

Adaptation to Climate Change and the Sustainable Development Goals at Local Scales

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1. Introduction

Adaptation to climate change is an essential local activity affecting in some way essentially all of the Sustainable Development Goals (SDGs) and their targets and indicators. Adaptation, in contrast to the extensive externalities of emissions reduction, is a process whereby the positive and negative impacts of alternative plans are largely internalized to the local level. As a result, a comprehensive climate adaptation decision framework for towns and cities of different scales, important in itself, can also help to assess progress toward the SDGs. In some cases, we will know in the aggregate that something like “adaptation to climate change” would have significant positive effects on several SDGs; but disaggregation is needed to estimate these in detail. This paper illustrates how a set of disaggregated Adaptation Assessment Steps designed for climate change adaptation planning at local scales, with a set of objectives that only partially overlap with the SDGs, can be used in the latter context. Three sections follow this Introduction: 2. Adaptation Assessment Steps; 3. The SDGs, Targets, Indicators and the Adaptation Assessment Steps; and 4. Conclusions.

2. Adaptation Assessment Steps

Almost regardless of the measures taken globally for emissions reduction, extensive adaptation to climate change at local scales will be required in the coming decades. The adaptation framework presented here is based on specific practical experience, case studies and planning principles, and is designed to be fully accessible to local stakeholders, including citizens, planners and public officials. The disaggregated Adaptation Assessment Steps are based on relatively well-defined methods and benefit and cost accounting (positive and negative impacts) for economic, social, and environmental objectives.

The climate adaptation process can be divided into eight Adaptation Assessment Steps¹. These were originally designed for critical infrastructure planning and what might be called standard objectives of public investment, such as national income, financial returns, environmental improvement and equality. However, they have been expanded in current usage to include all assets, not just infrastructure², and they can be related to progress toward the very broad range of objectives embodied in the SDGs. The eight steps are:

¹ David C. Major and Megan O’Grady, “Adaptation Assessment Guidebook,” in New York City Panel on Climate Change, *Climate Change Adaptation in New York City: Building a Risk Management Response*, edited by Cynthia Rosenzweig and William Solecki, Annals of the New York Academy of Sciences, Vol. 1196, 2010, Appendix B, 229-285; David C. Major and Sirkku Juhola, *Climate Change Adaptation in Coastal Cities: A Guidebook for Citizens, Public Officials and Planners*. Helsinki University Press, 2021.

² Major and Juhola, *Climate Change Adaptation*, Ch. 2.

- 1) Identify present and future climate hazards (this step includes climate scenarios);
- 2) Inventory all local assets, including social, cultural and other assets as well as infrastructure;
- 3) Identify risk of climate impacts on all assets;
- 4) Develop initial adaptation strategies; this step includes management, infrastructure and policy adaptations;
- 5) Identify opportunities for coordination among agencies and between sectors;
- 6) Link adaptation to existing and future maintenance and replacement strategies,
- 7) Prepare and implement plans over time; and
- 8) Monitor and reassess on a regular schedule.

The next section briefly describes the SDGs, targets and indicators, and then illustrates the application of the Adaptation Assessment Steps to evaluating progress toward the SDGs and their targets and indicators.

3. The SDGs, Targets, Indicators, and the Adaptation Assessment Steps

The SDGs: Background. The United Nation's (UN) transformative Sustainable Development Goals (SDGs) provide guidance for a wide range of programs to achieve a sustainable future for a changing world. It is important that planning efforts in many sectors be linked to these goals to: move forward toward reaching them; efficiently channel limited resources; help achieve consistency and co-benefits among programs; and indicate the importance that planners, implementers and monitors attach to the SDGs.

On 1 January 2016, the 17 SDGs of the 2030 Agenda for Sustainable Development, adopted by world leaders in September 2015 at a UN Sustainable Development Summit, officially came into force³. Each of the goals has a series of targets, totaling 169 for all of the goals, which in effect are the operational sub-goals of the SDGs. Each of the targets has one or more indicators that serve to show how well that target has been met in a nation; they can thus potentially support a consistent and comparable global monitoring framework. The indicators deal in large part with earlier criticisms of some of the targets as not well defined⁴. The resulting indicator set, originally finalized in 2016, includes a total of (currently) 231 unique indicators, with a few used for more than one target⁵. These are revised as needed. This array of goals, targets, and indicators,

³ United Nations, 2015, *Transforming our world: the 2030 Agenda for Sustainable Development*, <https://sustainabledevelopment.un.org/sdgs>

⁴ Erik Stokstad, 2015, "Sustainable goals from U.N. under fire," *Science* 347: 702-3, 13 February.

⁵ United Nations, 2016, *Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators* (E/CN.3/2017/2), Annex III, Revised list of global Sustainable Development Goal indicators; United Nations, Department of Economic and Social Affairs, Statistics Division, n.d. *Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development* <https://unstats.un.org/sdgs/indicators/indicators-list/>

designed to apply to all countries, was developed to help mobilize global efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one and no place is left behind. Implementation and monitoring of the SDGs is integrated into the work of the United Nations system, setting a common agenda for global development efforts within the organization.

*Choosing SDGs, Targets and Indicators.*⁶ Adaptation to climate change is of course linked to substantially all of the SDGs and their targets and indicators in some way, and this poses a task for adaptation planners, implementers and monitors. Identifying every possible impact, however small, would quickly make analysis and reporting unmanageable and ineffective. It would, for example, be possible to examine a complete matrix relating the Adaptation Assessment Steps to all of the targets and indicators, but most of the cells would be empty or nearly so. Thus, the task of adaptation planners and implementers should be to identify the targets and indicators that adaptation is likely to impact to a significant extent. In the case of climate change adaptation, the most obvious linkage is to SDG 13, “Take urgent action to combat climate change and its impacts,” which is used as an illustration here. Other important linkages are noted below, which will have to be considered in planning applications.

Linking climate change Adaptation Assessment Steps to the targets and indicators can be illustrated by considering the first target and its indicators from SDG 13. This is the SDG of which climate adaptation is a part (it also includes mitigation). The first target and its indicators are shown in Table 1.

Table 1 SDG 13, Target 13.1 and Indicators 13.1.1 and 13.1.2

Target	Indicators
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of countries with national and local disaster risk reduction strategies 13.1.2 Number of deaths, missing persons and persons affected by disaster per 100,000 people

Note: the indicators for a given target do not necessarily exhaust the range of impacts on the target.

Using the Adaptation Assessment Steps to assist in analysis. In many cases, we will know in the aggregate that something like “adaptation to climate change” would have positive effects on several SDGs. But a level of disaggregation is needed to estimate these in detail. In most assessments, there will of course be some disaggregation, but the advantage of the present approach is that its disaggregation is both orderly and comprehensive. Each step may not give a final answer but will provide information for that answer. Disaggregation is helpful in particular because the targets and indicators are not fully linked in some theoretical sense.

⁶ The material in this paragraph is based on David C. Major, Martin Lehmann, and James Fitton. 2018, “Linking the management of climate change adaptation in small coastal towns and cities to the Sustainable Development Goals,” *Journal of Ocean and Coastal Management* (163) 2018, 206-7, <https://doi.org/10.1016/j.ocecoaman.2018.06.010>

In this section, the use of the Adaptation Assessment Steps for analysis is briefly outlined for Target 13.1 and its indicators, with some additional examples.

- 1) Identify present and future climate hazards. In this step, an inventory of current hazards is made (for example, coastal flooding), and future trajectories of climate variables (temperature, precipitation, SLR and the resulting hazards) are examined.
- 2) Inventory all local assets, including social and cultural assets as well as infrastructure. This establishes a base line for the examination of impacts on the target and indicators. It also indicates the population, for indicator 13.1.2.
- 3) Identify risk of climate impacts on all assets: this uses the information from steps 1 and 2, combined with risk estimates, to show both the current needs and the *additional* needs from climate change for Target 13.1 and its indicators. This careful parsing avoids double-counting. The forecasts will show the opportunities for adaptation relevant for particular targets for various impacted SDGs.
- 4) Develop initial adaptation strategies. In this step, further disaggregation is highly useful. For most sectors, such as climate change, there is a range of programs and projects that can be broadly grouped into infrastructure, management, and policy measures. The most relevant ones for the planning problem in question can be examined, and their impacts on the relevant targets and indicators assessed. This is also a point at which the assessment works in both directions: after assessing impacts on targets and indicators, it may well be that policies that look good on first analysis from the standpoint of economics, for example, are less good for the targets and indicators. Thus, the SDGs play back onto choice, and are not simply impacted by choices.
- 5) Identify opportunities for coordination among agencies and between sectors. This is a step that is crucial to effective and efficient attainment of the SDGs, yet it is often overlooked because of the siloed nature of much planning. Many sectors will impact Target 13.1 and its indicators, including transport, health, and education. New interagency procedures may be needed to be set up for this purpose.
- 6) Link adaptation to existing and future maintenance and replacement strategies. This step, like Step 5, is crucial to effective and efficient attainment of the SDGs, yet it is often overlooked because of the siloed nature of much planning. Building in adaptations to climate change as contributions to Target 13.1 and its indicators during routine maintenance and replacement is much more efficient than ad hoc additions.
- 7) Prepare and implement plans over time. This step proposes contributions of climate change adaptation to Target 13.1 and its indicators in an efficient and effective schedule. It is important not to overbuild at first, but also not to have to catch up later. This is perhaps one of the most important planning steps that is underassessed.
- 8) Monitor and reassess on a regular schedule. This is also additional disaggregation. The types and management of monitoring systems will be designed in part for the SDGs, but these will also reflect back on the design of the systems (as in 4, above).

These illustrations and the application of the steps can of course be expanded both to other targets and their indicators within SDG 13 (for example, 13.3., which has both local and national

aspects⁷) as well as targets and their indicators for other SDGs. For example, adaptation to climate change will impact SDG 11, “Make cities and human settlements inclusive, safe, resilient and sustainable.” This is an SDG that is directly linked to climate change adaptation. Target 11.5 and indicators 11.5.1 and 11.5.2 for SDG 11 are shown in Table 2.

Table 2: SDG 11, Target 11.5 and Indicators 11.5.1 and 11.5.2

Target	Indicators
11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	11.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people 11.5.2 Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services

In addition to SDGs 13 and 11, the SDGs to which adaptation for climate change of small coastal towns and cities are likely to be most importantly linked include SDGs 6, “Ensure availability and sustainable management of water and sanitation for all”; 9, “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”; and 14. “Conserve and sustainably use the oceans, seas and marine resources for sustainable development” (especially avoiding negative impacts on this goal from adaptation projects and programs). Adaptation to climate change is also linked to some components of SDGs that might at first sight appear not to be exceptionally relevant to planning for climate change adaptation. An example is SDG 16, “Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.” The targets for SDG 16 include 16.7, Ensure responsive, inclusive, participatory and representative decision-making at all levels, and the related indicators are 16.7.1, Proportions of positions in national and local institutions, including (a) the legislatures; (b) the public service; and (c) the judiciary, compared to national distributions, by sex, age, persons with disabilities and population groups (here the local element is relevant—the national institutions are at a higher level of aggregation), and 16.7.2 Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group. Inclusivity in decision-making is important throughout the Adaptation Assessment Steps⁸.

Further Aspects of Local and National Scales. It should be noted that data availability at the local level will impact the ability to accomplish applications of the Adaptation Assessment Steps to the evaluation of progress toward the SDGs, targets and indicators. In some cases, more detailed data will be available at local scales than at national scales—for example, local knowledge of flooding impacts. Further, in many cases, when SDGs are adapted to the local level, governments may create additional targets and indicators to supplement the (often rather broad) targets and indicators of the official SDG monitoring framework. This will depend on local priorities and data availability. In this regard, it is important to remember that the indicators for a given target do not exhaust the impacts of projects and programs on the target.

⁷ See Major and Juhola, *Climate Change*, 151-3 for the complete list of SDG 13 targets and indicators.

⁸ Major and Juhola, *Climate Change*, 17-19.

While impacts on many if not most targets and indicators will be developed at local scales, it is in part a function of national reporting bodies to aggregate the impacts on the targets and indicators across sectors and places.

Whether there will be a significant contribution to the national indicators from local assessments will not always be obvious and will depend in large part on national procedures and their treatment of scale. The contribution of a plan for a single settlement may be small, although given national aggregation procedures its contribution will have some effect. The final result will depend on the effectiveness of the aggregation procedures.

Finally, it should be noted here that the processes both of adaptation and assessing linkages to the SDGs require resources that may be difficult to access for many communities. This is a continuing challenge that needs to be addressed both by nations and the international community.

4. Conclusions

This paper is a contribution to linking climate change Adaptation Assessment Steps to the Sustainable Development Goals. What emerges from this approach is, first, a recognition of the importance of using disaggregated steps such as the Adaptation Assessment Steps in analysis at local scales; and second the realization that first-rate assessment of impacts on targets and their indicators is not a simple matter. The suggested approach here is just a contribution to a much larger issue, the enormous amount of work that will ultimately be required to fully realize and assess overall progress toward the SDGs.

Additional conclusions based on this and in part on an earlier related review⁹ are:

1. Very substantial resources will be required for the effective application of the methods described here (and others) for the evaluation of climate change projects and programs on the SDGs, targets and indicators. In regard to this and other conclusions, there are excellent opportunities for work within the Sustainable Development Solutions Network.
2. It will be important for adaptation planners, implementers and monitors to identify the SDG targets and indicators which adaptation to climate change is likely to impact to a significant extent. If a consistent set of SDGs, targets and indicators can be identified, reporting on the impacts of climate change adaptation on these using the Adaptation Assessment Steps can be a more regular and efficient effort.
3. The approach suggested here of assessing SDG impacts using a system of disaggregated steps might be used in other sectors where there are well-developed planning steps, such as transport improvements, and it can also be used as a guide for less developed sectors.
4. The approach can also be used as a screening device to evaluate alternative climate change adaptation plans in terms of their impacts on the SDGs. The application of the Adaptation Assessment Steps to SDG evaluation thus enables an iterative process at local scales.

⁹ Major, Lehmann and Fitton, Linking the management, 207.

5. Linking climate adaptation to the SDGs through the Adaptation Assessment Steps will help national entities to organize the management of adaptation aid more effectively and will also provide for alignment with projects in other sectors, providing potential co-benefits and more efficient funding.

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