TAMD

Tracking Adaptation and Measuring Development:
a step-by-step guide

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Contents

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Acronyms

CRM	climate risk management
CAF	County Adaptation Fund
CAPC	county adaptation planning committee
CSSP	Climate Change Strategic Action Plan
DAC	Development Assistance Committee
DDC	district development committee
DFID	Department for International Development
DRR	disaster risk reduction
EU	European Union
ICF	International Climate Fund (UK)
IEG	Independent Evaluation Group
IIED	International Institute for Environment and Development
IPCC	Intergovernmental Panel on Climate Change
M&E	monitoring and evaluation
NAPA	National Adaptation Programme of Action
NGO	non-governmental organisation
NSDP	National Strategic Development Plan
RCTs	randomised control trials
SLMP	Sustainable Land Management Project
TAMD	Tracking Adaptation and Measuring Development
VDC	village development committee
WAPC	ward adaptation planning committee

Introduction

Tracking adaptation and measuring development (TAMD) is a conceptual framework to monitor and evaluate climate change adaptation.

TAMD can be used by national and local governments, or within a programme or project to assess both institutional climate risk management (CRM) and adaptation and development outcomes. It is designed to promote thinking about outcomes and encourage longer-term thinking about resilience and climate change adaptation.

TAMD is a twin-track framework that evaluates adaptation success as a combination of how well countries or institutions manage climate risks and how successfully adaptation interventions reduce vulnerability and keep development on course. It does this by:

- generating frameworks that can be tailored to specific contexts;
- assessing the adaptation process at multiple scales – from multiple-country initiatives to local projects; and
- linking CRM, vulnerability and resilience, and broader human wellbeing.

The TAMD framework has been piloted in six countries. This guidance builds on these experiences and provides detailed steps on how to use TAMD to guide the monitoring and evaluation (M&E) of adaptation in a variety of different contexts.

Who should use this guidance?

▶ National government officials (planning and environment officials, line ministries, members of climate change committees and commissions) can use the guidance to:

- evaluate policies, plans and programmes of particular ministries;
- track national development and adaptation performance in the context of evolving climate-related risks; and
- promote long-term thinking about adaptation and development.

▶ Local governments or district councils can use TAMD to set up M&E systems for local adaptation planning, use to strengthen local plans from their inception, and to evaluate adaptation policies, programmes or projects.

▶ Development agencies and NGOs can use TAMD to:

- design programme and project M&E systems, and assess the effectiveness of programmes and projects;
- mainstream climate change M&E at the institutional level;
- evaluate their own capacities for CRM;
- support partner countries in the development of M&E systems and frameworks to assess policies, plans and programmes, and national adaptation performance; and
- support partner country governments in assessing the effectiveness of adaptation interventions and targeting of CRM.

This manual offers a step-by-step guide to how to assess the effectiveness of adaptation. It is anticipated that users will integrate relevant elements of the TAMD framework into existing local and national systems or programme M&E and that the TAMD framework will dissolve in each context.

This is the first version of this manual building on the experience of testing TAMD in Kenya, Mozambique, Nepal, Pakistan, Cambodia and Ethiopia. This manual will be updated and revised as more experience is generated on each step.

This manual provides the reader with:

- An understanding of the key elements of the TAMD framework
- A step-by-step process for developing a robust M&E framework that can be used as part of local and national planning systems, or to assess and compare specific interventions
- Guidance on how the TAMD framework can be applied by different users – such as national governments, sectoral specialists, project and programme managers.

The TAMD framework

TAMD is a twin-track framework that assesses institutional CRM on the one hand (Track 1) and measures adaptation and development performance on the other (Track 2). These processes may be linked to each other and across scales within the TAMD framework.

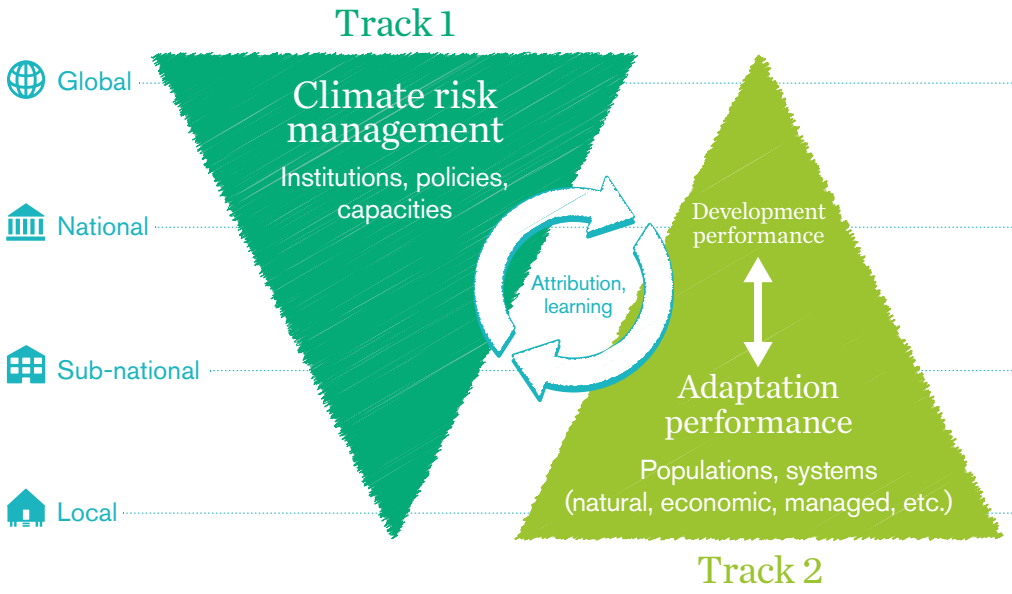


Figure 1. The TAMD framework

Figure 1 shows how the TAMD framework assesses the way in which CRM interventions (in Track 1) influence development and adaptation outcomes (in Track 2) through various processes described for each intervention in a theory of change. However, this simple 'risk management assists adaptation' relationship is just one among many that can be assessed. For example, TAMD can be used to evaluate an intervention's outputs, its short-term outcomes and its longer-term impacts (Box 1) within and across the two tracks, and at scales ranging from multiple countries to individual villages. Thus it can explore how adaptation and/or adaptation-relevant interventions, which have the potential to deliver ancillary adaptation benefits without being explicitly designed with adaptation in mind, contribute to better CRM and help keep development outcomes on course in the face of climate change.

TAMD is intended to be a flexible framework for evaluating adaptation and adaptation-relevant development interventions in diverse situations. It can be modified for different contexts and types of adaptation.

Box 1. Outputs, outcomes and impacts

Where TAMD is used to assess the results of specific interventions, these results are most likely to be described in terms of outputs, outcomes and impacts, defined as follows:

- Outputs: goods and services delivered by an intervention.
- Outcomes: shorter-term changes in the population or system targeted by the intervention resulting from the outputs.
- Impacts: longer-term changes that result from outputs and outcomes.

TAMD explicitly addresses the assessment of outcomes, impacts and outputs; it therefore seeks to go further than many existing or emerging adaptation M&E approaches.[1]

Climate risk management

Track 1 captures the institutions, policies and capacities for CRM that are needed for a particular intervention. For example, these could be a set of national capacities needed to manage climate risks in the national climate change strategy, or the institutional capacities needed within a village committee to deal with local climate risks with the support of district and national institutions. We have developed a set of nine indicators for Track 1 (see Step 3), which can be modified for different contexts.

Theories of change

A theory of change connects the activities to the anticipated changes of a policy or programme through a set of causal mechanisms. In the TAMD framework this can be between Track 1 and Track 2, connecting CRM to changes in resilience, or it can be within one track. Once a

1 | IEG (2013)

theory of change has been established, TAMD provides a framework for exploring the links between CRM, resilience and wellbeing/development outcomes. This can be done by locating these elements, and the relationships between them, on the TAMD tracks – in other words, by defining a pathway across the TAMD framework.

Adaptation and development performance

Within Track 2, interventions should firstly improve resilience and adaptive capacity and/or reduce vulnerability:

- Resilience: the ability of a system to continue functioning in the face of shocks and stresses.
- Adaptive capacity: the ability to respond effectively to changing stresses and shocks to manage or reduce risk.
- Vulnerability: the susceptibility to being harmed when exposed to an external shock or hazard.[2]

Put more simply, interventions should improve the underlying capacity of a households, communities or other system to anticipate, avoid, plan for, cope with, recover from and adapt to (climate-related) stresses or shocks. Such improvements may be characterised as outcomes in project/programme contexts. However, the way outputs, outcomes and impacts are defined varies across contexts (see Box 1 for general definitions). Consequently in this guidance we will refer to indicators of these first-level Track 2 outcomes as resilience-type indicators, for the sake of simplicity.

Improvements in resilience and adaptive capacity, and reductions in vulnerability, are outcomes representing intermediate goals that ultimately should improve human wellbeing and reduce costs in terms of assets, livelihoods and lives from climate-related stresses and shocks. Within government systems, improvements in human wellbeing and reductions in costs in terms of assets, livelihoods and lives are generally referred to as development outcomes. In the language of programmatic interventions, they are generally referred to as impacts. In this guidance, we refer to these second-level Track 2 indicators as wellbeing indicators. These include common development indicators relating to aspects health, nutrition, poverty/economic status, education, assets, livelihoods and lives.

Track 2 encompasses both changes in resilience (adaptation-specific results) and improvements in wellbeing (more general development results). Indicators representing these two different types of adaptation result may be useful for different audiences. For example, a local planning system may use local resilience indicators at the planning level for each community linked to the adaptation interventions they are implementing, but then track related wellbeing and impact indicators at the county government level.

2 | See the glossary of IPCC (2014) Working Group II of the report for detailed definitions of these three terms.

Steps in applying TAMD

There are six key steps to the effective application of TAMD, that can be followed in diverse M&E contexts (Figure 2).

	1	Scope	Entry points; existing systems; purpose.
	2	Theory of change	Linkages; pathways; outputs, outcomes and impact.
	3	Defining and constructing indicators	Climate risk management; resilience-type; wellbeing; climate.
	4	Measuring indicators	Sampling; baselines; methods; climate indices.
	5	Analysing and interpreting results	Attribution; aggregation; contextualising.
	6	Learning	Revisions; lessons; communicating.

Figure 2. The six steps in applying TAMD

Together these steps, set out in the next six sections, comprise the TAMD framework or system. These steps are iterative, meaning results from one step can feed back into previous steps, and steps may be repeated. This can lead to refinements in the processes represented in these previous steps during an intervention, or improving the way these steps area followed or applied in future initiatives. The results of TAMD can therefore be used to inform the planning of subsequent adaptation investments and activities, and to develop CRM processes. There are also cross-cutting issues to consider while applying the framework, such as gender equality and the political context[3].

3 | Fisher (2014)

Steps

Step 1 – Scope

Summary

- Outlines potential entry points for using the TAMD framework
- Discusses different uses of TAMD along the adaptation-development continuum
- Outlines key dimensions to consider about the adaptation context
- Addresses the need to identify key actors, institutions, M&E systems and data sources

The first step in the application of TAMD is to identify the scope and purpose of the M&E to be undertaken. This will involve identification of:

1. The entry point(s) for adaptation M&E, which might be the tracking of adaptation performance at the national, sectoral or local/sub-national level, or the evaluation of specific interventions – e.g. projects, policies and/or programmes (Table 2);
2. The spatial scales and time scales to be addressed by adaptation M&E, which will be closely linked to the purpose;
3. The relevant populations and systems that are the target of adaptation activities, or whose adaptation performance is to be assessed;
4. The climate-related (and other) hazards to which they are exposed, the consequences of these hazards for the exposed populations and systems.

Different applications of TAMD will emphasise different processes and locations on the TAMD tracks (Figure 1).

The time and spatial scales over which TAMD is applied will shape the focus of the M&E being carried out. For example, tracking of national or sectoral adaptation performance is likely to focus on the quality of CRM processes and mechanisms at the national level, and how these are linked to national development performance as measured in terms of typical development indicators interpreted in the context of observed changes in climate (see Steps 2–5). This type of tracking of adaptation will be carried out over long timescales, with national and sectoral M&E systems enabling adaptation performance to be tracked over years to decades. Within such contexts, TAMD might be integrated into, or used to inform the development of, existing national M&E systems. It will be important to consider how any M&E undertaken through TAMD might affect relations between different stakeholders, tiers of government and government agencies, as well as the accountability of government.

In contrast, where TAMD is used for the M&E of specific projects and programmes, the focus is likely to be on how these improve resilience over shorter timescales that match the lifetimes of projects and programmes, generally between three and five years (see Steps 2–5). Changes in CRM processes at the relevant project/programme scales might also be tracked in these contexts.

Populations, systems, hazards and consequences should be identified together, as different hazards will be relevant to different populations and systems. For example, storms and storm surges may be a priority for coastal communities, whereas drought may be a priority for people in certain non-coastal areas. Even where people are concerned with the same hazards, the consequences may be different for different groups. This may be a result of differences in physical location, livelihoods, or levels of poverty and vulnerability. Information on the prevalence of different hazards and their consequences for different populations, groups, locations and sectors may be available from national databases, meteorological and hydrological services, and other sources such as technical reports, academic papers and news media. Identifying sources of such information, including of climate data for the characterisation of climate hazards (see Step 3), is an important part of scoping.

The most likely entry points for the application of TAMD, and the focus of each application, are summarised in Table 1.

Table 1. Entry points for TAMD, with associated parameters

Entry point	Focus	Spatial and time scales
1. Tracking national-level performance of adaptation	National-level institutional mechanisms for CRM (Track 1) National-level development performance (Track 2)	National level Long timescales (years to decades)
2. Tracking the performance of adaptation within a particular sector	Sector-specific CRM (Track 1) Resilience of sector (Track 2) Sector performance (Track 2) Resilience of people and (development performance of) communities as relevant to sector (Track 2)	National level Long timescales
3. M&E of individual programmes and projects	Project/programme-specific Likely to focus on CRM (Track 1 and/or resilience (Track 2)	Local, district or regional level Short timescales (years)
4. Evaluating the impacts of particular policies	Policy-specific Likely to focus on CRM (Track 1) and/or resilience (Track 2)	National or district level Short to medium timescales (years to around a decade)
5. Tracking and/or strengthening adaptation planning and performance at the local level	Likely to focus on resilience (Track 2), but will also include CRM (Track 1) and may track local development performance (Track 2)	District or local/community level Medium to long timescales

Box 2 describes an application of TAMD in local planning in Mozambique, the fifth entry point in Table 1.

Box 2. Applying TAMD in Mozambique to strengthen local adaptation planning

TAMD has been used in Mozambique to support and strengthen local planning in the form of local adaptation plans (LAPs). This was piloted in Guija District and then rolled out to other districts as part of the LAP process. Developing a LAP involves 10 steps from scoping, to assessing vulnerability, designing the plan, collecting data and eventually evaluating it. Using the TAMD framework, the research team designed local level scorecards and integrated theories of change into step 2 of the LAP process, right at the beginning. This allowed the district to identify a clear goal for their adaptation activities and vision of what the climate-resilient district would look like. The theory of change was developed with engagement from district stakeholders and local communities. Following the vulnerability assessments and theory of change process, the team identified Track 2 indicators for adaptation and development performance in consultation with district staff.

Source: Artur *et al.,* 2014.

TAMD can also be mapped to the development and adaptation continuum[4]. This continuum describes different activities that contribute to adaptation, from generalised vulnerability reduction through capacity development and CRM, to targeted adaptation actions to address specific climate change risks and impacts (Table 2). Most activities currently labelled as adaptation fall under the heading *Addressing the drivers of vulnerability,* although there is an increasing focus on activities under the headings *Building response capacity* and *Climate risk management.* Few existing adaptation activities can be said to fall under the heading of *Confronting climate change.* However, if adaptation is to be effective and successful in the medium to long term, governments and organisations tasked with addressing climate change need to be engaging in activities under all four headings. When designing an M&E system (and when identifying adaptation activities) it is useful to identify how the activities being monitored and evaluated map onto the development and adaptation continuum.

4 | McGray et al. (2007); Tanner and Mitchell (2008).

Table 2. Mapping TAMD onto the development and adaptation continuum

	Addressing the drivers of vulnerability	Building response capacity	Climate risk management	Confronting climate change
Development and adaptation continuum	Focus on general vulnerability reduction and improved resilience with limited or no direct attention to climate change (focus on existing climate and non-climate risks)	Improving planning processes, communications, governance, weather monitoring, early warning systems, etc.	Integrating climate considerations and information (projections, risk assessments) into decision-making processes	Addressing specific climate change impacts and risks through targeted adaptation actions that would not be necessary without climate change
TAMD relevance	Tracking improvements in resilience and adaptive capacity, and reductions in vulnerability (TAMD Track 2)	Tracking improvements in CRM (TAMD Track 1)		Tracking development performance in the context of climate change: Is development on track despite observed changes in climate (TAMD Track 2)?

Source: After McGray *et al.* 2007 and Tanner and Mitchell 2008.

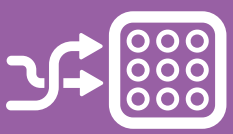
Checklist:

- ☑ Have you chosen your entry point for M&E? (e.g. national, sectoral or local planning, projects and programmes, policy evaluation)?
- ☑ Are you addressing drivers to vulnerability, response capacity and climate risk management or confronting climate change?
- ☑ Have you identified the key actors and institutions to engage in the M&E process?
- ☑ Have you identified the targeted populations and systems, climate-related hazards and the consequences for these hazards on the exposed populations and systems?
- ☑ Have you identified potentially relevant data sources and existing M&E systems?

Step 2 – Theory of change

Summary

- Discusses how to develop a theory of change
- Describes how to link targeted populations and systems, climate-related hazards and their consequences with the relevant adaptation processes and mechanisms
- Addresses how to map the theory of change across the TAMD framework
- Discusses how to map outputs, outcomes and impacts on the TAMD framework where relevant



Step 2 involves articulating a theory of change to frame and guide the M&E that is being undertaken.

A theory of change is effectively an explanatory model that links actions with results via causal mechanisms and pathways. For specific interventions, a theory of change can be viewed as a narrative that identifies the causal mechanisms linking outputs with outcomes and impacts.[5] The theory of change for a project or programme will be closely related to – and can be seen as a narrative representation of – the logframe. For projects and programmes, outputs, outcomes and impacts might be located anywhere on the TAMD framework/tracks, depending on the structure of the logframe.

A theory of change may have been developed during the design phase of an intervention or plan, and will be implicit in the log frame of the project or programme. However, it may or may not articulate the causal mechanisms and pathways linking outputs, outcomes and impacts. This step therefore represents an opportunity for quality control of any existing theory of change, in which those involved in managing an intervention can further test any underlying assumptions and revise and improve the theory of change, as well as ensure that it is adequate for the purposes of M&E.

Table 3 presents some very broad theories of change for the different entry points of the application of TAMD, identified in Step 1.

5 | For a more detailed discussion of theories of change, see Vogel (2012) and Bours *et al.* (2014).

Table 3. Broad theories of change for different entry points for the application of TAMD

Entry point	Theory of change
1. Tracking the performance of adaptation at the national level	Improved CRM at national level leads to better CRM at sub-national scales, which enhances resilience and builds the adaptive capacity of people, institutions and systems, enabling them to respond effectively to climate change and secure and improve wellbeing and development performance.
2. Tracking the performance of adaptation within a particular sector	Improved CRM at sector level makes the sector in question more resilient and better able to respond effectively to climate change risks, thus improving performance.
3. M&E of individual programmes and projects	Project activities and outputs enhance CRM and improve the resilience of targeted systems and populations.
4. Evaluating the impacts of particular policies	Policies that address climate change (directly or indirectly) influence CRM processes and factors that are important for people's and communities' resilience (and/or drivers of vulnerability).
5. Tracking and/or strengthening adaptation planning and performance at the local level	Multiple activities at local level aimed at addressing climate-related risks result in better local CRM and improved resilience of communities and households, with a positive impact on wellbeing and development performance.

Establishing a theory of change

The populations and systems targeted or influenced by adaptation actions, the hazards to which they are exposed, and the consequences of these hazards are identified in the scoping phase (Step 1). In this step, a theory of change is developed to identify:

1. The assumed causal mechanisms and pathways that lead from hazards to consequences (including physical/geographical variations in exposure, societal drivers of vulnerability, limits to resilience and constraints on capacities to cope and adapt).
2. The adaptation processes and mechanisms – such as better CRM and improved resilience – that are expected to result in an amelioration in the consequences of hazards.
3. The changes in causal mechanisms and pathways, and in the consequences of hazards for exposed populations and systems, that are expected to result from adaptation and that might be tracked using indicators (see Step 3 below).

Where TAMD is applied to track adaptation and development performance in general, without being tied to a particular intervention, theories of change may seek to explain how multiple, evolving CRM processes and mechanisms – for example, at national level – affect resilience, vulnerability and adaptive capacity, and/or how changes in these phenomena affect wellbeing and development at large. This approach is applicable to the tracking of adaptation performance at national level and at smaller scales such as district level. At this level, the theory of change might play an important role in linking CRM and development outcomes, which can be tracked at national level, with changes in resilience and vulnerability that are not so amenable to tracking at national level because of their highly context-specific nature (see Step 3).

Where TAMD is applied to the M&E of a specific intervention – a programme, project or policy – a theory of change should explicitly link the outputs, outcomes and impacts of the intervention. At the project and programme levels there is much more scope for identifying specific adaptation processes and mechanisms through methods such as participatory assessments and focus groups, from which beneficiary, stakeholder and expert narratives can be derived.

Theories of change should result in assumptions about how adaptation activities will lead to desired results being made explicit in narratives that identify and describe the (assumed) causal mechanisms and the processes leading from activities to results. These narratives should be developed in cooperation with, and scrutinised by, key experts, stakeholders and beneficiaries, based on their experiences and understandings of adaptation and risk contexts.

Narratives should be subject to constant review throughout an intervention or monitoring period, based on whether or not monitoring indicates that expected results are being (or are likely to be) achieved. Monitoring might include regular feedback from stakeholders and beneficiaries – for example, in the form of narrative descriptions of how their situation is changing and whether/to what extent this might be attributed to the intervention. It might also include structured surveys that seek to detect whether assumed causal mechanisms are active.

Theories of change should consider how the processes, mechanisms and pathways linking hazards to consequences, and adaptation activities to improved CRM, resilience and wellbeing, might differ for different groups, most obviously men and women.

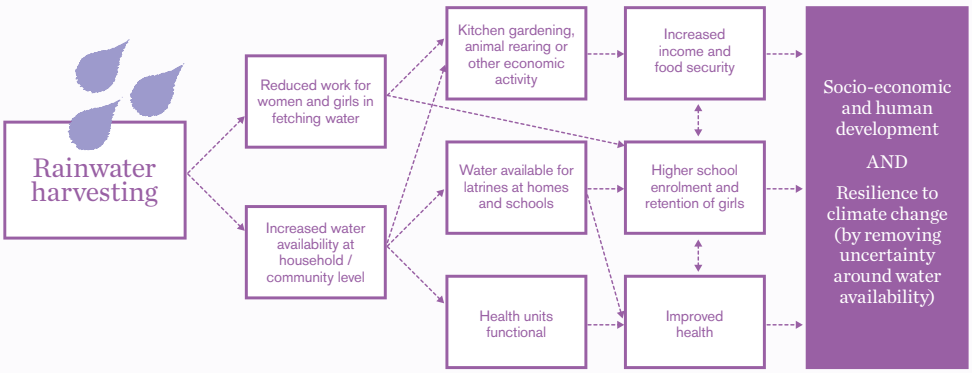
The example from Pakistan (Box 3) shows how taking a gender lens to a theory of change can highlight important changes in women and girls livelihoods and resilience.

In addition to considering gender dimensions, theories of change should consider the different experiences across groups differentiated by age, livelihood, geographical location, ethnicity and other factors as appropriate to the context. The particular experiences of the very poor and of marginalised groups should be considered.

Box 3. Applying TAMD in Pakistan

In Pakistan, TAMD was used to assess the developmental effectiveness of rainwater harvesting activities, testing the framework for monitoring and evaluating local-level climate-resilient economic growth. This involved developing indicators to understand how rainwater harvesting may impact livelihoods, health and education. The theory of change in this case (see below) was developed by compiling the findings of a series of interviews – with local people and those implementing the intervention – which focused on how rainwater harvesting is enhancing lives and livelihoods.

Interviewees said that by harvesting rainwater, women and girls spent less time fetching water and therefore had more time for other activities such as gardening or school. Stakeholders had anticipated that the initiative would increase the amount of water available for gardens and homes, and have a positive impact on health. Other expected consequences of reduced work and increased water were higher incomes, increased food security from gardening, improved employment from higher education and improved health. Results from the study showed that girls' school attendance increased as they were spending less time fetching water. This theory of change is an example of using a gender lens in applying TAMD.



Source: Khan *et al.*, 2014.

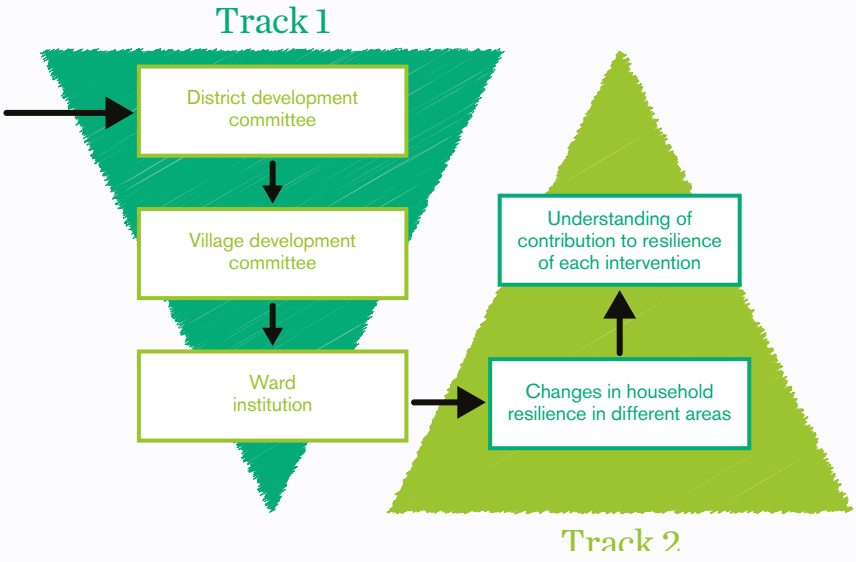
Defining pathways through the TAMD tracks

Once a theory of change has been established based on the principles outlined above, TAMD provides a framework for exploring the links between CRM, resilience and wellbeing/development outcomes – the three key elements of any system for tracking adaptation and its relationship to development – and outputs, outcomes and impacts – the three key types of results of a specific intervention or set of interventions. This can be done by locating these elements, and the relationships between them, on the TAMD tracks. Establishing the nature of the links between CRM in Track 1 and adaptation and development results in Track 2 is an important part of this exercise.

The result of this exercise will be a pathway through the TAMD tracks that represents the theory of change. Box 4 shows how different actors and types of results (which might correspond to outputs, outcomes and/or impacts in the case of specific interventions) can be located at various points along this pathway.

Box 4. Applying TAMD in Nepal

In Nepal, TAMD was used to assess community and household resilience and how these might be measured across different climate-relevant interventions. Local communities were matched for similar hazard and socio-economic profiles and then compared to understand the contribution of different interventions to building resilience in each area. The first entry point on Track 1 (CRM) is the district development committee, who used scorecards to monitor changes at district level and the context within which they were working. The next stage is the village development committee. Here, the interventions used in the study engage with the local government structures, who use scorecards to monitor climate planning at village level. Track 1 then goes down to the local institutions that are delivering local programmes – for example, the Community Forest Users' Group or the Ward Citizen's Forum. Focus groups helped to develop local theories of change in each community. This provides a connection between local institutions and any changes in resilience or livelihoods. These results also helped develop relevant indicators for the bottom of Track 2.



Track 2 indicators on resilience were collected at household level and compared for changes over the last five years, constructing a baseline using community recall. This was analysed to compare the changes over the time in the comparison areas.

Source: Fisher *et al.*, 2014.

Where there is an institutional component to the system undergoing M&E, the beginning of the pathway or entry point should be located in Track 1, representing the contribution of that component to CRM. This remains the case even when an intervention or system is not designed in the context of climate change and does not seek directly or explicitly to address climate change or deliver adaptation. This is because interventions and systems that do not target climate change explicitly or directly might still deliver ancillary adaptation benefits. For example, poverty reduction or agricultural interventions involving economic diversification to increase incomes or productivity might also spread or reduce risks associated with the impacts of increasing climate variability and intensifying extremes on crop production, food security and household incomes.

The pathway will then move across from Track 1 to Track 2, where it leads to changes in resilience, adaptive capacity and/or vulnerability, and then on to changes in human wellbeing (such as poverty or health) and development performance, measured by metrics such as economic growth or the Human Development Index.

A specific intervention (e.g. a project or programme) may target CRM processes and mechanisms, and thus have an entry point in Track 1. Alternatively, its outputs may seek directly to influence the resilience, vulnerability or adaptive capacity of individuals through the provision of resources or infrastructure. In such cases, the entry point for the intervention would be in Track 2, most likely at the local level (see Annex III for an example).

Table 4 provides some examples of changes in Track 1 and Track 2 associated with different types of interventions at different scales/levels.

Table 4. An illustration of changes in Track 1 and Track 2 for different types of interventions

Intervention types	Examples	Track 1 changes	Track 2 changes
Improvements in CRM at national level	Climate proofing transport infrastructure	Use of climate projections to judge severity of climate impacts and level of protection measures	Lower incidence of climate-related disruption of transport services Reduced loss of access to trading routes due to climate effects
Improvements in CRM at sub-national level	District authorities prepared for extreme weather events	Increased effectiveness of early warning systems	Reduced losses of household assets
Improvements in CRM at local level	Livelihoods-oriented local adaptation plans of action	Location-specific measures to protect natural resources	Fewer incidences of reduced food, water, energy or human security
Adaptation-related development	Micro-hydro energy generation for off-grid communities Local seed systems to diversify cropping systems Social safety net provision	Energy generation infrastructure located away from flooding Drought-tolerant landraces included in seed system Climate-vulnerable people targeted	Energy access improves range of adaptation options Local food insecurity due to drought is reduced Climate-vulnerable people use safety net provision to recover from climate-related events

Outputs, outcomes and impacts in the TAMD tracks

At a very general level, we might map outputs, outcomes and impacts to: improved CRM processes and mechanisms; improved resilience of populations and systems; and better wellbeing and development performance respectively. Such an approach might make sense for a large programme that seeks to define coherent, comparable results across a range of projects, or for a national M&E system. It also makes sense insofar as improved resilience is not an end in itself, but a means to securing and improving human wellbeing and development performance in the face of climate change. This approach would be associated with outputs located within Track 1 and result in changes in outcomes and impacts located with Track 2.

However, there is considerable variation across institutions and interventions in terms of how outputs, outcomes and impacts are defined (and indeed in the terms used to represent these concepts). For example, an individual project might seek to improve CRM through training and capacity building within an institution. The outputs of such a project might be defined in terms

of the provision of training and information; its outcomes as improved institutional knowledge and access to key information and data sources; and its impact as improved CRM, measured in terms of specific CRM mechanisms established after the project has finished. In this example, outputs, outcomes and impacts would all be located in Track 1.

Similarly, many projects and programmes identify improved resilience as an impact. This might be achieved by working with partners to establish CRM mechanisms such as micro-insurance schemes which are facilitated by, but not directly provided by the project, and thus would be outcomes. The outputs of such a project might be the provision of finance and the establishment of working groups and networks to design micro-insurance systems.

In principle therefore, outputs, outcomes and impacts may be located anywhere within the TAMD tracks, depending on whether they are associated with CRM, changes in resilience, or changes in wellbeing. In practice, outputs are likely to be located within Track 1, which frames them in terms of their contribution to CRM. Where these outputs are represented by fully fledged CRM systems, processes and mechanisms, outcomes and impacts will almost certainly be located within Track 2. However, where an intervention works towards the establishment of CRM systems, process and mechanisms, outcomes and impacts may also be located with Track 1.

Checklist:

- ☑ Have you linked the targeted populations and systems, climate-related hazards and the consequences of these hazards for the exposed populations and systems in a theory of change?
- ☑ Have you identified the relevant adaptation processes and mechanisms that will address these hazards and their consequences?
- ☑ Has the theory of change been developed using participatory methods/ stakeholder engagement?
- ☑ Have you mapped your theory of change as a pathway on the TAMD framework?
- ☑ Have you considered how pathways differ for different groups including those of different genders?
- ☑ Have you identified outputs, outcomes and impacts where relevant, and located these on the pathway?
- ☑ Have you considered how you will test your theory of change?

Step 3 – Defining and constructing indicators

Summary

- Defines four categories of indicators: climate risk management, resilience-type, wellbeing and climate
- Addresses how to use CRM indicators based on existing scorecards
- Discusses how to identify and construct resilience-type indicators
- Discusses how to identify relevant wellbeing indicators and appropriate climate indices

Indicators are metrics that are used to measure change. They can be used to describe a situation, monitor the evolution of a situation and/or measure achievements against an objective, comparing levels of quantitative or qualitative units to a baseline.

The TAMD framework defines four categories of indicators – for CRM, resilience, wellbeing and climate hazards.[6] These are described below.

Climate Risk Management indicators – Track 1

CRM indicators are used to assess the extent and quality of institutional processes and mechanisms for addressing climate-related risks. Nine generic institutional CRM indicators have been defined within the TAMD framework:[7]

1. Climate change integration into planning
2. Institutional coordination for integration
3. Budgeting and finance
4. Institutional knowledge and capacity
5. Climate information
6. Uncertainty
7. Participation
8. Awareness among stakeholders
9. Existence and coverage of local CRM processes

Methodological notes are available for eight of these indicators, which are intended to be generally applicable to institutional contexts at large[8] and the scorecards are in Annex I. The ninth indicator relates to CRM processes at the more local level – for example, management of specific risks or measures such as forecasts, micro-insurance or water resources – which are likely to be highly context-specific and will need to be tailored as necessary.

The TAMD CRM indicators have a scorecard format. Each indicator consists of five questions that ask whether a particular criterion has been met, to which the answer is 'no', 'partially' or 'yes'. Each question is scored as 0, 1 or 2 to correspond to these three possible answers respectively. Each indicator therefore has a maximum score of 10, meaning that an institution can be assessed at regular intervals to see how its CRM performance is changing against each indicator.

6 | Brooks (2014).

7 | These are detailed in Brooks *et al.* (2013), which also reproduces indicator scorecards.

8 | See www.iied.org/tracking-adaptation-measuring-development-tamd-framework

These indicators are intended as starting points for the M&E of institutional CRM. They might be used as off-the-shelf indicators or modified for use in different institutional contexts according to need. In any given context a subset of these indicators might be used, depending on their relevance. Questions from different TAMD CRM indicators might be combined into new indicators. The scoring system might be modified; for example, a system based on a score of 1–5 or 1–10 would enable more subtle changes in institutional capacities to be tracked.

As an example of how the TAMD CRM indicators might be modified, we can consider indicator 5, which relates to climate information. It may be that the use of climate information is a national responsibility and if TAMD is being applied at the district level, the district government need only have the capacity to access and understand the national data portal. At even more local levels such as the village, precursors to CRM such as the ability to learn from past disasters and be flexible when new information is received may be important aspects of CRM to address the development deficit. Annex II gives two examples of modified scorecards.

Although CRM alone cannot address issues of gender equality or the treatment of marginalised groups in planning, it should always be sensitive or responsive to gender and the inclusion of different groups. Extra indicators that help shift attention to gender equality and climate change for example can be integrated into existing scorecards. These types of local indicator can highlight gender inequality and may ultimately enable more transformative gender relations.

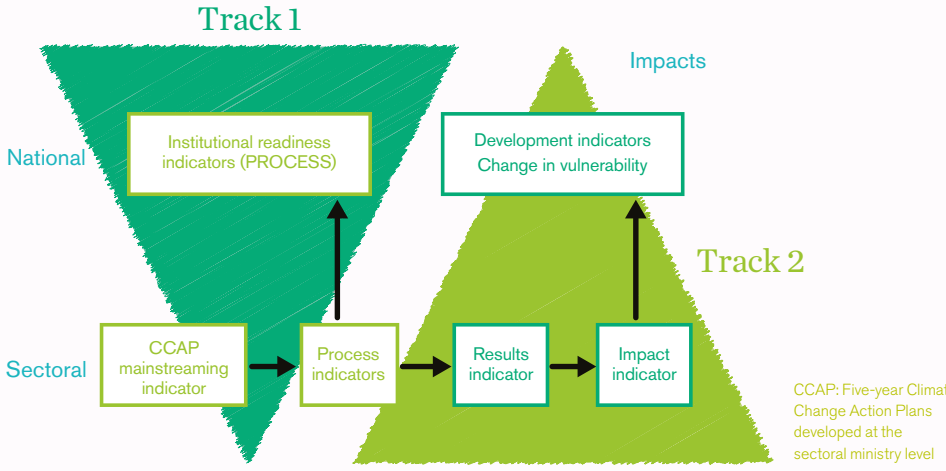
Key questions to ask could be:

- How are women's voices included in CRM processes? Are they involved – as individuals or organised groups – in planning, decision making or prioritisation?
- Do women's groups represent the most marginalised women? Are issues of interest to women included in the allocated projects and funded decisions?
- Do the data collected allow a disaggregated picture of climate impacts by gender?

Track 1 indicators can easily be integrated or added into existing government monitoring systems such as minimum conditions for local governments, or as a way of assessing the implementation of a national action plan. Box 5 gives examples of how CRM indicators have been used in different contexts in the feasibility studies.

Box 5. Adapting TAMD CRM indicators to national contexts – Cambodia

In collaboration with the Climate Change Department of the government of Cambodia and Cambodia Climate Change Alliance programme, IIED and Garama 3C have provided support for the operationalisation of the M&E framework (with a focus on adaptation), using TAMD. The government of Cambodia already has a national M&E framework for assessing its development interventions. They aim to integrate the national M&E system for climate change responses into this framework. This will assist in linking and mainstreaming climate change to national development priorities and targets as set out in the National Strategic Development Plan (NSDP). Using TAMD, CRM process indicators related to capacity development and institutional reforms have been developed at the national level, using a scorecard system derived from the TAMD CRM indicators to measure baselines and assess progress (see Annex II). These CRM process indicators have been prioritised into five key national areas and readiness ladders have been developed to track progress in national-level CRM processes. These readiness ladders have also been adapted as indicators at the sectoral level, and integrated with the core indicators for the Pilot Programme on Climate Resilience (PPCR), in which Cambodia is a participating country.



Other TAMD pilot countries

In Nepal, district and village level scorecards looked at learning and flexibility as well as ability to access or understand national climate services. The Kenyan study focused on four areas of CRM: strengthening of early warning systems; enhanced finance and budgeting processes that include budgeting for climate change; disaster risk reduction (DRR) policy development and operationalisation; and enhanced project coordination and planning to minimise duplication.

Sources: Rai *et al.,* (2014); Fisher *et al.,* (2014); Karani *et al.,* (2014).

Resilience-type indicators (Track 2)[9]

Indicators of resilience, vulnerability and adaptive capacity (resilience-type indicators) all seek to capture the ability of people and systems to anticipate, avoid, plan for, cope with, recover from and adapt to (evolving) stresses and shocks, with the emphasis varying depending on which term/concept is used. Resilience-type indicators generally seek to describe the characteristics or attributes of people or systems that affect their propensity to cope with or be harmed by shocks and stresses. Provided these attributes can be identified, these indicators can be measured at any time - there is no need to wait until a shock or stress occurs. They are thus predictive in nature (higher resilience represents a smaller likelihood of harm in the event of exposure to a hazard), and enable us to move beyond the measurement of intervention outputs to the measurement of changes that result from these outputs, addressing one of the key problems with adaptation M&E – the timescales over which climate change and adaptation are likely to unfold.

In very general terms, resilience can be broken down into a number of different dimensions, each of which encompasses a range of factors that influence resilience, the precise nature of which will vary across contexts (Box 6). Resilience-type indicators will be highly context specific. They therefore should be developed on a case-by-case basis, using a combination of expert judgment, empirical evidence and participatory assessment (see also Box 7). These approaches should be employed to identify the key factors that facilitate or hinder the capacity of people (or systems) to anticipate, avoid, plan for, cope with, recover from and adapt to stresses and shocks. Depending on the factors identified, resilience-type indicators may overlap with commonly measured development indicators such as poverty, health, nutrition, demographic and economic indicators, but this should not be assumed. The development of resilience-type indicators therefore may require significant resources to be deployed for primary data collection. However, this will strengthen M&E systems and deliver valuable learning. Examples of resilience indicators from the feasibility studies are in Annex III.

9 | Detailed guidance on measuring resilience has been developed to support the UK International Climate Fund (ICF)'s Key Performance Indicator No. 4 (KPI4). See: http://bit.ly/1t9xcn2

Box 6. Dimensions of resilience

There are no universal or generally applicable indicators of resilience (or of vulnerability or adaptive capacity), as these phenomena are highly context-specific. However, a number of studies have sought to define dimensions of resilience, with each dimension gathering together a suite of related factors that might be represented by context-specific indicators. A recent review[10] of methodologies for measuring resilience identified the following potential dimensions of resilience:

- assets: physical, financial assets; food and seed reserves, etc (contingency).
- access to services: water, electricity, early warning systems transport, knowledge and information – to plan for, cope with and recover from stresses and shocks.
- adaptive capacity: to anticipate, plan for and respond to longer-term changes – for example, by modifying current practice, creating new strategies.
- income and food access: the extent to which people may be poor or food insecure before the occurrence of a stress or shock.
- safety nets: includes access to formal and informal support networks, emergency relief and financial mechanisms such as insurance.
- livelihood viability: the extent to which livelihoods can be sustained in the face of shock/stress, or the magnitude of shock/stress that can be accommodated.
- institutional and governance contexts: the extent to which governance, institutions, policy, conflict and insecurity constrain or enable coping and adaptation.
- natural and built infrastructural contexts: the extent to which coping and adaptation are facilitated or constrained by the quality and functioning of built infrastructure, environmental systems, natural resources and geography.
- personal circumstances: other factors that make individuals more or less able to anticipate, plan for, cope with, recover from and adapt to changes in stresses and shocks – for example, debt, low socio-economic status, etc.

10 | Brooks et al. (2014).

Box 7. Statistical approaches to the identification of resilience-type indicators

One way of identifying resilience-type indicators is to examine the strength of the correlations between socio-economic and other (e.g. environment, governance) variables and measures of the effects of climate hazards (e.g. mortality, economic losses). In such an analysis, the variables should be time lagged, so that measures of hazard effects represent a period after that represented by the socio-economic variables. Socio-economic variables that are strongly correlated with hazard effects can be used as proxies for resilience or vulnerability, based on their power to 'predict' these effects. Logical explanations should be sought for any strong correlations between these variables, and the possibility of spurious correlations discounted as far as possible. This will involve some consideration of how hazards vary across the populations represented in the analysis, to eliminate the possibility that the correlations are driven by hazard behaviour rather than resilience or vulnerability. For example, do floods simply occur more frequency in areas where people are more likely to practice a certain type of agriculture, or fall below a certain level of household income?

This approach was used in Cambodia to identify indicators of vulnerability to floods, storms and droughts, using local-level data in a national database. Using this approach, a small sub-set of vulnerability indicators was isolated from a much larger set including hundreds of indicators. These indicators were used to produce preliminary maps of vulnerability to different types of hazards at the commune and district levels. These indicators will be validated and possibly augmented (for example through the inclusion of new vulnerability-focused questions in the national census) on the basis of participatory assessments of vulnerability in selected communes.

The concepts of resilience, vulnerability and adaptive capacity are only meaningful when they refer to specific entities, hazards, consequences and timescales. In other words, who is (not) resilient, to what, with respect to what consequences, and over what period(s)? For example, we might talk about a population's resilience to droughts likely to be experienced over the next decade, in relation to its food security. Specifying the consequences (in this case, reduced food security) allows us to link resilience with wellbeing and to identify relevant wellbeing indicators within our theory of change (Step 2). Specifying the timescale encourages us to think about what magnitude of hazard we are concerned with. Here we are looking ahead a decade and we can ask how severe droughts are likely to be over this period. A population might be resilient to droughts of a magnitude likely to be experienced over the next 10 years, but unable to cope with more severe droughts that might occur by, for example, 2050 as a result of climate change.

Household surveys and participatory workshops can be employed to ask key questions such as:

- What are the key hazards and associated impacts in a particular area/for a particular population or group?
- How are people likely to be most affected by these hazards? What are the main consequences?
- Who is likely to be most or least affected by these hazards?
- What factors make people more or less likely to be affected?
- How are women and girls, and those in extreme poverty or belonging to marginalised groups, affected by these hazards?
- Which groups have been most successful in adapting to changes that have already occurred, and why?

The results of such participatory narratives should be triangulated with a wider body of evidence, and participatory methods should be designed to provide supporting evidence and address existing risks. Future risks should also be considered.

Once the factors that are most important for mediating resilience, vulnerability or adaptive capacity have been identified, indicators for measuring and tracking them need to be constructed (see Box 8).

In any given context, there may be many factors that influence resilience, vulnerability and adaptive capacity. Where indicators are being developed for the M&E of a specific intervention, adaptation and resilience building activities might target only a subset of these factors. In these contexts, a decision will need to be made regarding which factors to represent and track with indicators. For example, should resilience at large be tracked, or just those aspects of resilience targeted by the intervention? Positive changes in the aspects of resilience targeted by the intervention might be offset or overwhelmed by negative changes in other aspects of resilience driven by forces outside of the intervention's influence. Can the intervention still be said to have been successful in such circumstances – for example, by preventing an even greater deterioration in resilience? Tracking aspects of resilience outside an intervention's influence at least enables us to place its results in a broader context, and to address any apparent inconsistencies between intervention-focused resilience indicators and broader trends in, for example, wellbeing indicators. Careful consideration therefore should be given to the construction of indicators representing factors outside the influence of an intervention that might be important for evaluation of the intervention's effectiveness.

Box 8. Different ways of constructing resilience-type indicators

Factors or characteristics that influence people's or systems' resilience, vulnerability and capacity to adapt to climate stresses and shocks might be represented by the following different types of indicators:

- Categorical indicators, based on assigning an entity such as an individual or household to a category (for example, low, moderate or high) according to certain criteria (for example, how easily they can access certain resources). Categorical indicators are likely to be constructed using participatory assessments and to involve a degree of subjectivity. They are essentially qualitative indicators, but can easily be represented as scores (such as 1–3 or 1–5) that map onto the categories.
- Binary indicators, consisting of 'yes' or 'no' answers that might be represented as scores of 1 or 0. So, you may ask a question such as: do you use weather forecasts to decide when to plant? Multiple binary indicators can be combined to create composite quantitative indicators with the same score ranges as categorical indicators. This enables these two types of indicators to be aggregated – for example, in a composite resilience index – if this is desirable.
- Continuous indicators based on a measurable quantity such as household income. Where these are used in conjunction with categorical or binary indicators, they might be converted to equivalent scores based on where an entity (say, a household) lies in the range of values – for example, the lowest 20 per cent of values for a score or 1 out of 5 – or whether the score is above or below a certain threshold. Through such conversions, continuous indicators may be combined with categorical or binary indicators.

Guidance on the identification, construction, aggregation and interpretation of resilience-type indicators (including attribution of changes to programmes and projects) – originally developed to support the UK International Climate Fund (ICF) and DFID's BRACED programme – can be applied to any project or programme targeted at resilience, vulnerability or adaptive capacity.[11]

11 | Guidance developed by Garama 3C and Landell Mills on behalf of DFID to report against ICF's KPI4. http://bit.ly/1t9xcn2

Wellbeing indicators (Track 2)

Ultimately, adaptation success will be measured in terms of indicators that represent costs in terms of assets, livelihoods and lives as a result of climate-related shocks and stresses and other aspects of human wellbeing that could be undermined by climate change. This might include indicators of ecosystem health or functioning, or of the state of other systems that are likely to be affected by climate change, to see how well these systems are coping with or adapting to climate change, with or without human intervention in the adaptation process. This will overlap to a large extent with standard development indicator used to track changes in phenomena such as poverty, inequality, health, nutrition, economic status, education, longevity, conflict, economic growth – in short, any aspects of development that might be adversely affected by climate change.

The overlap with widely used development indicators means that there is much greater potential for using secondary data than there is when using resilience indicators. Examples of wellbeing indicators from the feasibility studies are in Annex III. These indicators may also exist already in local and national planning systems. The TAMD framework in this instance may work to provide bottom-up data into the existing systems. Boxes 2 and 9 illustrate how this worked in the feasibility studies in Mozambique and Kenya.

These wellbeing indicators may be tracked at the national level, or used in the M&E of projects and programmes. In the latter case they will be defined at the impact level. At the programme or project level there will be considerable challenges associated with the tracking of these impact level indicators because of the timescales that are likely to be required for project outputs and outcomes to translate into detectable impacts. As a result, many programmes and projects will not track these indicators, although they may identify them in their logframes and develop narratives of how they are likely to contribute to impacts that will be measured over longer periods by, for example, national monitoring systems. Nonetheless, longer-lived interventions might track impact level indicators of wellbeing, using attribution methods involving techniques such as comparison/control groups or the construction of counterfactuals (see below) to address attribution/contribution issues.

Climate hazard indicators/indices (Track 2)

If we are to use measures of wellbeing to assess adaptation, we need to determine whether adaptation actions have improved wellbeing compared to a situation in which these actions did not take place (a counterfactual scenario). If the implementation of adaptation actions and interventions was the only thing that had changed in a given development context, we could simply measure changes in wellbeing over time and attribute these to the adaptation actions. However, changes in wellbeing indicators will also be influenced by other drivers – including economic trends, policy changes and changes and variations in climate. Economic trends may be identified using relevant economic indicators and both these and policy changes can be identified and described using more general analyses and narratives of the development context.

Climate indicators or indices are required to identify and track trends and variations in climate hazards that may complicate the interpretation of wellbeing indicators and must be taken into account in order to develop any 'no adaptation' or 'no intervention' counterfactual.

Climate indicators should represent the hazards that are most relevant to the adaptation context being assessed, at scales representative of the processes that lead from the occurrence of a hazard to the adverse consequences that adaptation actions are intended to address. The most commonly used and cited indicators of climatic conditions – average or extreme temperature, average daily rainfall, total annual or seasonal rainfall – may be some of the least useful indicators for interpreting wellbeing indicators, especially at small scales. More useful indicators might include maximum rainfall intensity (for runoff and flood risks), composite drought indices such as the Palmer Drought Severity Index, soil moisture indices, the onset date of seasonal rains, the number of days without rain during the growing season, the storm intensity of destructiveness,[12] etc.

Links between indicators and across scales

The different types of indicators discussed in this step should be linked by a theory of change (Step 2). Where M&E is concerned with the links between CRM and enhanced resilience, and/or between enhanced resilience and improved wellbeing, a theory of change should explain how the one leads to the other. CRM, resilience-type and wellbeing indicators should make sense and be complementary in this context. For specific interventions, there should be logical causal links between output, outcome and impact indicators, situated within a coherent theory of change. Where a specific intervention specifies that improved CRM should drive enhanced resilience, which in turn will improve certain aspects of human wellbeing, both of the above conditions should be met.

The scales at which different types of indicators are measured also need to be considered, as these may be different. For example, CRM at the national level might be linked in a theory of change with improvements in resilience at the district or local level. Conversely, a local planning system may link local, community-level resilience indicators to the adaptation interventions they are implementing, but track related wellbeing and impact indicators at the county government level. This is outlined in more detail in Box 9.

12 | See for example, Emmanuel (2005), for a power dissipation index, which provides an objective measure of the potential destructiveness of tropical storms by estimating the energy they deliver.

Box 9: Applying TAMD in Kenya

Adaptation in Kenya, especially in the arid and semi-arid lands, seeks to fill a development deficit. Most adaptation actions are therefore not seen as distinct from development and are developed by local communities. In Isiolo County (a county in northern Kenya), the County Adaptation Fund (CAF) is currently financing over 20 water, livestock and natural resource governance projects in six wards. Climate risk information was used to develop the projects, which were prioritised via ward-level climate resilience assessments. TAMD was used to identify how the CRM processes (Track 1) being planned by the county government under the County Adaptation Planning Committee (CAPC) would enhance the performance of the vulnerability reduction interventions (Track 2) being implemented by the community-level ward adaptation planning committees (WAPCs).

Supported by LTS Africa, the CAPC and WAPCs developed a monitoring framework for Isiolo County in 2013–2014. It involved participatory processes at the ward level to define theories of change and local indicators of resilience linked to the local ward interventions financed by the CAF. This framework will be used to assess adaptation benefits at the ward level and link these to national-level development indicators in the County Integrated Development Plan, the National Drought Management Authority strategic plan, the MRV+ system and Vision 2030. In this way, community-level adaptation action contributes to national-level development. Kenya chose the TAMD framework because of the way it clearly integrates a bottom-up approach into planning and monitoring systems at all levels.

Source: Karani *et al.,* (2014)

Checklist:

- ☑ Have you identified the categories of indicators you need to use: climate risk management, resilience-type, wellbeing and climate?
- ☑ If using TAMD within planning systems, have you identified relevant indicators in existing government plans and strategies?
- ☑ For specific interventions, have you identified which indicators represent outputs, outcomes and impacts and mapped these onto your pathway?
- ☑ If using CRM indicators, can you use existing TAMD scorecards, should you modify these, or do you need to develop new ones?
- ☑ If using resilience-type indicators, have you identified appropriate context-specific indicators using participatory processes?
- ☑ If using wellbeing indicators, can you use ones from existing sources and can you link these to existing monitoring systems?
- ☑ If using wellbeing indicators, have you identified appropriate climate indices to help you interpret your results?
- ☑ Have you checked that all of your indicators are logically linked in your theory of change?

Step 4 – Measuring indicators

Summary

- Discusses how to collect data on the scorecards
- Discusses issues of sampling, baselines and data collection for resilience and wellbeing indicators
- Considers how to measure and use climate indices

The methods used for gathering data and measuring indicators will depend on the type of indicators used. In some cases it may be possible to use secondary data such as existing census or other data; in others it may be necessary to build a data-gathering component into an intervention, to establish new monitoring systems, or to augment existing systems. While the use of primary data that must be gathered through new initiatives may have significant resource implications, it might be the only way of tracking results with any confidence.

CRM indicators

Data for CRM indicators might be gathered through any of the following:

- Self-assessment – for example, where an institution is tracking the development of its own capacities for CRM.
- Expert assessment – this could be carried out by national consultants who are familiar with the relevant institutional contexts.
- Structured or semi-structured interviews with key stakeholders, such as staff from a particular institution, by those tasked with carrying out the M&E.
- Focus groups that bring together stakeholders.

The relevant indicator scorecards for tracking institutional CRM processes (Step 3) should be completed at regular intervals, for example annually or bi-annually. The first set of measurements of these indicators will constitute a baseline against which future changes are measured. It is important to record narratives from stakeholders and experts and to collate these to support the interpretation of the scorecards.

It is important to consider how to gather the data for the scorecards and what level of comparability is needed. Scorecards can be filled in with a group of key informants at the appropriate levels who agree on the scoring for each one and provide supporting policies or evidence for each level. An alternative is key scores are given by each key informant and an average is calculated. Either way it is important to consider how the information will be collected in the future and what aspects of the scorecards can be checked on to demonstrate progress.

Resilience-type indicators

Resilience-type indicators should also be measured regularly. Annual measurement of these indicators is desirable, but may not always be practical depending on the nature and sources of the data used for the indicators. Where resilience, vulnerability and/or adaptive capacity are being tracked as part of national monitoring systems – for example, at sectoral or individual level, through census or survey questions – the relevant indicators might be measured every few years. Where changes in resilience indicators are being measured to assess the success of a specific intervention, indicator data might be collected at the beginning and end of the intervention.

However, depending on the duration of the intervention, it is may be desirable to gather these data during the intervention in order (a) to determine whether the intended changes are occurring and (b) to identify any unexpected outcomes or confounding factors. Unexpected outcomes might include maladaptation, in which the intervention actually increases vulnerability or undermines resilience or adaptive capacity, as a result of flawed assumptions or unintended consequences. Unexpected outcomes and confounding factors might be identified using:

1. stakeholder or beneficiary feedback;
2. indicators representing factors that are important for resilience, but not directly influenced by the intervention (external or 'confounding' factors), or;
3. indicators representing factors or processes that are not targeted by the intervention, but which might nonetheless be affected by it (unintended consequences).

If relevant historical data are available, it is useful to construct historical baselines for resilience-type indicators so that changes in these indicators can be placed in a longer-term context. This will help determine whether improvements in resilience are the result of an intervention, or simply part of a long-term trend towards greater resilience. Similarly, if resilience is not improving, longer-term data can reveal whether this represents no change relative to the baseline or, for example, the cessation of a trend involving declining resilience.

Nonetheless, the context-specific nature of resilience-type indicators means that secondary data may not be available for the construction of historical baselines. This will be the case where resilience-type indicators have been developed using primary data gathered using participatory methods. Generally, it is therefore not expected that historical baselines will be constructed for resilience-type indicators. What is important is the measuring of changes in these indicators over (usually) relative short timescales, and (for intervention-focused M&E) the attribution of these changes to specific adaptation activities (see Step 5).

Baselines for resilience-type indicators will most likely be represented by data collected at the beginning of the monitoring period. For the M&E of specific interventions this will involve data gathering at the very beginning of an intervention, before its effects are felt.

While it may be possible to use secondary data for resilience-type indicators in some instances, these indicators will usually need to be measured through other methods such as individual or household surveys, or participatory wellbeing rankings. These techniques can be used to gather information from a representative sample of the population(s) of interest. These might be national populations at large, disaggregated by gender, region, livelihood, socio-economic status or other criteria, or populations targeted by a particular intervention (also disaggregated as appropriate to the intervention).

Populations might be sampled in a number of ways to track changes in resilience and related parameters, as discussed below.

1. Longitudinal surveys of small representative samples.

Longitudinal or panel surveys involve the tracking of changes in circumstances of the same individuals or households over time. This is particularly useful when we want to measure amounts or degrees of change in indicators of resilience, vulnerability or adaptive capacity. Longitudinal approaches enable us to measure how continuous variables such as household income are changing, and allow us to determine whether a particular individual or household has moved from one category to another – for example, from low to moderate resilience based on key categorical indicators.

The regular collection of relevant indicator data using techniques such as household surveys is resource and time intensive. The identification and surveying of a small number of representative or typical individuals or households is one way of addressing this issue. However, care should be taken to ensure that the individuals or households selected are truly representative, and their suitability in this regard should be assessed over time.

2. Longitudinal surveys of statistically representative samples

Longitudinal surveys of larger samples can provide results that are more statistically robust. Such surveys will be more resource intensive than those examining smaller 'representative' samples. Nonetheless, such approaches might be considered for large programmes.
For tracking changes in resilience and related parameters as part of a national monitoring system, it might be possible to build questions relating to resilience into national censuses. Challenges here will involve ensuring that these questions are sufficiently general to include in a census, while addressing the fact that what makes people and households resilient will vary across contexts and populations at the sub-national scale.

3. Randomised sampling of populations

Random or cross-sectional samples might be easier to carry out than longitudinal surveys, for example where populations are highly mobile or where there is significant out-migration or population exchange. However, such samples can only tell us about changes over time in very general terms. They cannot – based on indicator values alone - tell us how many people experience improvements or declines in resilience.

For example, Table 5 presents a hypothetical example in which the percentage of a sample population classified as having low, moderate and high resilience is sampled at times T1 and T2. As indicated in columns 4 and 5, 17% of the sampled population improve their resilience, while 13% experience declines in resilience. However, because of the complex pattern of movements in and out of each category (with movements in masking movements out), all we can say is that the percentage of people with low resilience has fallen by 5%.

Table 5. Hypothetical example of movements in and out of different resilience categories

Resilience category	% at T1	% at T2	Movement out	Movement in	Net change
Low	30	25	10% to moderate; 2% to high (-12%)	6% from moderate; 1% from high (+7%)	-12+7=-5%
Moderate	45	50	6% to low; 5 % to high (-11%)	10% from low; 6% from high (16%)	-11+16=5%
High	25	25	1% to low; 6% to moderate (7%)	5% from moderate; 2% from low (7%)	-7+7=0%

As illustrated by the above example, random surveys are best suited to analysis of net changes in the numbers of people or households above or below a particular threshold of resilience, vulnerability or adaptive capacity. Information on changes in people's or household's individual circumstances might be obtained by building questions about changes over time into household or individual surveys.

Population sampling for the measurement/tracking of resilience – whether random or longitudinal – needs to address the issue of disaggregation. The results of such sampling will need to be disaggregated so that the diverse experiences of different groups can be understood. This will enable those responsible for M&E to identify groups that are not experiencing the benefits of adaptation activities, and those that are experiencing lower or higher improvements in resilience than the population at large. This will help M&E staff to further refine their understanding of resilience, and to address adaptation gaps in a population.

Resilience indicators should be disaggregated by gender as a matter of course to identify any differential benefits for men and women. However, depending on the context, there may be justification for disaggregation based on criteria other than gender, such as age, poverty level, livelihood, location, membership of a marginalised group, etc. The greater the level of disaggregation, the greater will be the required sample size.

The likely need to gather primary data and the potential resources required to do this means that M&E systems including a resilience component may demand significantly higher budgets than donors and other organisations are used to allocating for M&E. For specific interventions such as projects and programmes, the proportion of budget allocated to M&E may need to be larger than has been the case historically. However, where an intervention has an explicit goal of improving resilience, it will probably be necessary to allocate adequate resources for primary data collection if M&E is to be (cost) effective.

Wellbeing indicators

As with CRM and resilience-type indicators, wellbeing indicators should be measured at regular intervals. The frequency of measurement of these indicators will depend on the M&E context and – for the M&E of adaptation – the nature of the climate hazards to which the populations or systems of interest are exposed. In order to interpret wellbeing indicators in the context of climate-related shocks and stresses, monitoring periods need to be long enough to include hazard events associated with these shocks and stresses.

This might involve monitoring over relatively short periods (several years) so that:

- the effects of similar shocks and stresses can be compared before and after an intervention;
- the consequences of a shock or stress can be compared across different groups/populations – for example, those who do and do not receive support from a specific intervention; or
- the effects of a shock or stress can be assessed and compared with expectations – of what would have happened without the intervention, or of how the intervention should reduce adverse impacts on wellbeing.

For M&E within national systems, the focus is more likely to be on the tracking of wellbeing indicators over long periods so that trends can be identified. In these contexts, wellbeing indicators may be measured annually or at less frequent intervals. For indicators that seek to capture a snapshot of wellbeing – for example, health, education or economic status – measurements may represent a single point in time. Indicators for costs in terms of assets, livelihoods and lives should be cumulative, aggregated over periods of a year or longer. Given the high degree of variability associated with the occurrence of hazards that might trigger such costs, aggregated losses over periods of 3–5 years or even longer might be better at capturing trends, particularly if these indicators are not contextualised or calibrated using climate data (see Step 5).

Historical baselines for wellbeing indicators should be constructed wherever possible, so that changes in these indicators over time can be placed in a longer-term context. This is more likely to be possible for wellbeing indicators than for resilience indicators, as the former overlap significantly with indicators that used to track development performance by national governments and multilateral agencies. Where baselines cannot be constructed for recent historical periods, changes in wellbeing can still be tracked and climate indices used to contextualise or calibrate wellbeing indicators (see Step 5).

Climate indicators and indices

Climate data (in the form of indicators and indices of relevant climate variables) should be measured over the same timescales as wellbeing indicators wherever possible. This will mean the continuous monitoring of relevant climate indicators and indices to characterise variations and identify trends. Different hazards might be important for different groups, and this should be reflected in the choice of climate indicators and indices that are measured and tracked.

It is highly desirable to construct historical climatic baselines (known technically as climatologies) over as long a period as possible. This enables us to say whether climate hazards are intensifying and whether any apparent changes are historically unusual (i.e. outside the range of historical variability) – in other words, whether they are manifestations of climate change. Long-term historical records spanning several decades or more are required for some approaches to the contextualisation or calibration of wellbeing indicators (see Step 5).

However, in many contexts climate data will be sparse or non-existent, and the reconstruction of historical baselines will be difficult or impossible. In such circumstances efforts should be made to establish systems to measure the climate variables that are most relevant to the wellbeing indicators being tracked. Climate data can still be used to contextualise wellbeing indicators, even over short periods (see Step 5).

The above indicators and indices might be derived from existing datasets held by national meteorological, hydrological or agricultural services, or by national or international research institutions. Where this is not possible it will be worth establishing new observational systems – for example, automated weather stations in specific locations – even at the project and programme level, where this is feasible.

Local populations might provide information on the frequency and relative severity of certain climate hazards. While such qualitative information may involve considerable subjectivity and should be approached with caution, it can be used to identify years associated with, for example, moderate or severe drought, or abundant rainfall. Phenological indicators of climate – for example, times of animal migrations, leaf budding or flowering – might also be used to infer trends in climatic parameters such as temperature and rainfall (at specific times of year).

Table 6. Summary of baselines and sources for different indicator types

Indicator type	Baseline	Sources
1. CRM	Baseline is result of first application of scorecards	Completion of scorecards by stakeholders
2. Resilience-type (including vulnerability, adaptive capacity)	Baseline constructed at start of monitoring period	Most likely primary data collection from populations/beneficiaries
3. Wellbeing (development performance, costs to assets, lives, livelihoods, etc.)	Historical baselines desirable, otherwise construct at start of monitoring periods	Most likely secondary sources (census, national databases), but some primary collection may be necessary
4. Climate indicators/indices	Historical baselines (averages) highly desirable	National met/hydro services, international organisations, local populations (qualitative), new monitoring systems if no data

Checklist:

- ☑ Have you established how you will collect data on the scorecards?
- ☑ For resilience-type indicators, have you established how you will gather your baseline data?
- ☑ For resilience-type and wellbeing indicators, what type of sampling is appropriate?
- ☑ For wellbeing and climate indicators, are you able to establish a historical baseline?
- ☑ Have you established how climate indices will be measured and used?
- ☑ Have you established what secondary data can support your primary data collection?
- ☑ How often do you need to collect data on your indicators?
- ☑ For resilience-type and wellbeing indicators, have you established how you will disaggregate your results?

Step 5 – Analysing and interpreting results

Summary

- Discusses how to analyse and present CRM results
- Addresses issues of attribution
- Identifies methods to address aggregation and issues of weighting and thresholds for resilience-type indicators
- Identifies techniques for contextualising wellbeing indicators using climate data

Once indicators have been constructed and data collected, the indicators need to be processed and interpreted to tell us whether CRM, resilience and wellbeing are improving, how they are improving, and why they are improving. This may involve the aggregation of multiple indicators to produce a composite index with a single score that can be tracked over time. Alternatively, multi-criteria approaches might be taken, in which multiple indicators are tracked together.

For resilience-type indicators, it is important to consider whether any change in the desired direction in an indicator constitutes improved resilience, or whether improved resilience requires the values of one or more indicators to exceed a certain threshold.

For wellbeing type indicators, we need to place any measured changes in the context of changes in climate hazards in order to get a true picture of adaptation performance.

A key question to ask during this step is whether or not we can attribute improvements in CRM, resilience and wellbeing to specific activities or interventions, or say that certain activities or interventions contributed to these improvements.

At the most basic level, monitoring involves identifying whether CRM, resilience-type or wellbeing indicators have changed, and in what direction. This simple approach is useful for aggregating across indicators, and across interventions. For example, within a project M&E system, we can determine how many people experienced an improvement in a minimum number of indicators, or plot the numbers of people experiencing improvements and declines in multiple indicators. At the programme level we can aggregate across projects to say how many people experienced an improvement in resilience or wellbeing (based on improvements in a minimum number of resilience or wellbeing indicators or in a composite resilience or wellbeing indices). We might also identify how many countries have improved their CRM systems with support from a multi-country programme. By basing these statements simply on whether indicators have changed in a particular direction, we can aggregate across diverse indicators at the project or programme level, without having to convert indicators into a common format.

CRM indicators

Scorecard-type CRM indicators are relatively straightforward to process and interpret. Changes in individual indicators can be tracked over time, or multiple indicators can be aggregated by adding scores together. Scorecards for different CRM indicators can be designed to each have the same maximum score. Alternatively a variety of CRM indicators can be used, each of which has a different maximum score, for example where some indicators require a greater number of questions than others. In such cases, the scores for each indicator may be expressed as a percentage of the maximum possible score. This approach has been used for national level CRM indicators in Cambodia.[13]

13 | Rai *et al.* (2014)

If CRM indicators reveal an improvement in the extent and quality of CRM, the extent to which this can be attributed to an intervention or activity will need to be assessed. This might be done by gathering supporting narratives of how and why CRM has improved, at the same time that the indicators are measured by having stakeholders and/or experts complete the scorecards. Alternatively, or in addition, simply attribution questions might be addressed to stakeholders involved in completing the scorecards. These might ask stakeholders to assess whether a particular activity or intervention contributed to improved CRM:

- not at all
- a little
- to a moderate extent
- a lot
- no improvement without the activity/intervention.

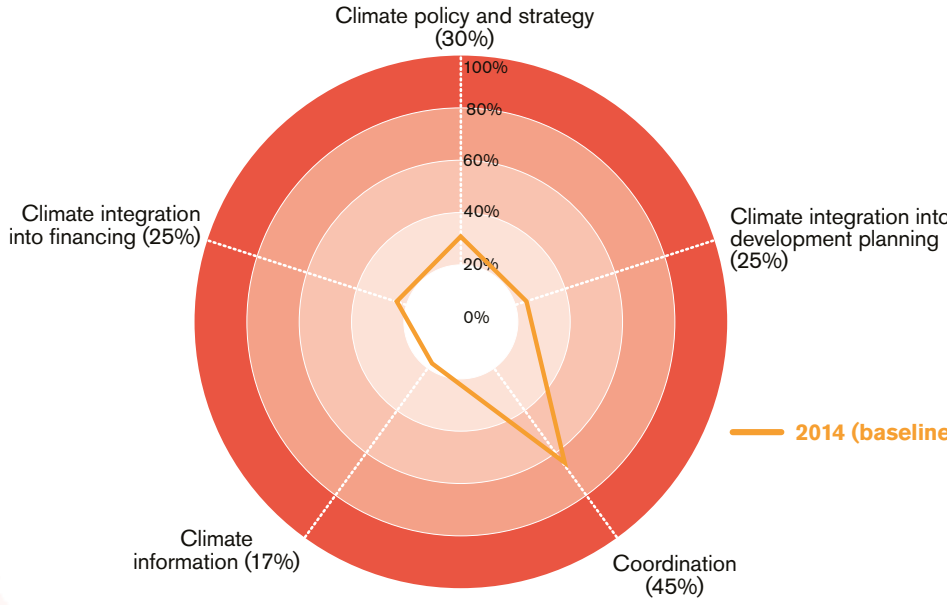
These answers can be converted into scores of 1–5 in order to provide a quantitative measure of the activity's or intervention's contribution.

To understand changes over time within a system, it is important to identify what changes constitute further progress. This can either be by identifying a ladder of CRM measures under each category and defining the pathway for the system, or by using narratives and supporting data on the scorecards so it is clear when further progress has been attained. Using yes/no/partial as a scoring system does not allow progress to be tracked in the area of partial achievement; if the system is making incremental changes over time, a more detailed scoring system may be helpful to show this progress. Scorecard results can be used for comparison between systems where the criteria for each category have been well defined and supporting evidence and narratives have been collected. This is particularly relevant when looking at CRM in two directly comparable systems, such as for example within two village institutions with the same responsibilities for local risk management. It is more difficult to meaningfully compare across country systems.

The results can be shown visually to provide a clear picture of overall CRM. Figure 3 shows the results for a national level assessment in Cambodia across the five dimensions covered by the CRM scorecard. These diagrams can be used to share results with stakeholders, to stimulate dialogue, to prioritise investments and to show progress over time.

Figure 3: Results of institutional scorecard in Cambodia

Cambodia
Track 1 indicators – Outcomes of scoring



	Indicator	2014 Baseline
1	Climate policy and strategy	30%
2	Climate integration into development planning	25%
3	Coordination	45%
4	Climate information	17%
5	Climate integration into financing	25%

Source: Rai *et al.*, (2014)

Resilience-type indicators

At the simplest level, resilience-type indicators can be analysed to show any changes over time in the dimensions or aspects of resilience being tracked, for example within a population. This can be achieved using standard statistical methods such as tests of statistical significance, or analysis using annual change in percentages. This may be all that is needed to track changes over time in a local planning system.

However, resilience-type indicators can be the most complex type of indicators to analyse and interpret. They may represent a very diverse array of factors and include continuous, categorical (score-based) and binary indicators (see Box 8). They may be aggregated or disaggregated for the purposes of analysis and interpretation, depending on the M&E context and purpose, and on the nature of the indicators and the factors they represent. For example, groups of resilience indicators might be aggregated to provide composite indices representing different dimensions of resilience (see Table 7).

Once a simple analysis to understand any potential change in resilience indicators has been done, it may be useful to go further to understand how these changes are linked to any activities and programmes. This may be particularly useful when doing an evaluation of a local system or programme that could supplement continuous monitoring and generate learning for the implementation of the local activities.

Attributing changes in indicators to adaptation actions and interventions

Where resilience-type indicators exhibit improvements, we may want to assess whether these improvements can be attributed – in whole or in part – to specific actions or interventions. Given that resilience-type indicators are highly context specific and are more likely to play a role in the M&E of specific interventions than in the tracking of adaptation performance at the national level (see Step 3), it is likely that they will be used in the analysis of attribution/contribution. Assessing attribution is also an important part of comparing adaptation approaches or assessing multiple adaptation interventions in a similar context. To be comparable, adaptation or CRM activities need to take place in similar contexts and their theories of change have to have the same the end points – for example, all elements of the portfolio should be addressing the same climate hazard or have a similar metric, such as 'avoided assets lost to climate effects' – unless you use some form of aggregation (see Table 7).

If activities are comparable, it is important to compare the results of different adaptation activities and to prioritise investment in activities with the greatest impact. This is easiest when indicators for each adaptation action have been similar.

Methods for attributing changes to interventions and for assessing the contribution of interventions to measured changes include:

- using stakeholder or beneficiary narratives
- randomised control trials
- difference-in-difference approach.

1. Use of stakeholder or beneficiary narratives

Participatory approaches can be used to elicit information on the extent to which an intervention contributed to changes in resilience. This might be done after an intervention, in a retrospective evaluation. Alternatively, and preferably, it might be done throughout an intervention by building attribution questions into any participatory assessments or household surveys. This might involve complementing questions on whether and how people's circumstances are changing with questions that ask why these changes have taken place. Stakeholders and beneficiaries might be asked open ended questions, or they might be asked directly to assess the extent to which particular actions or interventions made a difference, for example by choosing from a selection of responses associated with a set of scores (Table 7). The latter approach also enables the usefulness of different interventions to be compared. Scores can be aggregated across respondents to assess the extent to which an intervention helped.

This approach might be employed in the context of longitudinal/panel surveys or random/cross-sectional surveys (see Step 4).

Table 7. Assessing contribution through scoring

Statement	Score
There would have been no improvement without the intervention	5
The intervention contributed a lot to the improvements seen	4
The intervention made a moderate contribution to the improvements seen	3
The intervention contributed a little to the improvements seen	2
The intervention made no difference	1
The intervention made things worse	0

2. Randomised control trials

Approaches based on randomised control trials (RCTs) are increasingly popular for the assessment of attribution/contribution in development contexts.[14,15] They involve sampling statistically representative sections of target and control populations to see if there are significant differences in key indicators between the beneficiary and non-beneficiary populations of an intervention. RCTs are statistically powerful, but require significant resources and raise both practical and ethical issues. They are related to the random/cross-sectional surveys described in Step 4, with the key defining feature being the use of a control population.

Practical issues involve the identification of appropriate control populations. This might be done through propensity scoring, in which the similarities between different populations or population groups are assessed quantitatively on the basis of a number of criteria. For the evaluation of adaptation, this must include criteria relating to exposure to the same or very similar climate hazards, as well as criteria that compare wider developmental, environmental and livelihood contexts. Control populations are likely to be geographically close to beneficiary populations, which means that they may be indirectly influenced by the intervention – for example, they may emulate successful adaptation measures. In some cases there may not be an appropriate control population, for example where the intervention in question is a policy that seeks to benefit everyone in a country or region.

Ethical issues relate to the monitoring of populations who are excluded from an intervention's benefits, who might also be very vulnerable to the hazards being addressed by the intervention. These ethical issues might also translate into practical problems where they result in resistance from the intended control population. One way of addressing these issues is through phased interventions, in which a population that acts as a control during an early phase of an intervention receives support at a later stage.

While RCTs may be useful for some M&E contexts, they are likely to be appropriate in a relatively small proportion of cases.[16]

3. Difference-in-difference approach

The difference-in-difference approach involves measuring indicators before and after an intervention for a sample of individuals, households or other entities such as villages in a target/beneficiary population or area, and also for a sample in a comparison population or area that has not been targeted by an intervention. The differences in the indicators between the pre- and post-intervention periods are compared between the two populations. If the intervention has been successful, there should be a larger difference/improvement for the target population than the comparison population.

14 | Gilbert, N. (2013)
15 | Humphreys, *et al.,* (2012).
16 | Stern, *et al.,* (2011).

The use of a comparison or control group is something that this approach has in common with the RCT approach. However, the difference in difference approach is often applied to small samples that are identified as representative of a population at large based, on their characteristics, in much the same way as the for a typical panel survey. Indeed, this approach can be combined with the panel survey approach (see Step 4).

The difference-in-difference approach has been applied in the TAMD feasibility study in Pakistan.[17]

Multi-criteria approaches, thresholds and coupled indicators

Changes in resilience might be tracked using multiple individual indicators, or multiple composite indices, with each representing a particular dimension of resilience (see Box 6). Where multiple composite indices are tracked, the number of indices is likely to be small. We might say that resilience has improved in general if some of these indicators show improvements while others remain stable. As discussed in Step 3, when interventions target some factors that are important for resilience but not others, we may find that resilience as targeted by the intervention improves even if overall resilience does not, because other factors can drive changes in other dimensions in the opposite direction.

It is also possible to use a potentially large number of individual, disaggregated indicators to track changes in resilience. In this case, improvement might involve movement in the desired direction of a minimum number of indicators and deterioration in a maximum number of indicators, with the former number being greater than the latter.

Where using disaggregated indicators of resilience, it is important to consider whether any movement in the desired direction constitutes improvement. For example, an increase in the length of the period for which water is available for irrigation might increase, but still not be long enough to prevent crop failures if protracted drought occurs during key parts of the growing season. Such an increase in water availability will not necessarily represent an increase in resilience to this type of drought – the increase in water availability needs to exceed a certain threshold of days or weeks to be meaningful in these terms. Such thresholds should be identified for any relevant indicators, so that improved resilience is associated with changes that are meaningful for the people or systems whose resilience is being measured.

Other indicators might be coupled, in that resilience or wellbeing can only be said to have improved if a particular group of indicators all show either improvement, or a combination of improvement and stability. For example, improved access to grazing areas may not represent increased resilience if the areas in question are degraded to an extent that there is little useful pasture. Any such groups of coupled indicators (in this case access to grazing and quality of pasture) therefore also need to be identified if resilience and wellbeing indicators are to represent meaningful improvements in people's circumstances.

17 | Khan *et al.*, (2014)

Box 10. Aggregating resilience-type indicators

Aggregation of resilience-type indicators can be performed on combinations of continuous, binary and categorical (score-based) indicators (see Box 8) by converting these different types of indicators to a common score-based system. For example, where score-based indicators involve assigning households into one of five categories, the same households might be assigned scores to represent continuous variables (e.g. household income). In this example, a household would be assigned a score of 1 if its income was in the lowest 20%, and so on. If appropriate, related binary (i.e. yes/no) indicators could be aggregated in groups of 5, effectively creating new score-based indicators. All these indicators could then be summed or averaged in a composite index.

Wherever indicators are aggregated, consideration needs to be given to weighting the individual indicators. Typically, weights are assigned using expert judgment, for example through the relative importance assigned to different indicators by a panel of experts, stakeholders or beneficiaries. Different actors may assign different sets of weights, for example on the basis of livelihoods where these are based on beneficiary judgment. Systematic differences in weights assigned by beneficiaries might inform the way indicators are disaggregated. This is particularly relevant for resilience-type indicators.

Another way of weighting resilience indicators is through statistical analysis of their importance. This approach is most applicable to resilience-type indicators that should be correlated with well-being indicators. Analysis of these correlations can determine which resilience-type indicators are most important for predicting changes in well-being, and these can be assigned the largest weights.

The aggregation of indicators into a single composite index can mean that important details about how and why CRM, resilience or well-being are changing are lost. For example, moderate gains in composite indices may mask significant deteriorations in certain individual indicators if other indicators are improving. It is therefore important to retain the original, disaggregated data in an accessible format, so areas that may need attention can be identified. Nonetheless, composite indices can be useful, for example for tracking overall changes in resilience or vulnerability at sub-national scales (e.g. district or commune level) in national M&E systems.

Wellbeing indicators and climate data (indicators and indices)

A key challenge in analysing and interpreting wellbeing indicators is being able to attribute changes in these indicators to specific activities or interventions, and to determine whether changes in wellbeing indicators demonstrate that adaptation has taken place. This might be the case where wellbeing indicators are defined at the impact level in the M&E systems of an intervention. The attribution aspect of this challenge can be addressed using the attribution

methods described earlier in this step for resilience-type indicators, which are equally applicable to wellbeing indicators.

Using wellbeing indicators to determine whether adaptation has taken place, and to evaluate how successful it has been, requires the use of climate information and/or data. At the very least, qualitative climate information is required so that those interpreting changes in wellbeing indicators can determine whether these changes have occurred in the context of worsening, stable or improving climate hazards. Quantitative climate data will be needed to confirm that populations being compared in RCTs or difference-in-difference studies are exposed to the same climate hazards – a necessary condition if such comparisons are to be meaningful.

Climate information/data can be used to contextualise or calibrate wellbeing indicators, in order to evaluate adaptation effectiveness where RCT or difference-in-difference approaches are not feasible (e.g. where comparison populations are not available). Where these approaches are feasible, contextualisation represents a complementary approach to attribution that can increase the confidence with which observed changes can be attributed in whole or in part to specific activities. Contextualisation using climate data can also complement attribution based on stakeholder or beneficiary narratives.

Different approaches to the use of climate data and information in the contextualisation or calibration of wellbeing indicators are discussed below. These represent increasing levels of analytical complexity and are increasingly quantitative. The first approach (narratives informed by climate information) is likely to be the most, or indeed only, practical approach in many instances. More complex approaches might be impractical as a result of limited data or analytical capacity. While there is merit in considering these approaches, it is not expected that practitioners will necessarily employ them, and they are included here as pointers to potential avenues of enquiry rather than as suggested or required activities in the application of TAMD. The potential approaches are summarised in Table 8, including what the purpose of each approach.

Narratives informed by climate information

Wellbeing indicators might show improvement, deterioration, or no significant change over time. In order to evaluate what this means in terms of adaptation, the changes in wellbeing indicators need to be contextualised using climate information. The possible explanations for trends in wellbeing indicators are shown in Table 9 below.

Quantitative climate data provide contextual information that helps us explain whether adaptation has taken place (see Table 9), even where the relationships between climate indices and wellbeing indicators are not analysed quantitatively. Alternatively, we can use stakeholder perceptions of changes in climate hazards and of how these changes are related to changes in wellbeing indicators. Even where quantitative climate indices are used to provide a context for understanding changes in wellbeing indicators, stakeholder/beneficiary narratives will be important. This is particularly important if wellbeing has declined despite

adaptation actions (scenario 3 in Table 9). This does not necessarily mean that adaptation has failed to deliver benefits; however, these benefits may be very difficult to demonstrate. Here, stakeholder narratives might describe a 'no-intervention' or counterfactual scenario in which certain adaptation actions did not take place – in other words, they could tell us what would have been expected in a business-as-usual or 'no action' case, and whether this would have been worse than what actually happened.

Table 8. Approaches to contextualising wellbeing indicators

Approach	Purpose	Resources	Data
Narratives informed by climate information	To explore reasons for changes in wellbeing – gives context and narrative	Low to medium level of resources needed (e.g. for participatory assessments and surveys to construct or collect narratives). Low technical capacity needed.	Stakeholder perceptions informed by data on costs (mortality, economic losses, etc.) where available. Climate data used to understand context.
Case-by-case comparison	To compare effects of similar climate hazards before and after adaptation measures/actions have been taken.	Medium level of resources and technical capacity needed	Climate data used to compare cases; do not require long historical climate records Stakeholder perceptions and/or data on mortality, economic losses or other costs.
Combined climate and wellbeing metrics	To create indices linking wellbeing with climatic stresses and shocks	Medium level of resources and technical capacity needed	Need to cover long periods over which many hazards occur and trends can be identified.
Statistical modelling of counterfactual	Compare wellbeing changes against a counterfactual situation over long time frames	High level of resources and technical capacity needed	Good climate and wellbeing data spanning a period of sufficient duration to represent trends and correlations.

Case-by-case comparisons

Climate data can tell us about the severity of individual hazards. For example, daily pressure, rainfall and maximum wind speed data can be used to characterise storms and to identify events of similar magnitude occurring in the same district. Such events might occur before and after certain adaptation actions have taken place, allowing costs in terms of assets, livelihoods and lives and impacts on wellbeing to be compared between the two cases. Differences in these indicators can be interrogated using stakeholder narratives and other analyses to see if the

differences in wellbeing indicators can be explained in terms of adaptation delivered by particular interventions such as projects, programmes, policies or improvements in CRM.

Climate data are important in such comparisons in order to ensure that the hazards in question have similar physical characteristics – time and rapidity of onset, severity, duration, etc. To ensure a like-with-like comparison, social, economic and policy contexts, and other non-climatic factors – such as key commodities on global or national markets – that affect people's vulnerability to the hazards in question but will not be affected by the adaptation actions – should be sufficiently similar between the periods being compared.

Case-by-case comparisons have the advantage that they do not require long historical climate records. Certain climate hazards, such as tropical storms, are tracked by international agencies, meaning that data are likely to be available even if these are not collected or collated nationally.

Table 9. Possible explanations for trends in wellbeing indicators

Trend in wellbeing indicators	Possible explanations
1. Wellbeing has improved over time	a. Climate hazards have intensified and adaptation has enhanced wellbeing despite increased potential risks b. Climate hazards have not changed, but adaptation has delivered benefits c. Climate hazards have somewhat improved, with adaptation amplifying resulting benefits d. Climate hazards have significantly improved, but adaptation actions have contributed little
2. Wellbeing has remained more or less stable	a. Climate hazards have intensified, but adaptation has prevented deterioration in wellbeing (invisible benefits) b. Climate hazards have not changed and adaptation has not delivered benefits c. Climate hazards have improved, but adaptation has been counterproductive or irrelevant in the face of other drivers
3. Wellbeing has declined over time	a. Climate hazards have intensified and adaptation has not been effective b. Climate hazards have intensified, but adaptation has prevented an even greater decline in wellbeing c. Climate hazards have not intensified and adaptation has been counterproductive or irrelevant in the face of other drivers

Combined climate and wellbeing metrics

Climate data might be combined with wellbeing indicators to create indices of losses per event – for example, mortality per flood or drought. Such indices are crude and might be misleading if they are not supported by contextual information about the relative magnitudes of hazard events. Nonetheless, these indices may have some utility, particularly if they cover long periods over

which many hazards occur and trends can be identified. In such cases, losses per event might be averaged over periods of 3 years or more to reduce the impact of year-to-year climate variability on the index data. However, this will not completely remove the effects of variability, as infrequent high-magnitude hazards may skew the results. Alternatively, or in addition, losses might be scaled not simply by the number of hazard events, but by the number of hazards that exceed a particular magnitude or lie within a range of magnitudes, to ensure losses are being compared across hazards of similar magnitudes.

Such metrics will be more useful where they can be reconstructed for past decades (so that long-term trends may be identified). However, even a few years of data may be useful, particularly where metrics measure consequences associated with hazards of a particular magnitude.

Statistical modelling of 'counterfactuals'

There may be quantitative relationships between climate variables and wellbeing indicators. For example, there is a strong correlation between rainfall and GDP growth in some African countries[18, 19] – and in sub-Saharan Africa as a whole[20] over periods for which data are available, with the exception of periods characterised by conflict or other forms of societal disruption. In northern Nigeria, twentieth century famines are well correlated with rainfall deficits whose magnitude is more than 1.3 standard deviations below the local long-term mean.[21] Mortality increases significantly when temperature and humidity indices exceed certain thresholds in many urban areas, with these thresholds varying with location.[22, 23]

These historical relationships may be used to model wellbeing indicators. For example, values of wellbeing indicators that would be expected in the absence of adaptation might be predicted using linear regression, based on the correlation between wellbeing indicators and climate variables. Wellbeing indicator values in the resulting counterfactual scenario can be compared with measured values of wellbeing indicators.

A counterfactual might be constructed on the basis of observed relationships between wellbeing indicators and climate variables without using linear regression. For example, historical experience might indicate that an increase in mortality of between x and y per cent is expected when temperatures exceed T° C for more than N days. This expectation can then be compared with reality. This is essentially still an exercise in statistical modelling, even though it is based on a more interpretive approach than regression analysis.

In the above examples, deviations of measured wellbeing indicators and mortality from expectations might be due to adaptation activities. Combining these statistical approaches with RCTs or difference-in-difference studies (where feasible), or with qualitative stakeholder or beneficiary narratives, will increase the confidence with which changes in wellbeing can be attributed to specific activities.

18 | *Nature Climate Change 2:* 228–229 (April, 2012)
19 | Richardson (2007)
20 | Barrios *et al.* (2010)
21 | Tarhule and Woo (1997)
22 | Conti *et al.* (2005)
23 | McMichael *et al.* (2008)

Statistical modelling of counterfactuals depends on good climate and wellbeing data spanning a period of sufficient duration for correlations to be identified. In many contexts such data are unlikely to exist. Even where they do exist, clear correlations between climate variables and wellbeing indicators may not be apparent, due to the multiplicity of factors influencing the relevant aspects of wellbeing, the complex and changing interactions between these factors, and rapidly changing development contexts. This approach to the contextualisation or calibration of wellbeing indicators is likely to be feasible in only a minority of M&E contexts.

More quantitative approaches may be impractical due to a lack of appropriate historical data, the complexity of relationships between climate variables and wellbeing indicators – in other words, no clear correlations or thresholds – a lack of resources or capacity for data acquisition or analysis.

Box 11 shows how narratives and climate information were used to contextualise indicators in the TAMD feasibility study in Ethiopia.

Box 11. Applying TAMD in Ethiopia

IIED and Echnoserve (a local research partner), in partnership with Ethiopia's Ministry of Agriculture, have been testing the TAMD approach in assessing and developing the country's climate risk management. The initial stage of work looked at a programme called the Sustainable Land Management Programme (SLMP-1), and how this is contributing to building resilience through soil and water conservation. Soil and water conservation interventions in Ethiopia have enabled people to adapt to an increasing frequency of intense rainfall and flooding. TAMD was used to develop indicators to assess how people are adapting through local stakeholder consultation and focus groups. Indicators were compared to baseline levels of the same indicators prior to the soil and water conservation interventions, to understand how the intervention had contributed to resilience.

To contextualise the results, narratives were collected through focus groups with local people in the woredas on the type of climate hazards encountered, their frequency, and their impacts on livelihoods of the communities. Analyses were then carried out of the climate data available from the weather observation stations closest to the selected sites. These analyses included: trend of monthly, seasonal and annual rainfall; anomaly and frequency of heavy falls; as well as analysis of temperature. Comparisons were made between people's testimony on the occurrence of the hazards with the actual observations to triangulate the narratives. The available data from weather observation stations were also used to assess if the woredas faced similar climate challenges during the course of the SLMP-I intervention period, and to understand the extent of the climate challenge faced by the community over the intervention period. This analysis showed that the period 2006 – 2012 (the period over which SLMP-1 was being implemented) saw a particularly high number of heavy rainfall days for the past two decades. However, despite this climate variability and significant risks of flooding, gains have been made in development outcomes.

Source: Awraris *et al.*, (2014).

TAMD and evaluation criteria

In contexts where TAMD has been used to develop a forward-looking M&E system for local adaptation planning, it can also be used to design a retrospective evaluative step to ensure development is staying on track. This can be integrated into a learning and evaluation step at the end of the planning cycle.

The evaluation could include checking the mechanisms in the theory of change, seeing if the identified resilience-type indicators are still relevant and examining the theory of change and indicators from the perspective of any new climate data for the region. It might also include setting a timeframe for analysing changes in wellbeing in the context of climate change as outlined in Step 4. A counterfactual could be created, or hazards experienced before and after the planning response could be analysed for a case by case comparison. Even if counterfactuals or statistical analysis were not possible, some analysis could be done of the general nature and direction of any changes in climate hazards, to place any changes in wellbeing indicators the context of stable, ameliorating or intensifying climate hazards.

The OECD Development Assistance Committee (DAC) has defined criteria for the evaluation of adaptation interventions, which are used by donor and other organisations. The DAC criteria are: feasibility, effectiveness, efficiency, acceptability/legitimacy, equity and sustainability. DFID have defined criteria based on economy, efficiency and effectiveness.

TAMD, through the methods and approaches described in this guidance, deliberately focuses on assessing the effectiveness of adaptation actions. This is in response to the fact that existing approaches and frameworks are highly focused on outputs and "risk emphasising spending over results" (IEG, 2013). Well-established methodologies exist for assessing most of the other criteria listed above; they can (and should) be assessed as part of the initial scoping and design of an intervention. But there is an urgent need to develop new ways of assessing the effectiveness of adaptation, and this can only be done once an intervention has begun to achieve results.

Nonetheless, these other criteria can be measured alongside CRM, resilience and wellbeing where appropriate. For example, participatory methods involving scorecard-type approaches might be used to track people's perceptions of the acceptability, legitimacy, equity and sustainability of adaptation actions. These criteria might also be addressed through mechanisms to identify potentially controversial or unacceptable unintended consequences.

Where effectiveness relates to how successful an intervention is in delivering intended results, efficiency looks at the ratio of benefits to costs. Ultimately, measures of effectiveness can inform the assessment of efficiency by helping to describe the benefits achieved.

Equity can be addressed by disaggregating resilience-type and wellbeing indicators to see how the benefits of adaptation are distributed and the extent to which adaptation actions provide the greatest degree of assistance to the poorest; target the most vulnerable populations or individuals; and do not (further) marginalise certain groups – for example, those who were already disadvantaged or particularly vulnerable – or increase inequality.

Both the latter risks can be addressed by incorporating safeguards and screening processes into your evaluation.

Sustainability is commonly separated into technical and institutional aspects: the extent to which an intervention maintains its technical relevance to the problem it addresses – crucial in the context of changing climate hazards – and how well the institutions involved can continue to operate the intervention.

For adaptation interventions to be sustainable, they must:

- be compatible with environmental sustainability as it is usually defined – in other words, interventions should not be environmentally destructive, should seek to minimise environmental disruption and not contribute significantly to greenhouse gas emissions
- have benefits that continue beyond the life of the projects and programmes under which they are implemented
- not increase vulnerability or drive maladaptation in the medium to long term, when they are designed to deliver adaptation benefits in the near term
- be managed by mandated organisations into the medium and long terms.

To address risks, you should screen and introduce safeguards to minimise the risk of maladaptation or increased vulnerability.

To assess institutional sustainability, you will need to evaluate the extent to which mandated organisations depend on outside assistance to manage and implement interventions over an appropriate time period.

Checklist:

- ☑ Have you analysed your CRM results and presented them in an accessible way?
- ☑ Have you established a practical way to analyse your resilience-type indicators over time?
- ☑ If using resilience-type indicators, do you need to address aggregation, including issues of weightings and thresholds?
- ☑ If you need to address attribution, which method(s) will you use?
- ☑ If you're using wellbeing indicators, how will you contextualise these using climate indices?
- ☑ Have you considered how the results will be used and what format will be most useful?

Step 6 – Learning

Summary

- Considers how to integrate learning and M&E into the planning cycle
- Identifies key areas for learning from the application of TAMD

Conventional monitoring and evaluation systems are often characterised by an emphasis on being upwardly accountable to providers of overseas development assistance. The complexity and urgency of adaptation demands greater transparency to those who are intended to benefit from adaptation interventions as well as a greater emphasis on effectiveness and learning from results.

Carefully designed monitoring and evaluation processes can support continuous learning through reflection and evaluation and are therefore particularly relevant for evaluating adaptation outcomes that are complex, long term and uncertain. Given the complex nature of many adaptation initiatives, complementary monitoring and evaluation efforts require an iterative approach to learning and an effort to institutionalise learning into monitoring and evaluation processes

There are several ways to make learning more integral to monitoring and evaluation. These are outlined below:

- Ensure M&E is considered in initial planning and a clear theory of change is followed that is revisited and revised through implementation
- Build an explicit learning phase into planning or programme cycles – for example, for a Local Adaptation Plan or a project.
- Involve beneficiaries and key stakeholders in M&E to build ownership as well as to learn from the evaluation process
- Institutionalise the function of learning into a unit or existing team

In some cases, learning from adaptation will need long time frames. These may be significantly longer than the ones used for most project and programmes, or local government planning cycles. Learning from adaptation needs to be fed into local, regional and national strategies and plans so that governments can start to move towards monitoring the resilience and achievement of their respective strategies with as much evidence as possible of what works in a national context.

As well as learning for the implementation of the particular intervention, local plan or programme, the M&E of adaptation is a valuable opportunity to learn what leads to changes in resilience, how this relates to wellbeing and the relationship between CRM and these outcomes. It is particularly important to learn from these experiences of climate change adaptation, as little is still known about effective adaptation interventions over the long term and considerable financial investments are being made by both national and international actors.

A few core aspects of the TAMD framework could generate useful lessons for better implementation in that area and for future policy and programme design. We discuss these below.

Developing stronger theories of change

During and/or at the end of an intervention, explanatory narratives (essentially theories of change constructed retrospectively based on evidence of what has actually happened) may be developed and compared with the initial predictive theory of change. Lessons from such comparisons may be very important in designing future interventions in that context.

Looking at a theory of change throughout the programme may also help practitioners learn which parts of the pathways are leading to changes in resilience. This may help identify problems in implementation but also which pathways seem to be most robust to different climates.

Understanding contextual dimensions of resilience

TAMD processes generally involve developing contextual indicators of resilience for communities facing particular hazards. Through developing these indicators, practitioners will be in a position to better understand factors that support local resilience and resilience to particular hazards. This can help generate better understanding of factors of resilience in different contexts.

Understanding correlations between wellbeing and resilience indicators

The links between resilience and wellbeing articulated in a theory of change provide a means testing the relevance of resilience-type indicators. If resilience-type indicators represent factors that are truly important for securing and enhancing wellbeing in the face of intensifying climate hazards, they should be well correlated with costs in terms of assets, livelihoods and lives, and with changes in wellbeing that are related to climate shocks and stresses, such as extremes, disasters and longer-term changes in climatic conditions. Analysis of the relationships between resilience-type and wellbeing indicators therefore represents a means of validating the former, as well as a powerful tool for learning about resilience.

Linking climate risk management to adaptation and development outcomes

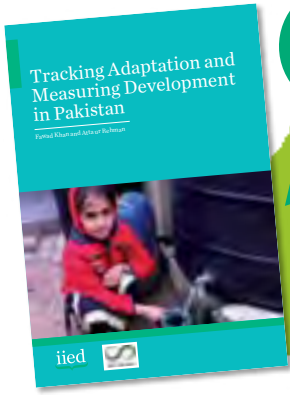
Applying TAMD may also allow practitioners to learn how CRM is contributing to changes in resilience and wellbeing. It may also help understand which investments in CRM have had the most significant impacts on adaptation and development performance.

Checklist:

- ☑ Have you integrated M&E across the planning cycle and/or built in a phase for learning?
- ☑ Have you considered when you will revisit and revise your theory of change?
- ☑ Have you assessed what you have learnt about contextual dimensions of resilience?
- ☑ What have you learnt about the correlations between wellbeing and resilience indicators?
- ☑ What have you learnt about the links between CRM and adaptation and development outcomes?
- ☑ Have you ensured this information is available to relevant stakeholders and more widely?

Further reading on TAMD

1] A series of conceptual papers on TAMD



IIED's publications on TAMD fall into three main categories:

3] A series of country reports documenting experiences of piloting TAMD

2] A series of technical guidance notes for practitioners using TAMD

Download publications at www.iied.org/pubs

1] Conceptual TAMD papers

▶ The original theoretical framing paper that outlines the rationale for a methodology that can track adaptation and measure development – Brooks, N. *et al.* 2011. Tracking adaptation and measuring development (TAMD). Working Paper 1. IIED. http://pubs.iied.org/10031IIED.html

▶ A working paper that provides practical guidance on how to put the TAMD concepts outlined in Working Paper 1 into action. – Brooks, N. *et al.* 2013. TAMD, an operational framework for tracking adaptation and measuring development. Working Paper 5. IIED. http://pubs.iied.org/10038IIED.html

▶ A briefing that provides an overview of the TAMD framework for policymakers and practitioners. – Anderson, S. 2012. TAMD, a framework for assessing climate adaptation and development effects. Briefing Paper. IIED. http://pubs.iied.org/17234IIED.html

2] Guidance documents

▶ Methodological guidance notes on using TAMD scorecard indicators.
– Brooks, N. 2013. TAMD Climate Risk Management Indicators: Methodological note. IIED. http://pubs.iied.org/G03881.html

▶ A briefing on selecting indicators for adaptation M&E.
– Brooks, N. 2014. Indicators for the monitoring and evaluation of adaptation. Briefing. IIED. http://pubs.iied.org/17273IIED

▶ A briefing on using institutional scorecards. – Rai, N and Nash, E. 2014. Evaluating institutional responses to climate change in different contexts. Briefing. IIED. http://pubs.iied.org/17271IIED

▶ A briefing on thinking about gender when applying TAMD.
– Fisher, S. 2014. Tracking Adaptation and Measuring Development through a gender lens. Briefing. IIED. http://pubs.iied.org/17270IIED

▶ A briefing on using climate data to understand trends
– Brooks, N., 2014. Using wellbeing indicators and climate information to assess adaptation effectiveness. Briefing. IIED.

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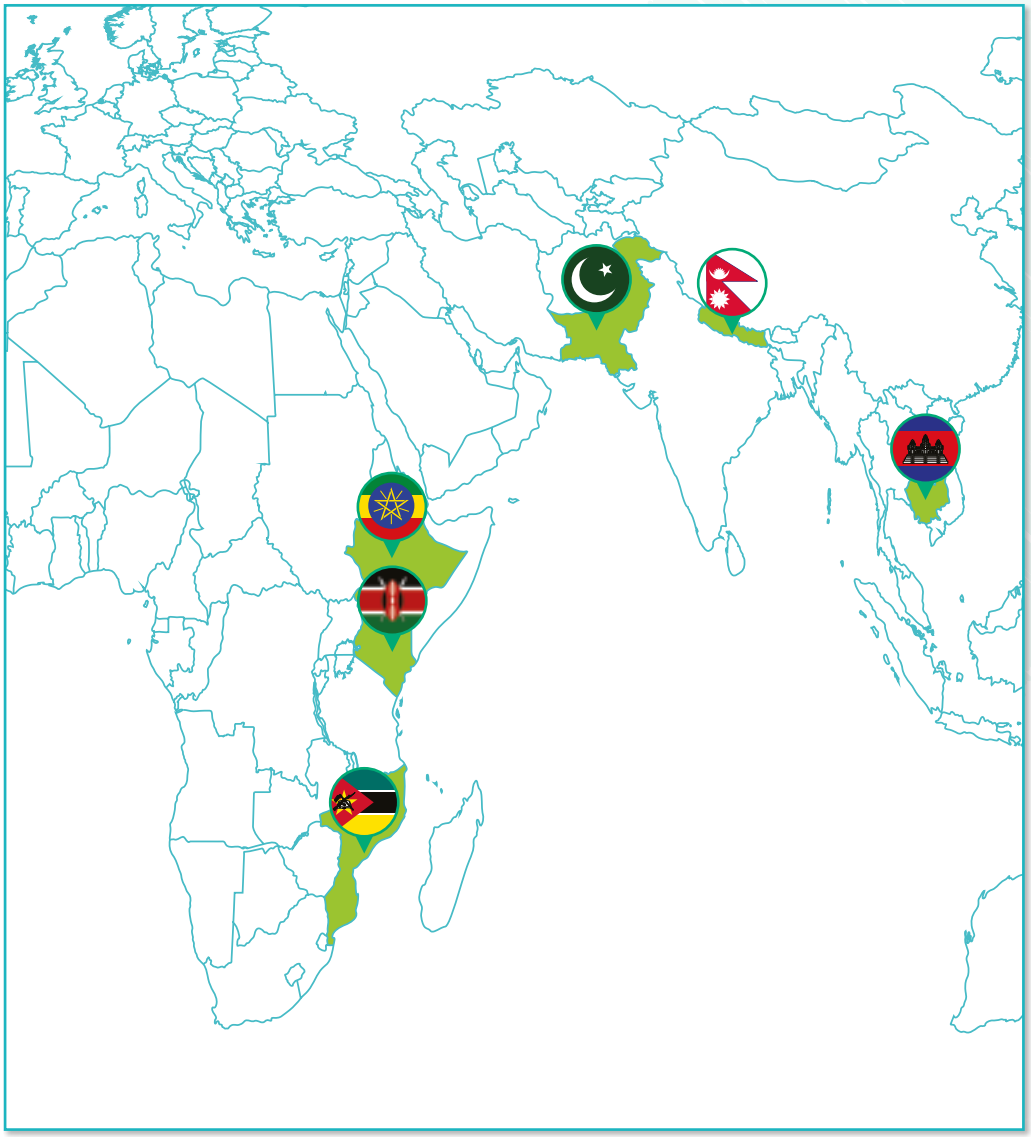
3] Country reports



Download publications at www.iied.org/pubs

Cambodia

– Rai, N. *et al.* 2014. Developing a national framework to track adaptation and measure development in Cambodia. Briefing . IIED. http://pubs.iied.org/17259IIED.html?

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Ethiopia

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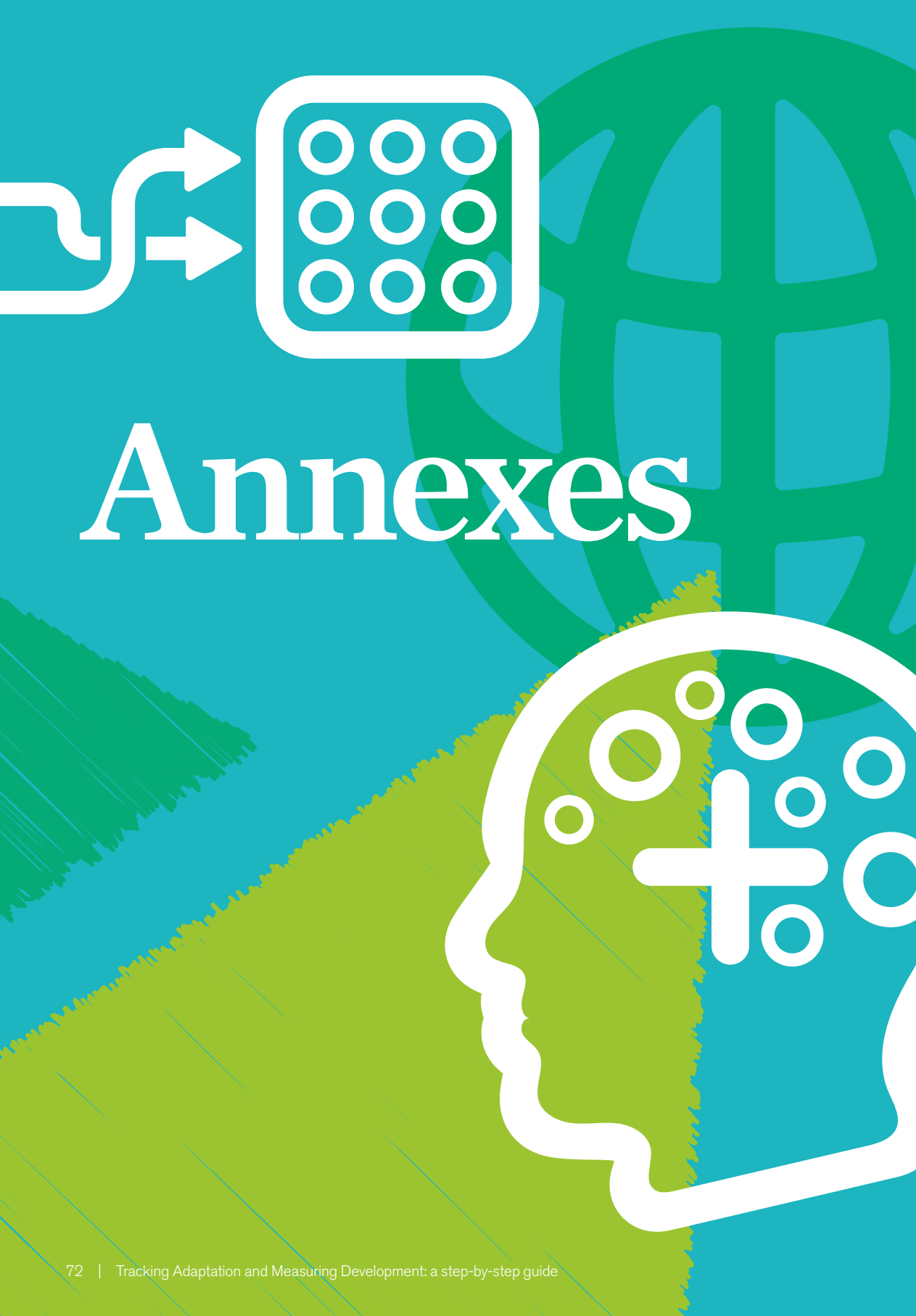
Annexes



Annex I: Climate risk management scorecards (Track 1)

INDICATOR 1. CLIMATE CHANGE INTEGRATION INTO PLANNING Representation of strategies that address climate change in relevant planning documents & processes	No	Partial	Yes
1. Is there a climate change plan or strategy set out in a dedicated strategy document and/or embedded in the principal planning documents at the level being assessed (e.g. national, sector, ministry)?			
2. Is there a formal (e.g. legal) requirement for climate change (adaptation/mitigation) to be integrated or mainstreamed into development planning (cf requirement for EIA for certain activities/projects)?			
3. Have specific measures to address climate change (adaptation/mitigation) been identified and funded?			
4. Are climate-relevant initiatives routinely screened for climate risks?			
5. Is there a formal climate safeguards system in place that integrates climate risk screening, climate risk assessment (where required), climate risk reduction measures (identification, prioritisation, implementation), evaluation and learning into planning?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

INDICATOR 2. INSTITUTIONAL COORDINATION FOR INTEGRATION Extent and quality of coordination of climate risk management across relevant institutions	No	Partial	Yes
1. Has an authoritative body been tasked with coordinating climate change planning and actions?			
2. Does the coordinating body have high convening authority/hierarchical importance across other cross sectoral departments or ministries?			
3. Has a dedicated institutional mechanism been defined for coordination and implementation across sectors?			
4. Is there dedicated funding or certainty of long term funding for sustaining this institutional coordination mechanism?			
5. Is there regular contact between the coordinating body and relevant ministries and agencies (e.g. in key climate-sensitive sectors)?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

INDICATOR 3. BUDGETING AND FINANCE Financial support for climate change mainstreaming & initiatives – funding available for local initiatives, locally-owned/driven	No	Partial	Yes
1. Is funding available to pilot measures that address climate change (e.g. adaptation, risk management, mitigation, low-carbon development)?			
2. Is funding available to roll out/support mainstreaming/integration of climate change?			
3. Do mechanisms/capacities exist for assessing the costs associated with measures to address climate change, such as those identified during climate screening/risk assessment?			
4. Is funding available to cover the costs of the necessary climate change measures identified (and costed) during climate screening/risk assessment?			
5. Are actions to address climate change supported by an authoritative financial entity (e.g. at national level, Ministry of Finance)?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

INDICATOR 4. INSTITUTIONAL KNOWLEDGE/CAPACITY Level of knowledge and training of key personnel in climate change issues and mainstreaming processes	No	Partial	Yes
1. Does planning involve individuals with some awareness of climate change?			
2. Does planning involve individuals with formal training in climate change issues?			
3. Does planning involve individuals who have attended accredited courses on climate change, development, planning and "mainstreaming" issues?			
4. Is integration of climate change into planning overseen by individuals with in-depth knowledge of integration/mainstreaming processes?			
5. Are enough people with the required training involved in planning processes?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

INDICATOR 5. USE OF CLIMATE INFORMATION Extent to which climate information is (i) used to inform responses to climate change and (ii) generated, at all levels of society	No	Partial	Yes
1. Does planning take account of observational data relating to climate trends and variability?			
2. Does planning take account of climate projections - is climate information (forecasts, projections, information on responses) readily accessible via information sharing platforms or networks (e.g. for screening)?			
3. Is there sufficient access to climate information generated by foreign and international organisations (e.g. IPCC, research bodies, academic institutions)?			
4. Is the use of scientific information from external sources complemented by the use of domestically generated information including local/traditional/ indigenous knowledge?			
5. Does the capacity to interpret and use climate information (e.g. in scenario planning, risk frameworks, vulnerability assessments) exist?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

INDICATOR 6. PLANNING UNDER UNCERTAINTY **Institutional capacity for decision-making under climatic uncertainty**	No	Partial	Yes
1. Does planning (and wider climate change dialogue) incorporate 'envelopes of uncertainty', defined as plausible ranges of key climatic parameters over relevant timescales, informed by climate projections where feasible?			
2. Does planning make use of scenario planning exercises, preferably based on 'envelopes of uncertainty'?			
3. Does planning explicitly address risks associated with 'maladaptation'?			
4. Is planning guided by well-developed frameworks and methodologies that address uncertainty?			
5. Do mechanisms exist for ensuring that planning guidance is updated with new information on climate change as it becomes available?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

INDICATOR 7. PARTICIPATION Quality of stakeholder engagement in decision-making to address climate change	No	Partial	Yes
1. Are all relevant levels of governance (national, provincial/district, local/ community) (required to be) represented in planning process?			
2. Are those who might be adversely affected by climate change initiatives represented in planning/decision-making?			
3. Are those most in need of / likely to benefit from measures to address climate change represented?			
4. Are the poorest and most marginalized members of society represented?			
5. Is the participation of all the above groups sustained throughout planning and implementation (i.e. at the start, end and throughout an initiative)?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

INDICATOR 8. AWARENESS AMONG STAKEHOLDERS Level of awareness of climate change issues, risks and responses	No	Partial	Yes
1. Are stakeholders aware of climate change and its potential implications (e.g. for their sector, for society at large)?			
2. Are stakeholders aware of potential, available, or on-going climate change response options?			
3. Does relevant information reach key stakeholders (e.g.) in climate-sensitive sectors?			
4. Do institutional mandates raise awareness of and disseminate information about climate change (risks, impacts, responses, etc)?			
5. Is adequate funding available for awareness raising among relevant stakeholders and public at large?			
SCORE (No. of "YES" answers x 2, plus no. of "PARTIAL" answers x 1)			

Annex II. Examples of modified scorecards

A] Village Development Committee scorecard Nepal

Village development committee (VDC) scorecard: VDC Secretary, Technical Officer		0 No	1 25%	2 50%	3 75%	4 Yes	Supporting evidence/ narrative
Climate Change mainstreaming/ Integration into VDC Planning	1. Have specific measures to address climate change (adaptation/mitigation) been identified and funded?						
	2. Is there a VDC climate change plan? (DRR = 50%)						
Institutional coordination	1. Is there a body for coordinating climate change actions at the village level (unit etc)						
	2. Is there long term funding for this unit and coordination?						
Budgeting and finance	1. Provision of specific budget allocation for CC						
	2. Availability of fund for additional climate risk identified (disaster fund – 50%)						
Institutional knowledge/ capacity (VDC)	1. % of people with climate change awareness involved in planning						
	2. % of people with formal climate change training involved in planning						
Use of climate information	1. Annual planning affected by historical trends of climate variability from informal observation/experience						
	2. Availability and use of relevant climate information from weather station or other reliable sources						

Village development committee (VDC) scorecard: VDC Secretary, Technical Officer		0 No	1 25%	2 50%	3 75%	4 Yes	Supporting evidence/ narrative
Participation	1. Are those living in flood affected areas represented proportionately in VDC planning processes around climate change measures?						
	2. Is the participation of these groups sustained throughout the lifecycle of the climate change measures?						
Awareness among Stakeholders (Representatives of WCF, CFUG and other civil society)	1. At least 25% of stakeholders members aware of potential or available responses to climate change						
	2. Stakeholders have specific information on village climate issues (flood)						
Learning and flexibility	1.The VDC has incorporated information/learning from past disasters in to future plans						
	2. The VDC has incorporated information on slow changes to the climate into future planning						
Business as usual (BAU) Functions: Functioning of local systems	1. A selection of 3 of the Minimum Conditions and Performance Measure indicators (MCPM)						

B] Modified scorecard on inclusion of climate change in planning documents in Cambodia

Level of inclusion of climate change in long, medium (NSDP) and short term (PIP) national and sub-national planning documents.			
Step	**Milestone**	**Yes/ No/ Partial**	**Supporting evidence/ narrative**
1	Climate change is mentioned in NSDP 2009–2013 but no specific measures on fund allocation		
2	Response to climate change is articulated in NSDP 2014–2018 and specific actions and indicators are included from CCCSP with related fund allocations		
3	Responsibility for climate change integration in national M&E Framework is assigned within NIS/ MoP.		
4	Climate change actions plans are integrated into the PIP.		
5	Formal Procedures are in place in CDC for screening major donor and private sector investments against climate risk.		
6	Subnational (commune and district) budgets and planning guidelines integrate climate change.		
7	At least one third of the most vulnerable provinces budget in their Provincial Development Plans the climate change actions identified in the sectoral Climate Change Action Plans.		
8	At least half of the most vulnerable provinces budget in their Provincial Development Plans the climate change actions identified in the sectoral Climate Change Action Plans.		
9	Almost all of the most vulnerable provinces budget in their Provincial Development Plans the climate change actions identified in the sectoral Climate Change Action Plans.		
	Total score: 100*[(No. of Yes)*2+(No. of Partial)*1+(No. of No)*0)]/9*2*1= X%		

Annex III: Examples of Track 2 indicators from the feasibility tests

A] Output, outcome and impact indicators for the Kenya feasibility test of TAMD.[24] The first two output indicators represent entry points in Track 2 of TAMD relating to activities intended to directly improve resilience/reduce vulnerability. The third could be viewed as an entry point in Track 2 intended to directly enhance adaptive capacity, or as an entry point in Track 1 intended to improve climate risk management (CRM) at the community level. To a large extent, outcome level indicators may be viewed as indicators of resilience, and impact level indicators as indicators of wellbeing.

Results	Indicators
Output level	▪ Number of constructed/rehabilitated water sources for livestock and humans
	▪ Number of veterinary laboratories rehabilitated
	▪ Number of trainings held for natural resource management committees (dedhas)
Outcome level	▪ Number of livestock and households with access to water during dry season
	▪ Number of months that water is available in the constructed/rehabilitated water points
	▪ Time spent fetching water for domestic use
	▪ Time spent trekking livestock to water points
	▪ Prevalence of livestock and human disease outbreaks per year
	▪ Number of hours spent fetching water at water point (s) for domestic use
	▪ Number of hours spent fetching water at water point (s) for livestock use
	▪ Quantities of milk and meat produced per household per year
Impact level	▪ Household expenditure patterns
	▪ Quantities of food surplus sold at the markets
	▪ Frequency of marriage and other cultural ceremonies held per year
	▪ Number of conflict incidences
	▪ Number of families migrating due to climate hazards
	▪ Number of children born
	▪ Number of schools, dispensaries, mosques, permanent settlements constructed
	▪ Number of children enrolled and retained in schools
	▪ Presence of cheese (traditional Borona cheese, known as ititu)
	▪ Number of families on food relief
	▪ Numbers of livestock
	▪ Number of new businesses or small scale traders in the market

24 | Karani *et al.* (2014)

B] Output, outcome and impact indicators for the Mozambique feasibility test of TAMD.[25] As in the Kenya example above, outcome and impact indicators map approximately onto resilience and wellbeing results.

Results	Indicators
Output level	▪ Average quantity (litres) of water per household/day in Nalazi and in Caniçado
	▪ Average time (hours) spent to fetch water in Nalazi and Caniçado(back-and-forth)
	▪ Quantity of honey produced in the district
	▪ Number of forest fires per year (reference year)
	▪ Burned area (ha) per year (reference year)
	▪ Quantity (ha) reforested per year (reference year)
	▪ Quantity (ha) reforested per year (reference year)
	▪ Number of stocks assisted by veterinarian agents per year (reference year)
	▪ Number of stocks with access to fodder crops during dry season
	▪ Average time (hours) spent by stocks to drink water in Mafada, Mbalawala and Nalazi
	▪ Number of households undertaking irrigation agriculture
	▪ Number of households assisted by extension workers
	▪ Number of farmers using:
	a. Conservation farming
	b. Improved seeds
	c. Manure and fertilisers
	d. Pesticides
	e. Animal traction
	▪ Average time (days) of receipt of information before the floods (reference year)
Outcome level	▪ Number of cases of water borne diseases reported per year
	▪ Number of cases of malnutrition report per year
	▪ Food security in the district (months of food security ensured through self-production) per year and per administrative post
	▪ Number of investors (reference year)
	▪ Number of shops (reference year)
	▪ Income (ton/ha) of cereals (maize and rice)
	▪ Number and quantity of plant species in the local forests

25 | Artur *et al.* (2014)

Results	Indicators
Outcome level	▪ Number and quantity of livestock species in the local forests
	▪ Average income (MTN) per month, per family
	▪ People assisted by the national health system
	▪ Number of households with access to safe drinking water
	▪ % of improved houses in the district
	▪ % of households with durable goods
Impact level	▪ Number or % of households affected by floods and drought (reference year)
	▪ Number or % of households in need of food aid (reference year)
	▪ Illiteracy rate
	▪ Child mortality rate
	▪ Life expectancy in the district (years)
	▪ Incidence of poverty

Glossary

Adaptation intervention: An activity, project or programme that aims to help people or systems respond to the challenges and hazards posed by the effects of climate change.

Adaptive capacity: The ability or potential to respond effectively to changing stresses and shocks to manage or reduce risk.

Attribution: The process of establishing the primary cause for a noted change.

Baseline: Information and data that is gathered prior to the start of an intervention, which serves as an initial reference point from which future evaluations will be measured against.

Climate risk management: The extent and quality of institutional processes and mechanisms for addressing climate-related risks.

Contextualisation: A process of accounting for change in the frequency and severity of climate-related shocks and stresses over time.

Control group: Used in randomised control trials or quasi-experimental methods as a comparative group that has not received an input or intervention.

Counterfactual: Used in a comparison to show the situation when a certain action or input has not taken place, compared to the situation in which these actions did take place.

Evaluation: An occasional or periodic activity to assess achievements, in a systematic and objective manner, for the purpose of informing stakeholders, re-orienting future activities and/or drawing lessons for future interventions.

Hazards (climate-related): physical manifestations of climate change and variability including climate-related phenomena that can be either rapid onset, coming in the form of a shock – for example, a flood – or slow onset, or a stress , such as variable rainfall.

Impacts: Longer-term changes that result from outputs and outcomes.

Indicators: A quantitative or qualitative variable that provides a simple basis for assessing achievement, change or performance.

Livelihoods: The capabilities, assets (including both material and social resources) and activities required for a means of living.

Longitudinal surveys: A methodology that involves the tracking of changes in circumstances of the same individuals or households over time.

Monitoring: A process to keep track of progress and external factors, on a continual basis, to inform management decisions and allow the timely adoption of corrective measures, where necessary.

Outcomes: Shorter-term changes in the population or system targeted by the intervention, which result from the outputs.

Outputs: Goods and services delivered by an intervention

Randomised control trials: A methodology that involves sampling statistically representative groups of the population who have either received an input or treatment or have not (the control group) to see if there are significant differences between the two.

Resilience: The ability of a system to resist, absorb and recover from the effects of hazards in a timely and efficient manner, preserving or restoring its essential basic structures, functions and identity.

Theory of change: A pathway or pathways connecting activities to the anticipated changes of a policy or programme through a set of causal mechanisms.

Wellbeing: Aspects of human development and livelihoods such as health, nutrition, poverty/economic status, education, assets, and lives.

Vulnerability: Vulnerability to climate change is the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change.

IIED is a policy and action research organisation promoting sustainable development and linking local priorities to global challenges. We are based in London and work on five continents with some of the world's most vulnerable people to strengthen their voice in the decision-making arenas that affect them.

The Climate Change Group works with partners to help secure fair and equitable solutions to climate change by combining appropriate support for adaptation by the poor in low- and middle-income countries, with ambitious and practical mitigation targets.

Garama 3C Ltd is a small UK-based consultancy firm specialising in climate change and international development.

The Institute for Social and Environmental Transition – Pakistan is a research organisation based in Islamabad and affiliated to ISET International.

Echnoserve, Ethiopia is a private research consultancy company based in Addis Ababa.

ACCRA is a consortium of NGOs working on climate resilience issues.

LTS Africa is a leading provider of technical services in support of sustainable development.

The Integrated Development Society, Nepal (IDS Nepal) is a non-profit development NGO.

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Knowledge Products

Toolkit

December 2014

Climate change

Keywords:
monitoring and evaluation (M&E); resilience, adaptation, indicators

Tracking adaptation and measuring development (TAMD) is a conceptual framework to monitor and evaluate climate change adaptation. This toolkit provides step-by-step guidance to develop a robust M&E framework that can be used as part of local and national planning systems, or to assess and compare specific interventions. It will be useful for local and national government officials, development partners and NGO staff seeking to develop adaptation plans and M&E in different contexts.

This is the first version of this guidance building on the experience of testing TAMD in Kenya, Mozambique, Nepal, Pakistan, Cambodia and Ethiopia. This guidance will be updated and revised as more experience is generated on each step.

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