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Abstract

As countries respond to the increasing impacts of climate change, evidence-based policy making for climate resilience has become ever more important. This working paper focuses on the role of monitoring, evaluation and learning (MEL) for promoting climate risk management. Effective MEL frameworks support governments and development co-operation in improving decision making under various uncertainties presented by climate change. The development of a MEL framework for climate risk management faces a number of technical challenges. Key among these challenges is the partial understanding of future changes in the climate, socio-economic and ecological systems. This is augmented by other challenges such as difficulties in attributing outcomes to specific interventions, moving baselines and targets on climate resilience, and long time frames for outcomes and impacts of climate risk management interventions to unfold. To address these challenges, this paper aims to: i) introduce a conceptual framework that governments and development co-operation providers can draw on when developing MEL frameworks, ii) present and discuss existing methods and tools that can help to deal with the technical challenges of MEL for climate risk management, and iii) provide examples of good practice for adjusting or updating existing MEL frameworks.

Foreword

This working paper contributes to the Organisation for Economic Co-operation and Development (OECD) initiative *Strengthening Climate Resilience: Guidance for Governments and Development Co-operation* by presenting a framework for monitoring, evaluation and learning (MEL) for climate risk management. In light of the increasingly urgent need to respond to the impacts of climate change, the OECD initiative aims to support the systematic integration of climate resilience into development co-operation. It builds on momentum for climate action at the global level. The adoption in 2015 of the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on climate change and the 2030 Agenda for Sustainable Development firmly placed climate change on the international agenda.

- The Paris Agreement on climate change includes a commitment to ensure a climate-resilient future (UNFCCC, 2015[1]).
- The 2030 Agenda for Sustainable Development and the associated Sustainable Development Goals (SDGs) include an explicit goal (13) that calls for "urgent action to combat climate change and its impacts", recognising the linkages between climate change, development and human well-being (UN, 2015[2]). Moreover, climate resilience is a cross-cutting issue in the majority of SDGs.
- The Third UN World Conference on Disaster Reduction 2015–2030 identified climate change as a driver of increased disaster risk, underlining the clear linkages between global climate policies, sustainable development and disaster risk management (UNDRR, 2015[3]).

As countries are identifying, developing and implementing interventions (e.g. strategies, policies, plans and programmes) on climate resilience and other development agendas, it is also important to establish mechanisms that facilitate assessments of progress made, impacts achieved and lessons learned. This paper presents the untapped potential of MEL frameworks to support data and evidence-based policy processes for climate risk management.

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Abbreviations and acronyms

DAC	Development Assistance Committee
FAO	Food and Agriculture Organization of the United Nations
MEL	Monitoring, evaluation and learning
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
UNDRR	United Nations Office for Disaster Risk Reduction
UNFCCC	United Nations Framework Convention on Climate Change

Executive summary

The urgent need for human and natural systems to learn, adapt and transform in response to risks induced or exacerbated by climate change is evident. Climate risk management requires the systematic integration of climate resilience considerations into interventions (e.g. strategies, policies, plans and programmes) by governments and development co-operation providers. A crucial part of climate risk management is monitoring, evaluation and learning (MEL). Effective MEL frameworks support governments and development co-operation in improving decision making under various uncertainties presented by climate change. They also facilitate continuous learning and adjustments as outcomes of interventions for climate risk management unfold over time. This paper explores how governments and development co-operation can design and use MEL frameworks that help tackle some of the major challenges to evidence-based policy making on climate risk management.

Conceptualising multi-level MEL frameworks

Climate risk management often includes activities across different levels of governance, which can benefit from a multi-level MEL framework. A multi-level MEL framework consists of global monitoring and evaluation standards and comparable criteria, along with country-, sector- and programme-specific MEL guidelines. The review and reporting mechanisms of the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on climate change and the 2030 Agenda for Sustainable Development provide opportunities for enhanced co-ordination on MEL frameworks for climate risk management.

Policy implication: Governments should develop MEL frameworks that reflect on the reporting requirements under the global review and reporting mechanisms relevant to climate risk management. Development co-operation plays an important role in providing long-term technical support to countries to enhance country-led MEL frameworks, and align them with the principles and standards of the global mechanisms. Moreover, using multi-level MEL frameworks can also help governments and development co-operation providers synthesise findings from MEL for individual projects and programmes to better understand results at the aggregated level.

Choosing suited methods and designs for MEL frameworks for climate risk management

Given their context specificity and various uncertainties presented by climate change, suitable methodologies and designs of MEL greatly differ between individual interventions. Such uncertainties also require MEL methodologies and designs to be adaptive and flexible to future changes. To develop context-specific, adaptive and flexible MEL frameworks for climate risk management, practitioners can draw on a variety of theories, methods and tools from the broader social sciences.

Policy implication: MEL frameworks for climate risk management should consider the evolving nature and on-going processes of climate risk management interventions. Such consideration facilitates improvement of the interventions over the course of their implementation. Development co-operation can

support the application of new and innovative tools to facilitate flexible approaches to MEL, such as remote collection of geophysical data and machine learning.

Applying a theory-based MEL framework

A theory-based MEL framework can support evidence-based and results-based policy making that is also more adaptive to future changes. A theory-based framework builds on prior knowledge (e.g. theories based on related research or experience from similar interventions in the past). A theory-based MEL framework aims to better understand how the specific intervention contributes to certain results (i.e. strengthened climate resilience) in a given context.

Policy implication: Governments and development co-operation providers should apply theory-based MEL frameworks to generate information that is relevant to future decision making. Such frameworks could also better consider unforeseen factors, including disasters, political unrests or global crises such as the COVID-19 pandemic. Governments should also align intervention-specific theories with the relevant national development policies and global agendas through consultations with stakeholders involved or affected. Such alignment can be achieved by embedding intervention-specific theories on climate risk management within theories of change for broader development agendas, sectors, regions or the country.

Defining objectives and indicators

Defining clear objectives and indicators is key to design theory-based MEL frameworks and ensure that their findings are relevant to future decision making. However, challenges such as uncertainties, context specificities and the complex policy environments, often make it challenging to define such objectives and indicators for a MEL framework for climate risk management. Applying existing, commonly used indicators may reduce the burden of data collection, improve data quality and facilitate harmonisation. In many cases, however, MEL frameworks need to identify indicators for each intervention, since existing indicators are often not sufficient for reflecting local circumstances and other contexts of the interventions.

Policy implication: Governments and development co-operation providers should increase efforts to improve existing conceptual frameworks for theory-based MEL. Such efforts should be made for a core set of standardised objectives and indicators on climate risk management. Around these, more context-specific indicators can be built in consultation with the stakeholders involved and affected at local, national and regional level.

Enhancing the global evidence base

It is important to further improve the external validity of evidence from MEL for individual interventions for climate risk management. Such improvement can facilitate the broader learning for decision makers across the globe. Governments and development co-operation providers should work to enhance an aggregated evidence base about findings from MEL of climate risk management at the local and national so that such aggregate evidence can inform regional- and global-level learning.

Policy implications: Governments and development co-operation providers should support the development of evidence (gap) maps, synthesis studies and systematic reviews on the findings. At the same time, they should also make effective use of existing knowledge platforms and establish linkages to global evidence initiatives to avoid duplication of effort. Enhanced knowledge about the funding portfolio and resource allocation of development finance can also facilitate the systematic integration of climate risk management into development co-operation. Improving such knowledge can help governments and development co-operation providers better understand the relevance, complementarity and coherence of the allocation of financial resources to climate risk management.

1. Context and key concepts of monitoring, evaluation and learning for climate risk management

The impacts of climate change threaten current and future development progress by adversely altering socioecological systems. Development co-operation plays a central role in supporting countries in strengthening their climate resilience (see Box 1.1). Climate science projects an increase in the frequency and intensity of extreme weather events such as storms and floods, as well as slow-onset changes such as sea level rise and ocean acidification (UNFCCC, 2014[4]). However, climate risk and vulnerability vary considerably between regions and social groups. Many developing countries and emerging economies are vulnerable to the impacts of climate change due to factors such as financial, technical and physical constraints. Coastal areas, for example, are particularly vulnerable due to storms, sea level rise and associated saline intrusions into coastal ecosystems and aquifers (IPCC, 2019[5]). Within developing countries, the burden is also unevenly distributed and particularly affects the poor and disadvantaged populations (IPCC, 2018[6]). With the overarching goal of promoting sustainable development, development co-operation can play an important role in supporting partner countries in strengthening their climate resilience.

Box 1.1. Strengthening climate resilience through climate risk management

Climate resilience is a component of the broader concept of resilience and refers to the capacity of human and natural systems to learn, adapt and transform in response to risks induced or exacerbated by climate change (OECD, 2021[7]). Climate risks are a function of the interaction between 1) environmental hazards triggered by climate change, 2) exposure of humans, infrastructure and ecosystems to those hazards, and 3) system vulnerabilities (e.g. its sensitivity or susceptibility to hazards and lack of capacity to adapt and cope) (IPCC, 2018[6]).

Climate risk management refers to the plans, actions, strategies and policies to deal with the potential impacts of climate hazards by referring to systems' exposure and vulnerability with the aim to reduce the likelihood and/or consequences of climate risks or to respond to their consequences (IPCC, 2018[6]). Climate risk management interventions (e.g. strategies, policies, plans and programmes) therefore aim to strengthen climate resilience.

The global agendas on development, climate change and disaster risk reduction accentuate the importance of monitoring, evaluation and learning (MEL) for climate resilience and highlight the role of country-led MEL frameworks. According to the Paris Agreement, the Sendai Framework and the Agenda 2030 for Sustainable Development (the 2030 Agenda), national reporting systems and country-led monitoring and evaluation provide the basis for both national and global stocktakes and international knowledge exchange. Complementary to the global agendas, strategic environmental assessments and environmental impact assessments are common obligatory tools at the national level that provide further

orientation. More synergies are to be expected under the post-2020 global biodiversity framework of the Convention on Biological Diversity, due to be agreed on in 2021.

A persistent challenge of MEL for climate risk management is to ensure that the information generated facilitates the transfer of knowledge across local, national, regional and global levels, and informs multi-level policy processes. Interventions that aim to strengthen climate resilience often include activities at local, sub-national and national levels. These interventions are also embedded in policies at the regional or global level. As a result, the focus of MEL frameworks needs to go beyond single level interventions, and calls for "multi-level" MEL frameworks. For instance, in Bolivia, multi-level learning based on the experience in climate resilience measures in the water sector has taken place. Such learning was conducted among different actors involved in, for instance, multilateral processes, development co-operation, national policy making, and watershed management at the provincial and local levels (Gonzales-Iwanciw, Karlsson-Vinkhuyzen and Dewulf, 2020[8]).

Moreover, while not unique to the context of climate risks, the uncertain nature of current and projected climate change impacts and the need for adaptive management highlights the importance of continuous learning (OECD, 2020[9]). There is also growing pressure on governments and development co-operation providers to enable more ambitious climate risk management interventions, while proving the effectiveness and efficiency of resources used. In some countries, development co-operation has played an important role in supporting partner countries in strengthening the capacity of national data and evaluation systems and in identifying opportunities for creating links between national, regional and global MEL processes.

A multi-level MEL framework consists of monitoring, evaluation and learning as integral and interdependent pillars (Box 1.2)**.** Monitoring is the continuous process of data collection on the performance of interventions. Evaluation provides systematic ex-post assessment of the merit, worth or significance of an intervention. Learning should be integrated into all processes to reflect upon the information generated by monitoring and evaluation and to continuously improve interventions based on the evidence gathered.

Developing a MEL framework for climate risk management faces a number of conceptual and methodological challenges. For example, there is no standard methodology or definition that provides a simple concept of what a MEL framework for climate risk management is. The uncertainties related to changes in climate as well as socio-economic and ecological systems make it methodologically challenging to develop a MEL framework for climate risk management. This challenge is also augmented by the difficulties in attribution of outcomes, non-linearity of climate change patterns, moving baselines and targets on climate resilience, and longer time frames for outcomes and impacts of climate risk management interventions to unfold, compared to those targeting other development issues (Bours, 2014[10]) (Dinshaw et al., 2014[11]). These points are elaborated in the subsequent chapters. To address these challenges, this working paper aims to:

- Introduce a conceptual framework which governments and development co-operation providers may use to strengthen MEL capacities for better climate risk management interventions.
- Present and discuss existing methods and tools that are suitable for dealing with the methodological challenges to conducting MEL for climate risk management interventions.
- Provide examples of good practice for adjusting or updating existing MEL frameworks.

Box 1.2. Introduction to monitoring, evaluation and learning (MEL)

Monitoring is "a continuing function that uses 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 and achievement of objectives and progress in the use of allocated funds" (OECD, 2002, p. 27[12]). If actions are taken to address climate risks, monitoring can help to understand if implementation is on track and if expected results may be achieved in the future. At an aggregated level, monitoring provides essential information for the reporting to the UNFCCC, the Sendai Framework for Disaster Risk Reduction and ultimately the 2030 Agenda. Monitoring typically entails several steps: identifying outcomes that are to be achieved by an intervention, as well as related outputs, activities and inputs, choosing indicators to assess progress, and managing and analysing collected data.

Evaluation is "the systematic and objective assessment of an on-going or completed project, programme or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, development efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors" (OECD, 2002, pp. 21-22[12]). A major focus of evaluations is to determine the effectiveness or impact of an intervention. This is also important for evaluations of climate risk management interventions to address climate risks and identify opportunities. There are, however, many challenges to evaluations of the effectiveness and impact of climate risk management interventions, especially since their effectiveness or impact may only unfold over decades.

Learning requires the development of systems and procedures to reflect and act on the information generated by monitoring and evaluation. This must be complemented by a learning environment that is inclusive and participatory. Such a learning environment should also be country-led and transparent. The need for learning is particularly relevant in the context of climate risk management, due to the uncertainties presented by climate change, long time horizons and high context specificity, which necessitate flexible and adaptive management of interventions.

These components together build a MEL framework. MEL frameworks for climate risk management must aim to support the integration of climate resilience into development interventions.

The working paper should be read within the following confines:

- The paper is not an in-depth technical guide on MEL methodologies. Rather, it seeks to inform readers of good practices related to effective MEL components for climate risk management policy interventions to strengthen climate resilience and to navigate through available options.
- The focus of this paper relates to climate change adaptation and resilience. As such, it does not include climate change mitigation as an option to reduce climate risks, which would imply conceptual and methodological differences in relation to MEL.

The sections include practical examples from various countries and development agencies and boxes with suggestions for additional reading. The paper is structured as follows:

- Section 2 introduces the most prominent climate-risk-related conceptual and methodological challenges and opportunities with regard to MEL for climate risk management;
- Section 3 outlines the conceptual basis and introduces the MEL framework for climate risk management, its main concepts and definitions;
- Section 4 presents main methods and designs;

- Section 5 elaborates on intervention theories and theory-based evaluation approaches;
- Section 6 describes the challenges of defining metrics specific to climate risk management;
- Section 7 sets out specific approaches and opportunities for climate risk management impact evaluations at the level of individual policies and at the aggregated level by highlighting the potential of evidence gap maps and systematic reviews for global learning;
- Section 8 highlights the further potential of portfolio and allocation analysis at the strategic policy level.

Box 1.3. Defining the term "intervention"

The term "intervention" is used throughout this document to refer to the subject of the MEL framework. In development co-operation, interventions encompass the different types of development and humanitarian support that may be monitored or evaluated, such as a project, programme, policy, strategy, thematic area, technical assistance, policy advice, institution, financing mechanism, instrument or other activity (OECD DAC, 2019[13]). In this paper, the focus is on MEL for climate risk management interventions supported by development co-operation at higher – often national – level which sets the framing for the implementation of concrete projects and programmes being implemented by development partners.

2. Monitoring, evaluation and learning for an uncertain climate future

The uncertainty in future impacts of climate change and associated responses of societies and ecosystems highlights the importance of continuous learning and adaptive decision-making processes for climate risk management. Despite climate scenarios and predictions becoming more accurate, decision-making processes remain exposed to various uncertainties about when and where exactly climatic conditions will change, and which human and natural systems will be affected. There are also uncertainties in technological advances and social responses, and changes and dynamics (Wilby and Dessai, 2010[14]). These uncertainties and their interactions highlight the need for continuous learning based on constant monitoring and periodic evaluation. This can also support adaptive management of interventions in response to future challenges unfolding over time.

Both MEL frameworks and climate risk management interventions need to be adaptive so that they can be adjusted and remain relevant when unpredicted changes unfold in the future. Similarly, interventions should be flexible to be able to accommodate findings emerging from the MEL process. Changed processes facilitated by climate risk management interventions typically reveal their full potential only after years or even decades and need regular monitoring. For instance, the outcomes and impacts of ecosystem-based adaptation can take decades to fully unfold (UNEP-WCMC, 2020[15]). Changes in biophysical and socio-economic conditions as well as societal values also increase the challenges of long-term MEL for climate risk management interventions.

Different approaches that address the uncertainties related to climate risk management interventions include the risk management approach (Jones, 2010[16])the adaptive pathways approach (Haasnoot et al., 2012[17]), the dynamic policy approach and the dynamic adaptive policy pathways approach (Haasnoot et al., 2013[18]). Mathew et al. (2016[19]) discuss the last of these approaches with regard to the nexus of uncertainty and climate change adaptation and note that it enables monitoring and evaluation frameworks to manage uncertainty through iterative processes, including learning by doing and regular reviews in the light of more information (see Box 2.1). Measuring successful climate risk management might also be difficult in the absence of a climate event. When success means no observable changes but instead maintaining status quo, a counterfactual analysis may be needed.

Box 2.1. The adaptive pathways approach

The adaptive pathways approach (Haasnoot et al., 2012[17]) focuses on tipping points where actions do not deliver the required objectives. It includes a long-term vision of the changing adaptive landscape and anticipated societal change (Mathew et al., 2016[19]). The approach provides insights into potential adaptive pathways, lock-ins and path dependences. MEL at a project or programme level essentially checks what aspect of a programme is progressing according to the objectives and why. It also aims to focus on mechanisms to refine decision-making processes.

The adaptive pathways approach supports monitoring and decision making under uncertain circumstances. However, it may conflict with an actor's preference for predetermined pathways to confirm success for accountability. Instead, they highlight the importance of continuous learning.

Multiple factors may influence an achieved outcome (i.e. strengthened climate resilience), which makes it challenging to attribute the outcome to a particular climate risk management intervention during the MEL process. Long time horizons are usually needed to observe the benefits of climate risk management interventions in socioecological systems. Yet, challenges of the attribution and multiple influencing factors make it harder to observe benefits of the interventions over a long period of time (Dinshaw et al., 2014[11]). Moreover, a MEL framework that focuses on transformative adaptation[1] measures can hardly fit within a classic development intervention cycle of a few years. This has several implications for political cycles, programme management and the financing of climate risk management initiatives.

MEL frameworks must develop metrics that remain useful over time and reflect the dynamic nature of climate risks. Identifying such metrics is also key to preventing maladaptation. MEL will need to monitor and evaluate the socio-political contextual changes as well. At policy or programme level, climate risk management interventions that cause maladaptation may indeed meet intended targets, but also cause unintended harm (Bours, McGinn and Pringle, 2014[20]). An adaptive approach to MEL for climate risk management interventions needs to use metrics to assess systematically if a narrow focus on the immediate objectives of the interventions may lead to maladaptation (African Development Bank et al., 2019[21]). MEL frameworks for climate risk management also need to consider path dependences which means that potentially effective climate risk management interventions may not be taken up in practice due to other political and non-climate-related priorities (Matthews, 2012[22]).

Constructing baseline data for MEL for climate risk management interventions need to consider long time horizons along with dynamics within human and natural systems over time. Baseline data describes conditions before the beginning of an intervention and provides a reference point for assessing the effectiveness of the intervention. climate risk management-related baselines are situated in dynamic human and natural systems, both of which are hardly stationary. The basis against which climate risk management interventions are evaluated can also change, as the observed impacts of climate change materialise. Simply comparing the situation before and after the intervention will therefore be insufficient when assessing its effectiveness or impact. Setting and using ranges of target values according to different scenarios of possible changes in human and natural systems can also help to approach the challenges posed by dynamics within these systems. Selection of the target values must be informed by clearly articulated assumptions and intervention theories.

[1] Transformational adaptation changes the fundamental attributes of a socio-ecological system in anticipation of climate change and its impacts, when incremental adaptation is not sufficient for managing climate risks. Examples include fundamental changes in livelihood choices such as relocation of people and assets (IPCC, 2018[86]).

The changing contexts may also require that the baseline be revised to provide a more accurate comparison between the observed outcomes and what would have happened without the intervention (Dinshaw et al., 2014[11]). Such a comparison is called counterfactual analysis. It uses different assumptions to evaluate various development scenarios. Further, an intervention itself may need to be revised to adjust to a changing context. In some cases, this may be challenging since many development co-operation providers have clear rules about not changing targets or indicators to avoid abuse of flexibility. For example, in the event of political pressure to prove an objective has been achieved, there is the risk of using the flexibility granted to make favourable adjustments. To avoid this, adjustments should be subject to an independent review.

Uncertainty, long time-horizons and shifting baselines all challenge one prominent objective of MEL for climate risk management: attributing results to a specific climate risk management intervention. The attribution challenges become even harder to address when a climate risk management intervention relates to actions across multiple sectors or development objectives, or when the intervention is a joint action by different development actors. Theory-based mixed-method impact evaluations offer potential to overcome these challenges as detailed in the following sections.

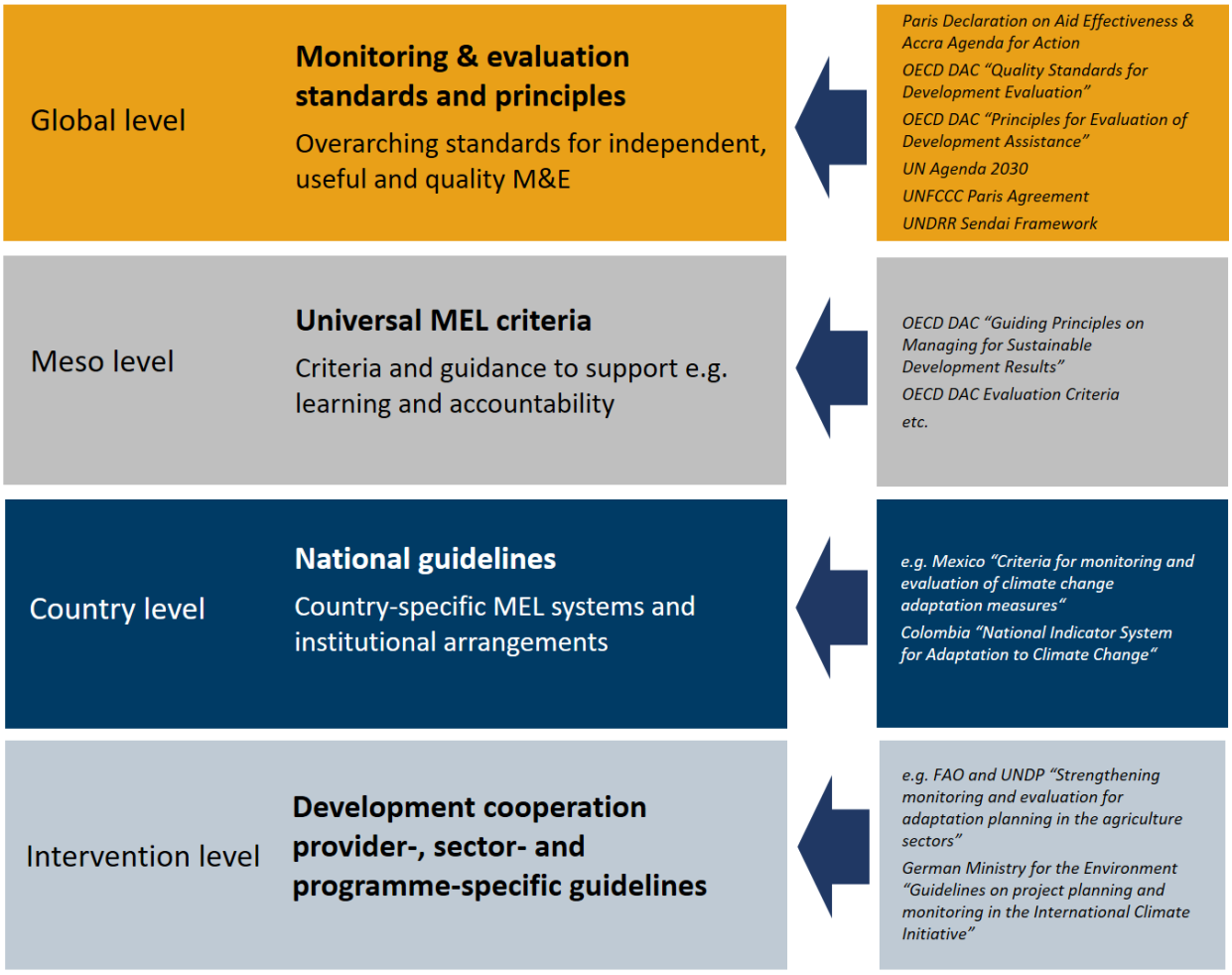
3. Conceptualising a framework for monitoring, evaluation and learning for risk management

Monitoring and evaluation for learning are the pillars of an interdependent and integrated framework (see Box 1.2)**.** OECD (2020[9]) highlights the integrated nature of MEL as a prerequisite for effective national reporting systems and policy-making processes for climate change adaptation and disaster risk reduction. A flexible approach to MEL is also key given the various uncertainties of the response of the climate system to greenhouse gas (GHG) emissions, its impacts on the ground, and social and technological contexts (Kunreuther et al., 2014[23]). These uncertainties also highlight the importance of continuous learning and adaptive management.

Climate risk management interventions often include activities at local, sub-national and national levels that are also embedded in policies at the regional or global level. This calls for a MEL framework that covers interventions across levels of governance (a multi-level MEL framework). For instance, many existing MEL frameworks refer to the assessment of a national strategy on climate risk management, but they often do not adequately consider sub-national level activities that contribute to the overall outcome of the strategy (Leiter, 2015[24]). Monitoring and evaluating interventions across different levels also entail a series of challenges. One example is stakeholder co-ordination, especially when making an agreement on overarching conclusions among actors at different levels of governance.

Multi-level climate risk management interventions require one comprehensive multi-level MEL framework, or several frameworks inter-related with each other. A MEL framework sets standards and guides monitoring, evaluation and learning for an intervention. An effective MEL framework is adjusted to national and sub-national needs and refers to international agreements and agendas, while being in line with relevant monitoring and evaluation standards, principles and criteria (see Box 3.2 and Box 5.3). A conceptual MEL framework for climate risk management ideally considers different interrelated levels (see Figure 3.1).

Figure 3.1. Standards, criteria and guidelines on MEL



Source: Authors

Globally agreed standards and principles for development co-operation and for national reporting on climate risk management are a point of departure for multi-level MEL frameworks. In overall development co-operation, the core principles that provide guidance for MEL standards are shared responsibility, mutual accountability and results-based management (OECD, 2008[25]) (OECD DAC, 2005[26]). With the adoption of the Paris Declaration on Aid Effectiveness in 2005, the principles of ownership, alignment, harmonisation, results and mutual accountability gained universal acceptance. In 2008, development co-operation providers and partner countries reiterated those principles with the adoption of the Accra Agenda for Action and agreed to greater accountability. The 2030 Agenda for Sustainable Development and the Paris Agreement on climate change refer to national reporting processes. The Paris Agreement on climate change also calls for enhanced transparency of action and an assessment of collective progress via a global stocktake. Reporting is governed by the Enhanced Transparency Framework (biennial transparency reports) and through the Adaptation Communications, but national approaches to MEL and reporting are not standardised or compulsory.

The Guiding Principles on Managing for Sustainable Development Results, adopted by the OECD DAC, provide useful guidance on designing processes and components for MEL frameworks for climate risk management interventions. The principles are presented below, and the associated guiding document also provides more detailed description of key elements of the principles (OECD, 2019[27]). For

instance suggestions for operationalising MEL frameworks refer to the importance of clearly defining the rationale, keeping measurements and the framework simple, and increasing the focus on learning, all of which are relevant to climate risk management interventions. The focus on simplicity is important but can be a challenge especially in the context of climate risk management interventions.

- Principle 1. Support sustainable development goals and desired change
- Principle 2. Adapt to context
- Principle 3. Enhance country ownership, mutual accountability and transparency
- Principle 4. Maximise the use of information and results for learning and decision making
- Principle 5. Foster a culture of results and learning
- Principle 6. Develop a results system that is manageable and reliable.

For evaluation standards, the main reference framework for development co-operation at the macro level are the OECD Development Assistance Committee's (DAC) "Quality Standards for Development Evaluation" (OECD, 2010[28]) **and "Principles for Evaluation of Development Assistance**" (OECD DAC, 1991[29]). Other international standards from the UN and other multilateral organisations complement the OECD standards, including the norms and standards of the UN Evaluation Group (UNEG) (UNEG, 2016[30]), the Evaluation Cooperation Group's (ECG) good practice standards, the ALNAP Evaluation of Humanitarian Action Guide (Buchanan-Smith, Cosgrave and Warner, 2016[31]), and other initiatives by other actors such as Better Evaluation and the International Initiative for Impact Evaluation (3ie). The OECD DAC Quality Standards are aligned with the commitments made in the Paris Declaration and the Accra Agenda.

Complementing these Principles, the OECD DAC evaluation criteria provide a conceptual basis for meaningful evaluation questions, which are also applicable to MEL frameworks for climate risk management (OECD DAC, 2019[13]). Guided by a set of questions outlined in Figure 3.2, the OECD DAC evaluation criteria pave the ground for a comprehensive and in-depth perspective on development co-operation in support of climate resilience. While the criteria are primarily applied in evaluation, they are also widely applicable in monitoring and results-based management. Being a useful conceptual basis for an overall MEL, OECD DAC evaluation criteria must be operationalised and supplemented by climate-resilience-specific dimensions and questions. Below presents examples of possible questions relevant to MEL for climate risk management interventions.

- Does the intervention achieve its climate risk management objectives and contribute to strengthened climate resilience?
- Have the resources been used in a cost-effective manner?
- Do the net benefits of the intervention continue over time and is maladaptation avoided?
- To what extent is a given climate risk management intervention aligned with the objectives of the Paris Agreement, the Sendai Framework and, ultimately, Agenda 2030?
- Does the intervention support the implementation of the National Adaptation Planning process and Nationally Determined Contributions?

Figure 3.2. The OECD DAC evaluation criteria

Source: (OECD DAC, 2019[13]) Better Criteria for Better Evaluation. Revised Evaluation Criteria Definitions and Principles for Use https://www.oecd.org/dac/evaluation/

Principles, standards and criteria for monitoring and evaluation are adapted to national and local contexts and offer opportunities for specific methodological consideration. In line with the Paris Agreement, the Sendai Framework and Agenda 2030, national reporting systems and country-led monitoring and evaluation provide the basis for both national and global stocktakes and international knowledge exchange. The Paris Agreement provides a qualitative global goal on adaptation but there are no common metrics, baselines, terminologies or methodologies. The Paris Agreement requests that Parties "should, as appropriate" report on progress (Articles 13.8 and 7.9-11) (UNFCCC, 2015[1]). A country-led MEL ensures flexibility and avoids additional burden, especially for developing countries that may have limited MEL capacity or that are already subject to different monitoring and evaluation requirements by development co-operation or those based on national agendas and priorities. It is important to align MEL approaches to local contexts, an aspect focusing on harmonisation, ownership and the use of a country's own results framework highlighted in the Paris Declaration and the OECD Guiding Principles on Managing for Sustainable Development Results (UNFCCC, 2015[1]) (OECD DAC, 2019[13]). The Sendai Framework also provides a global monitoring and evaluation framework for the seven global outcome-based targets and 38 associated indicators. The framework, however, is not compulsory and allows certain flexibility in national-level application, which makes comparison of achievements and results difficult as coherence is not necessarily given.

In order to unleash its full potential, country-level MEL frameworks should be aligned to international review mechanisms, with possible technical support from development co-operation providers in strengthening such MEL frameworks and capacity. In order to strengthen national MEL

frameworks through evaluation capacity development, a systemic approach with regard to individual capacities, institutional capacities and a conducive environment becomes essential. Further potential arises from the integration and upscaling of national capacity development programmes that are embedded in regional approaches and linked to international capacity building initiatives (see Box 3.1). Capacity development for the development and implementation of national MEL agendas and plans can also provide multi-annual orientation to government bodies and their development co-operation partners (see Box 3.2).

Box 3.1. DEval – Strengthening national evaluation systems through evaluation capacity development in Latin America

Background: With the Paris Agreement, the Sendai Framework and the SDGs of the UN's Agenda 2030, evidence-based decision making on the basis of monitoring and evaluation and the development of national evaluation capacity becomes key. However, approaches and measures to strengthen evaluation capacity are often limited to fragmented individual procedures that do not take into account all relevant actors or the various levels of capacity development.

Approach: The systemic approach developed by DEval encompasses evaluation capacity development on three levels - individual capacity, institutional capacity, and a conducive environment. The combination of activities at all three levels are envisaged. As part of Costa Rica's project "Fomento de Capacidades y Articulación de Actores de la Evaluación en América Latina en el marco de la Agenda 2030 / Building Evaluation Actors' Capacity and Networking in Latin America as a Contribution to the Agenda 2030", this approach has been fully implemented together with the project's counterpart, the Ministry of National Planning and Economic Policy (MIDEPLAN), and is being taken up by other countries in Latin America. A range of measures are used, such as the launch of national and regional platforms for the involvement of key stakeholders, the planning and design of a national evaluation agenda, including those on climate risk management, and respective policy, along with numerous training measures, piloting of participatory evaluations and the incorporation of young and emergent evaluators.

Source: (Krapp and Geuder-Jilg, 2018[32]) Evaluation Capacity Development: A Systematic Project Approach by DEval in Latin America, https://www.deval.org/files/content/Dateien/Evaluierung/Policy%20Briefs/DEval_Policy%20Brief_7.18_Foceval_EN_web.pdf

At the intervention level, providers of development co-operation often use guidelines for MEL frameworks which are more specific (e.g. to particular sectors). These guidelines are based on the providers' institutional mandates, thematic objectives or reporting requirements. These guidelines often support more detailed MEL that strengthen the objectives of the organisation or focus sectors, and may also allow for aggregation and reporting across comparable sectoral interventions. Ideally, these guidelines should also complement national-level reporting requirements as well as regional or global MEL standards, principles and criteria (see Box 3.2). Guidelines for development co-operation differ considerably across agencies. Furthermore, specific groups of interventions might adopt their own reporting requirements, such as reference indicators, that were developed to meet particular organisational needs. Intervention-specific MEL requirements should ideally be carefully balanced between the needs of the finance providers and the aim of using country systems where possible. These requirements should also be aligned with national priorities and limit the competing demands on national reporting systems.

Box 3.2. Ministry of National Planning and Economic Policy of Costa Rica - Assessment of international development co-operation on biodiversity and climate change in Costa Rica (2010–2018)

Background: Over the last decade, Costa Rica has received a considerable amount of assistance for climate change mitigation, adaptation and biodiversity conservation and sustainable use, as the country pursues a low-carbon green development agenda. In order to assess management and results of these finance flows in fulfilling the respective national objectives, Costa Rica is presently undertaking an evaluation on international development co-operation in the fields of biodiversity and climate change during 2010–2018. This initial thematic evaluation from Costa Rica's National Evaluation Agenda is one of the first country-led evaluations of international development aid being undertaken from the perspective of the recipient country.

Approach: The evaluation is led by Costa Rica´s Ministry of National Planning and Economic Policy Ministry together with the Ministry of Environment and Energy, both of whom are supported by Deval with technical and financial assistance(see also Box 3.1). A first step was taken in 2019 with the development of a comprehensive database on international donors' interventions on biodiversity and climate change, which provided a detailed overview and made it possible to decide which actors from the different sectors would be involved in the technical steering committee for the evaluation.

In order for this model evaluation from Costa Rica to allow other recipient countries to analyse and improve fund allocation and management for climate change, biodiversity and the wider field of the SDGs, a peer-learning process among Latin American countries has been set up. Using the distinctly Latin American "systematisation" approach, the aim is to extract lessons learned from the evaluation process itself. Ideally, this will follow a participatory process on how to generate evidence for decision making, in order to enhance governance mechanisms and better access limited development finance from international sources.

The COVID-19 pandemic and related restrictions on travel and movement had complicated the team's ability to conduct fieldwork and effectively engage relevant stakeholders. In response, novel methods for gathering data – e.g. online focus groups and virtual meetings, adapted interview techniques, and digital surveys – were pursued along with a higher reliance on local evaluators, with results expected by December 2020.

Source: (MIDEPLAN, 2019[33]) Agenda Nacional de Evaluaciones, https://www.mideplan.go.cr/agenda-nacional-de-evaluaciones (MIDEPLAN, 2020[34]) Ficha técnica de Evaluación: Cooperación internacional no reembolsable en Biodiversidad y Cambio Climático, Costa Rica, 2010-2018 https://documentos.mideplan.go.cr/share/s/EB6eKpjFQ8yaAYbGaHhTeQ

4. Choosing methods and design for monitoring, evaluation and learning for climate risk management

In addition to the traditional objective of accountability, a focus on learning should be put a greater emphasis when choosing methods and design for a monitoring, evaluation and learning (MEL) framework for climate risk management. The greater emphasis on learning, especially from the outset of development of the MEL frameworks can enhance flexibility and continuous improvement of climate risk management interventions over time. Apart from the objectives of learning, other policy objectives can also affect how methods and design of a MEL framework for climate risk management should be selected. The development of the MEL frameworks can therefore draw on existing MEL frameworks, such as for disaster risk reduction and for long-term ecosystem or biodiversity conservation. This means that broadening the scope of these existing MEL frameworks, rather than creating entirely new frameworks, could be a practical first step to design components of a MEL framework for climate risk management.

MEL frameworks for climate risk management also focus on the evolving nature and on-going processes of the interventions, aiming to facilitate improvement of such interventions over the course of their implementation. Certain types of evaluation have been developed to promote "developmental evaluation" that aims to conceptualise, design and test new approaches while the intervention is in progress (also known as formative evaluation). In developmental evaluation, the evaluators accompany the intervention team and assist in assessing and adapting interventions. Patton (2011[35]) argues that developmental evaluation is required for complex problems in rapidly changing systems where constant feedback and adjustment are needed. This applies to the long time horizon of climate risk management interventions and their outcomes.

Designing a MEL framework to inform decisions on whether to continue, increase or end funding for a particular climate risk management intervention could benefit from impact evaluations obtained from a summative perspective. Summative MEL frameworks mean those aiming to summarise the results of a development intervention and provide final assessments of its success. The most prominent element of summative MEL designs is impact evaluations (see also section 7.). However, such impact evaluations of climate risk management interventions are still rare and evidence on their effectiveness and impacts remain limited to date (Doswald et al., 2020[36]). This is partly due to the high complexity that characterises many climate risk management interventions, the uncertainties presented by climate change and changes in other socio-economic factors, as well as long time horizons, attribution issues (see also section 2.). It is also often difficult to find right metrics that determine success of a climate risk management intervention. The approaches, methods and designs are a result of a set of strategic choices informed by various factors and constraints. They include the evaluation questions explored, the characteristics of the intervention, technical or financial feasibility of different methodological options for impact evaluations, to name a few (see also (Stern, 2015[37]).

A focus on participatory approaches also contributes to fostering the learning for climate risk management and increase the MEL framework's accuracy and validity. Using a participatory design

increases the acceptance by involved stakeholders of the outcomes of the MEL process and its recommendations (Zall Kusek and Rist, 2004[38]) (OECD DAC, 2019[13]). Moreover, participation and transparency are also one of six adaptation principles embodied in Article 7 of the Paris Agreement (UNFCCC, 2015[1]). Involvement of relevant actors at the design stage of MEL frameworks is conducive to enhancing stakeholder participation and improving consultation throughout the MEL process. In the field of evaluation, participation can be supported by the use of explicit participatory approaches such as empowerment evaluation, human rights-based evaluation and indigenous evaluation, which are often based on formative MEL perspectives (CARE, 2014[39]) (see also Box 4.1). Since MEL frameworks for climate risk management interventions are characterised by a diversity of actors, each with different interests, needs and perspectives, considering participation is especially relevant.

The diversity of members within a MEL team can widen the scope of its analysis, shape a common understanding of complex interventions and their outcomes, and balance the perspectives. This can in turn bring about a broader acceptance of the recommendations from the MEL among different social groups. This potential is currently often overlooked when designing climate risk management interventions and the associated MEL framework. Beneficiaries of the climate risk management intervention and the implementation team become jointly responsible for the MEL design and the use of the results for strengthened local resilience.

Box 4.1. From participatory approaches to participatory evaluation

While participation is an essential part of effective MEL for climate risk management, there can be multiple options for such approaches. A participatory approach enables contextualisation of evaluations; allows for the integration of multiple perspectives from a wide range of stakeholders from various contexts and levels (as is often the case in climate risk management); contributes to a common understanding of complex interventions and their outcomes and impacts among stakeholders; promotes ownership; and strengthens learning opportunities for the stakeholders involved (see (Shulha et al., 2015[40])). A participatory perspective in MEL allows for different degrees of participation, according to the specific contexts or needs of stakeholders. Allowing for participation within an MEL may change relations between stakeholders and alter the existence of more open and horizontal relationships from the outset. After a number of different experiences with participatory approaches, Costa Rica's Ministry of National Planning and Economic Policy drew up guidance for evaluations with participation (MIDEPLAN, 2019[41]).

In contrast to the wider definition of participatory approaches to evaluation, "participatory evaluation" is a specific type of evaluation with the responsibility for the evaluation delegated to local participants. Participatory evaluation is defined as a type of evaluation in which non-evaluative stakeholders (i.e. those involved in and affected by the evaluation, other than the evaluator – in particular, the managers and beneficiaries of a programme) become significantly involved in implementing the evaluation. Significant involvement by such stakeholders is defined by a certain level of control in decisions relative to the conduct of the evaluation. In other words, the stakeholders are real actors in the evaluation, not mere data sources or simple observers.

In the context of an open and flexible MEL framework for climate risk management, practitioners can draw on a variety of methods from the broader social sciences. Most social scientists distinguish between statistical methods (e.g. meta-analysis, or regression, multivariate or time-series analysis); comparative methods (e.g. qualitative comparative case study analysis, network analysis or realist analysis); and methods for the analysis of single cases (e.g. process tracing, contribution analysis, case narratives, outcome mapping or most significant change analysis). Empirical data collection includes quantitative tools (e.g. surveys, questionnaires and feedback sheets); geo-data tools (e.g. remote sensing,

mobile phone data and social media data, see also Box 4.2); and qualitative tools (e.g. interviews, focus group discussions, participatory rural appraisal and expert assessments). While many of the abovementioned methods and tools are predominantly characterised as evaluation tools, most have monitoring and learning elements and can thus be classified as MEL methods and tools. For example, contribution analysis[2] offers a range of opportunities for formative and summative learning, depending on the characteristics of iterative participatory elements.

Box 4.2. Integrating new types of data and analysis into MEL for climate risk management

MEL frameworks are increasingly reliant on new types of data by using mobile technologies, social media and satellite data. Besides cost-effectiveness aspects, accuracy and large-scale climate risk management interventions as well as MEL objectives specific to them increase the relevance of new types of data. Remote forms of data collection and analysis can support MEL in contexts of high fragility or even conflict.

Geophysical data on a climate phenomenon and a territory is an alternative to in situ observation. Such data can be used, for example, to improve warning and climate-related disaster preparedness, monitor changes to an ecological system, set a baseline by assessing the state of the ecosystem or assess impacts after a specific climate or weather event, such as fluvial flooding, occurs.

Machine learning, developed out of earlier artificial intelligence, predicts trends and patterns based on the processing of large datasets potentially needed for comprehensive MEL frameworks. Large-scale policy interventions targeting transformation and behavioural change may be monitored and evaluated using machine learning, e.g. on newspaper or social media comments. Data on mobile phone usage, for instance, can help to predict the spread of diseases, including those spreading increasingly due to a changing climate. New and larger datasets are not a panacea, however. Often, they only reflect major trends and probabilities and fail to address cause-and-effect relationships. There is, however, enormous potential in using both big data and machine learning for complex evaluations and assessing ever more empirical data.

Given the complexity of climate risk management interventions, with their diversity of contexts, objectives, actors and instruments, there is no one-size-fits-all methodological design to all MEL frameworks. This calls for a mixed- and multi-method MEL approaches. Such approaches provide unique opportunities to deal with this complexity by systematically combining different MEL methods and tools (Creswell and Plano Clark, 2017[42]) (Goertz, 2017[43]) (Hesse-Biber, Johnson and (eds), 2015[44]). In order to increase learning from data obtained through a MEL process, they can be further analysed and aggregated in the form of meta-evaluations. Systematic, mixed-method, realist and other types of reviews are useful tools which can be either conducted or consulted from other sources for the planning of new interventions.

[2] Contribution analysis is a theory-based approach to evaluation, aimed at making credible causal claims about interventions and their results (Mayne, 2012[47]). It focuses on how an intervention interacts with other aid or non-aid factors and analyses whether an intervention was a necessary and/or a sufficient causal factor, along with other factors (Fisher et al., 2015[88])

5. Applying theory-based monitoring, evaluation and learning for risk management

A meaningful and well-grounded monitoring, evaluation and learning (MEL) framework for climate risk management should be theory-based. A MEL framework based on explicit intervention theories can support evidence-based and results-based policy making that is also more adaptive to future changes. **Intervention theories** (see Box 5.1), also called "programme theories", consist of two components: theories of action and theories of change (Funnell and Rogers, 2011[45]).

- **The theory of action** provides orientation for planning and implementation, and describes what inputs are needed from different actors to implement activities, how these will be implemented and what outputs they will produce.
- **The theory of change** contains the expected outcomes of the intervention and explicitly traces the pathways from activities and outputs to outcomes.

Intervention theories can stem from either pre-existing theories based on related research or prior experience from similar past interventions, or a "grounded theory" that grounds the theory in actual data, which means the analysis and development of theories happens after data collection. Against this background, a theory-based MEL framework begins at the design phase of the intervention to ensure that both the project design and the MEL framework facilitate learning throughout the intervention cycle (see Box 5.3 for an example of actual application to the African Risk Capacity).

Box 5.1. Intervention theories as an element for results-based management, continuous learning and transformational change

Intervention theories may facilitate learning for evidence-based policy making on climate risk management through an iterative process of planning and implementing interventions, and reflecting their outputs. Intervention theories are set up at the beginning of a policy intervention, reflected and revised on a regular basis throughout the process of implementation and finally updated at the end of a policy cycle. They are powerful instruments for learning-based approaches oriented towards transformational change, especially when combined with participatory approaches and stakeholder involvement. Approaches of results-based management and adaptive management support strategic programming and contextualisation (Schuetz et al., 2017[46]). Moreover, theories that go beyond single interventions (combined or nested theories) can facilitate institutional learning towards broader climate resilience and sustainable development outcomes.

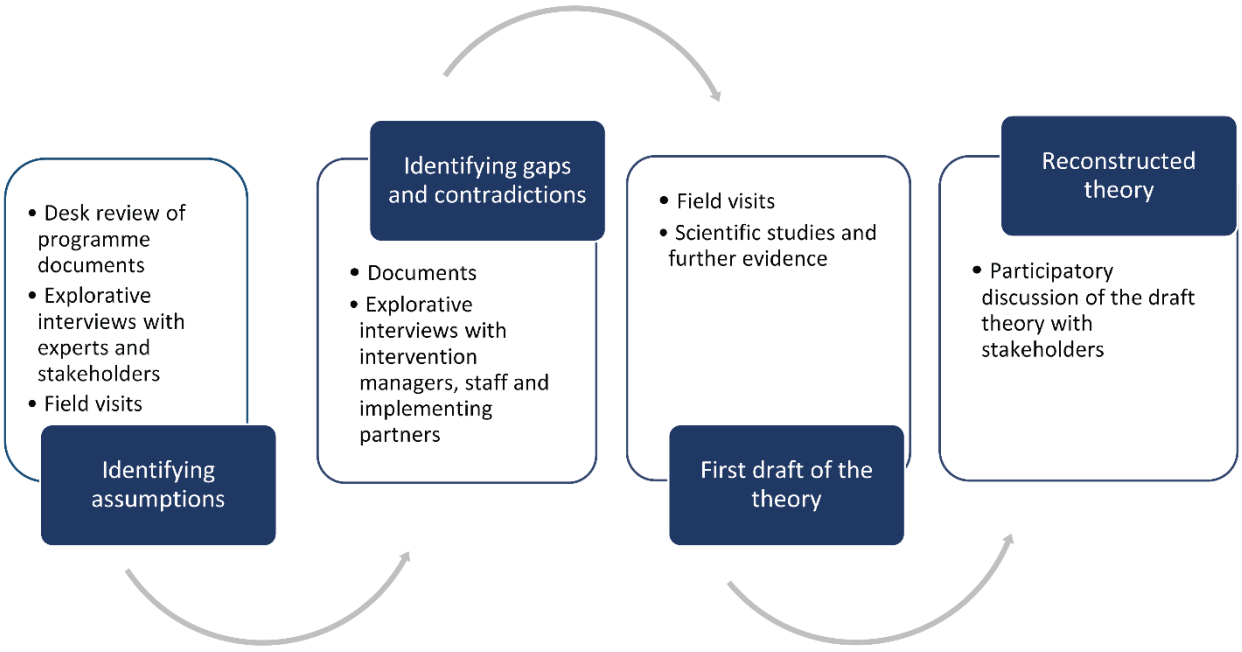
A theory of change is a key instrument of theory-based MEL frameworks, since basing the MEL framework on a theory is essential to better understand the climate risk management intervention and its context. A theory-based approach normally uses a theory of change or a combination of multiple

theories of change at different levels. The so-called "nested theory of change" can be particularly useful for climate risk management interventions that involve various interrelated levels (see Box 5.2). Most theories of change follow the pathways of change to impacts from inputs and activities rather than from outputs and outcomes.

A theory of change also helps to identify the underlying assumptions, risks and rival explanations that need to be understood and revisited throughout the climate risk management intervention to ensure its desired change (see Figure 5.1). These assumptions, risks and rival explanations should be identified before monitoring and evaluation starts. **Assumptions** are events and conditions that need to happen for the causal link to work. **Risks** are external events and conditions that could put those links at risk, despite the assumption being in place. **Rival explanations** are other explanatory factors or conditions that might help explain the occurrence of an observed result other than the intervention (Mayne, 2012[47]).

Observed information (inputs, outputs and outcomes) through MEL can be collected in the form of an "evidence analysis table" or "MEL matrix" along the indicators defined. This should be complemented with information on the sources and method of data collection and analysis. Thus, a meaningful theory of change for climate risk management goes beyond a simple results chain or logical framework. It includes information about the context of the intervention, as well as the perspectives of key stakeholders, beneficiaries and existing relevant research (see Box 5.3). To assess and ensure the quality of an overall intervention theory, useful quality criteria are the plausibility, feasibility and testability of the theoretical model (Connell and Kubisch, 1998[48]).

Figure 5.1. How to (re-)construct an intervention theory for climate risk management interventions



Source: Adapted from (Weiss, 1998[49]) Evaluation: Methods for Studying Programs and Policies, the Second Edition, Prentice Hall, New Jersey

Box 5.2. Tracking adaptation and measuring development

A comprehensive and flexible theory-based framework can support governments and development co-operation in assessing the relative effectiveness of interventions that directly or indirectly address climate risks. The International Institute for Environment and Development (IIED) developed the Tracking Adaptation and Measuring Development framework that uses a theory of change approach to connect interventions, acknowledging the need to make related change happen at multiple levels (IIED, 2014[50]). This framework has also been applied in various national-level settings in different ways (e.g. in Nepal, Pakistan, Cambodia, Mozambique, Kenya, Ethiopia, Uganda and the United Republic of Tanzania, supporting local planning to undertake a retrospective analysis and bolster national indicators). A top-down perspective assesses institutional characteristics of climate risk management – the extent and quality of climate risk management processes and action – while a bottom-up perspective measures adaptation and development outcome on the ground. Causal mechanisms are viewed as movements up and down across different tracks (i.e. a top-down movement for the climate risk management track and a bottom-up movement for the development performance track). For example, Track 1 assesses how climate risk management interventions at the national level will result in better climate risk management at regional and local level. Track 2 describes how climate risk management and development interventions at the local level will lead to collective impact at regional and national level. Causal relationships are also identified across the tracks, e.g. when climate risk management results in reduced vulnerability and improved development outcomes.

The challenge of attributing observed and intended development and adaptation outcomes to a specific intervention is addressed by using a quasi-experimental approach: Track 2 indicators are estimated for populations before, during and after interventions, or with and without interventions. The Tracking Adaptation and Measuring Development framework uses indicators that represent vulnerability and capacity to adapt to a climate risk in addition to the development indicators. Complementary approaches for more robust attribution are using and testing theory of change, and developing, comparing and testing causal narratives during the evaluation process (Brooks and Fisher, 2014[51]).

Box 5.3. DFID – Theory-based evaluation of the African Risk Capacity

Background: The African Risk Capacity is a specialised agency of the African Union established in 2012 as an African-owned, index-based weather risk insurance pool and early response mechanism that combines the concepts of early warning, disaster risk management and risk finance. The African Risk Capacity's mission is to develop a pan-African natural disaster response system that enables African governments to meet the needs of people at risk from natural disasters. In 2015 the UK Department for International Development (DFID) commissioned an independent evaluation of the African Risk Capacity to cover the period 2015 to 2024. This had two components: a two-stage formative evaluation and a two-stage impact evaluation. The overall purpose is to identify and feed lessons learned into African Risk Capacity's programme management; to assess the effectiveness of the African Risk Capacity with the aim to contribute to the global evidence base; and to provide accountability.

Approach: The evaluation starts with a formative phase that tests early stages of the theory of change and provides an assessment of whether the African Risk Capacity is on the right trajectory to achieve its intended outcomes. This phase is followed by a summative phase assessing African Risk Capacity's contribution to the outcomes identified in the theory of change. Given the complexity of the intervention and in order to integrate the two phases, the MEL approach builds on the theory-based design of contribution analysis. Complexity is driven and augmented by 1) high levels of uncertainty around how a programme will evolve and where and when it will achieve results; 2) high degrees of interdependence across multiple stakeholder levels; 3) emergent conditions in implementation of the programme and in the manifestation of droughts and other natural disasters; and 4) the co-evolutionary nature of applying African Risk Capacity's contingency planning frameworks to implementation as interactive and adaptive agents organise themselves.

Given the explicit learning and adaptation objectives of the MEL framework and the inherent challenges in implementing an experimental evaluation design for a complex programme such as African Risk Capacity, a theory-based approach provides the most systematic, thorough and appropriate model.

Source: (Scott et al., 2017[52]) Independent Evaluation of African Risk Capacity (ARC): Final Inception Report, https://reliefweb.int/sites/reliefweb.int/files/resources/African-Risk-Capacity.pdf

6. Identifying objectives and indicators for monitoring, evaluation and learning

Objectives and definitions of what constitutes successful climate risk management may differ among stakeholders, since both climate change adaptation and management of residual risks are highly context-specific. Defining clear objectives of climate risk management interventions often faces a range of challenges, while this is key for utilisation-focused MEL frameworks[3]. For example, it is often challenging to formulate the envisioned objectives of the interventions with expected environmental, societal and economic changes. This is because the formulation of such objectives needs to anticipate the links between immediate results of the climate risk management intervention and how they will influence different conditions in the future (WCS Climate Adaptation Fund, 2015[53]).

Another challenge is that some fundamental concepts, terms and definitions related to climate risk management, including those on residual climate risks, are understood differently by different stakeholders (World Bank, 2017[54]; Schipper and Langston, 2015[55]). For instance, concepts such as "adaptation", "vulnerability" and "resilience" are still continuously discussed in the political and scientific community. In addition, there may also be confusion about some of the nuances (e.g. between "adaptive capacity" and "ability to adapt"). Against this background, the IPCC's Fifth Assessment Report defines "successful adaptation" using the criteria of feasibility, efficacy/effectiveness, efficiency, acceptability/legitimacy, equity, sustainability, integration and coherence with wider national policies and development goals (IPCC, 2014[56]). International agreements such as the Paris Agreement and the Sendai Framework provide further guidance to countries but still allow for flexibility based on national priorities (see Box 6.1). For a MEL framework, a clear and common understanding of targets, related definitions and concepts as well as metrics, will facilitate the development of a theory of change for climate risk management interventions in question (see Box 6.2).

[3] Utilisation-focused evaluations are based on the principle that an evaluation should be judged according to how useful it is. To increase the likelihood of the findings being used, it is important to identify the primary users of an evaluation and ensure that they are engaged in decision-making throughout the evaluation process (INTRAC, 2017[87]).

Box 6.1. Defining objectives for climate change adaptation interventions

At the global level, the Paris Agreement provides a qualitative goal on adaptation of "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal …" (Article 7.1) (UNFCCC, 2015[1]). Countries define their own national goals, targets and indicators, e.g. within their Nationally Determined Contribution (NDC) and National Adaptation Plan (NAP) processes, while they also set their own strategies and priorities for achieving sustainable development. Reporting is not standardised (Articles 13.8 and 7.9–7.11) but further prioritised by the Enhanced Transparency Framework and guided by the Katowice climate package (UNFCCC, 2018[57]). The Sendai Framework details a global goal with seven outcome-based targets, associated with 38 indicators and standardised reporting mechanisms of which several contribute to climate risk management (UNDRR, 2015[3]). With regard to bilateral and multilateral development co-operation providers, many report on their financial support for adaptation interventions in accordance with the definitions in the OECD DAC Rio Markers for Climate (OECD DAC, 2016[58])

Indicators form the reference system of monitoring and evaluation and the backbone for meaningful MEL (see Box 6.2)**.** Indicators can help to measure progress if defined and used appropriately (Dinshaw, 2018[59]). Outcomes formulated in the theory of change of MEL frameworks can be measured by one indicator or several. Accordingly, indicators can be categorised into those on input, output, outcome or impact (OECD, 2002[12]). Input and output indicators can be collected through regular monitoring activities and generate information on progress in implementation. Outcome and impact indicators are, on the other hand, part of data collection for the evaluations and, depending on the outcome, potentially retrieved from national data. They provide information about the effectiveness of an intervention to achieve its objectives. For example, indicators of adaptive capacity can be used to measure outcomes. In addition, context indicators might be relevant metrics in a MEL framework in order to account for factors outside the control of the intervention that can positively or negatively affect the achievement of expected results. Repeated climate risk and vulnerability assessments can potentially be used to establish a baseline, measure outcomes and provide a periodic snapshot of changes in climate risks (Lamhauge, Lanzi and Agrawala, 2012[60]).

Quality criteria provide further clarity on appropriate indicators that refer to the specific attributes of climate risk management interventions, although they need to be linked to identified needs. Different approaches to developing useful indicators exist (see Box 6.2 and Box 6.3). Examples include SMART (specific, measurable, achievable, relevant, time-bound) criteria and CREAM (clear, relevant, economic, adequate, monitorable) principles for performance indicators, including for climate risk management interventions (Zall Kusek and Rist, 2004[38]) (Roberts and Khattri, 2012[61]). Both approaches emphasise the importance of formulating indicators that are simple (clear and unambiguous), measurable (data sources are available, costs are feasible) and relevant (stakeholders can make use of the information and it informs the intended outcome). Relevance is an important aspect in the context of climate risk management, as some of the indicators need to inform the MEL framework in the absence of a climatic event. Villanueva (2010[62]) proposes the "ADAPT" criteria, which are adaptive, dynamic, active, participatory and thorough. Comparability is equally important for climate risk management, for which indicators should be carefully designed to ensure that they remain relevant across different time horizons (long term and short term) for impacts and outcomes to unfold. Another important consideration to select indicators is that they should not impose an undue burden on countries.

Quantitative metrics are complemented by qualitative information in the light of uncertainty and complexity faced by climate risk management interventions. Lamhauge et al. (2012[60]) highlight the importance of qualitative information adding to quantitative or binary indicators. Measuring progress based

only on (quantitative) indicators does not provide all the information needed for learning and adaptive management (Bours, McGinn and Pringle, 2014[63]). For continuous learning, the question of "why" an outcome or an impact was or was not achieved needs to be assessed by qualitative information. Such information can be collected through observation in individual or group interviews. Why an intervention works is a key learning aspect but this is often left out of reporting. These knowledge needs should be increasingly addressed in reports and further exchange formats.

Readily available indicators, if they reflect defined climate risk management objectives, reduce the burden of data collection, increase data quality and facilitate harmonisation. Such indicators are useful to facilitate some aggregation but are not sufficient for a complete MEL framework to capture further relevant aspects. Indicators that are already widely used, e.g. for broader development or sectoral MEL, should be promoted where appropriate, as these reduce the demand for resources and the risk of duplication. In addition, such indicators have already been tested and are therefore less prone to measurement problems. At the impact level, effective climate risk management interventions are supposed to contribute to overarching development objectives. Hence their impact indicators should overlap with those used in other development interventions in the light of the 2030 Agenda for Sustainable Development. Consistency. Using standard indicators has also the potential to enable aggregation across local, sub-national and national level reporting. Ideally, indicators for climate risk management should be developed collaboratively to ensure consistency across areas and scales, and capture changes, including at the local and behavioural levels (Bours, McGinn and Pringle, 2014[63]).

Unlike mitigation, and due to highly context-specific nature of climate risk management, no standard indicators or universal metrics are available. Thus, MEL frameworks must identify indicators for each individual intervention reflecting its context. As a result, comparability over time, scale and place is limited (Leiter and Pringle, 2018[64]). In most country contexts, data availability restricts the choice of indicators. This also holds true when data is not available in the appropriate format, at the right scale or for the time period of interest (Dinshaw, 2018[59]) (Leiter and Oliver, 2016[65]). However, there may be synergies with other data-collection or analytical processes, capacities being built or indicators used for broader development MEL or sectoral reporting. In practice, synergies exist, for example in the area of agricultural or water policies. Sector-specific compilations of reference indicators by the national or development co-operation providers support greater comparability and the use of pretested and accepted indicators.

In the absence of standard metrics and challenges to identify suitable indicators for dynamic and uncertain contexts of climate risk management, MEL frameworks frequently apply proxy indicators while assessing progress towards ultimate goals. Due to the multiple dimensions, long time frames of climate risk management implementation and the deep uncertainty of climate change, the final outcomes may not be assessed during the course of an implementation cycle. Instead, process measurement is a way to assess that the impact pathway is on track. The benefits of using proxy indicators increase when they are embedded in a theory of change approach to MEL that goes beyond the end of an implementation cycle (Bours, McGinn and Pringle, 2014[63]). A theory of change approach can also be suitable for climate risk management since it goes beyond log frames that follow a linear cause-and-effect pattern (Bours, McGinn and Pringle, 2014[66]). The approach should include necessary elements such as multi-actor perspectives, inter-linkages and multidirectional impact pathways (Mathew et al., 2016[19]). However, the use of proxy indicators and aggregated units of analysis often falls short in detecting the true interactions between climate and development (Barrett et al., 2019[67]). Thus, instead of using individual proxy indicators for climate risk management, more complex indices combining several indicators could be constructed. Such aggregated proxy indicators need careful interpretation due to their underlying complexity and the merely indirect measurement of actual development progress (Christiansen et al., 2016[68]) (Leiter and Oliver, 2017[69]). In response to the complex nature of suitable indicators for climate risk management interventions, one option is to emphasise process and proxy indicators along the theory

of action being part of the intervention theory. However, this risks producing a very narrow focus that fails to detect the broader development outcomes.

Box 6.2. Climate Investment Funds – Monitoring, reporting and evidence-based learning in the Pilot Program for Climate Resilience

Background: The Climate Investment Funds (CIF) introduced a participatory results-based monitoring and reporting system for its Pilot Program for Climate Resilience (PPCR). The objective is to improve the effectiveness of spending and accountability of climate finance, as well as enhancing transparency and learning. A Monitoring and Reporting Toolkit was developed in an iterative and participatory process. Its purpose is to track progress towards climate-resilient development at the national level and to monitor, report and learn from the implementation of PPCR activities at country and project level.

Approach: The toolkit relies on a theory-based MEL framework. It contains 11 indicators that are linked to objectives and embedded in a logic model; five are compulsory core indicators and six are optional. Among the core indicators, two track progress on climate resilience mainstreaming at the national level and three track progress at the project level.

Overall, the MEL framework is based on four principles: country ownership, stakeholder engagement, use of mixed methods and learning by doing. The core indicators are measured accordingly in a participatory manner through a combination of qualitative and quantitative methods. Data tables from monitoring at the project level are complemented through insights gathered in scoring workshops at the national level. Scores from 0 to 10 are used to assess progress on the selected indicator, such as the degree to which climate change is integrated into national planning. The scoring is informed by evidence. Countries are encouraged to establish criteria so that scores are less subjective. Baseline data permits the use of the scores to assess and compare progress across sectors.

Several refinements resulted in a flexible but streamlined approach and generated lessons learned on setting up an MEL framework for CIF's multi-level adaptation programmes. Using a limited set of core indicators allows for some degree of comparability across countries while simultaneously limiting the reporting burden and allowing for context-specific supplementation. While country leadership proved essential to ensure the effective implementation of the system; capacity development, along with clear roles and responsibilities were also identified as prerequisites for quality data.

Reference: (Roehrer and Kouadio, 2015[70]), Monitoring, Reporting, and Evidence-Based Learning in the Climate Investment Funds' Pilot Program for Climate Resilience https://doi.org/10.1002/ev.20136

While the Sendai Framework and Agenda 2030 provide lists of indicators suitable for MEL and for climate risk management, the uptake of standardised indicators at the country level still differs, limiting the opportunities for global aggregation and comparability. The SDGs provide a set of 231 global indicators, 14 of which include a direct reference to climate risk management objectives (IAEG-SDGs, 2016[71]). The current set of SDG indicators related to climate risk management refer to risk preparedness, prevention and reduction, and resilience to residual climate risks. While the SDG indicators have the advantage of being pretested and internationally accepted, the relevance of such global indicators for climate risk management has been questioned (Leiter and Pringle, 2018[64]). Moreover, calls have been made for efforts on improved indicators focusing on vulnerability and exposure to climate-related hazards, current impacts from climate change and projected risks, as well as adaptation processes and the concept of resilience (Ebi et al., 2018[72]). Other reference systems, such as the Sendai Framework, provide further specifics. Thus, the use of SDG indicators is neither all-embracing nor compulsory for national reporting, and countries should also refer to complementary national and regional indicators in line with their own development agendas.

Box 6.3. InsuResilience Global Partnership – A collaborative effort towards the development of a holistic, multidimensional MEL framework

Background: The multi-stakeholder InsuResilience Global Partnership for Climate and Disaster Risk Finance and Insurance Solutions is transitioning towards a new MEL framework. The endorsement by the UN Climate Action Summit in late 2019 of the partnership's "Vision 2025", with its six result areas, was the first milestone towards a more comprehensive, holistic and partnership-wide MEL framework. It focuses on broadening impact dimensions and providing evidence on positive long-term impacts of climate and disaster risk finance and insurance. This new MEL framework was developed in a collaborative process to involve different stakeholder perspectives. Members of the partnership, including from civil society, the private sector, implementing programmes and academia, jointly developed a common terminology and formed a technical sounding board for the review process. The framework is complemented by a theory of change that identifies causal chains and links impacts directly to activities under the partnership.

Approach: The framework consists of 19 indicators and corresponding targets, clustered in six result areas. Each result area has a prominent lead indicator (such as the goal of reaching 500 million poor and vulnerable people by 2025). The six result areas track progress on, respectively, 1) total risk covered and number of people protected, 2) number of countries with comprehensive disaster risk finance strategy, 3) number of countries adopting climate and disaster risk finance and insurance solutions, 4) increased cost-effectiveness, 5) development/human impact and 6) increase in evidence. Targets for these indicators were set taking into account estimated baselines.

The performance of the indicators will be measured in multiple ways. The InsuResilience Secretariat conducts annual data collections to measure beneficiaries, coverage volumes in relation to average annual losses and other quantitative indicators across all contributing programmes and projects. This information is complemented by desk research, e.g. on the availability of countries' disaster risk financing strategies. Moreover, a set of research questions and gaps in the field of impact evaluations will be addressed under a specific research plan, the evidence roadmap. Until 2025, the full toolbox of rigorous impact evaluation instruments will be applied to identify and quantify impacts under the partnership.

The foundation of all components of the partnership's MEL are the InsuResilience Pro-poor Principles: impact, quality, ownership, complementarity and equity. These principles were developed by the partnership's M&E Working Group and underwent a partnership-based review process similar to the MEL framework.

Source: (InsuResilience Global Partnership, 2019[73]), InsuResilience Global Partnership Vision 2015, https://www.insuresilience.org/wp-content/uploads/2019/09/InsuResilience-Global-Partnership_Vision-2025-with-Workplan1.pdf

Many indicators refer to the lower levels of the results chain, including headcounts such as the number of beneficiaries, and are only partially suitable for MEL at outcome and impact level. Several reasons pave the way for using headcount indicators for results measurement: they are easy to measure and are derived from monitoring rather than survey data. The latter require additional analysis with statistical methods. Instant or even real-time information can be provided, e.g. on funds disbursed. Furthermore, these figures are very illustrative – a valuable characteristic when, for example, communicating the allocation of expenditures to relevant stakeholders. The previously widely applied log-frame approach focused on output and activities, which explains why many actors are still used to the reporting of headcounts and funds disbursed. In climate risk management, actors might be particularly prone to the use of headcounts and input-related indicators since they provide an opportunity for

aggregation and comparison of data and early communication while the impacts of the intervention still need to be revealed. Nevertheless, such indicators are more suitable for implementation and process monitoring than for evaluating the effectiveness, sustainability or impact of an intervention.

Finally, broad concepts should not result in the selection of a large quantity of metrics to measure the objectives. Many MEL frameworks become rapidly overloaded in terms of the human and financial resources that are necessary to collect the data. If resources are limited, the quality of data collection will be low and the data collected will not be reliable or useful for the institution. It is therefore important – especially if problems are detected in data quality and reporting – to carefully simplify the MEL framework and identify priorities.

7. Assessing impacts of climate risk management interventions

There is a demand for impact evaluation in development co-operation, as providers, stakeholders and the wider public are increasingly interested to understand the extent to which interventions contribute to agreed outcomes. However, providing unambiguous statements about the causal effects of an intervention remains a challenge to any MEL frameworks, including those for climate risk management. Impact evaluations seek to demonstrate that intended results directly or indirectly follow from the intervention (see Box 7.1.). Whilst evaluation of development interventions is nothing new, the focus on impact has become more urgent due to resource constraints and political demands for greater accountability and transparency (Stern, 2015[37]).

Box 7.1. The definition of impact and impact evaluation

The second edition of the OECD DAC Glossary of Key Terms in Evaluation and Results Based Management defines impact as "the likely or achieved higher-level effects of an intervention's outcomes and ultimate effects or longer-term changes resulting from the intervention, including intended and unintended, positive or negative higher-level effects" (OECD, forthcoming[74]). According to the glossary, impact evaluation assesses the degree to which the intervention meets its higher-level goals and establishes the causal effects of the intervention, including quantitative and qualitative, theory-based approaches.

Designing an impact evaluation begins with clarifying the question of interest. In general the impact evaluation questions listed below can be distinguished (see also (Stern, 2015[37])). In practice, evaluations combine multiple questions to assess impacts, such as what works for whom, when and under what circumstances. The evaluation questions of interest and the resources available can guide decisions on the most suitable method design.

- To what extent can a higher-level effect be attributed to the intervention?
- Did the intervention make a difference?
- How has the intervention made a difference?
- Will the intervention work elsewhere?

Systematic or rigorous impact evaluations for climate risk management interventions are still much needed to strengthen the global evidence base and ensure effective allocation of climate finance. Development co-operation providers have an important role to play in providing resources to government decision makers to encourage rigorous impact evaluations and the provision of results to a larger community.

Most impact evaluations build on either quantitative research across different cases (cross-case impact evaluation designs) or qualitative assessments of specific cases (within-case impact evaluation designs). In addition, some mixed and multi-method impact evaluation designs integrate

qualitative and quantitative analysis in order to increase internal and external validity and, finally, the learning potential.

Comparing the outcome across multiple cases in a counterfactual logic is the basis for most systematic impact evaluation designs. Experiments and quasi-experiments are forms of quantitative impact evaluation designs, which are gaining a growing popularity in recent years due to their ability to assess causal attribution. Cross-case (quantitative) impact evaluation designs require a comparison of the same or very similar context with and without an intervention in place. However, the construction of a control group is demanding. An approach to cross-case impact evaluation designs is experiments in form of randomised controlled trials. This approach aims to minimise selection bias through randomised project implementation across the eligible target groups.

In the absence of treatment and control groups, quasi-experimental designs can offer ways to construct a control group artificially (see Box 7.2). In real world policy environments, complex interventions often do not follow the randomised implementation protocols. Hence, the suitability of the abovementioned experimental designs is constrained by the nature of the activities as well as their implementation. Quasi-experimental impact evaluation designs, such as eligibility criteria and a staggered rollout[4] design, can serve as an alternative, when pure experiments are not possible. Compared to randomised controlled trials, quasi-experimental designs have the advantage that they can be carried out while an intervention takes place or after an intervention has been implemented. However, in a quasi-experiment, the control and treatment groups differ not only in terms of the treatment they receive but usually also with regard to other characteristics. Researchers must therefore try to statistically control for as many of these variables as possible. Yet the risk remains that unknown variables causing the difference between both groups escape the researcher's attention, leading to biased results (Banerjee and Duflo, 2011[75]) (Deaton, 2009[76])).

Even though the number of experimental and quasi-experimental evaluations has remarkably increased in the field of development co-operation, there is an enormous untapped potential with regard to its contribution to evidence-based policy making on climate risk management. An evidence-based agenda that builds on systematic impact evaluation should, however, extend far beyond individual studies (White, 2019[77])**.** This contains the rules-based aggregation of evidence from different impact assessments. Such aggregation should be done through systematic reviews of evidence to increase its external validity, and the learning potential for decision makers at the broader policy level.

Evidence gap maps are also part of this agenda, which maps theme-specific evidence by systematically collecting synthesising already existing information (White, 2019[77]). Doswald et al. (2020[36]) present evidence gap and intervention heat maps for climate change adaptation in low- to middle-income countries (see Box 7.4). The evidence gap maps describe where high-quality evidence exists and highlights gaps in available information. The intervention heat map therefore indicates the extent to which a project portfolio of (e.g.) a development co-operation agency is evidence-based. However, these maps do not include a discussion about the content of the information available, the quality of evidence or an evaluation based on the evidence. Hence, when communicating evidence to policy makers, researchers should also point out that the quality of evidence varies.

[4] A randomised staggered rollout allow all experiment participants to access the intervention, but with different timings.

Box 7.2. DEval – Impact, diffusion and scaling-up of a comprehensive land-use planning approach in the Philippines

Background: This evaluation assessed the impact of ten years of comprehensive land-use planning in the Philippines, implemented by German development co-operation. The technical co-operation included enhanced land-use planning and capacity development from the community to the national level, supporting decentralised planning, natural resource governance and resilience to impacts of climate change and other natural hazards. The impact evaluation applied a theory-based mixed-method design and measured the medium to long-term effects, including impacts of the intervention on environmental and socio-economic indicators. Among a diverse set of findings, the evaluation shows that many municipalities were able to increase their risk management capacity and local risk awareness, as well as the development of planning documents. However, the evaluation also found that actual positive impacts on natural resource management and implementation of regulations (on building codes and land use, for example) have been limited.

Approach: The core of this evaluation is a systematic impact assessment in order to measure and quantify effects in five impact fields, including improvements to administrative structures and conditions in planning administrations, the handling of natural resources, measures and activities in disaster risk management, the functions of local governance, and welfare improvements for the affected population. The impact fields are based on a comprehensive reconstruction of the ToC of the intervention. The evaluation uses a theory-based approach and a mixed-method design with panel data from a multi-level survey, qualitative interviews and focus group discussions, literature reviews, document analysis of land-use planning documents and geographical data and information.

The panel data comprise 3 000 households, spread across 300 barangays (districts) in 100 municipalities, with and without assistance, across 11 provinces in the Visayas region, measured at two points in time (2012 and 2016). The impact assessment method is based on a quasi-experimental design, in which the evaluation applies a propensity score matching procedure with lagged outcome variables. With this procedure, the evaluation identifies “statistical twins”, based on several dozen characteristics of the municipalities, barangays and households.

Source: (Leppert et al., 2018[78]), Impact, Diffusion and Scaling-Up of a Comprehensive Land-Use Planning Approach in the Philippines: From Development Cooperation to National Policies, https://www.deval.org/files/content/Dateien/Evaluierung/Berichte/2018/DEval-2018_Philippinen_final_web.pdf

Qualitative comparative case study designs can complement or substitute experimental and quasi-experimental designs, when neither the evaluation questions nor the characteristics of the intervention can enable a purely quantitative impact evaluation design. Qualitative comparative analyses are particularly suitable for climate risk management interventions that are performed across different cases and contexts and for which “how” and “why” questions should be answered (see Box 7.3). Such qualitative methods help to identify new or previously missing variables and thus avoid omitting variables in the formulation of hypotheses. The identification of variables can also help to draw conclusions about the underlying causal mechanisms (Stern, 2015[37]). Comparative case studies can be relevant in assessing the determinants of effectiveness across different interventions, such as the influence of government policies and markets on outcomes or the influence of accompanying technical assistance.

Box 7.3. EBA – Evaluation of the Swedish Climate Change Initiative, 2009–12

Background: The evaluation subject is the Swedish government's development co-operation in climate change over the period 2009–12, known as the Swedish Climate Change Initiative. The evaluation focuses on long-term impacts as well as governance and co-ordination issues concerning the initiative. As part of a broader government initiative on climate and energy, the Climate Change Initiative worked through multilateral organisations (via the Swedish Ministry for Foreign Affairs) as well as bilateral and regional efforts (via the Swedish International Development Co-operation Agency). The goal of the Climate Change Initiative was to contribute effectively to long-term adaptation efforts, especially in the poorest countries, and to developing countries' efforts to reduce greenhouse gas levels.

Approach: With regard to the framework conditions of the evaluation – complexity, governance and learning – the evaluation approach combined elements from case studies and portfolio analysis at various levels, including country, regional and global. With regard to complexity responsiveness and its focus on learning, the evaluation worked through a close and iterative co-learning process with an evaluation reference group taking a principles-based design approach into account.

Source: (Colvin et al., 2020[79]), Evaluation of the Swedish Climate Change Initiative, 2009–2012, https://eba.se/wp-content/uploads/2020/04/Evaluation-of-the-Swedish-Climate-Change-Initiative-2009-2012-2.pdf

In addition to cross-case analyses, a within-case (or qualitative) analysis can also help evaluate causal relationships between an intervention and its impacts in a systematic, theory-based manner. Approaches to within-case analysis include contribution analysis, process tracing or realist evaluation. Unlike experimental designs, qualitative methods do not rely on counterfactual causation. Instead, they analyse the (intervening) causal mechanisms or processes that generate the outcomes (Schmitt, 2020[80]). This is also referred to as "generative causation" (Stern, 2015[37]). Below shows examples of approaches to within-case analyses:

- Contribution analysis: This approach recognises that effects are produced by several causes at the same time, none of which individually might be necessary or sufficient for the impact to materialise (Mayne, 2012[47]).
- Process tracing: This approach essentially explores a series of interlocking events or facts, referred to as mechanism parts. Taken together, they can contribute towards an explanation of the outcomes. Advocates of process tracing approach argue that the analysis of causal mechanisms can provide a better understanding of the inner workings of complex programmes, such as blended finance, and might be more suitable for interventions with small sample size (e.g. comparing results between only a few countries). (Befani et al., 2016[81]) (Befani and Mayne, 2014[82])).
- Realist evaluation: This approach assumes that nothing works everywhere or for everyone, and that the context really does make the difference (Westhorp, 2014[83]).

Box 7.4. Green Climate Fund/DEval – Evidence gap and intervention heat maps of climate change adaptation in low to middle-income countries

Background: There has been considerable interest in understanding what does and does not work to increase the ability of human and environmental systems to adapt to changing climate. The Green Climate Fund and DEval developed an evidence gap map that examines evidence on development co-operation work on climate change adaptation in low and middle-income countries between 2007 and 2018. The study analyses evidence related to the effectiveness of adaptation measures.

Approach: First, an evidence gap map is developed by systematically and exhaustively reviewing adaptation-related high-quality evidence from evaluation and research in developing countries, from both peer-reviewed and grey literature. In total 464 papers were included. The evidence gap map categorises the literature by type of intervention, sector of activity and type of outcomes measured. Second, the study introduces an innovative extension to a pure evidence gap map: in international development co-operation, interventions should ideally be evidence-based and effective. For countries, donors and development actors, a comparison of the intervention portfolio – for example of the Green Climate Fund (GCF) and Germany – with the available evidence in the form of an intervention heat map can indicate how evidence-based the portfolio is. An intervention heat map also helps these actors identify where more evidence needs to be generated and where interventions are backed by evidence. The study provides this systematic overlay of the evidence gap map with the climate change adaptation portfolio of the GCF and Germany's bilateral commitments in international development co-operation.

Source: (Doswald et al., 2020[36]), Evidence Gap and Intervention Heat Maps of Climate Change Adaptation in Low- and Middle-Income Countries, https://ieu.greenclimate.fund/evidence-review/adaptation

8. Conducting portfolio and allocation analysis for climate risk management

To facilitate further integration of climate risk management into development co-operation, systematic knowledge about the portfolio and the patterns of the allocation of financial resources is essential. Governments and development co-operation providers often lack systematic and comprehensive information about their climate risk management portfolio, which inhibits their understanding of the relevance, complementarity and coherence of the allocation of financial resources to climate risk management (see Box 8.1 and Box 8.2). A comprehensive investigation of resource allocation patterns and factors that influence the allocation is essential for future decision making. Enhanced knowledge about them can support decision making on, for instance, resource allocation between bilateral and multilateral channels, or programmatic and project-based interventions (see also Box 8.1). There is also often limited knowledge on the contributions made by other core development co-operation partners, including civil society, academia and the private sector. A rigorous analysis of perspectives and funding patterns of different development partners contributes to the global knowledge base on potentials and challenges of future climate risk management funding.

A combined approach of a portfolio review and climate finance allocation analysis can generate evidence on the relevance, co-ordination, complementarity and coherence of the portfolio under scrutiny. Such a combined approach also provides a basis for developing questions to be explored in more detailed evaluations. For example, in addition to assessments of allocation patterns of development finance, a follow-up study may focus on the determinants of the allocation patterns. This kind of combined approaches can look into the vulnerability status of the target region or the capacities of local implementing partners, and shed light on past allocation decisions in order to improve them further in the future (see Box 8.1). To determine whether current allocation patterns are consistent with global development agendas, as well as national strategies and priorities, results from both analyses should be mirrored with findings from a qualitative content analysis of strategy documents and expert interviews at central (e.g. national) and decentralised (e.g. sub-national) levels. Finally, results should be cross-checked by perspectives of different development partners, including government, civil society organisations, the private sector and final beneficiaries.

Box 8.1. DEval – Evaluation of climate change adaptation measures: a global portfolio and allocation analysis

Background: In accordance with the Paris Agreement, Germany has set itself the objective of supporting partner countries and people most affected by climate change. DEval examined to what extent this objective is reflected in the allocation patterns of Germany's adaptation finance from 2011 to 2017. Specifically, it examined the extent to which increasing climate vulnerability affects a country's probability of receiving adaptation commitments and the amount of funds committed. Furthermore, it analysed to what extent the poorest countries and small island states benefit from Germany's support in adaptation measures.

Approach: The evaluation's methodological approach is based on theory-building and theory-testing procedures within the scope of a macro-quantitative portfolio and allocation analysis. The evaluation combines statistical data analysis with document analysis and qualitative interviews with development co-operation providers, implementing organisations and civil society. Such an approach is suited to the evaluation of cross-sectoral issues, which are usually connected to different thematic or sectoral strategies and can therefore rarely be dealt with using evaluation approaches derived from already existing theories. The theory-building component operationalises the research interest through empirically verifiable expectations or assumptions. The theory-testing component confirms or refutes the identified expectations and forms the basis for this evaluation module's conclusions and recommendations. The central database for this study is the Creditor Reporting System of the OECD DAC. The OECD data are supplemented with statistical data from other organisations, publicly accessible strategy documents, scientific literature and interviews with key informants.

Source: (Noltze and Rauschenbach, 2019[84]), Evaluation of Climate Change Adaptation Measures. Portfolio and Allocation Analysis, https://www.deval.org/en/evaluation-reports.html

Box 8.2. FAO – Evaluating the contribution to climate change adaptation and mitigation at the country level

Background: The UN Food and Agriculture Organization's (FAO) evaluation of its contribution to climate change adaptation and mitigation focused on the results of the organisation's work at the country level. The exercise sought not only to assess the FAO's work on the issue and indicate where improvement can be made in the future, but also to constructively guide future planning by highlighting areas of strength that can be built upon. It examines the FAO's global comparative advantages in climate change adaptation and mitigation in each of its different forms of assistance and engagement by assessing the relevance, effectiveness, sustainability and innovative quality of the FAO's work in different areas.

Approach: The evaluation used a variety of methods for data collection and analysis to gather evidence with a primary focus on qualitative tools and methods. In a first step, 11 countries were selected for closer investigation. The FAO's strategic objectives and a literature review then served to develop a framework with four broad domains and more specific sub-domains. Activities and contributions were subsequently mapped against these to create a composite image of the FAO's engagement in climate mitigation and adaptation. Semi-structured interviews with internal and external stakeholders served as the main source of information to draw inferences on the contribution made by the organisation's interventions, as well as their strengths and weaknesses. This information was complemented with two short surveys among member countries and partners as well as a review of past evaluations and other documents. The insights generated are strategic in nature: for example, a comparative advantage for the FAO was identified in harmonising climate change and disaster risk reduction policies in member states. In order to leverage this potential, strengthening the expertise on climate issues in FAO Country Offices was recommended. The involvement of stakeholders allowed, amongst other things, the identification of an unmet demand of governments in the area of capacity building in data and knowledge generation.

Source: (FAO Office of Evaluation, 2015[85]), Evaluation of FAO's Contribution to Climate Change Adaptation and Mitigation. Final Report, Thematic Evaluation Series, http://www.fao.org/3/a-bd903e.pdf

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