusiness producers, workers and family farmers involved in agriculture and the relevance of the sector for economic development and improvement welfare

of the population. The most obvious linkages between agriculture and SDGs goals consider food production and nutrition, health and poverty, and among agriculture, natural resources, clean energy and climate change. However, the links and contributions of agriculture to the reach of other SDGs are also undeniable. In this way, reflecting and acting in the development of Agenda 2030 is an obligation and an opportunity for Embrapa. The Corporation has used some strategies in the structuring of its contributions to reach the SDGs and its goals, through agricultural innovation. Using a set of qualitative methodologies, such as learning network, the organization of the work went by means of the establishment of criteria for the organization of Embrapa's contributions to reach the SDGs, the constitution of an internal contributors network and the structuring of a virtual community. As a result, 17 e-books containing examples of the Corporation's technological solutions have been published, which can contribute to the achievement of 76 goals distributed in the 17 SDGs. Beyond that, an e-book representing a synthesis of Embrapa's strategic positioning in the face of the challenge of internalizing within the Corporation these contributions and communicate, to Brazilian and global societies, how it has been done.

The Potential and Role of National Science Platforms in the Implementa-tion of the SDGs: Reflections on the German Science Platform Sustainability 2030

Submitter: Ellersiek, Anne
Associate Researcher, Institute for Advanced Sustainability Studies, Germany,
anne.ellersiek@iass-potsdam.de

Abstract:
Science-platforms that support drafting and implementing policy agendas are not a new phenomenon. The 2030 Agenda and the SDGs postulate under SDG 17 effective collab-oration between multiple stakeholders and their coordination platforms at international and national levels as a key means of implementation. While there is no stand-alone SDG on science, Science, Technology and Innovation (STI) are recognized as one of the main driv-ers behind sustainable development and effectively engaging the scientific community in the implementation of the agenda is seen as essential to its success. Science-platforms that at-tempt to do so are not only seen as levers for technological innovation but to promote an integrated scientific approach that addresses the social, economic and environmental dimen-sions of sustainable development, respects the diversity of knowledge systems and disci-plines, reflects on structural systemic deficits, and advances a universal yet inclusive and accountable implementation of the agenda.

These aspirations thus beg the question of how previous and current experiences may inform science-platforms to strengthen these qualities. This paper will present the case of the Sci-ence Platform Sustainability 2030, which was launched by the German scientific community in 2017 as integral part of Germany's Sustainable Development Strategy of 2016. As such the goal of the platform is twofold: on the one hand, it is set to foster broad scientific en-gagement in the implementation of the German Sustainable Development Agenda beyond those disciplines, such as developmental and environmental studies and political science, that usually are involved in the scientific discourse around sustainable development. On the other hand, the platform seeks to channel the findings of the scientific community into Ger-man sustainability policies more effectively. To these ends, the platform tries to engage the scientific community in different

dialogues, one being a new form of dialogue that brings together a number of scientific councils that work in policy fields already or potentially to be linked to the German Sustainable Development Strategy.

In our paper we draw upon first hand experiences of setting-up and developing the platform and its various formats. Getting to the end of its second year, we are asking whether so far the platform was able to live up to its promises and which lessons learnt we can draw from this experience to inform future endeavors of this kind in Germany and beyond the German experience. Reflecting upon the chances and obstacles in engaging the scientific community in the implementation of national sustainable development strategies for the SDGs in other country contexts and globally.

Leadership as networks: The case of the South African SDG Hub

Submitter: Fourie, Willem
Associate Professor, University of Pretoria, South Africa, willem.fourie@up.ac.za

Abstract:
In 2015, leaders representing 193 countries adopted the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs). Yet, the nature of the leadership required to realise the complex and interrelated SDGs has received scant attention. Building on the emerging theory on the notion of network leadership, this paper explores the leadership capacities needed to attain the SDGs. The South African SDG Hub, South Africa's premier national facility focussed on building networks to foster the evidence-informed realisation of the SDGs is used as an illustrative case.

The paper proceeds from the Prasad Balkundi and Martin Kilduff's contention that network theory is based on four principles: the primacy of relations between actors, the importance of actors' embeddedness in social fields, the social utility of network connections, and the notion of structural patterning. Based on this understanding of networks, leadership can be understood as a phenomenon that resides in relationships between individuals. In networks, leadership could be seen as 'an emergent quality of a group', with distinctly 'heterarchical' patterns of influence.

Network leadership theory is used to chart the emergence and consolidation of the South African SDG Hub. This analysis is used as the basis for proposing approaches to leadership that could accelerate the realisation of the SDGs – particularly in developing contexts.

Information Exchange for Implementing the Agenda 2030 – What is the Role and Potential of Policy Forums?

Submitter: Pärli, Rea
Scientific Assistant, prospective PhD Student, Swiss Federal Institute of Technology (ETH) Zurich, Switzerland, rea.paerli@usys.ethz.ch

Additional Authors:

Dr. Manuel Fischer, Group Leader, Swiss Federal Institute of Aquatic Science and Technology (Eawag), Private Lecturer, University of Bern

Dr. Eva Lieberherr, Group Leader, ETH Zurich

Abstract:
In 2015, the member states of the United Nations (UN) developed and passed the Agenda 2030 for sustainable development. The Agenda 2030, an action plan designated to lead to a sustainable future, includes 17 Sustainable Development Goals (SDGs) and serves as a guideline for all the UN member states. According to the UN's resolution covering the Agenda 2030, countries should not only implement the SDGs nationally, but also support other countries in their implementation. Our paper investigates the potential of different policy forums in fostering information exchange between Swiss stakeholders supporting the implementation of the SDG 6 (Water) in developing countries. Although Switzerland itself performs well regarding this goal, it has a high virtual water footprint, which has a major impact on the water situation in developing countries where quantity and quality of water are often problematic. This pattern can be observed for many other industrialized countries as well as many other SDGs. One way of taking responsibility of Switzerland's high impact in developing countries is to mobilize Swiss expertise to solve water problems in these countries. To ensure evidence-based decision-making in this process, information exchange between stakeholders is key.

Policy forums, defined as issue-based intermediary organizations providing a space for different stakeholders to connect and exchange, are an important tool to foster information exchange, and a frequent research subject in academia. With the passing of the Agenda 2030 several new policy forums such as the Sustainable Development Solutions Network (SDSN) as well as the respective national and regional SDSNs have been developed. While these forums are often rather broad, aiming to foster collaboration across multiple different stakeholders for the implementation of the Agenda 2030, other, sometimes long-established forums are rather narrow in the type of actors they include (e.g. mostly NGOs and scientists) as well as the subject they cover (e.g. focus on sanitation). We will discuss the role of different policy forums for the implementation of SDGs. By drawing on data collected through expert and stakeholder interviews as well as an online survey we combine social network analysis as a quantitative approach with qualitative data. Overall, we will present and discuss different types of policy forums in place as well as their effects on information exchange.

Preliminary results show that overall space for exchange, as it can be found in policy forums, is highly desired. Additionally, the developed information exchange networks show that activity in policy forums correlates with high information exchange behavior. However, some stakeholders mention limited time and financial resources as hindering information exchange and claim that yet another forum might be a burden rather than a benefit. Furthermore, we noticed a discrepancy between the stakeholders' request for more exchange across disciplinary and sectoral silos, while on the other hand policy forums with a rather narrow focus are preferred. We will discuss potential options about how the observed barriers could be tackled and how the full potential of policy forums could be used to foster information exchange for the implementation of the Agenda 2030.

SUMAS K-Net: Energy, Environment and Social Sustainability Knowledge-Network

Submitter: Rodriguez Martinez, Antonio
Full-Time Professor-Researcher, Universidad Autonoma Del Estado De Morelos, Mexico, antonio_rodriguez@uaem.mx

Additional Authors:
Esmeralda Cervantes Rendón, Professor, El Colegio de Chihuahua (El Colech)

David Castrejón, Researcher, Instituto Nacional de Electricidad y Energías Limpias (INEEL)

Rosenberg J. Romero, Centro de Investigación en Ingeniería y Ciencias Aplicadas (CIICAp), Universidad Autónoma del Estado de Morelos (UAEM)

Abstract:
The energy sector in Mexico is the main driver of the country's economic development. At the same time, it is responsible for the majority of the country's greenhouse gases (GHG) emissions. Therefore, to find a balance between economic development, sustainable energy management and minimum impact on the environment and society has become a huge challenge for scientific communities, civil society groups and policy-makers.

In 2016, the Energy, Environment and Social Sustainability Knowledge-Network (SUMAS K-Net), funded by CONACYT (National Council of Science and Technology) was established by researchers from Institutions of Higher Education (IHE) and Research Centres (RC) in Mexico and Europe. The Universidad Autónoma del Estado de Morelos (UAEM, Mexico) and the Centro de Investigaciones Energéticas, Medio Ambientales y Tecnológicas (CIEMAT, Spain) were the founding institutions of the SUMAS Network.

SUMAS K-Net aims to analyse the implications of the public and prospective policies of the Mexican energy system towards sustainable development, to contribute to human resources training, to integrate the efforts of IHEs and RCs, public and private sector and other national and international partners, and to develop projects on energy sustainability, environmental integrity and societal cohesion.

In 2018, international meetings were organized with members of five Energy Networks in Mexico. In addition, the Network promoted human resource training through conferences, short courses and mobility of IHE/RC members. At present, SUMAS K-Net has 215 members (106 students, 76 researchers and 33 no-academic) from 22 IHE/CI in Mexico and 8 from Europe, 1 from Canada and 1 from Colombia.

The previous administration of Mexico prioritized renewables and clean energies technologies development, promoted the interchange between academic and industry as well as implemented energy and environment politics in order to ensure compliance of Mexico mitigation commitments. The new administration has chosen a more social approach, which represents a great opportunity and relevance to increase the presence of SUMAS K-Net in the Mexico development plans.

The world as commons: a cultural-cognitive framework for sustainability

Submitter: Sabatini, Francesca
PhD student in Architecture and Territory, "Mediterranean University" - Reggio Calabria, Italy, Italy, francesca.sabatini.49@gmail.com

Additional Authors:
Michele Trimarchi, Professor of Public economics and Cultural Economics, "Magna Graecia" University, Catanzaro, Italy

Abstract:
In the cultural system sustainability is conventionally associated, within a parallel view, to physical decay and to financial weakness. Although the two areas are not strictly related some reciprocal influence may occur, since on one hand maintenance and restoration can be harmed by tight budgets, while on the other the range of possible investments and expenditures can be prejudiced by the needs of material survival.

Cultural heritage, both material and intangible, faces problems of sustainability within the shared desire to transmit their enjoyment to next generations (more in general, to future demand) with no reduction. Keeping it safe, whole and financially sound is therefore a necessary, but not sufficient condition for its proper enjoyment, whose root, glossary and value hierarchy is shaped by the amount, variety and consistency of knowledge crafted, elaborated and exchanged about its historical, technical, social, symbolic and economic meaning and content. It is cognitive sustainability.

The present paper explores the cognitive framework of sustainability, interpreted as a cultural commons. The cognition of sustainability is, in facts, embedded in and shaped by culture: cultural habits and social norms affect our behaviour and our relationship with other humans and the environment, determining our willingness to contribute collectively to a sustainable future.

Being culture-bound, cognitive sustainability can be understood as a cultural commons: a form of cultural capital generated, managed and sustained by a community. Being a cultural commons, cognitive sustainability implies collective responsibility and a pluralist approach to sustainability issues A decision-making gap exists, however, between policymakers and society: in spite of the interest placed in community engagement, most policy solutions are still market-based and top-down oriented.

As a consequence, it is necessary to rethink institutional action and community engagement: when understood as cultural commons, cognitive sustainability becomes an appropriate framework for interaction between local communities and institutions, where decentralization, social interaction and education play a crucial role, and centralized control is mediated by collective action aimed at sustainable development.

The first section introduces a theoretical framework, investigating behavioural and social sciences: the notions of sustainability empathy and of cognitive sustainability are introduced, as

they prove crucial in understanding cultural instances behind the personal and social motivations of people in acting sustainably. Since sustainable development is a collective elaboration, determined by a set of cultural norms shared by a community and strictly related to the management of common-pool resources, it is possible to understand cognitive sustainability as a cultural commons.

The second section illustrates how the characteristics of cognitive sustainability as a cultural commons shed a light on fruitful ways of eliciting sustainable behaviours: cultural commons, as well as physical commons, prove effective when managed by bounded communities with a self-determined set of rules, effective monitoring, graduated sanctions. Not being imposed from external institutions, such rules and sanctions prove site-specific and generate a higher moral affection in individuals, proving environmentally, socially and cognitively sustainable.

This raises crucial consequences for policy design and regulation, which are dealt with in the third section. The two social dilemmas typically associated with cultural commons can be overlooked efficiently: the free riding dilemma is faced through monitoring and sanctions by the community, while the uncertainty of transmission is ensured by inter-institutional interaction between communities and international institutions. The adoption of market-based solutions, though necessary in limiting the environmental damages of extractivist economies, do not implement cognitive sustainability in society, which calls instead for negotiation and learning within and between communities: such objectives need to be pursued through education, delegation and decentralization together with new and more sustainable forms of collective management of resources.

In conclusion, understanding cognitive sustainability as a cultural commons helps shape a more efficient institutional action: the way cultural commons are coherently built and maintained by communities prove, in a sustainability context, that informed local regulation and flexible social interactions are more beneficial than hard regulation in fostering sustainability empathy and implementing collective engagement.

Network building for SDSN Indonesia: Lessons Learned from Rewards.

Submitter: Supriatna, Jatna
Professor and Co-chair SDSN Indonesia, Institute for Sustainable Earth and Resources, Universitas Indonesia, Indonesia, jatna.supriatna@gmail.com

Additional Authors:
Lisa Wijayanti, SDSN Indonesia

Cokorda Dewi, SDSN Indonesia and UID

Gouri Mumpuni, SDSN Southeast Asia, UID

Cherie Nursalim, SDSN Southeast Asia, UID

Abstract:

UN SDSN Indonesia was inaugurated by the President of Indonesia, Soesilo Bambang Yudoyono, in 2013 during an APEC meeting in Bali. Initially, only 7 organizations registered for the Indonesian SDSN, which was co-chaired by the University of Indonesia and an NGO based in Jakarta, United In Diversity Foundation (UID). Since then, the network has grown to 21 registered members and 15 more spectators (not yet fully registered in UNSDSN) and there are now many youth members either individuals or student associations. Our research questions in SDSN Indonesia is how do we identify and attract more people to enable them to gain an understanding of what sustainability is and how it works. A supplementary question is to what extent are awards such as the Indonesian SDSN Award promoting the implementation of SDGs in this country? From 2014-2016, in collaboration with UID, we developed the UID SDSDN Award for local solutions to SDG related works either carried out by local governments, NGOs, the private sector or communities. The criteria for this award, available to Indonesia based organizations or individuals, are that they are working on innovative solutions to significant social or environmental problems, and that they demonstrate some measure of success in achieving long-term financial or organizational or environmental sustainability. The jury members were selected by SDSN Indonesia with various backgrounds and fields of expertise from Indonesia and other countries. Our results showed a significant increase in the number of applicants for this award. The number of applicants grew from around 30 in the first year to more than 100 in the second. Winners varied from small NGOs, to International NGOs based in Indonesia, to university and local governments. We select 5 winners each year, who each receive a token of appreciation, funding award of 300 million rupiah plus mentorship, networking opportunities and publicity. SDSN members discuss the impacts of the applicants' activities and winners are required to provide a record of what they did, how they did it and the level of success achieved.

Bridging the North-South knowledge divide through transnational knowledge cooperation

Submitter: Vogel, Johanna
Researcher, German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE), Germany, johanna.vogel@die-gdi.de

Additional Authors:
Dr Anna Schwachula German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE), Dr Tatjana Reiber German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE)

Abstract:
While discussing the emergence of knowledge societies, a strong focus within research has been put on the "widening of a knowledge gap" between the South and the North (Evers & Gerke, 2004; Melber, 2015). Particularly in the area of research on sustainable development, there is a call for transdisciplinary and transnational approaches for joint knowledge cooperation (Wiesmann et. al., 2012). Different types of knowledge besides codified scientific knowledge must be equally acknowledged to legitimise knowledge and to create impact.

The 2030 Agenda for Sustainable Development also regards partnership as key factor for its

successful implementation. However, so far there is little scientific reflection on the role of knowledge cooperation in networks and the analysis of partnerships between South and North.

This paper presents a qualitative research design for analysing transnational knowledge cooperation. Taking the case of the Managing Global Governance (MGG) Network – a network of research institutions in emerging countries and Germany (Fues 2018) – the aim of the research is threefold: 1) to understand the challenges of transnational knowledge cooperation, 2) to analyse what different actors in transnational knowledge cooperation regard as success, 3) to explore how transnational knowledge cooperation should be set up to produce legitimate, meaningful knowledge.

The authors regard these three aspects as closely related. We assume that different actors will understand challenges and success of transnational knowledge cooperation differently, due to varying reference systems, power asymmetries and local contexts. Only if these different perspectives are taken into account, transnational knowledge cooperation can create legitimate, meaningful knowledge.

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The Role of Transport in Achieving the SDGs

Human effects of climate change mitigation policies through energy use in urban transport: A sensor array measuring sidewalk exposure to PM2.5 concentrations at street level in Mexico City, deployment of personal sensors of CO, health adversities and possible urban solutions.

Submitter: Gío-Hernández, Raúl
Mechatronics Engineer intern, MADiT, ICAT, UNAM, Mexico, gioraul@me.com

Additional Authors:
Dr. Arón Jazcilevich, Researcher CCA, UNAM

Dr. Irma Rosas, Researcher CCA, UNAM

Dr. Alberto Caballero, MADiT, UNAM

Dr. Pilar Corana, CIA, UNAM

Eng. Dario Reyes, CIA, UNAM

Chem. Eng. Samanta Salazar, CCA, UNAM

Eng. Aurora Armendáriz, CCA, UNAM

Student Israel Gil, CIA, UNAM

Abstract:
Measuring direct exposure of human beings to environmental pollutants is critical for creating public policies to ensure a healthy air quality and efficient use of energy destined to public transportation. Street design in Mexico City (CDMX) forces pollutants into passerby's before these noxious molecules get a chance to scatter. Atmospheric Monitoring Systems have the drawback of being located at approximately 10 meters above street level, therefore they don't measure the direct exposure passerby's face when walking on a sidewalk, specially when there's traffic.

An array of sensors was designed to measure Particulate Matter with an aerodynamic scale of 2.5 micrometros (PM2.5). After readings were successfully obtained, a program was created to visualize them in the form of a heat map, showing the exact concentration of pollutants at different levels of the sidewalk. This distribution of pollutants assists in finding risk areas in an urban canyon where vulnerable groups could have serious health effects.

Carbon Monoxide, another hazardous ambient pollutant, was also measured thanks to personalized sensors which could connect to a smartphone. Measurements were done throughout Ciudad Universitaria, the Central Campus of the Universidad Nacional Autónoma de México, and also with a transportation system throughout the city known as the Metrobus. An Urbanist Intervention Manual was developed after further development of the data collected from the field work with the CO sensors. This Manual proposes better street design to help mitigate the interaction of passerby's with noxious elements caused by car engines.

Preliminary results of campaigns carried out throughout the city will be presented using the array of sensors of PM2.5 and the personal sensors of CO, further development of the instrumentations

of the systems, the heat maps generated by the array of sensors and the behavior of the flow of pollutants in the spatial range below 10m.

A systems approach to understanding walkability and non-auto travel

Submitter: Fu, Xing
PhD Student, The University of Alabama, United States, xfu8@crimson.ua.edu

Additional Authors:
Jun Liu, Assistant Professor, The University of Alabama

Xiaobing Li, Postdoctoral Fellow, The University of Alabama

Asad Khattak, Beaman Professor, The University of Tennessee

Steven Jones, Professor, The University of Alabama

Abstract:
Sustainable transportation strategies are directed at improving traffic safety, mitigating traffic congestions, and reducing energy use and greenhouse gas (GHG) emissions by promoting non-auto travel behavior. The walkability of a community is an essential factor for non-auto travel especially in Transit-Oriented Developments (TOD) when compared with Auto-Oriented Developments, where TOD often needs walk access and egress to transit stations. Many U.S. cities are making tremendous investments in improving pedestrian infrastructure to encourage non-auto travel. The U.S. Environmental Protection Agency (EPA) has developed the National Walkability Index to indicate the likelihood of walking being used as a mode of travel in a U.S. Census block group. The Index is developed by accounting for the influence of the built environment characteristics on community walkability. It is expected that people living in a more walkable community are more likely to walk. However, the travel mode choice is an outcome affected by many factors that include built environments (physical and socio-economic), traveler behavior and characteristics, vehicle ownership, and other factors. It requires a systems thinking to unveil possible connections or relationships between various parts of the mode choice decision-making process, including stakeholders (e.g., cities), infrastructure (e.g., sidewalk), and traveler (e.g., income, employment) The main goal of this study is to identify the correlates of community walkability, vehicle ownership, and travel mode choice. Through a systems approach, this study will establish a quantifiable relationship network between the built environment, infrastructure, traveler, vehicle ownership and mode choice. This study will use data from three main sources: National Walkability Index from EPA; the socio-economic, vehicle ownership and travel information from Census' American Community Survey (ACS); and open access data about cycling and transit infrastructure. Results are expected to answer some important research questions, such as whether a higher walkability community is associated with a lower level of vehicle ownership and a higher share of walking (or walk and transit) as a mode of travel. It is possible that some people may live in a highly walkable community, but they may have to drive to their workplace due to unequal pedestrian facilities across different parts of a region or poor connections between walk and transit. The results of this study will help form effective strategies that promote non-auto travel and reduce car

dependency. These strategies may not be focused only on improving walkability in a community, but also on ensuring the equity of pedestrian facilities across communities in a region and strengthening the connections between walk and transit.

Transport systems and the right to the city - The case of Medellín, Colombia

Submitter: Mejía-Dugand, Santiago
Senior Researcher, Universidad EAFIT, Colombia, smejiadu@eafit.edu.co

Additional Authors:
Carlos Cadena-Gaitán, Ph.D. Universidad EAFIT, Center for Urban and Environmental Studies - URBAM

Abstract:
The city of Medellín, Colombia, has ridden a roller coaster of respect and infamy. In the 1940s, Life Magazine hailed it as a "sort of capitalist paradise," a city where "everybody made good money", and the Reader's Digest highlighted that wide social gaps were inexistent. In the 1980s, it became the most violent city in the world in terms of its rate of murders per 100,000 inhabitants, home to one of the largest drug cartels that has ever existed, and one of the most segregated cities in the country. Recently, the city has regained good reputation as a result of several radical initiatives aimed at attacking the deteriorating social conditions caused by its uncontrolled expansion, the usually violent displacement from the countryside, and the oblivion to which the segregated majorities have been subjected.

We analyze the impact that transportation solutions have had on the city's transition. Despite not being the only vehicle of change, transport systems such as the metropolitan train (Metro), the gondola lifts (Metrocable), the BRT (Metroplús), and the tram (Tranvía) have been important contributions to influencing the discussions about the right to the city, changing the city's spatial paradigm, shifting power balances in favor of mass transit, and inspiring changes in other aspects of city life.

Our study seeks to answer two questions:

1) How have transport systems been used to exert change in Medellín?

2) What has been the contribution of transport systems to the social and environmental changes experienced in Medellín during the last three decades?

Our research seeks to shed light on the importance of aligning transport projects with local values, and of taking advantage of them to address other concerns that cities in the Global South have (e.g., security, social inclusion, aesthetics, urban renovation and culture) and pursue the achievement of relevant SDGs.

Relating Car Availability to Regional Walkability - A Hierarchical Investigation on National Databases

Submitter: Nie, Qifan
Graduate Research Assistant, The University of Alabama, United States, qnie1@crimson.ua.edu

Additional Authors:
Xing Fu, Graduate Research Assistant, The University of Alabama

Xiaobing Li, Postdoctoral Research Associate, Alabama Transportation Institute, The University of Alabama

Qinglin Hu, Research Data Analyst, Alabama Transportation Institute, The University of Alabama

Jun Liu, Assistant Professor, The University of Alabama

Steven Jones, Professor, The University of Alabama

Abstract:
Car ownership is a choice of life and it is dependent on the living environment. Owning a car has once been part of the American dream, but now it is changing. According to U.S. Census data, the percentage of no-car households increased from 8.9% to 9.1% from 2010 to 2015 . Some studies speculate that the rise of new mobility services, such as Uber and Lyft, could lead to reduced car dependency. However, Uber and Lyft do not necessarily reduce the number of motorized trips which are the driving force behind traffic congestions, emissions and crashes that worsen the quality of life. Therefore, promoting non-auto travel appears to be a more effective strategy of reducing car dependency and ultimately improving the living environment. The walkability of a community is an essential factor for non-auto travel especially for transit travel, e.g., transit-oriented development (TOD). This study is to reveal the relationship between walkability and car dependency in a region which still remains unclear.

This study will integrate multiple national databases including the 2017 National Household Travel Survey (NHTS) by Federal Highway Administration (FHWA), National Walkability Index by Environmental Protection Agency (EPA), American Community Survey (ACS) by Census, and open access data about quality of transit and biking facilities in a metropolitan region. The NHTS data contain car ownership of individual households, and travel behavior and socio-demographic variables. The EPA's National Walkability Index is a measure of the relative walkability of a community based on intersection density, proximity to transit stops, and diversity of land uses at the census block-group level. The ACS data contain comprehensive socio-economic information about a region which may also be significantly related to car dependency. Aggregation of data from multiple sources will create a database with a tree-like hierarchical structure from households, census blocks to metropolitan regions. This study will apply a hierarchical modeling approach to disentangle the relationships between car dependency and walkability along with other factors. Furthermore, this study will examine whether car dependency is related to walking inequity or imbalance of pedestrian facilities across different

parts of a region.

This study will contribute by understanding the correlates of car dependency related to regional walkability. The results will offer implications for the planning and implementation of pedestrian facilities as part of the strategy of promoting sustainable travel and improving transportation equity.

Bus Rapid Transit (BRT) and Transit-Oriented Development (TOD) in Dar es Salaam in Tanzania

Submitter: Stojanovski, Todor
PhD student, KTH Royal Institute of Technology, Sweden, todor@kth.se

Additional Authors:
James Fenske, Master Student, KTH Royal Institute of Technology

Abstract:
Bus rapid transit (BRT) is an innovative bus system with sophisticated vehicles, high speed and frequency, distinctive image and comfort, inflexible busways that target improved integration with cities and lucrative promise of flexible capacity and high quality at lower costs than the railway systems. In contrast to the conventional bus systems that operate predominantly in mixed traffic, on streets or dedicated lanes, BRT achieves high capacity by canalizing passenger flows in a system of segregated busways, partially or fully separated from other traffic.

Transit is a shortening from mass transit or for public transportation and Transit-Oriented Development (TOD) is defined as a policy to synchronize urban development with public transportation systems. The combination of BRT as new attractive bus system propelled by affordable and clean fuels with TOD as development policy should contribute to sustainable cities and communities by achieving high accessibility at affordable costs. This would reduce inequalities in society and help improve urban living with affordable and quick access to jobs and urban activities.

This paper looks at the development of the BRT system in Dar es Salaam, the most populous city in Tanzania and analyzes the TOD effect on the city. The aim is to contribute with empirical research about the how BRT influences urban form and accessibility. The paper illustrates section of the city from the downtown to the suburbs and analyzes the effect of the busways and bus service on the different neighborhood types. BRT brings high speeds at lower costs and many cities in the world can pursue TOD as policy to network neighborhoods and increase accessibility to jobs and urban activities. The TOD experiences with BRT in Dar es Salaam can inspire many other cities to take that path towards sustainable cities and communities.

How to implement greener commuting to universities – a campus case study from Schwäbisch Hall as contribution to achieving the SDGs

Submitter: Wellbrock, Wanja

Professor, Heilbronn University of Applied Sciences, Germany, wanja.wellbrock@hs-heilbronn.de

Additional Authors:
Erika Müller, Research Assistant,Heilbronn University of Applied Sciences

Benjamin Högele, Research Assistant,Heilbronn University of Applied Sciences

Abstract:
In its recent report, the UNIPCC has described the impacts and possible magnificent disturb-ances that arise from climate change. Nevertheless, CO2 emissions are still on the rise. The transport sector can be seen as one of the fastest growing contributors. The majority of fuels used are still based on non-renewable sources, even though research and implementation of alternative transport technologies are making progress. Also on the policy-side, efforts are being made to tackle climate change and stimulate transition to a sustainable way of living.

With its 17 Sustainable Development Goals (SDGs) the 2030 Agenda represents one global approach trying to solve economical, ecological and social problems. Transport can be seen as a crosscutting issue to directly or indirectly contribute to the SDGs, e.g. in case of fuel subsi-dies, rural transport or good health. Shifting mobility and transport to emission free resources is one major factor for climate change mitigation. Thereby, innovative mobility concepts, based on renewable energy supply as well as offering multimodal mobility solutions, equal access and stimulating behavioural changes are necessary. Especially rural areas often have to deal with missing transport links, resulting in an above-average use of cars. This makes taking action all the more important.

By executing an empirical case study, the authors try to investigate the implementation potentials for sustainable public mobility at universities in rural areas as a local contribution to the 2030 Agenda. The Campus Schwäbisch Hall, part of the University of Applied Sciences Heilbronn serves as an exemplary setting for this field test. Schwäbisch Hall is located in a rural area in Southern Germany. Daily commuting by car is the favoured way of travelling by students and staff. The aim of the project is to devise a mobility concept that creates incentives for all parties involved to dispense individual car traffic and switch to public transport or e-bikes instead. The introduction of a new bus line and the possible use of e-bikes will be examined in a test phase. The implementation of the test phase is linked to a quantitative and qualitative collection of mobility data (modal split) focused on the current mobility behaviour and the acceptance of green mobility by students. Incentives for other mobility opportunities and potential obstacles are investigated. By exchanging knowledge with local stakeholders and experts, measures and recommendations for action and the implementation potential of sustainable mobility will be elaborated.

A CFD model to obtain human exposure to direct vehicular emissions in a street-canyon with different mitigation strategies: preliminary results

Submitter: Zavala, Juan

PhD candidate, Universidad Nacional Autónoma de México, UNAM., Mexico,
jcz_5@hotmail.com

Abstract:
Exposure and its health effects ultimately determine the effectiveness of pollution control policies. Therefore, air quality models with the ability to include wind-flow dynamics, green infrastructure, pollution transport and human exposure are important tools. Air quality in street canyons is of major importance since high levels of pollution can be found due to direct vehicle emissions. The main exposed population are pedestrians, residents and cyclist, which may include children. These can produce adverse health effects on especially vulnerable populations.

Although meteorological conditions play an important role decreasing or increasing pollution levels, improvement can come from vehicular fleet technology by reducing PM2.5 and NOx emissions. In addition, traffic flow impediments may increase vehicle emissions by creating stop-and-go traffic conditions. Also, green infrastructure and urban morphology could play an important role by decreasing or increasing pollution at pedestrian level. Therefore, assessing exposure to vehicular emissions requires high spatial-temporal emissions data, pedestrian activity information and urban morphology.

The proposed modelling system provides a computational tool based on computational fluid dynamics (CFD) that can be used for policy development and to implement strategies to reduce human exposure. The proposed system allows evaluating pedestrian routes, vehicular technology, green infrastructure and urban morphology.

Keywords: Air quality, Vehicle emissions, Policy development, Human exposure, Street canyon, Computational Fluid Dynamics (CFD).

Transforming the Higher Education System to Accelerate SDG Implementation

Creating Sustainable Mindsets

Submitter: Beyne, Jan
Researcher Sustainable Transformation Lab, Antwerp Management School, Belgium,
jan.beyne@ams.ac.be

Additional Authors:
Dr. Lars Moratis, Antwerp Management School & Breda University of Applied Sciences

Abstract:
Developing sustainability intelligence is critical for the prosperity of societies worldwide, for conservation of the natural world, for achieving future business success and for the credibility of the concept of sustainability itself. If there is one place where developing sustainability intelligence is crucial, it is management education. It is in business schools that young, ambitious people from a variety of backgrounds find a context in which they can develop their belief

systems, their moral values, and their attitudes. It is in management education that they have the opportunity to experiment with ideas and are challenged to test and show their leadership (Moratis & Melissen, 2017).

As a way of navigating between the practice of business and theoretical insights, the challenge of educating new generations includes enabling critical thought, lighting up horizons and, ultimately, stimulating them to set sail for making a contribution to prosperity for all. At Antwerp Management School, sustainability intelligence or 'sustainable transformation' is described as the journey of profound change during which we successfully reverse the forces of disintegration (Visser, 2015) in our global economic, social and ecological systems and create a future that is more integrated, i.e. a high-synergy society.

Studies (Haski-Leventhal & J. Concato, 2016) show that students are increasingly taking sustainability elements into consideration when choosing their career and future companies they want to work for. This paper describes an SDG Student Ambassadorship Program that was developed and implemented for Master students at Antwerp Management School. This program has the aim of planting sustainable seeds and ethical values in the minds of future leaders. In short, SDG Student Ambassadors work voluntarily on projects related to one or more Sustainable Development Goals. Through this program, students learn about the integrated and indivisible approach of the 17 SDGs.

This paper shows how students are enabled to develop sustainability intelligence by working on and supporting local initiatives on poverty reduction, fighting climate change, reducing plastic pollution, etc. Finally, the paper reflects critically on the importance of the SDGs, CSR and responsible management education (RME) in business schools.

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Buying into sustainability

Submitter: Beyne, Jan
Researcher Sustainable Transformation Lab, Antwerp Management School, Belgium, jan.beyne@ams.ac.be

Additional Authors:
Dr. Lars Moratis, Antwerp Management School & Breda University of Applied Sciences

Abstract:
Sustainability and corporate social responsibility (CSR) have developed into important topics for business and are increasingly integrated in management education programs offered by business schools around the world. Whereas the body of knowledge from which management educators may select the contents for their sustainability and CSR courses has grown substantially over the years, they may find only few suggestions for offering practical assignments to their students that let them 'experience' sustainability.

This paper describes a group assignment for management students based on an experiential learning design that was developed and implemented during the so-called on-boarding days for Master students at a Flemish business school. In short, the assignment challenges students to buy a product of their choice at a local store, analyze its sustainability claims, dispose of the product, and prepare a presentation to share the results and their experiences. Through this assignment, students reflect on the credibility of sustainability claims and the role of consumers as a factor in spurring or frustrating sustainability. The assignment engages students also as people who have certain values, political beliefs, and cultural backgrounds, inflicting a deeper sense of learning about sustainability dimensions than through merely analyzing sustainability reports or through lectures.

The paper has been written with fellow management educators that want to implement the assignment in mind and includes learning goals and observations by the authors about the implementation of the assignment.

Back to the Future: Implementing the SDGs in Canadian francophone academia

Submitter: Cheriet, Mohamed
Full professor, ÉTS, Canada, luce_beaulieu@mac.com

Additional Authors:
Luce Beaulieu, Executive Director, CIRODD

Liliana Diaz, PhD., Research and practicum coordinator, Institut EDS, Université Laval

Daniel Forget, Sustanaibilty operations coordinator, Université Laval

Olivier Riffon, Full Professor, UQAC

Issam Telahigue, Full Professor, UQO

Abstract:
In late May 2019, a consortium of Québec research organizations and universities (Institut Hydro-Québec en environnement, développement et société (Institut EDS) from Université Laval, Centre interdisciplinaire de recherche en opérationnalisation du développement durable

(CIRODD), Université du Québec à Chicoutimi (UQAC) and Université du Québec en Outaouais (UQO) put together a conference at ACFAS1 titled "The Sustainable Development Goals: an opportunity to engage the dialogue between science and society?". The conference tackled three major areas of SDG academic implementation over one and a half days:

1. The SDGs and research: Sharing of diverse experiences in Québec, Canada and elsewhere in order to ponder on the opportunities offered by the SDGs to develop inter, multi and transdisciplinary research.

2. The SDGs and Training: Building on Key Competencies in Sustainable Development (Wiek et al., 2011), which is an increasingly recognized tool for facilitating the integration of sustainable development into university education, this workshop reflected on the links between the key competencies and the SDGs.

3. Operationalization of the SDGs: Co-creating the necessary collaborations between research, training and civil society stakeholders, this participatory workshop brought together a rich nexus of actors in the field who presented their networking strategies in order to link with academia (research and training). The workshop also allowed participants to share their vision and proposals to foster co-creation of spaces for connection, dialogue and collaboration between academia, government and civil society stakeholders, in order to accelerate the operationalization of SDGs. With over 20 contributions, this conference was the starting point of a dialogue that we hope to sustain and accelerate beyond Canada.

Thus, results of this conference will be presented to support the answers to these two questions: what is the way forward for francophone universities, research organizations and their partners to accelerate the cross-cutting implementation of the SDGs? In 2030, when we will look back on our achievements, what do we want to be proud of? Notwithstanding DeLoreans and Flux-Capacitators, this session will make a pragmatic attempt at setting a roadmap pertaining to this important topic, mapping levers and roadblocks and proposing ways to accelerate the SDGs implementation for present and future generations of learners.

1: ACFAS (Association francophone pour le savoir) is the most important multidisciplinary, interuniversity and intersectoral science event in the Francophone world. Established in 1923, its mission is to promote research and innovation as well as scientific culture in the French-speaking world by contributing to knowledge dissemination and to the scientific approach, with a view to improving society's quality of life.

Connecting universities' sustainable development objectives with the SDGs through students' activities: The case of the Global Affairs course at Universidad EAFIT

Submitter: Escobar-Pemberthy, Natalia
Assistant Professor, Universidad EAFIT, Colombia, natalia@environmentalgovernance.org

Abstract:

Even before the adoption of the 2030 sustainable development agenda, universities had incorporated this concept as part of their strategic planning and institutional goals. Considering the fundamental role of education in guaranteeing the availability of resources for current and future generations, it was clear that higher education institutions were called to play a crucial role in the implementation of sustainable development. As countries embarked on the adoption and implementation of the Sustainable Development Goals (SDGs), this commitment became even more critical, as was evidenced by the emergence of new global networks and cooperation mechanisms for sustainable development in higher education, as well as by the definition of new global metrics that assess the contribution of universities to the different goals and targets.

In the case of Universidad EAFIT, located in Medellín (Colombia), the process was very similar. To continue and solidify its engagement to sustainable development, in 2018 the university reviewed and updated its strategic planning guidelines, launching what has been denominated its "Itinerario (Itinerary) 2030". This new roadmap prioritizes four SDGs for the university's mission and vision and establishes the strategic guidelines that will allow the university to "contribute to humankind's sustainable development through the offering of programs that stimulate lifelong learning". Among the different efforts connected to these purposes, a course in Global Affairs has designed specific evaluation activities that required students to assess the institutional efforts on the implementation of each of the 17 SDGs.

The purpose of this paper is then to use the case of Universidad EAFIT to characterize the specific approaches to the incorporation of SDGs into institutional objectives, and to define how class activities can be used in terms of both research, training and operations to establish best practices and mechanisms that enhance the contribution to the effective implementation of the SDGs, while developing competences that strengthen students' professional development across disciplines.

A regional approach to addressing SDGs: Postgraduate Education and Research in Africa

Submitter: Harrison, Graham
Science and Technology Specialist, World Bank, United States, graham@stanfordalumni.org

Additional Authors:
Maulshree Gangwar, World Bank

Abstract:
While the task of addressing the Sustainable Development Goals is of global importance, it is frequently in low- and middle-income countries that the challenge is most pronounced. In many cases, these countries do not have the resources – financial, sectoral and human – in place to comprehensively tackle all of the SDGs. In these developing economies, universities are tasked with educating a rapidly growing number of undergraduate students, training postgraduate students who will have the skills to contribute across the economy, and also generating the academic research necessary to achieve the SDGs.

The challenge for universities is perhaps most pronounced in sub-Saharan Africa. Universities frequently struggle with high student/teacher ratios, the number of postgraduate students (especially in STEM disciplines) is limited, and historically the region does not produce enough academic research compared to other parts of the world. And at the same time, it is perhaps in this region that universities will be relied upon most in the coming years to provide both the human capital and the knowledge base for development.

In this paper, we look at how national and regional strategies are being employed in sub-Saharan Africa to systematically use the higher education sector to address the SDGs. Our approach is two-fold. First, we investigate how national development plans, coupled with regional agendas, focus on SDGs. As part of this, we report on the higher education sector strategies, and in particular the integration with Ministries focused on thematic sectors. And second, we focus on the universities in the region, and how they – both through formal strategies as well as new academic programs focused on SDGs – are training students to address the skills gap, and producing a growing body of applied research that is relevant to the needs of the region.

African universities effectively tackling SDGs require not just strategies and new programs, but also the financial resources to implement these activities and conduct research. Given the scope of the SDGs, partnerships – with private sector stakeholders both national and international, with appropriate Ministries and public utilities, and with leading researchers (regional and global) – are essential.

Tracking Sustainable Development Goals in Urban Slums using SMAART framework

Submitter: Joshi, Ashish
Senior Associate Dean Academic and Student Affairs, City University of New York Graduate School of Public Health and Health Policy, United States, ashish.joshi@sph.cuny.edu

Additional Authors:
Bhavya Malhotra, Public Health Scientist, Foundation of Healthcare Technologies Society, New Delhi, India

Menka Loomba, Public Health Scientist, Foundation of Healthcare Technologies Society, New Delhi, India

Archa Misra, Public Health Scientist, Foundation of Healthcare Technologies Society, New Delhi, India

Shruti Sharma, Public Health Scientist, Foundation of Healthcare Technologies Society, New Delhi, India

Chioma Amadi, Research Associate, CUNY Graduate School of Public Health and Health Policy, New York

Arushi Arora, Research Assistant, Foundation of Healthcare Technologies Society, New Delhi, India

Abstract:
Problem: The urban population in the world is rising generally. Rapid urbanization in the 21st century has precipitated a proliferation of informal settlements Informal settlements or slums dominate the urban landscape. Slums constitute the most prominent manifestations of urban poverty in developing countries resulting in several challenges related to housing, transportation, health, education, and employment.

Objectives: The objective of the study is to describe the utility of an interactive SMAART (S-Sustainable, M-Multisector, A-Accessible, A-Affordable, R-Reimbursable, T-Tailored) dashboard to visualize the association between socio-demographics and indicators of various SDG goals across urban slum settings in India.

Research methods: We conducted a cross-sectional study between June 2016 and January 2017 and enrolled 907 individuals across 38 urban slum sites, selected from the 675 un-notified slums of New Delhi. The sampling frame utilized was the "Delhi Urban Shelter Improvement Board Jhuggi-Jhopadi Cluster List of 2015". The study covered 38 slums distributed across all zones of New Delhi. We selected 10 percent of the households from each zone. One member from each household was selected and interviewed, based on their availability and fulfillment of the eligibility criteria including individuals aged 18 years and above, resident in these slums and provided voluntary consent to participate in the study. Information gathered included socio-demographic characteristics, access to technology such as cell phone and internet access and familiarity of mobile texting. Information related to the following SDGs such as SDGs 2 (zero hunger), 3 (Good Health and Well-Being), 4 (Quality education), 5 (Gender Equality), 6 (Clean water and sanitation), 7 (Affordable and Clean energy) and 8 (Decent work and economic growth) was also gathered.

Results: An interactive, mobile and internet enabled, SMAART Slum Dashboard was implemented to collect, process and visualize the burden of SDG goals in an interactive format using series of graphs, charts and maps. The SMAART platform included several interactive modules such as Data collection, Data quality, Data analysis, and Data visualization. Findings showed average age of the study participants to be 36 years (SD=13). Findings showed disparity among males and females in regards to education, mobile texting, food insecurity and stress levels. More than half of the study participants perceived educational, family relationships, electricity needs, general safety, women safety, and child health and education needs to be met.

Conclusions: The determinants of health for slum dwellers are multi-factorial and SMAART can be a useful approach to collect, analyze, track, and visualize the burden of sustainable development goals in urban slum settings.

The role of the university in the development of SDGs practices

Submitter: Longinos Marín Rives, Universidad de Murcia

Vice-Rector of Transparency and Social Responsability of the University of Murcia, Professor, University of Murcia, Spain, delegadors@um.es

Additional Authors:
Inés López López, Professor, Social Responsability Coordinator, University of Murcia

Alicia Rubio Bañón, Professor, Vice-Rector of Employment, Entrepreneurship and Society, University of Murcia

Abstract:
In 2015, all the countries of the United Nations adopted the so-called 2030 Agenda, an ambitious plan comprised of 17 Sustainable Development Goals, which represent the global challenges the world faces nowadays. They are a call for action and their achievement could depict a better future for all. Different actors such as nations, public institutions, private companies, citizens… are encouraged to play a role in their pursuit. Higher education institutions are not an exception. On the contrary, they are expected to lead social change by promoting the values associated to sustainability.

In this context, the University of Murcia (UMU) is carrying out a project called ODSesiones (a word game using "ODS", the equivalent for the initials "SDG" in Spanish, and the translation of the word "obsession") where different forces are brought together to work for the SDGs. The project aims is two-fold: 1) Its aim is both to increase consciousness of the importance of the SDGs among members of the UMU and 2) to make a real impact among Murcia citizens by promoting intervention activities suggested by NGO's and schools; such initiatives require proactive behavior on the part of students and citizens alike.

From February 2019 to April 2021, the UMU will devote 17 months to promote the SDGs, one per month. The different schools as well as some of the University's administration services (the Volunteering Service, the Student Council, the Sustainable Campus platform…) are involved in the project. Additionally, more than fifty NGOs and associations, some companies and public administrations are also actively working on the project.

First of all, a meeting with the Deans of all the Schools at the UMU was arranged to give them the opportunity to choose the specific SDGs they would participate on, based on their areas of expertise. A similar procedure was followed regarding NGOs, as they could select the SDGs their courses of action were more related to. A monthly calendar indicating to which SDG Schools and NGOs became adhered was developed.

Each month, a wide array of activities related to the SDG in focus is developed: lectures, workshops, art exhibitions, field trips, volunteering programs, fairs… They will take place mainly in the hosting faculties or schools but also in other venues (city center, university social center…). By the end of each month, the so-called 2030 Classroom is held. Run by an expert on the field, a group of professors from the hosting School discusses the way the corresponding SDG could be implemented into their degrees.

Although the project started quite recently, its value as a SDGs enhancer among young students,

in particular, and citizens, in general, is unquestionable. What is more, this project could be easily transferred to other universities all over the world attempting to spread the word regarding SDGs. Therefore, the presentation at the conference would enable us to share the experience with other scholars and practitioners.

From multi-actor partnerships to innovation platforms: the case of Alianza Shire and Lab Shire

Submitter: Mazorra, Javier
Postdoctoral Research Fellow, Innovation and Technology for Development Centre at Technical University of Madrid (itdUPM), Spain, javier.mazorra@upm.es

Additional Authors:
Manuel Pastor, Research Fellow, Innovation and Technology for Development Centre at Technical University of Madrid (itdUPM)

Ander Arzamendi, Research Fellow, Innovation and Technology for Development Centre at Technical University of Madrid (itdUPM)

Jaime Moreno, Research Fellow, Innovation and Technology for Development Centre at Technical University of Madrid (itdUPM)

Xosé Ramil, Research Fellow, Innovation and Technology for Development Centre at Technical University of Madrid (itdUPM)

Carlos Mataix, Director and Associate Professor, Innovation and Technology for Development Centre at Technical University of Madrid (itdUPM)

Abstract:
Formed in 2014 “Alianza Shire. Energy Access to Refugees and Host Communities” is a partnership with the aim to develop solutions for improving energy supply services and quality of life in refugee camps. The members of Alianza Shire are three leading Spanish companies in the renewable energy and lighting sector -Iberdrola, Signify (previously Philips Lighting) and Acciona.org-, Spanish Agency for International Development Cooperation (AECID) and the Innovation and Technology for Development Centre (itdUPM) at the Universidad Politécnica de Madrid. The United Nations High Commissioner for Refugees (UNHCR) is a collaborating partner and other international NGOs and national entities are implementing partners on the field.

The work of Alianza Shire is framed within the Sustainable Development Goals (SDGs), particularly SDG 7 – Ensure access to affordable, reliable, sustainable and modern energy for all – and SDG 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development -.

The itdUPM is playing the role of facilitator or promoter and responsible for designing and managing a space for collaboration as well as for carefully monitoring all working processes.

Moreover, the itdUPM promotes management and dissemination of knowledge generated by the partnership.

The partnership's first experience took place at Adi-Harush refugee camp in Shire, in the north of Ethiopia, where more than 8,000 Eritrean refugees live, many of whom are unaccompanied minors. Energy access-related problems at Adi-Harush were numerous. The project focused on the improvement and extension of the electricity grid in this camp, the connection to communal services, such as the primary school, two communal kitchens or markets hosting 36 small businesses and the installation of protection devices and rehabilitation of equipment at the communal services. Furthermore, 63 LED luminaries have been installed as public street lighting covering a distance of over 4km.

From 2018, thanks to the positive results of the previous intervention, the project is being extended to four refugee camps and their respective host communities, by enhancing local capacity and improving access to basic services. The project has two main components, both in the refugee camps and host communities:

- Firstly, by improving and extending the delivery of the electrical grid and installation of street lighting providing access to domestic electricity with solar home systems (SHS),

- Secondly, by creating livelihood opportunities and by improving basic services delivery through capacity-building, distribution of solar home systems (SHS), creation of businesses based on solar technology as well as by fostering employment and economic development.

The need to activate multiactor strategic partnerships is emphasised by the Sustainable Development Goals (SDG)4. Alianza Shire is today a collaboration and innovation space enabling organisations from very different working cultures and backgrounds to collaborate and innovate in order to face a complex problem: to improve energy services for people who are forced to flee and to temporarily settle in refugee camps.

However, during the first project a need to create an innovation space within the partnership was identified. The main function of this space should be to assure that innovation is fostered during the project, a correct management and dissemination of knowledge is done, learning is fostered inside partnerships organisations and to foster connections with other organisations, researchers, higher education institutions and the international community working on the SDG 7 and SDG 17.

For this, Alianza Shire has created the Lab Shire. Lab Shire is designed as an innovation platform, centred on SDG 7 and on SDG 17, to develop the previous functions in collaboration with Alianza Shire members and other organisations.

Capacity Building for Sustainable Development in Small Island States through Science and Technology Research and Education

Submitter: Mijts, Eric
Associate Professor, University of Aruba, Aruba, eric.mijts@ua.aw

Additional Authors:
Patrick Arens, business director, University of Aruba

Abstract:
Higher education needs to play a pivotal role in the implementation of the SDG's. For small island states, the implementation can play an even more crucial role. Small island states are subject to numerous threats due to their environmental, geographical, social and economic characteristics that lead to greater vulnerability. Multiple initiatives have been undertaken to build resilience to these threats, but the focus of these attempts is mostly externally oriented, rooted in international technical and logistical support and consultancy. However, internal capacity building for resilience of these small island states is of great importance as well, if not even more important, as the creation of a critical mass of local higher educated experts that can create contextually relevant and locally accepted solutions will highly contribute to the resilience of these states. Institutes for higher education in small island states need to take the responsibility to develop programs and networks to foster the development of a resilient and critical network of experts in multidisciplinary collaboration for inclusive sustainable development in small island states through education and research.

In 2019, the University of Aruba starts new programs with the title Sustainable Island Solutions through Science, Technology, Engineering and Mathematics (SISSTEM). The startup of these programs is funded by the 11th European Development Fund with a focus on SDG's 7, 11 and 17. The SISSTEM programs will start of as a BA program, an MA program and 12 PhD-projects, as well as the establishment of a research and services center. The program stimulates the development of a critical mass of experts in a wide variety of fields that can critically address the vulnerabilities and developmental needs of small island states from an internal perspective, as well as contextualize solutions and create new industries in small island states.

In this contribution, the authors will present the rationale behind the project, the local and international network partnership development, the model behind the new program design, as well as the way in which the programs will contribute to capacity building for sustainable development.

Grappling with scales of impact: Considering the campus, the city, and the globe

Submitter: Newman, Julie
Director of Sustainability, Massachusetts Institute of Technology, United States,
j_newman@mit.edu

Abstract:
For the past two decades institutions of higher education have set out to solve for a range of sustainable development challenges. While our work is primarily based on the campus, we must address the complexity of sustainable development to the global outlook of our institutions. We also seek to uniquely bridge operational staff and academics to inform our understanding and co-develop implementable solutions. This is the unique value proposition of a sustainability office. At MIT we launched our program on a framework that seeks understanding and solutions across

scales of impact that extend from the individual to the campus to the city to the globe. We have built a model that leverages the campus as a test bed for climate and sustainability research in a manner that co-joins rigorous research with operational and academic partners, sustained data collection/analysis, and measurable and communicable outcomes that seek to innovate, improve and accelerate. The purpose of this session is to discuss and explore how such models can deepen our understanding of and contribution towards the SDGs.

Sustainability Reporting through UN Global Compact at Unisa: Mainstreaming GRI Sustainability Standards and the SDGs

Submitter: Nhamo, Godwell
Professor, University of South Africa, South Africa, nhamog@unisa.ac.za

Abstract:
As late as 2018, academic publications are still recommending more research on sustainability reporting in higher education. This paper focuses on how the University of South Africa (Unisa), an Open Distance e-Learning institution reports sustainability matters under the UN Global Compact. Based on lived experiences and application of Participatory Action Research, findings reveal that Unisa has done well in sustainability reporting and continues to improve its scoring. It further emerged that significant reporting on sustainability reflects in Annual Reports. However, with the advent of twin globally recognised sustainability mainstreaming and reporting frameworks like the Sustainable Development Goals (SDGs) and Global Reporting Initiatives' (GRI) Sustainability Reporting Standards, Unisa is working on mainstreaming these to enable both implementation and reporting. The paper recommends that Unisa think through possibilities of adopting GRI Sustainability Reporting Standards and have a separate hybrid Sustainability Report addressing fundamentals from the UN Global Compact, SDGs and the GRI Sustainability Reporting Standards. The stand-alone Sustainability Report will also be integral to the UN Global Compact. The work further recommend that the SDG Campus from the GRI, UN Global Compact and World Business Council for Sustainable Development be used in localising the SDGs across Unisa for enhancing both implementation and sustainability reporting.

Nigerian Universities and the Achievement of Sustainable Development Goals: Problems, Issues and Prospects

Submitter: Nwogbo, David
Senior Lecturer, National Open Unversity of Nigeria (NOUN), Nigeria, dnwogbo@noun.edu.ng

Abstract:
The paper examined the preparedness of some universities in Nigeria to implement the SDG. Based on a survey carried out on 12 Nigerian universities, 84% admitted knowledge of Sustainable Development Goal (SDG) while 80% claimed awareness of Education for Sustainable Development. 36% are carrying out research but not SDG-related. 70% have no strategic plan on implementing SDG, while 65% appreciate the need for community partnership to implement SDG but have no mechanism on ground to achieve it. In terms of sectoral collaboration, 35% have such linkages but the implementation of the SDG is not their priority or

focus. 62% have no plans of training future leaders for the realization of SDG. 38% agree on the need to train future leaders but have no plans to do so. 74% have no immediate plan to integrate the SDG into curriculum. 65% believe that it is the responsibility of the federal, state and local governments to implement SDG. The stratified random sampling technique was used to select a representative sample of 340 respondents. The data was obtained through a survey method that: (a) ensured that all the members of the sample (academics and students) had equal chance of being selected (b) ensured that the instrument of data collection used was strong with respect to external validity to ensure that the findings obtained from the sample in the survey are generalizable to the population (c) ensured that the findings will play an active and important role in describing the current state of affairs in the Nigerian University system so that it can be used as a basis for reforms in the higher education sector to correct the unacceptable situation. The researcher prepared and designed questionnaire which was pre-tested on some members of the universities who were not part of the original sample. The aim of the pre-test was to improve the reliability and validity of the instrument. After carrying out the pre-testing, and based on the observations of some experts, the questionnaire was reviewed accordingly, and defects were corrected before they were administered on the original sample. The findings indicated that it is business as usual. Nigerian Universities are ill-prepared for the implementation of SDG due to structural, financial and functional contradictions of form and reality. The Nigerian higher education system is inundated with debilitating challenges which limit its capacity to accelerate the achievement of the SDG- problems of equity and inclusion, access, funding and infrastructure. Accelerating the implementation of the SDG require a transformative and strategic action on the part of the Universities as well as a sustainability plan agenda with local and international dimensions. The paper recommends a paradigm shift, both in terms of curriculum development and strategic action to revolutionize and reconstruct the University system for it to escape from its traditional and isolationist position, in order to close the gap between form and reality, as well as tailor its curriculum towards finding practical solutions, conducting research activities and building synergies toward implementing the SDG. Though the University system claims to be committed to teaching and research, it is disconnected from societal development.

Key words: SDG, university education, implementation, curriculum, strategy

The knowledge of SDGs through audiovisual tools

Submitter: Parra, Carmen
Professor, Abat Oliba CEU University, Spain, cparra@uao.es

Additional Authors:
Yolanda Cruz, Postdoctoral Fellow Almeria University

Abstract:
Based on the fact that young people belong mostly to the audiovisual culture, the main objective of this proposal is to raise awareness among students and professionals of education and the University Community in general, of the educational and cultural possibilities offered by cinema to know and be aware of SDGs.

For this it is necessary to train both students and teachers who know how to interpret through the

language of film the respect and social commitment of the SDGs. This is intended to achieve:

- A space within the university community that can interpret the messages offered by the Information Society.

- Develop the critical spirit of active spectators (rather than passive spectators) who can use new technologies in the development of their professions.

- Regarding teaching professionals, it will be a question of creating a tool that offers them learning mechanisms.

- Reinforce the role of the university community as promoters of the Information Society, which will result in sustainable, social and economic development.

To do this, they will be instructed in the use of short films as educational tools, providing professionals with an appropriate audiovisual competence for the correct interpretation of cinema for pedagogical purposes.

This is intended to convert students into active spectators that will allow them to acquire an audiovisual culture through which they can know the scope of the SDGs both from their informative dimension, as well as through the stimulus and the capacity for reflection.

To this end, we will work with a selection of short films whose content and use of cinematographic language will aim to identify the SDGs and make them aware of their importance both in their personal and professional lives.

At the same time, the critical spirit in university students will be fostered, making them responsible, since through the short film they will be able to analyze everyday situations that will allow them to take positions in order to achieve the objectives of the 2030 Agenda.

To achieve these objectives, educational material designed for learning the cinematographic language will be used. The short films that will be used to develop this project will come from a database that gathers short films from around the world that have won an international festival of social short films.

The final goal will have several tools:

- Preparation of a manual that brings together the contents generating teaching content to show the tools of didactic innovation using the audiovisual in teaching and its analysis, reinforcing the role of university students in the Information Society as spokespersons for SDGs.

- Creation of an audiovisual database connected to the 17 SDGs that will be a pioneer in the implementation of the 2030 Agenda, being a reference for educational training.

- Implementation of a transversal subject that can be taught in any course and degree depending on the SGDs that you want to develop.

- Create a universal language (that of the images) that will allow us to internationalize our classrooms.

Universities Engagement Driving Delivery of the Sustainable Development Goals: Social Enterprise

Submitter: Purcell, Wendy
Professor, Harvard University, United States, wpurcell@hsph.harvard.edu

Additional Authors:
John D. Spengler, Akira Yamaguchi Professor of Environmental Health & Human Habitation, Harvard T.H. Chan School of Public Health

Abstract:
We face global environmental, social and economic challenges that together threaten to overstep our planetary boundaries. In 2015, 193 countries adopted the Sustainable Development Goals (SDGs)– the first agreed actionable agenda by the global community for all citizens. Higher education institutions being 'locally rooted and globally connected' have significant opportunities to deliver against the SDGs, working with faculty, staff and students as well as their stakeholder community and alumni. As Jeff Sachs (Director, UN Sustainable Development Solutions Network) said "Advancing the SDGs is the 'moon shot' for our generation". Universities and colleges must step up and shape new ways for the world, they have a critical role to play as change agents working with industry partners.

We are approaching a tipping point, which is widely acknowledged, but most people are carry on as normal. This is the case in much of the global higher education system too. Work in sustainability often sits on the margins of mainstream subjects, continuing to educate for a world that is rapidly changing. We need a more transformative approach to higher education, helping to facilitate change towards a more equitable society and a better world and working with industry partners is a means to accelerate change and co-create the future.

The role of universities as engines of transformational sustainability will be explored, drawing on examples of institutional change projects in teaching/learning, research and service informed by working with business and industry. The university's approach as a research-led institution will be compared with two international examples. The first, a public university in the UK which adopted sustainability at a strategic level to secure institutional differentiation in a disrupted global market; its mission-led transformation became a catalyst for change in regional business and the community. The second, a private university in Bulgaria working with a business association; its goal to support economic regeneration and social innovation.

Adopting the SDGs at a strategic level was a means of connecting the universities with industry and meant that new teaching and research opportunities emerged, focused on stakeholder priorities but aligned with the academic mission. As such students and faculty became involved in real-world projects of local/global benefit driving up student engagement and employability as well as research funding and impact. Embedding the SDGs into the curriculum with

entrepreneurship activated leadership by students who set the institutional agenda in many ways. The radical adaptive changes needed to deliver institutional transformation for the SDGs are examined. The overhaul of teaching/learning looked-for to enable students as the next generation of scholars and leaders, as well as the careful revision to research strategy and leadership and governance frameworks is discussed.

Higher education has a unique role and responsibility in helping the world achieve the SDGs. Framed as 'living labs' they can make a fuller contribution in sustaining the economic, cultural and intellectual well-being of our communities and society at large. Focusing deliberately and proactively on the SDGs, sustainable transformation within higher education can help deliver a more sustainable and inclusive future.

[1]Rockstrom, J., et al., A safe operating space for humanity. Nature, 2009. 461(7263): p. 472-475.

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[4]Cortese, A.D., The Critical Role of Higher Education in Creating a Sustainable Future. Planning for Higher Education, 2003. 31(3): p.15-22.

[5]http://www.sustainabilityexcahnge.ac.uk/files/further_and_higher_education_and the_sdgs_report.pdf

Inspiring Leadership in the Academic Community - Newton Smart Campus Case Study

Submitter: Sant'Anna, Andreia
Smart Campus Coordinator, Centro Universitário Newton Paiva, Brazil, andreia.santanna@newtonpaiva.br

Abstract:
The intensification of urbanization leads to various aggravating factors in an intensely populous city. Among them, we can mention: difficulties of urban mobility, increase in waste generation and difficulties of destination, intense use of finite resources, such as water, electricity and energy. Difficulties such as these also exist within an University Campus. Because of this, the nucleus of extension called Smart Campus appeared.

The proposal of the Newton Smart Campus is to identify the real problems of society and the intensification of urbanization and develop solutions to solve these problems, using the campus as a space for prototyping and learning. The projects are developed with an average duration of six months to one year.

The main focus is that all actions and projects fit into Human, Intelligent and Sustainable Cities

concepts, with support in some of the UN's Sustainable Development Goals and Belo Horizonte Agenda 2030. For this purpose, the program is subdivided into axes according to the themes that synthesize the pillars of a Smart City: Education and Culture; Energy; Industry and Business; Mobility and Safety; Governance; Health and Quality of Life; Environment; ICT - Information and Communication Technology; Urbanization and Newton Tech.

The program was designed so that the target audience is generic, prioritizing the students of the institution, so that they have contact with routine situations of a labor market, project management, people management and oratory, thus preparing and building them in their professional training.

It is up to the students to manage the projects coming from each axis and to achieve the best solution taking into account effectiveness, lower cost, execution time, impacts and financial return.

The prototypes will be replicated in the external community, thus reaffirming the commitment to solutions to real problems. These actions directly impact the disclosure of the institution, since we will be working with corrective actions, designed in the comfort of users.

Among the objectives of the Smart Campus Newton Program, we can highlight:

• Make cities more human, intelligent and sustainable;

• Meeting the 17 Sustainable Development Goals, in particular: 3; 4; 6; 7; 8; 9; 11; 12 and 17;

• Meeting the Challenges of Belo Horizonte Agenda 2030, in particular: Belo Horizonte as a municipality of very high human development; Resilient and environmentally sustainable city; City in which one lives more, with health, safety and quality education; Belo Horizonte with transparent, shared and excellent management; Compact, integrated, inclusive and connected city with sustainable mobility;

• Make university campi smarter;

• Articulate, empower and inspire the academic community to create solutions to real problems applicable in the urban context, aligning them with the needs of Brazil in the coming decades;

• Encourage leadership from the first graduation periods, giving the responsibility for managing projects from each axis and with that achieve the best solution taking into account effectiveness, lower cost, execution time, impacts and financial return;

• Be a reference in Human, Intelligent and Sustainable Cities in Minas Gerais.

The main purpose of the SCN is to enable students to experience market practices by putting into practice the theories acquired during the course. With this, Newton would place qualified professionals on the labor market, raising the credibility of the institution.

The respective axes develop multidisciplinary projects based on corrective actions that go through cycles and meticulous field research, being the management carried out by the student responsible, thus enabling the interaction between students and users.

The activities developed are always focused on applicability, that is, they must be thought of in a way that replicates in society.

In three years of existence, Smart Campus has performed more than 90 projects to make the campus and society better. The expected results for the next few years are that the projects have greater complexity and impact society more comprehensively, elaborating projects on topics such as Machine Learning, Big Data, IoT and Industry 4.0.

From the point of view of participating students, the development of all work projects positively impacted the plans of engineers and architects with an emphasis on negotiation, leadership and management.

The Italian path toward SDGs implementation: a first mapping exercise

Submitter: Sonetti, Giulia
Assistant professor, Politecnico di Torino, Italy, giulia.sonetti@gmail.com

Additional Authors:
Daniele Campobenedetto, Assistant Professor, Politecnico di Torino

Caterina Barioglio, Assistant Professor, Politecnico di Torino

Abstract:
Unlike other SDGs, education is not a goal in itself; it is a tool to attain different goals. Universities in this respect play a crucial role in the short-term implementation of SDGs for educating with new ways and contents the leaders of tomorrow. Current academic debates explored the best practices via deductive-theoretical or inductive-experiential approaches, yet not always considering the geographical, and therefore cultural and infrastructural factors affecting the success and the failure of such practices. In this paper, we systematize the implementation of SDGs in Italian universities during the last three years, from 2016 to 2019. A collection of 18 experiences have been collected after a national call by the RUS (the Italian Network of Sustainable Universities) aimed at mapping the current landscape of SDG related actions, enhancing the path taken by each member and generating positive feedbacks among each other. Results have been analyzed according to the educational "container" where the SDGs implementation takes place (from random workshops to dedicated courses) and to the different organizational scales (from the foundation of a new department to the campaigns of local green teams), as well as to the kind of issues to be tackled and reported impacts. Within the Italian context, SDGs implementation it is still primarily understood as a strategic element for branding and promoting the green image of the Athenaeum. Secondarily, it is seen whether as a separate discipline to be inserted into existing curricula and original teachings or as a conceptual tool for remedying specific societal challenges through random workshops or fieldworks. Conclusions highlight the value of this first Country-wide systematization of the Italian Higher Education

Institutions toward SDGs implementation, to avoid individual experiences remaining isolated and self-concluded, and most importantly to provide comparability and transferability criteria to help similar cases be networked both within similar governance levels and within methodological practices. Further works envisage the recognition of same elements in the broader European traditions, as well as the enhancement of stimuli generated by the good partnership of all public institutions engaged in the exciting yet urgent defy of today's climate change.

Participatory Action Research and Multi-level Perspectives to Education Pathways of Congolese Refugee Youth

Submitter: Usui, Maki
Master in Social Work Candidate, University of Michigan School of Social Work, United States, usuim@umich.edu

Additional Authors:
Odessa Gonzalez Benson, PhD, Assistant Professor, University of Michigan School of Social Work

Mieko Yoshihama, PhD, Professor, University of Michigan School of Social Work

Ana Paula Pimentel Walker, PhD, Assistant Professor, University of Michigan Taubman College

James Ellis, PhD, Assistant Research Scientist, University of Michigan School of Social Work

Victoria Lichtman, Master in Social Work Candidate, University of Michigan School of Social Work

Abstract:
“Quality Education” is the 4th goal of the 17 Sustainable Development Goals established by the United Nations to be achieved by 2030. Providing inclusive quality education is crucial as it provides necessary knowledge and skills to the future leaders for innovative solutions to tackle worldwide social issues. Although the world has progressed in providing educational opportunities at a primary level, there remains numerous challenges that need to be addressed. One such challenge is the inequitable opportunities for higher education, especially for youth and young adults of marginalized communities.

For resettled refugee youth, education is a primary empowerment tool: education functions as a space of resilience and learning that can facilitate refugees in preparing for the future and envisioning a renewed life trajectory. Educational experiences are one of the key domains for integration for refugee youth to a local host community, such as cities of resettlement in the United States. Yet, schools and colleges in U.S. resettlement cities are often inadequate in providing appropriate educational support for youth/young adults of refugee background. Due to challenges pertaining to age, interrupted schooling, and language barriers, high schools consider refugee population as hard to serve. There is lack of appropriate information and assistance provided to young refugees and their parents about the school system, including the

consequences of the youth's choice for future pathways.

Research on refugee youth education in the United States and other resettlement countries is particularly scarce for refugees from African nations. This is paradoxical particularly in the U.S., given that such populations have long been a part of refugee admissions to the United States since earliest years of federal resettlement policy in the 1980's. Admissions spiked in recent years; approximately 46.5 % of the total refugee admissions into the U.S. in 2018 were refugees from Africa, the large bulk from the Democratic Republic of the Congo, surpassing all the other refugees from different regions. Some exploratory studies have laid initial foundations for understanding how Congolese youth struggle upon resettlement, and some point to education as a critical challenge. Despite the centrality of education to refugees' resilience, empowerment, and future pathways, there is lack of attention to these issues in both practice and scholarship.

This study aims to tackle these important educational barriers for resettled refugees, and help fill these gaps in knowledge, through a community-university Participatory Action Research (PAR) for refugee youth education and development. The research partnership includes a Congolese refugee-led organization, a student organization, and interdisciplinary group of faculties and students in refugee studies, social work, urban planning, and education. The central program is a college education pathway workshop for resettled refugee youths/young adults. Data collection methods include surveys and life history calendar interviews, and analyses entail reflective analyses of the PAR engagement itself, thematic analyses, and outcome evaluations of the workshop. Findings yield insights pertaining to skills development and empowerment of individuals towards Quality Education, but also about structural and institutional challenges, as school policies of educational transition and programming can inhibit meaningful learning and access to higher education, rather than facilitate them, for refugee youth in resettlement cities.

Innovation driven by the Sustainable Development Goals and International Multidisciplinary Teams

Submitter: Vinajera, Carlos
Associate Professor, Autonomous University of Yucatan, Mexico,
profesorvinajera@hotmail.com

Additional Authors:
John Spengler, PhD, Professor, Harvard T.H. Chan School of Public Health

Ramon Sanchez, ScD, Professor, Harvard T.H. Chan School of Public Health

Abstract:
Fulfilling the United Nation's Sustainable Development Goals (UN SDGs) should be a shared responsibility between governments and society. However, it is difficult for citizens in developing countries to find and secure sufficient funding to implement sustainable solutions due to inadequate regulatory frameworks for innovation and lack of knowledge on how to prepare and present an effective business plan. For that reason, since January of 2018 Harvard University has been teaching a graduate level course in the Yucatan Peninsula with students from Mexico and the United States to understand some of the major problems related to SDGs faced

by rural Mayan communities and urban populations around Merida, Mexico. They use these problems as a starting point to create startups in sustainability and health that might help in fulfilling UN SDGs. In this way, PhD and Master Students receive a comprehensive training in new product development, intellectual property, assessment of environmental and social impacts and guidelines on how to write value propositions (for-profit and social ventures) and prepare a business pitch for innovation investors. Students spend 15 days travelling to impoverished urban areas and rural indigenous communities to listen to their problems, understand the cultural context and socioeconomic issues around each problem and gather information from the government and private entities to create new for-profit and social business models to solve problems related to UN SDGs. Past projects created solutions to protect and improve coastal areas (artificial oyster reefs to clean water, recycling of different waste streams from cruise ships to create jobs and sustainable building materials, etc.), improve mobility in Mayan archaeological sites like Chichen Itza and Uxmal, significantly reduce poaching and traffic of endangered species through social programs, improve drinking water supply for urban and rural indigenous communities and foster the development of renewable energies and sustainable agriculture in the region.

At the end, they deliver a business plan and business presentation that deals with solving a SDG and a strategy on the way forward to secure funding from international innovation investors to create a multidisciplinary and international startup that solves real community issues in developing countries. This is a model that could be implemented in other regions of the world with similar characteristics.

Pedagogical methodologies to achieve SDGs in developing economies

Submitter: Yeretzian, Aram
Assistant Professor, American University of Beirut, Lebanon, ay10@aub.edu.lb

Abstract:
Aiming to achieve the Sustainable Development Goals requires alternative thinking modes, cultural approaches and behavioral practices. This is particularly relevant in developing economies that face considerable challenges at the social, economic and environmental levels. Higher educational platforms provide opportunities to address and promote such changes. Students, within a university context, are encouraged to engage in academic subjects and with knowledge disciplines that are different than their intended areas of study. For example, students at the Maroun Semaan Faculty of Engineering and Architecture (American University of Beirut) who are interested in cross-disciplinary work addressing the built environment can take two courses that develop the complementarity of their specializations.

"Environmentally responsive buildings" is a course where Architecture, Civil Engineering and Mechanical Engineering students address the quality of the current built environment using the way natural systems work as an inspiration to improve the quality of communities and the sustainable aspects of buildings and their surroundings. This interactive course is supported by the Climate Design Unit, a lab that provides possibilities for hands on investigations and real life simulations of issues pertaining to climate and buildings. The second course "Scales of sustainability" has a seminar format where students present and critically discuss issues relevant

to the Sustainable Development Goals at both global and regional / national scales.

The aim of this paper is to reflect on the methodology associated with the two teaching courses by presenting two different models of course delivery, illustrating their outputs and assessing the pedagogical process in terms of the course learning outcomes. The paper will also discuss the opportunities of involving students with ongoing research initiatives such as the optimization of building form to reduce incident solar radiation, the different construction methods, such as rammed earth & vernacular walls as well as the study of the dynamic profile of energy use in the Mediterranean city of Beirut. The intent of engaging students within a high level academic context is to train them to develop thinking frameworks which will enable them to address complex interrelated issues, similar to the ones that they will confront in their professional life.

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**

Association of the Master's in Development Practice (MDP) programs is a network of 38 MDP programs, each committed to a high-intensity program of teaching, research, innovation, and practice that involves all parts of the world. The Global Association arises from a shared commitment to forge a new profession of sustainable development practice that integrates the social sciences, natural sciences, health sciences and management. Intellectual foundational support was provided in the 2008 report of the International Commission on Education for Sustainable Development Practice, supported by the MacArthur Foundation. Numerous universities have or are in the process of designing, introducing, and promoting the new, cross-disciplinary global Master's in Development Practice program. In order to function effectively as the Global Association of the Master's in Development Practice, the Association is guided by bylaws that define its purpose and responsibilities. **mdpglobal.org**

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