# Monitoring & Evaluation for climate change adaptation

A summary of key challenges and emerging practice. Understanding, discussing and exemplifying the key challenges of M&E for adaptation

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# MONITORING & EVALUATION FOR CLIMATE CHANGE ADAPTATION

## A summary of key challenges and emerging practice

Understanding, discussing and exemplifying the key challenges of M&E for adaptation

# DISCLAIMER



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# FRAMING AND CONTEXT

## THE IMPORTANCE OF M&E FOR CLIMATE CHANGE ADAPTATION

Monitoring and Evaluation (M&E[1]) and Measuring, Reporting and Verification (MRV) for climate change adaptation are areas of increasing interest and attention at both the political and operational levels[2]. On the political side, the outcomes of the recent Paris agreement indicate an increasing focus on the national reporting of both future adaptation needs and the aggregated results of adaptation actions that have already been implemented (e.g. through National Adaptation Plans or NAPs and Intended Nationally Determined Contributions or INDCs) (UNFCCC, 2015). At the same time, on the operational side the scale of the financial resources that are expected to flow into climate change adaptation in the future (e.g. through the Green Climate Fund), combined with the increasing number of already funded adaptation activities now reaching maturity, is likely to lead to a much stronger donor emphasis on documenting results and impacts in the years ahead (UNEP, 2015).

Climate change adaptation is a relatively new field, and thus far there is no scientific or political consensus over what successful adaptation is and how the success of adaptation interventions should best be measured (Hedger et al., 2008). Working towards such a consensus is essential for several reasons. First, there is an obvious need to ensure well-targeted interventions to build climate resilience that do not have contradictory or unintended outcomes, such as maladaptation (see definition in Annex I). Secondly, a better understanding of adaptation interventions and their achievements and failings serves an important learning purpose by supporting the development of an evidence base that will inform climate change adaptation policy and practice in the future. Lastly, there is also a growing need and pressure both nationally and internationally for donors and governments to demonstrate the effectiveness and efficiency of the resources allocated to climate change adaptation, as investments are increasingly going towards mainstreaming and scaling up, rather than pilot interventions.

## OBJECTIVE OF SUMMARY NOTE AND TARGET AUDIENCE

As a result of this increasing focus and interest, significant efforts have been directed towards improving both methodologies and guidance for M&E and MRV for adaptation. Key institutional players in such efforts include the IIED, GEF, GIZ/WRI, OECD and UKCIP, who have all produced various forms of overview and guidance documents on M&E for adaptation (for references to these materials, see Annex II). These documents are excellent and generally reader-friendly, and should be very helpful to most readers who are already familiar with adaptation. However, readers with limited prior experience of climate change adaptation (e.g. development practitioners starting to introduce mainstream adaptation into their existing portfolios) may not be able to visualize the challenges fully.

1 The terms 'monitoring' and 'evaluation' are often used together, but they refer to separate tasks within an adaptation activity. While monitoring is ongoing, evaluation is periodic in nature and can be ex-ante, ex-post, or mid-term evaluation. The two concepts therefore complement one another.

2 In general, 'M&E for adaptation' refers to the process of following up on individual projects or programmes for the purpose of documenting project outputs and outcomes to a donor and/or drawing lessons that can be used to improve adaptation activities. MRV, by contrast, is still a rather vague concept when applied to adaptation. So far MRV has primarily been used to refer to national greenhouse gas inventories and mitigation actions with the aim of documenting emissions levels and reductions in the international political context. Many sources seem to suggest that MRV for adaptation is most meaningfully applied to the tracking of flows of adaptation finance from developed countries to vulnerable recipient countries with the aim of documenting fulfilment of financial pledges (see e.g. ECBI, 2014 and UNEP 2014). In principle, however, MRV for adaptation could also refer to national, regional or sector-level results and impacts from adaptation actions that have been implemented.

Against this background, the ***objective of this summary note is to present an easy-to-read overview of the key challenges and emerging practices associated with M&E in the area of climate change adaptation.*** The primary difference of the present document from the other summary publications mentioned above, apart from its concise format, is its specific focus on providing instructive, simplified examples (based on UNEP DTU Partnership (UDP) experience in implementing M&E frameworks in adaptation projects around the world) that will hopefully help development practitioners with limited or no experience in the field of adaptation to visualize each of the challenges better. The hope is that readers in this target group, with a comparatively limited investment of time, will be given a proper introduction to the challenges involved and obtain an overview of emerging practices for handling such challenges among adaptation practitioners, as well as acquiring the ability to target research into the specific challenges and solutions of their interest, for example, through some of the other summary notes referred to above. However, practitioners and policy-makers who are already familiar with adaptation may also find this a useful concise overview of the issues relating to the implementation of M&E and MRV in the field of adaptation.

## SCOPE OF THE SUMMARY NOTE

While it is tempting to use an umbrella term such as M&E to describe the instruments used to assess adaptation interventions, it is important to acknowledge that M&E frameworks and the ways in which they are applied are as diverse and multiple as interventions are. M&E frameworks differ mainly in terms of:

- Their focus: policy versus programmatic application
- Their purpose: for example, to measure and report results, to monitor progress or to facilitate learning in order to inform policy
- Their level of application: project, programme, portfolio, sector, national, municipal, community.

***This summary note will focus primarily (but not exclusively) on interventions at the programme and project levels,*** i.e. interventions with a relatively limited scale and time frame. Short time frames for measuring the impacts of adaptation investments, while problematic from a technical standpoint, are often the basic premise of M&E at project levels. Also, a project-level focus is useful for exemplifying many of the general challenges involved in monitoring M&E for adaptation at higher level of interventions such as national frameworks, portfolio and sector levels etc.

**DEFINITIONS AND KEY CONCEPTS**

To aid understanding of the ensuing discussion and to act as a reference point, a few key terms used in discussing M&E and adaptation need to be defined at the outset.

In terms of M&E, the following discussion will apply terminology used in the methodology of logical framework analysis (LFA). In essence, the idea of LFA is to link all inputs and activities logically to the intervention's long-term impact through a series of outputs and outcomes. See Annex I for a short list of key terms and their definition for the purpose of this summary note.

The objective of any adaptation project is ultimately to reduce the adverse impacts of expected climate change on development. Two terms are commonly used to describe this process: 'climate change vulnerability' and 'climate change resilience'. There are important nuances between the two terms, but for the purposes of this general discussion they are practically correlated and can be used interchangeably (here we mainly use 'resilience'). Definitions of these and associated terms are also included in Annex I.

## INTRODUCTION TO THE FACT SHEETS

The note is structured into five brief fact sheets focussing on some of the key challenges associated with M&E for adaptation. The aim of the factsheets is to introduce key challenges to the reader in a concise and easily understandable format. Each of the fact sheets is structured into the following three main parts:

1. **Background and introduction.** This section provides a brief description of the challenge and its implications for the successful implementation of M&E.
2. **Illustrative example.** This section provides an example of the challenge and shows how it might impact on the successful implementation of an M&E process.
3. **Current thinking and practice.** This section aims to show how the challenge is being handled in practice, for example, by institutions and in projects in the design and implementation of M&E frameworks. Also, this section provides an overview of relevant discussions in the key academic literature.

Acknowledging and addressing the different challenges identified in the fact sheets is relevant at all stages of the project life-cycle, from the project formulation phase (when identifying indicators and setting up results frameworks), through project monitoring, to the post-project documentation of outcomes and impacts. The overview of challenges is not exhaustive, but presents the key challenges that should be known when working with M&E for adaptation interventions. The relevance of the different challenges that are identified is likely to vary with specific contexts, depending on the scales and scopes of the interventions in question (see above). The order of challenges is random, and they are by nature interrelated and to some degree overlapping. The key challenges presented in this report are as follows:

**CHALLENGE 1 – LACK OF STANDARD 'OFF THE SHELF' METHODOLOGY.** Lack of a well-established standard of 'best practice' M&E methodology and indicators for adaptation interventions, as is generally available for many regular (i.e. non-climate change-focused) development interventions.

**CHALLENGE 2 – BASELINES.** Due to the nature of adaptation as an additional but not easily distinguishable factor in an already dynamic development process, the definition of specific baselines for an isolated adaptation investment is difficult.

**CHALLENGE 3 – TIMING.** Timeframes for the expected benefits of adaptation interventions are usually much longer than the normal lifetime of standard projects and programmes. This means that, paradoxically, impacts will often need to be documented before they have fully materialized.

**CHALLENGE 4 – INDICATORS AS PROXIES: THE LACK OF A STANDARD ADAPTATION METRIC.** There is no standard metric for adaptation, which makes tracking and aggregating results across different sectors and localities very challenging. Identifying the best possible proxy outcome indicator is therefore a key challenge in designing M&E frameworks.

**CHALLENGE 5 – ATTRIBUTION.** The problem of attributing outcomes in the form of increased resilience directly to specific adaptation investments, as adaptation is inherently a complex process cutting across sectors and levels of interventions.

The challenges were selected based on a review of the existing literature on the topic (see Annex II) and UDP's own experience in implementing adaptation projects. The literature listed in Annex II also constitutes the primary references for the information and discussion contained under each of the challenge fact sheets and may be used as resources for further information.

# FACT SHEETS

## CHALLENGE 1. THE LACK OF STANDARD 'OFF THE SHELF' METHODOLOGY

### BACKGROUND AND INTRODUCTION

M&E of 'regular' development interventions (i.e. not focused on climate change adaptation) usually draws on a significant pool of well-established methodologies and 'best practices'. For example, for an agricultural project aiming to increase productivity and food security, a long list of standard quantitative indicators is available for assessing impacts such as yield per hectare, the prevalence of underweight children under five, etc. Each of these standard indicators in turn comes with well-established methodologies for baseline data collection, clear metrics and a large pool of practical experience regarding the expected level of the impacts to be achieved from different types of intervention, i.e. to assign realistic targets that are fully attributable to the project activities. Practical M&E experience of adaptation interventions is still limited, and no standard 'off the shelf' methodology has yet been developed. Instead M&E for adaptation interventions will often require the adjustment of standard development indicators (or even the definition of new ones) and/or combinations of indicators to obtain a reasonable assessment of the impacts of the individual project or programme.

### ILLUSTRATIVE EXAMPLE:

Imagine an adaptation project implemented in the agriculture sector aimed at increasing the drought tolerance of maize and sorghum, the targeted region's staple crops. Other projects targeting the same region and sector over the past forty years, on which the adaptation intervention will build, have established a number of relevant indicators for tracking agricultural productivity, farmers' economic situations, food production indices, the nutritional health of the population and so forth. Furthermore, baseline values for these indicators are either well established and available in existing local statistics and records or easily obtained through methodologies that local extension staff have experience of applying. The adaptation project, however, will not be able to rely on such indicators directly, as it will either have to develop new indicators and baselines (e.g. crop production per unit of water) or normalize the baselines for existing indicators used as proxy indicators of impact (or a combination of the two), all of which are time- and resource-consuming and will be unfamiliar to local staff and farmers involved in data collection. Furthermore, specific concepts like vulnerability or resilience – if applied, for example, in a perception-based indicator[3] – will require definition and explanation, as they may not be as familiar to local staff and farmers as more straightforward metrics used in conventional agricultural indicators.

### CURRENT THINKING AND PRACTICE

Some attempts have been made to design and implement generic adaptation indicator frameworks. Large adaptation donor funds, such as the Global Environment Facility, the Adaptation Fund and the World Bank's 'Pilot Programme on Climate Resilience', have designed standard results frameworks to guide project and programme proponents and improve their ability to capture portfolio-level impacts in comparable metrics. For example, the Global Environment Facility's Adaptation Monitoring and Assessment Tool (AMAT) introduces three overall objectives and nine associated outcomes, each with one or more standard quantitative indicators. The idea of AMAT is that each adaptation project supported by GEF must be linked to at least one of the programme's three objectives and one associated outcome, as well as providing reporting for standard indicators of these objectives and outcomes both at mid-term and at the project's end. Indicators are deliberately kept very generic to make them applicable to a broad range of very different projects. Examples of outcome indicators include: 'Type and extent of assets strengthened and/or better managed

3 A perception based indicator is one that instead of direct quantitative measurement of a actual impact (e.g. change in vulnerability) estimates the same impact through interviews of targeted stakeholders perception of impact.

to withstand the effects of climate change (metrics: ha of land, km of coast and km of road)' and 'Number of people or geographical area with access to improved, climate-related early-warning information (metric: number of people, percent of targeted area)' (GEF, 2014). However, the intention of standard frameworks like the AMAT is not to replace, but rather to supplement more specific and comprehensive evaluation frameworks designed for each project. Donors like WB and GEF therefore seem to be very aware that focusing too narrowly on standard M&E frameworks and indicators may not fully capture either the success or the failure of project interventions.

Other generic frameworks, such as the International Institute for Environment and Development's 'Tracking Adaptation and Measuring Development' framework, do not provide a predefined list of specific criteria. Instead this framework provides general guidance on the main categories of indicator at different scales and for different types of adaptation interventions, as well as a suite of potential options, and it also shows how these can be best applied throughout the M&E cycle. Again, the main message is that there is no 'one size fits all' solution and that the M&E framework needs to be adapted to the specific project context, potentially supplemented by project-specific indicators, to capture project impacts adequately.

## CHALLENGE 2: BASELINES

### BACKGROUND AND INTRODUCTION

The definition of a baseline scenario against which to measure results is a critical factor in the success of any M&E system. However, since adaptation is an additional, but not easily distinguishable factor in an already dynamic development process, the definition of distinct baselines for adaptation is a highly approximate exercise. Ideally, the baseline for adaptation interventions should be 'development as it would have happened in the absence of adaptation investments', that is, including the effects of any regular development projects or investments made for purposes other than addressing climate change. This approach to M&E is also known as counterfactual impact evaluation, in contrast to simpler baselines that compare impacts to a basic 'before project situation'.

Counterfactual baseline definition is challenging for adaptation for the following reasons:

**Uncertainty.** While it is indisputable that climate change will cause more adverse weather events globally, there is still uncertainty about the severity and timing of climate change impacts, as well as the specific unfolding of those impacts locally. Some uncertainties are related to climate change directly, such as the extent of rises in sea level, the degree of temperature increase, the intensity of rainfall and the location and occurrence of hazards. Other uncertainties affecting the process of climate change adaptation, which are equally unpredictable but not solely dependent on direct physical climate change impacts, include population growth, the effect of an increased frequency and intensity of droughts on migration trends, and changes in socio-economic trends and political priorities. Since the counterfactual approach to baseline definition represents a prediction of all these uncertainties, such an exercise is also inherently uncertain and susceptible to fit-for-purpose interpretation. This is not unique to adaptation baselines, but given the very long time spans involved in terms of both climate change impacts and the expected benefits of adaptation investments, it is particularly challenging here. Ideally the constructed baseline should therefore be validated later through a control group comparison (i.e. a comparable target group that is not impacted by the adaptation project), but this is not always practically possible or feasible within a limited budget.

**Shifting baselines.** Accounting for climate change introduces additional uncertainty to the baseline development. More specifically, development investments that would have had relatively predictable and sustainable outcomes in the absence of climate change can lead to unpredictable and unsustainable outcomes under new climate conditions, that is, a 'shifting baseline'. The successful baseline scenario thus needs to predict accurately not only the physical climate impacts, but also the development outcomes under such physical effects. With climate conditions deteriorating and business as usual development consequently being negatively affected, simply maintaining livelihood and income levels can sometimes be considered an adaptation success. To capture such shifting baselines through 'normal' development indicators such as food security, incomes and crop yields (used as proxies for specific resilience metrics), it is thus necessary to normalize the evaluation metrics for changing climatic and environmental conditions. Such normalization, however, is not trivial and requires a comprehensive data set which is not readily available due to a lack of prior experience with climate impacts.

**Data availability.** Since climate change is a cross-sectoral issue, the specific data needed to construct the baselines can be scattered across many different ministries, departments, sectors and projects. Assembling and coordinating information from so many sources can be challenging and time- and resource-consuming.

## ILLUSTRATIVE EXAMPLE

To illustrate some of the practical issues involved in establishing baselines for adaptation, let us imagine a project targeting adaptation to climate impacts on irrigated agriculture. Climate change is expected to lead to a significant reduction in rainfall and water availability in the targeted region, leading to significantly reduced agricultural productivity. An adaptation project is therefore planned involving the introduction of drought-resistant crop varieties, investments in more water-efficient drip irrigation technologies and capacity-building for local water-user associations to improve the management of water resources. At the same time, the government is implementing a development programme to increase agricultural productivity, including expansion of the irrigated area, microcredit schemes and increasing farmer access to inorganic fertilizers. Let us assume for the sake of simplicity that the government development programme would be sustainable under current climate conditions and would thus be able to achieve its objectives of increased crop productivity, with derived improvements in food security, farmer income levels, etc. Assuming that productivity is chosen as a proxy indicator for our project, what would then be the most reasonable baseline for it? Productivity as it is today? Productivity as it would be in the absence of climate change and with impacts of planned development investments, that is, the productivity gains described above? Or productivity as it would be in thirty years from now (or whatever is a relevant timeframe given the expected lifetime of the investment), with climate change impacts coming into full force, assuming fewer positive effects of planned government investments in productivity, perhaps with productivity falling lower than even levels today? The latter would be the only option that captures the impacts of climate change and can therefore successfully measure the success of the adaptation measures.

There are, however, a great number of uncertainties and data gaps when it comes to constructing this type of counterfactual baseline. For example, will the planned government investments and farmer behaviour remain static, or will there be a change in the strategy of government programmes in response to observed climate change, or perhaps a rise in awareness stemming from the adaptation project? What will be the specific climate impacts? Climate scenarios are likely to differ in their predictions of the magnitude of precipitation levels, which in turn may affect the feasibility of the government programme and its ability to deliver the planned productivity increases. The subjective assumptions made by the baseline developer regarding these questions and many others will ultimately determine the quantitative level of the baseline and in turn the perceived level of success or failure of the adaptation intervention. A further complication will be access to data permitting analysis of complex questions such as the above. For example, data and expertise on agricultural systems may reside in the ministry of agriculture, climate data and scenarios in the department of meteorology, and hydrology in the ministry of water.

### CURRENT THINKING AND PRACTICE

Some experts have recommended and described projection techniques for establishing baselines. This includes 'simple' deterministic models – that is, linear or exponential projections of the future based on current trends – as well as more complex multivariable stochastic models[4] designed to capture the inherent uncertainties involved in long-term counterfactual projections of development. With stochastic models, variables can be tested individually to give an indication of the sensitivity of the baseline to different factors and provide a full range of possible outcomes. Such an approach also makes it easier to adjust the baseline on a continuous basis as the actual paths of development and climate becomes clearer. However, as previously indicated, such approaches, even the deterministic one, are likely to involve data-, time- and cost-intensive exercises. Other experts have suggested setting up two levels of baselines.

At the project level, complex analytical baseline construction, such as that mentioned above, is generally ruled out by the high costs associated with data collection, scenario development and statistical analysis. Pragmatic and arguably less optimal solutions are therefore often applied in practice. One example is the practice of assigning baselines based on 'business as usual' (i.e. similar to the first question in the example above) with the assumption that indicator values will remain more or less stable in the absence of the adaptation intervention. Such assumptions can sometimes be reasonable for short time spans and when there are few or no other ongoing baseline activities that may potentially affect indicators. Short-term project outcomes are thus captured fairly well, but the longer term impacts of shifting baselines remain ignored. However, since the time horizon for most project M&E is often quite short, with final evaluations often set at the end of three to four years of project implementation, such longer term baseline issues can sometimes be regarded as going beyond the immediate 'interest' or responsibility of project partners (see timing). Another pragmatic approach to limiting the impact of shifting baselines, especially in a context of ongoing non-climate change adaptation development projects with the potential to affect key indicators, is to define indicators with self-reference. Examples might include the number of hectares of mangrove planted by the project, number of meters of irrigation installed by the project, water use efficiency in the project's pilot demonstration fields etc. This overcomes attribution issues and limits the costs of collecting baseline data and monitoring the indicator during the project, but it fails to capture the broader and secondary impacts on resilience in areas where the population is not directly targeted by the project. To illustrate, a project may succeed in planting 100 hectares of mangroves, but if, during the same period, 10,000 hectares are deforested in other areas, the net impact on resilience could be quite different from that indicated by the indicator. Other practical strategies for dealing with counterfactual baseline issues include supplementing M&E frameworks with qualitative indicators based on, for example, structured interviews and participatory vulnerability assessments when the normalization of baseline values is not feasible due to a lack of data underpinning the analysis. This can provide a secondary method for understanding the mechanisms and pathways through which adaptation interventions lead to impacts and showing how these impacts are mediated by other factors such as climatic and environmental trends.

## CHALLENGE 3: TIMING

### BACKGROUND AND INTRODUCTION

As the impacts of climate change materialize gradually over the coming decades, the investment lifetimes and focuses of climate change adaptation interventions to address these impacts will also need to be long-term. However, since adaptation is often implemented in the context of a relatively short-term project, the impacts will generally have to be measured before they actually appear or can be fully documented. Including one or more ex-post evaluations would be a simple way of accounting for the adaptation achievement in a project context, but this is rarely feasible in a project context. Therefore, to assess

4 A stochastic model is a tool for estimating the probability distributions of potential outcomes by allowing for random variation in one or more inputs over time.

progress towards the planned objective(s) during the project time frame, the M&E framework for adaptation activities will to a large extent have to rely on proxy indicators to measure 'increased resilience' or 'reduced vulnerability'. One particularly relevant type of proxy indicator in the context of timing issues is the so-called 'process indicator', understood here as an indicator that measures progression towards the achievement of an outcome, but that does not guarantee or measure the final outcome itself. For example, process indicators, such as training quality as perceived by participants, or 'percentage increase in the cultivation of drought-resistant crops, can be applied to help indicate progress towards the intended long-term outcomes that would otherwise not be measurable within the timeframe of the project. A helpful 'tool' in this regard is to assess progress along the anticipated pathway of the adaptation project (as described in a 'theory of change' or a 'logical framework' see definitions in Annex I) and specify interim indicators at each step of the pathway. Although useful, these approaches to facing the challenge of adaptation impacts not unfolding within a normal project cycle do not guarantee that outcomes will turn out as expected.

## ILLUSTRATIVE EXAMPLE

Imagine a two-year project concerned with introducing more climate-resilient livelihoods for farmers in areas impacted by salinization due to rises in sea level. The project involves activities related to the construction of dikes and mangrove restoration to revitalise salinized agricultural lands, experimentation with resilient crop varieties and training local farmers in adapted agricultural practices. These activities were designed to lead to the intended impact, namely 'increased resilience in farmers' livelihoods'. Measuring the output related to the construction of dikes and the restoration of mangroves is relatively simple and should be possible to do during or at the end of the project timeframe. However, the full measure of the outcomes ('desalinised agricultural lands', 'changing agricultural practices') and the final impact that these outcomes should lead to (resilient livelihoods for local farmers) may not have manifested themselves by the end of the project. Two ex-post evaluations were planned and budgeted for already in the M&E design phase. One was planned to be performed two years after the activities end in order to assess whether the resilient agricultural practices are being sustained and that progress with desalination is as expected. The other evaluation is planned to take place ten years afterwards, where the long-term outcomes and impacts are expected to be rooted in the behaviour of the farmers (i.e. adopted in the new agricultural practices) and to have increased the resilience of their livelihoods. Although these long-term outcomes will not be measurable within the short project cycle, some assessment must take place during the course of the project to indicate its achievements. Process indicators as proxies for the long-term outcomes were therefore defined. In accordance with the theory of change of this project, the following process indicators were specified: '% of crops cultivated being climate resilient crops', and '% of farmers applying adapted agricultural practices learned from the training sessions'.

## CURRENT THINKING AND PRACTICE

How to measure long-term results before they have materialized has been a key academic discussion since climate change adaptation came on the political agenda. As outlined above, a central component in these discussions has been whether to assess process or outcomes. As shown in the example above, however, the two approaches are not mutually exclusive and can complement each other to achieve the best possible description of the impacts of an adaptation project.

The importance of the institutional context is increasingly being acknowledged in academic literature as a useful process indicator of adaptation impacts. The resilience of formal institutions, including local authorities, governance and legislative systems, and their capacity to accommodate climate change adaptation in planning, legislation and practice, has been shown to give a good indication of the sustainability of the impacts of an adaptation intervention. Formal institutions have a key role to play in leading societies in their response to vulnerabilities caused by climate change, thus strengthening resilience, for example, by subsidising climate-resilient crop varieties. Adaptation at the institutional level is thus considered a good foundation for interim assessments of progress towards the objective of the project.

Using proxy indicators related to institutional adaptive capacity is also becoming common practice in M&E frameworks for climate change adaptation project planners and implementers in order to provisionally assess progress. This approach is often used to overcome, or at least face, potential challenges with accountability towards the donors of an adaptation project. In practice the donor usually requires a certain level of accountability for the success of the project within the latter's timeframe, which adds to the importance of showing results before they have materialized.

## CHALLENGE 4. INDICATORS AS PROXIES: THE LACK OF A STANDARD ADAPTATION METRIC

### BACKGROUND AND INTRODUCTION

The ultimate goal of M&E for adaptation is to assess whether a given adaptation intervention has been successful in increasing the resilience of targeted assets and populations to the impacts of climate change. However, a key premise for the objective assessment of impacts is that a meaningful standard metric should exist with which to measure the level of success or increase in climate change resilience. To illustrate, the achievement of climate mitigation investments is often measured using the metric of $CO_2$ equivalent, which provides a straightforward indicator of the project's results and impact, as well as enabling direct comparison of the contribution and cost-effectiveness of very different types of mitigation project, such as reforestation and landfill methane. No similar standard metric exists for resilience to climate change[5], which implies that M&E frameworks for adaptation must generally rely on proxy indicators when it comes to assessing progress toward ultimate goals. It is thus of critical importance that the limitations of proxy indicators are kept in mind when designing and implementing an M&E framework for adaptation interventions. Proxy indicators give an indication of the progress made in achieving increased resilience to climate change, but they do not offer an accurate measurement of actual resilience improvements. Obvious as that may seem, this fact is often forgotten, especially when tracking and reporting on proxy indicators over the long term, which can lead to unsupported or even wrong conclusions about the impacts of adaptation investments. Using the example of the productivity proxy indicator from fact sheet 2, it may be that productivity increases for the first years where the general positive effects of investments in drip irrigation and more drought-resistant varieties are harvested, but then levels off and falls in the long term as the compounding effects of climate change materialize. For this reason, it is often wise to include multiple impact proxy indicators in the M&E framework to triangulate assessments of climate change resilience and validate their conclusions. It is also important to recognize that there will always be a trade-off between the number of indicators included and the level of resources required to measure these indicators in terms of time, man hours and information. The challenge in finding good proxy indicators lies in going beyond direct project activities (e.g. distribution of drought-resistant seeds) to indicators capturing the derived impacts of activities (e.g., reduced risk of crop loss due to drought), but still without describing conditions that are hard to attribute to the project (e.g. national crop production statistics). A specific approach to reducing the risk of individual proxy indicators for resilience is to construct more complex vulnerability/resilience indices combining several indicators into one overall vulnerability/resilience 'score'. While such indices can be useful in achieving more nuanced and realistic indications of changes in resilience, it should be remembered that they are still proxies and not a direct measure of actual changes in resilience.

### ILLUSTRATIVE EXAMPLE

To illustrate the challenges arising from the lack of a single adaptation metric, imagine a coastal adaptation project involving construction of sea walls, mangrove and reef restoration, livelihood diversification activities and the training of regional authorities in mainstreaming climate change into coastal planning and management. The theory of change for this illustrative project assumes that the combined effect of its activities leads to the overall project objective

5 The primary reason is that resilience to climate change is a cross-cutting phenomenon providing a wide range of types of benefits (e.g., health, economic and livelihoods, disaster prevention, food security, ecosystem services, biodiversity) that are difficult to compare and weigh directly.

of the increased resilience of targeted coastal populations to the impacts of climate change (rises in sea levels, increased storm activity, etc.). When designing the M&E framework for the project, a number of output and outcome indicators can easily be defined: for example, 'the seawall has been successfully built according to climate-resilient designs', 'mangroves have been restored as a buffer to rises in sea level and storms', 'livelihoods have been diversified and are less dependent on climate-vulnerable activities', 'regional plans for coastal adaptation management are in place' etc. These indicators will document whether or not the project succeeded in achieving its intended activities, outputs and outcomes, and since the activities were designed to lead logically to increased resilience to climate change on the part of coastal populations, in combination achieving these targets can also be seen as a proxy for the impacts of the project. However, there is a need to somehow validate the theory of change by directly measuring how resilience levels have evolved from 'before project' to 'after project'. The individual activities can be flawed in a way that is not captured by the indicators: for example, the sea wall might not have been designed to resist actual climate change impacts, the mangrove species chosen was not appropriate for the local environment and the actual climate scenario, livelihood activities were not profitable or interesting for the local population and were discontinued at the end of the project end, or the planning was of poor quality or was simply not implemented or enforced correctly. Also, in some cases the theory of change could be wrongly constructed so that the aggregated results of individual outputs and outcomes do not lead to the intended increase in resilience to climate change because one works against another: for example, the construction of a sea wall may lead to sedimentation and changed shoreline currents with negative impacts on mangrove and reef health. Again the timing is a key factor here, as such flaws may not materialize until long after the project ends.

## CURRENT THINKING AND PRACTICE

In practice, the metric issue is generally addressed by development institutions and governments by using output and outcome indicators as proxies for impact, as described above. While this approach has clear limitations, it can, as noted above, potentially be improved by triangulating the data by including supplementary proxy indicators. One idea that has been applied in some multilateral projects is to include a composite, perception-based resilience index, which conducts a survey among target groups before and after the adaptation intervention by, for example, asking about their perceptions of the climate risks they face and their adaptive capacity. This has limitations of its own, as the perception of risks can change through, for example, training and awareness-raising without actually reducing the risk. A further limitation is that the beneficiaries of adaptation investments will often not have a good understanding of climate change and climate change adaptation, and may not even be aware of them. There may also be some level of acquiescence bias (i.e. a tendency for respondents to agree to statements made by an authority), making the exact phrasing of questions an important factor in the outcome. However, as a supplement to output and outcome indicators (as proxies), perception-based indicators can be valuable. Other projects have combined resilience perception surveys with more direct impact surveys (e.g. 'was your crop yield impacted by drought this year', 'was your house damaged by storms', etc.) to produce more elaborate composite resilience indices. In general, while more proxy indicators improve the reliability of the impact assessment, this also has to be balanced against the costs.

Academically, the last ten years have seen ongoing discussions on developing a more operational definition of resilience and vulnerability (and by extension a metric that can be applied either universally or at least on a sectoral level). Overall, however, the convergence of such discussions seems distant. And this is not helped by the political undertones to such a debate, as any universal quantification of resilience and vulnerability is inevitably going to define some sectors, regions and countries as more vulnerable than others and thus more entitled to financial assistance by donors and governments. One interesting paper from 2011 (Stadelmann et al. 2011 – see Annex II), proposes two potential universal adaptation metrics: 'saved wealth' and 'saved health', though such concepts have yet to be evaluated for their practical application.

## CHALLENGE 5: ATTRIBUTION

### BACKGROUND AND INTRODUCTION

M&E frameworks typically aim at determining the changes brought about by a specific project, programme or policy. This is important for development agencies and governments alike, for accountability and learning purposes, as well as in justifying the implementation of specific interventions and the allocation of resources to a specific area, and thereby also to secure future funding. Given the continuing constraints on government and donor budgets, there is a growing need to demonstrate that interventions to build resilience to climate change are well designed, effective and meet the objectives laid down. The attribution of observed changes in resilience to specific adaptation interventions is therefore essential to most governments and donors. The following account outlines some of the particularities behind this difficulty that one should bear in mind when attribution is considered in the context of M&E for adaptation.

Countries are increasingly focusing their adaptation efforts on multi-scale, cross-sectoral and integrated strategies, moving away from an isolated project focus. This process, which is also called 'mainstreaming', while seeking to support a wider and more effective integration of climate change adaptation, makes attribution more challenging. With an integrated approach to adaptation, a country's resilience to climate change reveals changes generated not only by adaptation interventions, but also by policies implemented for other reasons than climate change. Understanding which adaptation interventions are working and which are not is also challenging due to the complex and overlapping donor-reporting mechanisms, which do not always encourage learning or build the capacity to improve adaptation decisions. Instead, adaptation is often integrated into existing processes and M&E frameworks, which are not always sensitive to the need for long time-frames and a unified M&E system.

Because the full benefits of adaptation interventions will usually not materialize until many years after project or programme closure (timing issue), and due to the uncertainty attached to potential future climate impacts, it is almost impossible to attribute explicit outcomes and/or changes to specific interventions initiated by development agencies or governments. Whether or not a country's resilience is reinforced is, for example, also influenced by a number of external factors, namely socio-economic trends, government policies, and climate trends, over which the adaptation intervention has very little or no control and which, due to the long timespans involved, may not easily be anticipated at the design stage of the intervention.

### ILLUSTRATIVE EXAMPLE

To illustrate the challenges of attribution, let us consider the example of a programme aimed at building the resilience to water stress of drought-prone rural communities by improving water security and livelihoods and facilitating recovery from drought. While establishment of the baseline for the programme should normally consider other actors involved in the same area – whose activities also may have direct and indirect implications for the impact of the programme in question – a number of external factors are also likely to impact on rural communities' resilience to water stress, making attribution even trickier. Unanticipated changes in rainfall, changes in land tenure legislation, migration, political instability and a decrease in the market demand for agricultural products produced in the area are all elements which are difficult to anticipate, but which may nonetheless have direct implications for how rural water stress would develop in the context of the adaptation programme. This underlines the difficulty of seeking to attribute specific outcomes and impacts to specific interventions. How this challenge has been addressed is outlined in the following section.

### CURRENT THINKING AND PRACTICE

As a result of the multi-scale/multi-sector nature and complexity of climate change and adaptation, it may be difficult, even futile, to seek to attribute changes to particular interventions. In this context, the application of proxy indicators is a way for practitioners to address this challenge. Furthermore, given the increasing mainstreaming of climate adaptation across multiple sectors and scales, the application of process indicators (see definition in 'timing' section) may help demonstrate how a policy or programme contributes to an overall adaptation process shaped not only by the intervention in question, but also by various external factors, including other policies, projects and programmes.

Given the variety of actors and interconnected factors that may not necessarily be predicted and that have direct and/or indirect long-term effects on whether adaptation interventions meet their intended objectives, some practitioners are increasingly looking at the ***contribution*** of specific adaptation interventions to a common objective, such as strengthening adaptation capacity, instead of seeking to attribute changes to specific projects, programmes and policies. This approach acknowledges that there are various factors affecting outcomes, especially when working in a long-term and multifaceted area such as climate adaptation.

## CLOSING REMARKS: THE COSTS OF COMPLEXITY

As these fact sheets have shown, climate change adaptation interventions are generally highly complex, being characterized by their multi-sectoral and multi-stakeholder nature, and impacted by changing baselines and high levels of uncertainty. The M&E system must be able to accommodate these complexities. This often entails increased costs of M&E activities for adaptation compared to other interventions. Moreover, due to uncertain trends in resilience and risk, through which interventions are impacted by various external factors not controlled by the project management, a high degree of flexibility in the M&E system is required. The original indicators, baseline and timing of M&E activities might have to be adjusted during the course of an intervention. Continuously adapting the M&E strategy requires additional time, human and financial resources in quantities that are difficult to predict in advance. Finally, the lack of a common metrics for adaptation results adds another layer to this complexity: long-term outcomes and impact, such as 'adapted livelihood activities in rural populations' or 'increased resilience to droughts', will rarely materialise within the relatively short timeframe of an intervention, which usually necessitates additional man hours for performing interim process assessments and ex-post evaluations to a greater extent than in conventional M&E. In the worst-case scenario, a scarcity of resources and time constraints relative to the needs in M&E for adaptation interventions could mean that the quality of the M&E is compromised.

In practice, ambitions in terms of the quality of M&E processes and frameworks do not always correlate with the resources that are allocated to the activities. Many projects and programmes experience difficulties in staying within the budget without compromising the quality of the often complex M&E. When M&E planning is done by agencies detached from the local adaptation context in which an intervention takes place (e.g. multilateral donors), there is a risk that the M&E budget plans turn out to be rather unrealistic and rigid, not fully taking account of the inherent complexity and unpredictability in adaptation. Moreover, the human and technical capacity to collect sound and valid data to perform the M&E on adaptation is rather scarce, especially in developing country contexts. Additional costs in terms of time and money as a consequence of the lack of context-specific knowledge (e.g. knowledge of local adaptation capacity), poor ability to plan M&E activities (e.g. longer timelines for impacts to materialize) and the lack of adaptation-specific skills, methods and tools (e.g. the measurability of results) are therefore not unusual in practice.

# ANNEX I. GLOSSARY OF M&E AND ADAPTATION TERMS

**ACTIVITY:** *Actions taken or work performed through which inputs, such as funds, technical assistance and other types of resources are mobilized to produce specific outputs* (OECD-DAC, 2002).

**ADAPTIVE CAPACITY:** *The combination of the strengths, attributes and resources available to an individual, community, society or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities* (IPCC, 2012).

**EVALUATION:** *A periodic assessment of the efficiency, effectiveness, impact, sustainability and relevance of a project in the context of the stated objectives.* Usually undertaken as an independent examination with a view to drawing lessons that may guide future decision-making (based on OECD-DAC, 2002).

**EXPOSURE:** *The presence of people, livelihoods, environmental services and resources, infrastructure, or economic, social, or cultural assets in places that could be adversely affected* (IPCC, 2012).

**IMPACT:** *Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended* (OECD-DAC, 2002).

**INDICATORS:** *Quantitative or qualitative factors or variables that provide a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor* (OECD-DAC, 2002). Outputs, outcomes and impacts which represent the results of an intervention on different scales can and should all be monitored and evaluated by indicators in the logical framework approach, which would then be the *output indicators, outcome indicators* and *impact indicators.* In general, indicators should be SMART, i.e. Specific, Measurable, Attainable, Relevant and Time-bound, or CREAM, i.e. Clear, Relevant, Economic, Adequate and Monitorable.

**LOGICAL FRAMEWORK ANALYSIS (LFA):** *A practical tool used to plan, manage and monitor development projects, usually in a matrix format.* Logically links project inputs and activities to expected project impacts through a number of intermediary outputs and outcomes. Closely related to the 'theory of change' (see below), the two are sometimes used almost interchangeably, but the LFA is generally considered to be more of a practical tool used in a project, whereas the theory of change is a broader analytical framework.

**MALADAPTATION:** *Any changes in natural or human systems that inadvertently increase vulnerability to climatic stimuli; an adaptation that does not succeed in reducing vulnerability but increases it instead* (IPCC, 2001).

**MONITORING:** *A continuing function that uses the systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress, the achievement of objectives, and progress in the use of allocated funds* (based on OECD-DAC, 2002).

**OUTCOME:** *The likely or achieved short-term and medium-term effects of an intervention's outputs* (OECD-DAC, 2002).

**OUTPUT:** *The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention that are relevant to the achievement of outcomes* (OECD-DAC, 2002).

**RESILIENCE:** *The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including by ensuring the preservation, restoration, or improvement of its essential basic structures and functions* (IPCC, 2012).

**SENSITIVITY:** ***The degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to rises in sea level)*** (IPCC, 2001).

**THEORY OF CHANGE:** No consensus over definition, but can be understood as an analytical framework to achieve a ***'comprehensive description and illustration of how and why a desired change is expected to happen in a particular context'*** (**http://www.theoryofchange.org/**). That is, a theory of change would explain, in a logically consistent way, the process of how and why activities implemented will lead to the desired long-term goals. ***It does this by first identifying the desired long-term goals and then works back from these to identify all the conditions (outcomes) that must be in place (and how these are related to one another causally) for the goals to occur*** (**http://www.theoryofchange.org/**).

**VULNERABILITY:** ***The propensity or predisposition to be adversely affected*** (IPCC, 2012). A common description (IPCC, 2001) aptly sees vulnerability as a function of Exposure, Sensitivity and Adaptive Capacity (refer to definitions above).

**For other definitions related to M&E, see OECD-DAC, 2002.**

**For other definitions related to adaptation, see IPCC, 2012 and OECD, 2006.**

# ANNEX II. REFERENCES AND FURTHER READING

Bours, D., McGinn, C. and Pringle, P. (2014), ***Monitoring & evaluation for climate change adaptation: a synthesis of tools, frameworks and approaches.*** SEA Change CoP, Phnom Penh and UKCIP, Oxford, available at: http://www.seachangecop.org/sites/default/files/documents/2014%2005%2015%20SEA%20Change%20UKCIP%20Synthesis%20Report%202nd%20edition.pdf

Bours, D., McGinn, C. and Pringle, P. (2014), ***Guidance note 1: twelve reasons why climate change adaptation M&E is challenging,*** SEA Change CoP and UKCIP, available at: http://www.seachangecop.org/sites/default/files/documents/2014%2001%20SEA%20Change%20UKCIP%20GN1%2012%20Reasons%20why%20CCA%20MandE%20is%20challenging.pdf

Bours, D., McGinn, C. and Pringle, P. (2014), ***Guidance note 2: selecting indicators for climate change adaptation programming,*** SEA Change CoP and UKCIP, available at: http://www.seachangecop.org/sites/default/files/documents/2014%2001%20SEA%20Change%20UKCIP%20GN2%20Selecting%20indicators%20for%20CCA_0.pdf

Brooks et al. (2011), ***Tracking adaptation and measuring development,*** Climate Change Group – IIED, available at: http://pubs.iied.org/pdfs/10031IIED.pdf

Brooks, N. and Fisher, S (2014), ***Tracking adaptation and measuring development: a step-by-step guide.*** Toolkit. IIED, London. Available at: http://pubs.iied.org/10100IIED.html

Climate-Eval Community of Practice (2015), ***Good practice study: on Principles for Indicator Development, Selection, and Use in Climate Change Adaptation Monitoring and Evaluation,*** Climate-Eval, available at https://www.climate-eval.org/sites/default/files/studies/Good-Practice-Study.pdf

Dinshaw, A. et al. (2014), ***Monitoring and Evaluation of Climate Change Adaptation: Methodological Approaches,*** OECD Environment Working Papers, No. 74, OECD. Available at: http://www.oecd-ilibrary.org/docserver/download/5jxrclr0ntjd.pdf?expires=1445422633&id=id&accname=guest&checksum=F7F0B9B3E4B6920117B3E99CA40A6DE2

GEF (2014), ***Tracking Tool for Climate Change Adaptation Projects.*** The Global Environment Facility. Available at: https://www.thegef.org/gef/tracking_tool_LDCF_SCCF

GIZ. (2014), ***Monitoring and Evaluating Adaptation at Aggregated Levels: A Comparative Analysis of Ten Systems.*** GIZ. Bonn, Germany. Available at: http://www.giz.de/expertise/html/12269.html

Hedger, M.M., Mitchell, T., Leavy, J., Greeley, M., Downie, A., and Horrocks, L. (2008). ***Evaluation of adaptation to climate change from a development perspective, desk review.*** Institute of Development Studies (IDS) / AEA Group. Available at: www.seachangecop.org/node/128

IFRC (2011), ***Project/programme monitoring and evaluation guide.*** Geneva: The International Federation of Red Cross and Red Crescent Societies. Available at: http://www.ifrc.org/Global/Publications/monitoring/IFRC-ME-Guide-8-2011.pdf

IPCC (2012), ***Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.*** [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564. Available at: https://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf

Levina, E. and Tirpak, D (OECD) (2006), ***Adaptation to climate change: key terms.*** Paris: OECD/IEA. Available at: http://www.oecd.org/env/cc/36736773.pdf

Naswa et al. (2015), ***Good practice in designing and implementing national monitoring systems for adaptation,*** UDP/CATIE/CTCN available at: **http://ctc-n.org/sites/default/files/National%20Monitoring%20Systems%20for%20Adaptation_Final_for_upload_0.pdf**

OECD-DAC (2002), ***Glossary of Key Terms in Evaluation and Results-Based Management.*** Paris: OECD/DAC. Available at: **http://www.oecd.org/dac/2754804.pdf**

OECD (2015), ***National Climate Change Adaptation: Emerging Practices in Monitoring and Evaluation,*** OECD Publishing, Paris. Available at: **http://www.oecd-ilibrary.org/environment/national-climate-change-adaptation_9789264229679-en**

Pringle, P. (2011), ***AdaptME toolkit: adaptation monitoring and evaluation.*** UKCIP, Oxford, UK. Available at: **http://www.ukcip.org.uk/wp-content/PDFs/UKCIP-AdaptME.pdf**

Sanahuja, H.E. (2011), ***Tracking Progress for Effective Action: A Framework for Monitoring and Evaluating Adaptation to Climate Change,*** Climate-Eval Community of Practice, Global Environment Facility. Available at: **https://www.climate-eval.org/sites/default/files/studies/Climate-Eval%20Framework%20for%20Monitoring%20and%20Evaluation%20of%20Adaptation%20to%20Climate%20Change.pdf**

Spearman, M. and McGray, H. (2011), ***Making adaptation count: concepts and options for monitoring and evaluation of climate change adaptation.*** Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ), and World Resources Institute (WRI). Available from: **www.seachangecop.org/node/107**

Stadelmann M., Michaelowa A., Butzengeiger-Geyer S., Kohler M. (2011), ***Universal metrics to compare the effectiveness of climate change adaptation projects.*** Centre for Comparative and International Studies. University of Zurich. Available at: **http://www.oecd.org/env/cc/48351229.pdf**

UNEP (2014), ***Measuring, Reporting and Verification. Additional guidance supporting UNEP's MCA4climate initiative: a practical framework for planning pro-development climate policies.*** MC4Climate Initiative. Available at: **http://www.mca4climate.info/_assets/files/Final_MRV_report.pdf**

UNEP (2015), ***STAP + PROVIA Technical Workshop on Strengthening Scientific Knowledge Base for Measuring, Monitoring & Evaluating Climate Change Adaptation January 22-24, 2015, Mumbai, India.*** Available at: **http://www.unep.org/provia/Portals/24128/STAP_PROVIA-WorkshopSummaryReport.pdf**

UNFCCC. (2015), ***Adoption of the Paris Agreement.*** UNFCCC document FCCC/CP/2015/L.9/Rev.1. Available at: **https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf**

Villanueva, P.S. (2011), ***Learning to ADAPT. Monitoring and evaluation approaches in climate change adaptation and disaster risk reduction: challenges, gaps and ways forward,*** SCR Discussion Paper 9. Strengthening Climate Resilience (SCR). Available from: **www.seachangecop.org/node/103**

Wartmann, S., Dodwell C., Nafo, S. (2014), ***LDC concerns related to MRV in the climate regime.*** LDC Paper Series. European Capacity Building Initiative (ECBI). Available at: **https://ldcclimate.files.wordpress.com/2014/03/updated-ldc-papers_mrv.pdf**