PACT EAC2
Promoting Agriculture, Climate and Trade Linkages in the East African Community

Note

Methods and Approaches for Assessing Adaptation, Adaptation Co-benefits and Resilience

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Summary

Assessing adaptation and resilience is an important step in the process of adapting to climate change, by enabling Parties to increase their understanding of climate risks, improve the effectiveness of adaptation measures and increase accountability. Yet, existing methods and approaches for assessing adaptation, adaptation co-benefits and resilience are inadequate, and are difficult to compare and scale up. To address these challenges, this note provides recommendations to the UNFCCC SBSTA and SBI for their consideration.

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Executive summary

Climate change threatens to reverse progress towards sustainable development and threatens lives and livelihoods around the globe and Africa in particular, either directly through its physical impacts or as a compounding factor towards existing vulnerabilities. Reducing the vulnerability of natural and human systems to the impacts of climate change by means of adaptation and resilience building is critical. Adaptation would moderate the risks and damage, or capitalizing upon potential benefits from current and likely future conditions. In addition, adaptation helps individuals, communities, organizations and natural systems to deal with those consequences of climate change that cannot be avoided. It involves taking practical actions to manage risks from climate impacts, protect communities and strengthen the resilience of the economy. This can involve gradual transformation with many small steps over time or major transformation with rapid change.

The foundation of the Paris Agreement (PA)'s architecture is that all Parties will nationally determine what actions they are able and willing to take in achieving the purpose of the Agreement (to limit warming well below 2oC above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5oC above pre-industrial levels). The PA for the first time establishes a Global Goal on Adaptation (GGA). The principle underlining the GGA is to raise ambition of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal. Every five years countries are required to take stock on the progress achieved through Global StockTake (GST) and increase ambition through successive Nationally Determined Contributions (NDCs)1. The GGA provides a new starting point and impetus for examining the suitability of the existing tools and the need for new and innovative approaches for assessing adaptation progress across sectors and levels.

Assessing adaptation and resilience is an important step in the process of adapting to climate change, by enabling Parties to increase their understanding of climate risks, improve the effectiveness of adaptation measures and increase accountability. Furthermore, given the scale of the adaptation challenge, it is essential that there is way to track progress of adaptation efforts to improve policy learning and strengthen accountability on use of resources, and whether the policy and adaptation actions are delivering as expected. A review of the existing methods and approaches for assessing adaptation, adaptation co-benefits and resilience reveals that they are inadequate, (not systematic, rigorous and/or transparent) for addressing the whole spectrum of adaptation, adaptation co-benefits and resilience, and also are based on the conventional Monitoring and Evaluation (M&E) framework for projects and programmes. Further, these methods and approaches have varied indicators at different scales and are therefore difficult to compare and scale up bearing in mind the diversity of African agricultural systems.

In this regard, the paper recommends that

[1] Paris Agreement, Article 14

SBSTA and SBI consider the following:

1. Taking stock and identify the gaps of the existing methods and approaches for assessing adaptation, adaptation co-benefits and resilience.

2. Developing an appropriate framework/methods or guidance for tracking adaptation, adaptation co-benefits and resilience across scales for effective implementation of NDCs and that also would make it possible to assess the progress, adequacy and effectiveness of adaptation efforts at a global level (GGA) in a way that is systematic, rigorous and transparent.

3. Facilitating international cooperation and support with regards to finance, technology development as well as transfer and capacity building on the application of the framework/methods or guidance for tracking adaptation, adaptation co-benefits and resilience in order to enhance implementation of the NDCs, National Adaptation Plans (NAPs) and climate policies.

Introduction

Global climate change presents a threat that is unprecedented in human history, and one that will unfold over a long timescale, in a non-linear fashion, and often unpredictably. Conventional development interventions are not usually designed to address such circumstances. The adoption of the Paris Agreement marked a significant global commitment to addressing the challenge of climate change by creating pathways to low-carbon and climate-resilient societies. The Agreement recognized that the importance of addressing both climate mitigation – reducing greenhouse gas emissions and transitioning to a low carbon economy – and climate adaptation and resilience – adjusting society to the impact of climate change and building the capacity to respond to and recover from climate risk is substantial and increasing. In addition, the Paris Agreement specifically recognized that "adaptation is a global challenge faced by all with local, subnational, national, regional and international dimensions."

Experts from climate scientists and meteorologists report that climate change is already underway, with average global temperatures continuing to rise annually, and reinsurance companies reporting that the frequency and severity of extreme weather events are increasing, along with their associated losses (IPCC, 2014). These changes are exacerbating existing risks to societies and economies, including pressures on food production due to changes in agricultural yields, or the risks of cities being flooded due to more extreme rainfall. Climate change could also lead to the emergence of new risks, such as the spread of climate-induced pests and diseases.

In response to this challenge, there is a growing focus on implementation of adaptation actions that ultimately enhance resilience to climate change. Many countries have prepared NAPs. Most of the NAPs are based on impact assessments, often based on historic trends and climate scenarios and most have identified adaptation options. Relatively few countries to date have designed and implemented a national system for adaptation monitoring and evaluation, many more have indicated in their NDCs that they are either developing one or plan to do so. National adaptation M&E is a relatively recent activity, and there is limited

experience with mid-term and end-term evaluations of adaptation policies at the national level. However, the four tools that underpin M&E of adaptation are:

- **Climate change risk and vulnerability assessments** provide a baseline of vulnerabilities to climate change against which progress on adaptation can be reviewed. If repeated, such assessments can also demonstrate how risks and vulnerabilities are changing over time.

- **Indicators** facilitate assessment of progress made in addressing adaptation priorities. However, indicators cannot explain on their own how the change came about. Reporting on, and using indicators, is resource intensive. They must therefore be carefully defined, and when possible, draw on existing data sources.

- **Project and programme evaluations** help to identify what approaches to adaptation are effective in achieving agreed adaptation objectives and to understand what some of their enabling factors for success may be.

- **National audits and climate expenditure reviews** examine if resources allocated for adaptation are appropriately targeted and allocated cost-effectively. This information may be particularly useful when resources are specifically earmarked for adaptation.

Methodology

This paper is based on literature review in general and specifically for publication of specific methods and approaches that have been covered. Literature was considered to include: toolkits, project documents, reports, publications; peer review and academic papers including sources from the UN agencies especially the UNFCCC and IPCC. Qualitative Document Analysis was based on work by Altheide et al., (2008), which has been utilised to facilitate the analysis of the documents. This approach, considers the meaning and implication of text. The approach adopted in this paper follows several steps to improve rigour and consistency including (i) obtaining documents through online search and (ii) analysis of documents. In addition to criteria proposed by Altheide et al., 2008, the approach further analysed three key issues including (i) the conceptual issues covered by the methodology or approach (ii) criteria used to measure or track adaptation, adaptation co-benefits and resilience (iii) parameters being measured, and (iv) evidence to show that adaptation is taking place.

Understanding adaptation

Definition

Adaptation refers to adjustments in ecological, social or economic systems in response to actual or expected impacts. It refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change. Thus, adaptation focuses on reducing vulnerability to the impacts of climate change. Vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability to climate change combines exposure to hazards that result from the changing climate and sensitivity to their impacts when they occur. Vulnerability is thus high if changes in climate

increase the exposure of populations to events such as drought, flood or coastal inundation, because of higher frequency or severity, where the ability of people to cope is limited (Yamin et al., 2005). Broadly speaking, vulnerability is viewed as a system's susceptibility to harm when exposed to a given external stress or shock.

Despite the growing awareness of the scale and immediacy of the need for adaptation and the development of resilience to the physical impacts of climate change, investment flows in adaptation and resilience have been dramatically lower than in climate mitigation, both in the public and private sector. As noted, the Climate Policy Initiative (CPI) reports that less than seven percent of public sector's climate finance can be identified with climate adaptation, and that there is an extremely limited ability to identify and track private adaptation financial flows. Other studies reveal a very limited amount of private sector engagement in those public sector investments. And although there may be some private sector investment around adaptation and resilience challenges, it remains at an early stage, and is not at the scale that experts project will be needed to address the challenge. It is not focused or coordinated at the same level of sophistication or scale as climate mitigation investments in renewable energy and energy efficiency, for example.

Several key issues appear to contribute to the extremely limited amount of identifiable investment in climate adaptation and resilience. First, as described above, one critical issue (both in identifying and driving private investment into climate adaptation and resilience) has been the uncertainty, lack of data, complexity, questions about time-frame and issues with measurement, that make shorter term, location-specific practical investments and related business decision-making much more challenging for businesses. The uncertainty about how to evaluate or measure both existing and potential physical climate risk – and also the potential adaptation and resilience benefits of related investments – also makes identifying successful investments and driving additional financial flows in this area very challenging. Second, as noted, sources of investment such as strategic and institutional investors report the lack of concrete investible opportunities and the related uncertainty about the financial risk and return of those investments. These two are distinct, but related issues.

Methods and approaches for assessing adaptation

There has recently been a proliferation of initiatives, guidelines and frameworks on developing systems for monitoring and evaluating adaptation at all levels. Practitioners (SEA Change and UKCIP, 2013, 2014) and the Adaptation Committee (AC, 2016) have developed syntheses and inventories of existing adaptation M&E tools and frameworks. The Least Developing Countries Expert Group (LEG) has developed guidelines for NAPs, a subset of the literature focuses on providing guidance to develop national level systems for M&E (GIZ and IISD, 2016), or providing information and insights from a set of existing systems (OECD, 2015b; EEA, 2015; GIZ and IISD 2013). However, there are still only a few examples of M&E systems for adaptation being implemented at the national (rather than e.g. programme or project) level. The large majority of the Parties mentioning adaptation M&E in their NDCs indicate that they are still in the process of developing their national approach

(Kato and Ellis, 2016).

Most of the existing methods and approaches for assessing adaptation and resilience are based on M&E of policies, programmes and projects. M&E system generally forms part of a comprehensive and iterative process that includes the assessment of impacts, vulnerability and risks, planning for adaptation and the implementation of adaptation measures. Most M&E systems address one or both of two purposes, broadly categorised between learning and accountability. The former refers to improving the effectiveness and efficiency of the adaptation process through the incorporation of new information and lessons learned, while the latter is about demonstrating that actions have taken place and led to a result. National M&E systems are tailored to domestic circumstances, priorities and capacities, and reflect the context-specific nature of adaptation responses. Most of the M&E Systems to date have focused on a diverse range of specific purposes, types of indicators or self-assessment, and taken different approaches to aggregate information from sub-national scales. Very few national M&E systems have a coordinated approach to aggregate information from sub-national scales.

According to the Global Environment Facility (GEF), M&E plays an essential role in understanding where to focus investments, what is working and what is not (and perhaps more importantly, why this is the case), and how to learn from experience to know how to maximize impact. M&E can (and should) support strategic and effective investments in Climate Change Adaptation (CCA). Despite over 15 years of CCA project implementation experience at the GEF and elsewhere, M&E has only in recent years gained wide attention, focus, and prioritization as a strategic toolset for not only understanding what is and is not working well, but for ongoing learning and improvement to enhance results and impact. Experience thus far has demonstrated that M&E is particularly challenging—beyond the challenges experienced in most other sectors—given: the inherent complexity of the issue; context-specificity; the combination of natural/climatic, economic, and social variables; the non-linearity of stresses, risks, and change pathways; the lack of predictability; the long-term nature of the problem; and the lack of uniformity around what is required to adapt effectively (Williams 2016; Bours, McGinn, and Pringle 2015; Fisher et al. 2015; Steelman et al. 2015; Naswa et al. 2015). While there are now many M&E systems in place at project, country, and international levels, the field of M&E is still relatively young and rapidly evolving.

Overall, there are many challenges attached to developing an adaptation M&E system at the national level, some of which relate to the nature of climate adaptation itself (e.g. long timescales for impacts and outcomes, determining attribution). Other challenges include the lack of an "off the shelf" methodology to assess adaptation outcomes; the difficulty to identify, combine and interpret relevant indicators; and information gaps. Capacity and resource constraints are additional limiting factors to building national systems for adaptation M&E, which an increasing number of bilateral and multilateral channels of support aim to address. Examples of existing methods and approaches for assessing adaptation are discussed below:

- *Tracking Adaptation and Measuring Development (TAMD)*

The Tracking Adaptation and Measuring

Development (TAMD) was developed by Brooks et al. (2011, 2013) where they argue that it can be used to assess institutional climate risk management, adaptation and development outcomes of policies, projects and programmes. It is envisioned to enhance long-term strategic thinking with regard to adaptation and development. Further to that it attempts to show the effectiveness of adaptation. It has been employed in selected countries: Kenya, Mozambique and Ethiopia. However, this approach of tracking adaptation has not been widely used, but has been used in assessing individual agricultural projects in the Eastern African region.

- *Adaptation Monitoring and Assessment (AMAT)*

The Adaptation Monitoring and Assessment (AMAT) is an M&E tool that is advanced by GEF since 2014. The tool can be used to measure progress in terms of how outputs and outcomes in a project context can be realized. It makes use of an excel spreadsheet that requires to be filled thrice during the project cycle period. The tool assesses (i) reduced vulnerability to impacts, (ii) increased capacity to respond to impacts and, (iii) promote transfer and adoption of adaptation capacity. The tool is primarily designed to facilitate GEF secretariat to analyse its programming strategy based on its results-based CCA.

- *Participatory Monitoring Evaluation Reflection and Learning for Adaptation (PMERL)*

The Participatory Monitoring Evaluation Reflection and Learning for Adaptation (PMERL) is an approach that was advanced by Ayers et al. (2012). It is applied at the beginning of a project and meant to complement the traditional M&E structure. It facilitates experiential learning for the users, as it is a participatory process. It is not linked to policies or plans and requires proper scientific knowledge as well as local knowledge. Thus, its suitability is revealed at the project level and perhaps its employability at a regional scale in Africa in terms of assessing adaptation, adaptation co-benefits and resilience might be stretching it within its context limits.

- *Adaptation Made to Measure Framework (AMM)*

The Adaptation Made to Measure Framework (AMM) is a framework that was proposed by Olivier et al. (2013) with the aim of designing and monitoring adaptation projects. It is designed for use by national and international Non Governmental Organisations (NGOs), and research institutions. It utilizes a five-step process. It attempts to identify opportunities and priorities for building adaptive capacity and implementing key activities. Despite it being a framework that can be applied by organisations for results-based adaptation interventions it faces the hurdle of addressing the tracking practicality across scales of adaptation, adaptation co-benefits and resilience.

- *National Adaptation Capacity (NAC)*

The National Adaptation Capacity (NAC) focuses on institutions that have a mandate with regard to adaptation. It manifests itself as a tool that can be used to assess how well adaptive functions are being performed. The primary goal is to establish opportunities and priorities for building adaptive capacity at the national scale. It is relevant at the national context especially with regard to adaptation functions but does not highlight how it is going to track

adaptation. This tool was developed by World Resource Institute (2009).

- *Tracking Adaptation in Agricultural Sectors (TAAS)*

The Tracking Adaptation in Agricultural Sectors (TAAS) is a framework advanced by Food and Aagriculture Organization (2018a). It is employed to examine processes and outcomes of adaptation at the national and local scales availing a consistent and flexible list of indicators. It is meant to aid in understanding how multiple interventions contribute to CCA. It allows information to be collected qualitatively through key informants' interviews, focus group discussions, among others. It is meant to track adaptation in the agriculture sector and even combines sustainable development, risk reduction and CCA indicators.

Understanding Resilience

Definition

Resilience is defined formally in various ways, including by the Intergovernmental Panel on Climate Change (IPCC, 2008) as:

"The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self organization and the capacity to adapt to stress and change."

Resilience is viewed in terms of a system's capacity to maintain its fundamental character and functioning in the face of a stress or shock. USAID defines resilience as "the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth" (USAID, 2012). This definition illustrates that resilience is multi-level and multi-faceted, covering topics such as: socioeconomics, governance, health, infrastructure, environmental issues, and climate, weather- and disaster-related risk reduction and response. The definition also illustrates that resilience is not focused on recovery from discrete shock events, but it is rather about increased adaptive capacity, improved ability to address and reduce risk, and improved social and economic conditions of vulnerable populations; that together provide the foundation for these populations to avoid the most severe elements of these shocks, minimizing the need for the expenditure of scarce household resources and social capital on recovery. Under this broad umbrella, climate adaptation activities are important contributors to building resilience. USAID has also developed a resilience measurement framework that contains three key components: resilience capacities, shocks and stresses, and well-being outcomes (Vaughan et al., 2018).

Methods and approaches for assessing resilience

Resilience measurement is in its infancy and as such, a robust body of literature on the effectiveness of indicators does not yet exist. Resilience is necessarily specific to contexts – time, space, livelihood and shocks, but this precludes generic indicators of resilience and therefore makes comparison difficult. Additionally, the multi-scale, dynamic and multidimensional nature of resilience means that many standard methods and approaches are ill-suited to measuring resilience in a holistic way. It is not easy to obtain data that is both

reliable and meaningful. Development and measurement of context-specific indicators requires collection of primary data. Simple aggregation across projects may not stand up to scrutiny.

Despite the challenges, there has been some progress in forming general principles to underpin attempts to quantify resilience and in constructing relevant indicators. There is a plethora of different resilience measurement frameworks that vary in terms of purpose, scale, focus and method of analysis. This means that they are directly comparable. Nevertheless, there is considerable overlap in terms of dimensions of resilience and indicators used. Examples of tools for measuring resilience are discussed below.

- *Monitoring instrument for Resilience (MIR)*

As the name suggests, Monitoring Instrument for Resilience (MIR) is a tool that is used in the tracking of changes with regard to resilience in agricultural projects. It is also used to complement the traditional M&E tools. Thus, monitors the capacity of people to adapt, enhance livelihoods, farm functioning and ecosystem services that foster resilience. It is a suitable tool that can be used to monitor resilience at the project level where local languages can be incorporated. However, its employability as method and approach for assessing adaptation, adaptation co-benefits and resilience might not be practical at the scales and contexts in which such methods or frameworks should be. It was developed by Hills et al. (2015).

- *Community-based Resilience Assessment (CoBRA)*

The Community-based Resilience Assessment (CoBRA) is advanced by the UNDP (2013), it finds its employability at the household and community level, where locally-specific factors contributing to resilience are identified. It is mostly finds applicability in the Disaster Risk Reduction (DRR) planning sector especially assessing the impacts of community-based DRR interventions in terms of building resilience. The tool is clearly meant for the DRR sector and finds limited use in the agricultural sector especially as method or approach for assessing adaptation, adaptation co-benefits and resilience.

- *Common Analytical Model for Resilience Measurement (CAMRM)*

The Common Analytical Model for Resilience Measurement (CAMRM) is an analytical tool advanced by World Food Programme (WFP) (2014) that can be employed in constructing resilient measurement in order to understand the nature of resilience that will influence the selection of indicators used to construct measures. The resilience capacity data structure is developed to identify indicators needed to measure resilience, and finally the resilience measurement expected is constructed to capture the rate of change. It utilizes a mathematical analytical tool and does find relevance in Africa. However, it is limited in scope in terms of accommodating a cross-scale framework of assessing adaptation, adaptation co-benefits and resilience.

- *Resilience Index-Measurement and Analysis Model II (RIMAII)*

The Resilience Index-Measurement and Analysis Model II (RIMAII) is a tool that facilitates estimations of rural household resilience and attempts to explain how some

households cope with shocks and stressors better than others. It is applied for multi-stage factor analyses using a combination of indicators to inform an index. It has been used to estimate resilience dynamics. It does address adaptive capacity, but its scope tends to limit its employability across scale to address its operation as a framework for assessing adaptation, adaptation co-benefits and resilience. This tool was advanced by FAO (2016).

Self-evaluating and Holistic Assessment of Climate Resilience of Farmers and Pastoralists (SHARP)

The Self-evaluating and Holistic Assessment of Climate Resilience of Farmers and Pastoralists (SHARP) was developed by FAO (2013), it focuses on assessing climate resilience of smallholder farmers and pastoralists through utilizing a set of qualitative indicators. It provides critical data for scientists and policy-makers in terms of addressing climate change. It is deployed using a tablet application making it easily accessible at the local level. Despite its suitable at the local level, especially in dealing with smallholder farmers, it is still limited in scope in addressing commercial farmers or agriculture sector beyond the local scales. Hence, it might be proven problematic in terms of assessing adaptation, adaptation co-benefits and resilience overall.

Synergies between adaptation and mitigation: Adaptation co-benefits

Definition

Integrated planning and sustainability strategies can yield benefits for both climate adaptation and mitigation, better than through siloed approaches (Shaw et al., 2014). This requires understanding the inter-relationships and synergies between development practices and climate innovations, which can result in co-benefits (i.e., benefits that are often unanticipated and unplanned that enhance another sustainability outcome). Climate actions with co-benefits can result in 'win-win' situations.

In the past, both adaptation and mitigation have evolved along different pathways. However, addressing climate change challenges through only one lens (either adaptation and mitigation) can lead to trade-offs and one could undermine the other. Even if strong efforts are put on mitigation, the climate will still continue changing in future decades; hence adaptation efforts are also greatly needed. But if the focus is only on adaptation, all the negative impacts will not necessarily be reduced, so mitigation actions are also needed to limit changes in the climate system (Locatelli, 2011).

Apart from increasing the ability to adapt and build resilience, adaptation efforts can have positive side effects due to the intersection with other societal goals, called co-benefits. In practice, adaptation efforts can offset some share of GHG mitigation costs. According to Organisation for Economic Co-operation and Development (OECD), the benefits of climate change mitigation policies in the coming decades would be essentially their co-benefits, since the direct benefits of mitigation policies are expected to occur in the longer run. This purpose is twofold: on one hand, creating synergies between adaptation and mitigation

can increase the cost-effectiveness of actions and make them more attractive to stakeholders; on the other hand, the implementation of a poorly coordinated policy mix may lead to undesirable outcomes.

The analysis of the inter-relationships between adaptation and mitigation reveals techniques to support the effective application of co-benefits actions together. That is the case because elements of adaptive and mitigative capacities, such as the availability of technological options or the access to economic resources, social capital and human capital, largely overlap. The IPCC (2007) stated that opportunities for synergies are greater in the agriculture, forestry, buildings and urban infrastructure sectors. Moreover, four different types of interaction are identified:

- Adaptation actions that affect mitigation actions (A - M);
- Mitigation actions that affect adaptation actions (M – A);
- Decisions that include trade-offs or synergies between adaptation and mitigation (M,A); and
- Processes that have consequences for both adaptation and mitigation (A^M).

The PA has fundamentally altered the dynamics. Being one of the three key objectives of the Agreement, adaptation is close to parity with mitigation. Adequately capturing and recognizing adaptation and mitigation co-benefits will facilitate operationalization of the PA.

Mitigation co-benefits of adaptation can be understood as the GHG emission reductions that are the result of implementation of adaptation-related actions. Mitigation co-benefits can be positive when adaptation measures induce net GHG emission reductions (sinks) or negative when adaptation measures are responsible for net GHG emissions. The concept is laid down in PA Article 4.7, which states that "Mitigation co-benefits resulting from Parties' adaptation actions and/economic diversification can contribute to mitigation outcomes under this Article". However, this wording does not make it clear how co-benefits of adaptation are to be integrated and recognized under the PA, as they are not mentioned under accounting (Art. 4.13), market mechanisms (Art. 6) or transparency (Art. 13). Nevertheless, Art. 4.7 provides a good anchor.

Methods and approaches for assessing adaptation co-benefits

When asking the question how mitigation co-benefits of an adaptation action can be determined, it is worthwhile to make use of existing approaches under the UNFCCC. For example, the Kyoto Protocol (KP) introduced three different market-based mechanisms for countries to reach their targets on limitation or reduction of GHG emissions: the Clean Development Mechanism (CDM), Joint Implementation (JI) and international emissions trading. The large number of baseline and monitoring methodologies for mitigation under the CDM can serve as a solid basis for the assessment of mitigation co-benefits of adaptation actions.

Transferring the rich methodological bod of knowledge from the CDM to the assessment of mitigation co-benefits, it needs to be taken into account that the specificities of adaptation action may differ from those of traditional

mitigation efforts. Thus, it will not necessarily be possible in all cases to apply existing methodologies. However, the framework offered by the CDM can be used as guidance for the development of new methodologies and of a validation/verification framework of mitigation co-benefits of adaptation at the international level.

The definition of a baseline scenario is key for assessing the mitigation co-benefits of adaptation actions, the objective would be to assess emissions of GHG without implementation of the adaptation action. There is thus need to build a Measurement, Reporting and Verification (MRV) system that would combine data related to adaptation co-benefits.

Challenges associated with existing monitoring and evaluation for assessing adaptation, adaptation co-benefits and resilience

M&E for climate adaptation, adaptation co-benefits and resilience presents a number of challenges. These are mainly because climate adaptation objectives across the Quadruple Bottom Line (QBL) and cultural dimensions vary according to differing adaptation contexts (e.g. proximity to coasts, people vulnerable to multiple stressors) and effects of climatic changes (e.g. extreme events), see, e.g., Spearman and McGray (2011). One of the most important challenges associated with M&E is that a general or standard approach may not be applicable given the location and variability in policy, program and impact. By way of comparison, climate mitigation projects are mainly tracked through quantifiable units such as changes in GHGs or avoided emissions through the protection of carbon sinks providing common ground for monitoring, evaluation and reporting (EEA 2015). For climate adaptation however, each objective will usually have a particular appropriate adaptation strategy or combination of strategies that meet the specified objectives and a corresponding indicator that measure its effects. As well, the focus of adaptation may vary for different projects as many adaptation objectives are increasingly integrated within goals for mitigation and as part of development and DRR planning for GEF (Sanahuja 2011). Uncertainty associated with climate systems, combined with uncertainties associated with the social, environmental and economic factors, influence the extent of impacts and make it often difficult to evaluate the appropriateness of adaptation policies and actions.

In addition, there are a number of other challenges associated with developing robust M&E frameworks including long timeframes, impact of multiple drivers, maladaptation and varying sociopolitical contexts. Impacts of climate change are usually observed over long time scales and thus success of any intervention is best measured over long time horizons. The long time frame is necessary to assess and measure damages avoided (Morand et al. 2014). When seeking to measure avoided damages, measuring success is difficult in the absence of an event. For example, it is hard to estimate the success of an adaptive measure for an extreme storm event unless a storm event actually occurs.

Compounding the challenge of a long term M&E framework is that that there are changes in societal values, biophysical conditions and socio-economic conditions. Multiple drivers (e.g. change in community attitudes, new technologies) may also contribute towards a desired outcome, which makes it challenging to attribute the outcome to a particular adaptation measure during the M&E process. M&E needs to consider if the chosen options develop maladaptation (i.e. reduce vulnerability to climate risks but increase vulnerability to other non-climate related stressors in the long term) as the adaptive space changes. Also, objectives may need refining with changes in the adaptive landscape (e.g. changes in community values; technological advancements, variations in assumptions made at the planning stage). There is also a need to consider potential adaptation path dependencies that can be shaped by a number of lock-in effects (Wilson 2014), which can be caused by improper planning or abrupt

changes in the adaptive landscape. 'Many rational options are likely to fail, competing against political timelines and non-climate-related priorities' (Mathew et al. 2012), constraining the range of pragmatic adaptation pathways. This would mean M&E would need to also monitor and evaluate the socio-political contextual changes happening while adaptation options are planned and implemented.

Evaluation is usually conducted against reference conditions. However, the baseline data, which reflect the conditions at the time of project planning and implementation, may not be stationary. A shifting baseline, where specific points of reference used to measure adaptation progress change over time will impact on the overall evaluation (EEA 2015). It is important to assess the effectiveness of adaptation by comparing what would have happened in the absence of the measure through counterfactual analysis. Counterfactual analysis utilizes a number of assumptions to evaluate various alternative development scenarios: which also makes it difficult to define a standard for comparison.

There are a lot of efforts to support the development of national adaptation M&E systems through technical or financial assistance. Bilateral development co-operation providers have supported several countries on building M&E systems by piloting local or national approaches. Examples include the United Kingdom's Department for International Development supporting the Tracking Adaptation and Measuring Development (TAMD) initiative to track adaptation and measure its impact on development, led by International Institute for Environment and Development, or Germany's Gesellschaft für Internationale Zusammenarbeit (GIZ) support through "M&E Adapt" project and other bilateral projects. At the multilateral level, the Climate Investment Fund's Pilot Program for Climate Resilience (PPCR), which supports adaptation programmes in 28 pilot countries, held regional workshops in Tajikistan (2015), Jamaica and Tonga (2016) on climate adaptation "monitoring and reporting" across a broad range of sectors (CIF, 2016a). Each PPCR pilot country is also expected to report on five core indicators during the life of their PPCR investment plan, including the "degree of integration of climate change in national, including sector planning", or the "extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR supported tools, instruments, strategies, and activities to respond to climate variability or climate change" (CIF, 2016b).

Several resources have also been developed under the UNFCCC to support capacity-building for M&E of adaptation. The first of those is the Nairobi Work Programme (NWP), established at COP11 (December 2005). The NWP's main role is to be a knowledge hub to support enhanced action on adaptation, in part through its Adaptation Knowledge Portal, which also provides information on M&E tools.

Conclusion and Recommendations

Conclusion

Assessing adaptation progress and resilience is one of the cornerstones of the PA as it is an important step of the process of adapting and building resilience to climate change, by enabling Parties to better address climate risks, improve the effectiveness of adaptation measures, and increase accountability. There is currently more experience in devising and implementing M&E systems at the project and programme level than at the national level. Review of the M&E tools has shown that the main focus is more on adaptation monitoring than on adaptation evaluation. The fact that few outcome indicators have been developed at the national level can be partly explained as in many cases adaptation policies and programmes lack measurable targets or clearly defined expected outcomes necessary to assess their effectiveness using indicators (SBSTA, 2010).

The majority of the existing M&E tools are not appropriate for tracking adaptation progress and measuring resilience. Tracking adaptation and measuring resilience is constrained by a lack of comparable metrics and standardized—or even standardizeable—units of analysis for measuring and quantifying climate change impacts. At least four major categories of challenges can be identified with regard to current approaches to physical climate risk: historical data limitations, consistency of future scenario planning, implications of analysis, and diversity of uses and risks. While mitigation reporting is already well developed for inventorying emissions across sectors and countries, similar mechanisms for tracking adaptation are urgently needed. There is a gap on methodologies for assessing adaptation progress at different scales, as well as across and within countries, and over time. Results from such a framework at the national level could be one of the inputs to the GST on collective progress on adaptation.

Recommendations

The paper makes the following recommendations:

1. Take stock and identify the gaps of the existing methods and approaches for assessing adaptation, adaptation co-benefits and resilience.

2. Develop a harmonized framework/methodology or guidance for tracking adaptation, adaptation co-benefits and resilience across scales for effective implementation of NDCs, and that also would make it possible to assess the progress, adequacy and effectiveness of adaptation efforts at a global level (GGA) in a way that is systematic, rigorous and transparent.

3. Facilitate international cooperation and support with regards to finance, technology development and transfer, and capacity building on the application of the harmonized framework/methodology or guidance for tracking adaptation, adaptation co-benefits and resilience in order to enhance implementation of the NDCs, NAPs and climate policies.

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