

Learning to ADAPT: monitoring and evaluation approaches in climate change adaptation and disaster risk reduction – challenges, gaps and ways forward

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SCR Discussion Paper 9

The Climate Smart Disaster Risk Management Approach

Strengthening Climate Resilience



The questions in the approach are suggestions only and there may well be others

1. Tackle changing disaster risks and uncertainties

1a Strengthen collaboration and integration between diverse stakeholders working on disasters, climate and development

To what extent are climate change adaptation, disaster risk management and development integrated across sectors and scales? How are organisations working on disasters, climate change and development collaborating?

1b Periodically assess the effects of climate change on current and future disaster risks and uncertainties

How is knowledge from meteorology, climatology, social science, and communities about hazards, vulnerabilities and uncertainties being collected, integrated and used at different scales?

1c Integrate knowledge of changing risks and uncertainties into planning, policy and programme design to reduce the vulnerability and exposure of people's lives and livelihoods

How is knowledge about changing disaster risks being incorporated into and acted upon within interventions? How are measures to tackle uncertainty being considered in these processes? How are these processes strengthening partnerships between communities, governments and other stakeholders?

1d Increase access of all stakeholders to information and support services concerning changing disaster risks, uncertainties and broader climate impacts

How are varied educational approaches, early warning systems, media and community-led public awareness programmes supporting increased access to information and related support services?

2. Enhance adaptive capacity

2a Strengthen the ability of people, organisations and networks to experiment and innovate

How are the institutions, organisations and communities involved in tackling changing disaster risks and uncertainties creating and strengthening opportunities to innovate and experiment?

2b Promote regular learning and reflection to improve the implementation of policies and practices

Have disaster risk management policies and practices been changed as a result of reflection and learning-by-doing? Is there a process in place for information and learning to flow from communities to organisations and vice versa?

2c Ensure policies and practices to tackle changing disaster risk are flexible, integrated across sectors and scale and have regular feedback loops

What are the links between people and organisations working to reduce changing disaster risks and uncertainties at community, sub-national, national and international levels? How flexible, accountable and transparent are these people and organisations?

2d Use tools and methods to plan for uncertainty and unexpected events

What processes are in place to support governments, communities and other stakeholders to effectively manage the uncertainties related to climate change? How are findings from scenario planning exercises and climate-sensitive vulnerability assessments being integrated into existing strategies?

3. Address poverty & vulnerability and their structural causes

3a Promote more socially just and equitable economic systems

How are interventions challenging injustice and exclusion and providing equitable access to sustainable livelihood opportunities? Have climate change impacts been considered and integrated into these interventions?

3b Forge partnerships to ensure the rights and entitlements of people to access basic services, productive assets and common property resources

What networks and alliance are in place to advocate for the rights and entitlements of people to access basic services, productive assets and common property resources?

3c Empower communities and local authorities to influence the decisions of national governments, NGOs, international and private sector organisations and to promote accountability and transparency

To what extent are decision-making structures de-centralised, participatory and inclusive? How do communities, including women, children and other marginalised groups, influence decisions? How do they hold government and other organisations to account?

3d Promote environmentally sensitive and climate smart development

How are environmental impact assessments including climate change? How are development interventions, including ecosystem-based approaches, protecting and restoring the environment and addressing poverty and vulnerability? To what extent are the mitigation of greenhouse gases and low emissions strategies being integrated within development plans?

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Acronyms and abbreviations

ADPC	Asian Disaster Preparedness Centre
CCA	Climate Change Adaptation
CSDRM	Climate Smart Disaster Risk Management
DEFRA	Department for Environment, Food and Rural Affairs (UK)
DFID	Department for International Development (UK)
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
GEF	Global Environment Facility
GNDRR	Global Network for Disaster Risk Reduction
HFA	Hyogo Framework for Action
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
LFA	Logical Framework Approach
M&E	Monitoring and Evaluation
PM&E	Participatory Monitoring and Evaluation
OECD	Organization for Economic Co-operation and Development
OM	Outcome Mapping
UNDP	United Nations Development Programme
UNFCCC	United National Framework Convention on Climate Change
UNISDR	United Nations International for Disaster Reduction
WRI	World Resource Institute

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Learning to ADAPT: monitoring and evaluation approaches in climate change adaptation and disaster risk reduction – challenges, gaps and ways forward

Abstract

This working paper is a methodological contribution to the emerging debate on monitoring and evaluation (M&E) in the context of climate change adaptation and disaster risk reduction. Effectively managing disaster risk is critical for adapting to the impacts of climate change, however disaster risk reduction M&E practice may be limited in capturing progress towards adaptation.

First, this paper situates the M&E discussion at the interface of climate change adaptation, disaster risk management and development. It describes the key practical challenges for M&E in the context of climate change and briefly explores the limitations of current disaster risk reduction M&E efforts within this context.

Second, the paper examines current M&E efforts in adaptation and disaster risk reduction, comparing methodological aspects and the conceptual underpinnings of existing practice, pointing to gaps and limitations. Particular attention is paid to the room current approaches provide in gaining a deeper understanding of the determinants that may enable or constrain adaptation and in building an evidence base of progress made.

Finally, based on the limitations that these present, this paper presents a set of ADAPT principles (Adaptive, Dynamic, Active, Participatory and Thorough) to facilitate the development of M&E frameworks for interventions that aim to contribute to integrated adaptation processes. The M&E approach by which adaptation and disaster risk management are to be evaluated involves challenging existing M&E practice towards new M&E that enable flexibility, account for uncertainty and complexity and encourage an understanding of the linkages between capacity, action and the driving forces of individuals and communities towards change. The unique nature of adaptation to climate change calls for experience-based learning M&E processes for discovering the key insights into adaptive capacity and its links to adaptation processes, and to risk and vulnerability reduction at large. The ADAPT guiding principles and indicators set the foundations towards this end.

Key findings

M&E Methodologies	Focus on	Approach	Assumption
Input-Output-Outcome evaluation	Effectiveness	Elements of adaptive capacity/risk are pre-determined and evaluated against a set of indicators	Increased adaptive capacity will ultimately lead to reduced vulnerability
Process-based evaluation			Risk is probabilistically determined and known
Evaluation of behavioural change			
Economic evaluations	Efficiency	Benefits of adaptation is measured in terms of economic loss	Rational decision making The ability to determine a baseline and projected benefits and losses

Three key issues common to M&E

1. Deterministic approaches focus on input/outputs not processes

Current approaches focus on determining the preferred inputs and changes required to build adaptive capacity and on measuring the success of adaptation and risk reduction interventions. Evaluation approaches implicitly assume that once appropriate measures are identified and projects implemented this will protect communities against climate impacts. Such an approach appears linear and favours determining adaptation actions. In other words, the focus is on the 'what' rather than on the how or why. A focus on outputs and results tends to stress the evaluation of the 'delivery' of adaptation interventions and immediate reductions in risk sidelining the long-term developmental context. In order to support adaptive management and learning a shift in focus to process-based indicators is required in order to allow for a holistic monitoring and evaluation that gain a deeper understanding of the adaptation process. Equally important, a focus on processes enables flexible planning of programmes and policies that can deal with uncertainty and changing scenarios.

2. Most approaches remain static rather than dynamic

The evaluation of adaptation has been dominated by a focus on climate change impacts and static quantitative indicators. The reviewed M&E approaches and frameworks do not embrace the dynamism and flexibility required in an environment characterized by high levels of uncertainty and complexity – this is further reinforced when considering M&E approaches of DRR. In the context of climate change it is required that M&E frameworks reflect indicators and targets rather than considering changes over time and are responsive to the operational environment.

3. Effectiveness and efficiency predominate as key principles

Current evaluation approaches focus on measuring the effectiveness (achievement of results) and efficiency (in monetary value) in terms of risk and capacity to manage stresses and shocks. However, existing approaches are not run against indicators of maladaptation such as the distribution of vulnerability. Further, quantifying results as means to measure effectiveness leads to the development of indicators that are detached from the underlying reasons of a particular result.

These findings suggest that the need for establishing cause-effect relationships and demonstrating short-term effectiveness is prioritized over establishing M&E frameworks that enable learning. Currently the evidence base for bringing about change and the factors that influence decisions about adaptation actions is minimal. This research argues that M&E has the potential to fill this gap. To do so, M&E practice needs to go beyond business as usual. This research demonstrates the need for a new interpretation and alternative approaches to the design of M&E frameworks for adaptation interventions that go beyond measuring results, to promote learning from how, why or why not, these were achieved. As many adaptation interventions are at an early stage of implementation, this is an opportune time to design M&E approaches and methodologies that promote learning to adapt.

A perspective on M&E that enhances learning and knowledge promotion would examine the linkages between capacity and action by looking at the driving forces of individuals and community towards change. It would embrace constant monitoring, allow flexibility and enhance capacities to deal with uncertainty. Monitoring and evaluation frameworks that provide space for such issues would contribute to improved practice – the ultimate goal of M&E. The real need for the disaster risk reduction and adaptation community is to develop comprehensive M&E systems that embrace, promote and expand knowledge and the evidence base available on adaptation and risk reduction processes. There is a need for M&E frameworks that embrace comprehensive approaches, which reflect the multi-dimensional nature of adaptation and disaster risk reduction and its contribution to developmental outcomes. To this end, the following is recommended.

Recommendations

1. Support further research to study both the individual and community processes of change in current adaptation interventions.
 2. Design an M&E-learning tool that supports the generation of evidence-based knowledge about the decision-making processes that lead to adaptation. This needs to be dynamic, flexible and adaptive to local contexts and constantly changing circumstances and concerns of stakeholders.
 3. Use of the ADAPT principles which identifies key guiding principles for the future development of adaptation M&E indicators and frameworks.
 4. Engage with adaptation and development practitioners to develop a comprehensive basket of integrated process-based indicators that account for wider operational environmental household dynamics and perceptions and underlying causes of poverty and vulnerability.
 5. Develop ADAPT indicators – Adaptive, Dynamic, Active, Participatory, Thorough – in order to ensure that the complexities and dynamics involved in a constantly changing environment are captured.
 6. Establish M&E systems that go beyond programme/project timelines and that facilitate and promote organizational learning.
 7. Engage with M&E methodologies that promote and emphasize learning such as utilization-focused and developmental evaluation.
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Introduction

Climate change is exacerbating disaster risk and eroding community resilience. This makes the task of reducing disaster losses even more difficult and shows that efforts to manage the risk posed by current and future climate variability are not sufficient. The need to adapt to changing climatic conditions is increasingly gaining recognition and attention is being given to the converging agendas of disaster risk reduction and climate change adaptation and the need for integrating these within wider development processes (Mitchell *et al.*, 2010a). As such, the climate smart disaster risk management approach calls for an integrated approach as an imperative to deal with the scale and urgency of dealing with climate change impacts and its associated uncertainty. Yet, there is little empirical understanding about the factors that contribute to adaptation processes in practice. An important consequence of climate change for human systems is the need to adapt by altering economic, social and livelihood strategies faster than they have ever done before. Greater emphasis is therefore required to proactively adapt rather than just being responsive (Burton *et al.*, 2006). However, knowledge about the process of adaptation remains poorly understood. Climate smart approaches to disaster risk management that aim to facilitate adaptation actions require an improved understanding of how those decision-making processes take place. This working paper suggests that M&E has the potential to fill this gap and calls for urgent attention to a new interpretation of M&E.

Neither DRR or adaptation are about disasters or climate per se, but rather about all the social, physical and economic factors that influence the magnitude and impact of the threat (Schipper, 2009). Through examining and learning from existing M&E approaches of adaptation and DRR, the findings of this research can be factored into evolving approaches for M&E of not only these two fields, but also the integration of these into wider development processes.

As climate change adaptation gains increasing financial support, M&E is becoming a 'headline issue'. Nevertheless, M&E frameworks for adaptation programmes are still in early stages of development (Van den Berg and Spearman, 2009). The Global Environment Facility (GEF) Evaluation Office, for example, has recently launched a new website on evaluation of climate change initiatives, where experts are invited to suggest inputs to the development of an evaluation framework for adaptation¹. Other development agencies are also working on the design of M&E frameworks for climate change interventions. In recognition of the critical role DRR plays in facilitating adaptation and in order to avoid duplication of efforts, suggestions have been made to apply DRR M&E methods to evaluation progress in climate change adaptation. However, the DRM community has given low attention to M&E (Wilkinson and Twigg, 2007). At the most, the evaluation

of DRR efforts, have focused on calculations of risk and in identifying characteristics of disaster resilient communities. Now more than ever, these two approaches remain limited. First, calculations of risk may be fundamentally flawed given the high levels of uncertainty of future climate scenarios. Second, the characterization of disaster resilient communities

¹ See: www.climate-eval.org

tends to focus on the outputs of DRR interventions, providing little insights into the processes and determinants of such interventions. Hence, it is an opportune time to assess emerging efforts and key issues for further attention. To this end, this paper examines current M&E approaches and its methodological aspects and the conceptual underpinnings of existing practice, pointing to gaps and limitations.

Clarity over the objective of M&E activities is crucial to guide the development of appropriate M&E approaches. The nature and focus of M&E will depend on the desiderate purpose of evaluation. To date, the debate and research on M&E is focused on measuring the impacts of climate change adaptation interventions (Prowse and Snilstveit, 2010). However, there is a growing demand to share information and evidences of adaptation in practice as well as to measure progress. Beyond evaluating delivery of results, M&E can potentially offer promising avenues for learning, which is critically important for developing effective programmes that facilitate climate change adaptation (Frankel-Reed *et al.*, 2009). As many adaptation interventions are at an early stage of implementation, this is an opportune time to design M&E approaches and methodologies that promote learning to adapt. This paper examines the limitations of existing M&E approaches to support learning about how adaptation takes place and reflects on the potential role of M&E as a tool for generating knowledge about the factors that influence individual and collective adaptation actions. A further role for M&E is therefore, as a knowledge management tool to raise the evidence base in the policy and practitioners community.

This working paper, primarily aimed at the DRM and adaptation community, aims to contribute to the development of M&E frameworks for adaptation programmes and integrated CCA/DRM and development approaches. This is an emerging area of practice and many initiatives are underway, however extensive research has not yet been carried out. This working paper contributes to this emerging debate by proposing a set of ADAPT guiding principles for the development of M&E frameworks as a learning and knowledge management tool that may ultimately facilitate gathering evidences on the processes that lead to adaptation. Furthermore, the ADAPT principles can enhance the ability of the DRM community to better understand and build an evidence base of its contribution towards building climate resilient communities.

This paper is structured around four sections. Section 1 sets the context of this research and presents the critical challenges for M&E in the context of adaptation and DRM. Section 2 examines current evaluation approaches and tools, including an analysis of the assumptions behind each, and identifies gaps and limitations to supporting learning and knowledge creation about how adaptation may occur. Section 3 presents the research findings and analyses the limitations of the current approaches. These are identified in: i) three common issues that limit the use of existing M&Es to improve practice; and ii) the absence of evaluating the factors that influence the decision-making processes that lead to adaptation. It presents how, in spite of the recognized importance of such processes, these are currently sidelined. Section 4 presents the ADAPT principles and indicators (Adaptive, Dynamic, Active, Participatory and Thorough) for

M&E of adaptation and DRR interventions and discusses its implications for M&E practice. Section 5 returns to the original question, presents the main conclusions and proposes recommendations for future research and practice.

Methodology

The research was conducted by undertaking a literature review of studies in the area of climate change adaptation, monitoring and evaluation, and social learning and change. Data was collected on adaptation evaluation frameworks² used by several developmental agencies. The methodology to review the frameworks is two pronged. Each framework is reviewed on the basis of the conceptual approaches and on the indicators that emerge as a result. Because this is an emerging area of practice and research, a number of practitioners and researchers working in CCA and DRR were interviewed to further expand the findings of this research. This working paper proposes a new model for the M&E of adaptation interventions and suggests ADAPT indicators for future M&E frameworks. Looking at M&E as a potential tool for enabling learning instead of simply measuring results presents an opportunity to explore new areas of research. M&E that emphasizes multiple and complex adaptation processes, where household decision making and the factors that influence capacity leading to action become central, should be the future agenda for the evaluation of adaptation interventions.

1. Setting the context: Climate Change Adaptation, Disaster Risk Management and Development from an M&E perspective

Climate change is affecting the frequency and severity of some natural hazards, is increasing people's vulnerability and exposure, and is creating greater uncertainty – with a clear understanding that past climate conditions are less and less useful as a guide for future conditions. Growing attention to the threats posed by climate change has led to increasing recognition of the interactions between the fields of climate change adaptation and disaster risk management (Solecki et al., 2011; Mercer 2010). These connections in turn, have fostered research and debates about the synergies, convergence and differences between these fields (Mitchell *et al.*, 2010b). In particular DRM has come to be recognized as a critical tool for climate change adaptation – reflected specially in the 2007 Bali Action Plan, which made specific reference to DRM strategies and tools as means to address climate change impacts. This comes as a result of the recognition that there is a risk of reinventing older approaches and sidelining the wealth of lessons learnt in the DRM field. Rather than attempting to provide a review of this debate, this paper concentrates on its implications for M&E. In spite of the growth of research and debate surrounding integration, there has been little attempt to understand how integrated approaches towards adaptation may underpin thinking and practice in relation to M&E. This is particularly surprising, given the still limited consensus and understanding of adaptation in practice. However, this is changing. On the one hand, the higher international political and public profile of CCA is generating momentum for M&E practices, in particular due to the concern surrounding the effectiveness and cost

² Given the limited scope of this research, these do not include sector specific M&E frameworks, for example natural resource management or agriculture.

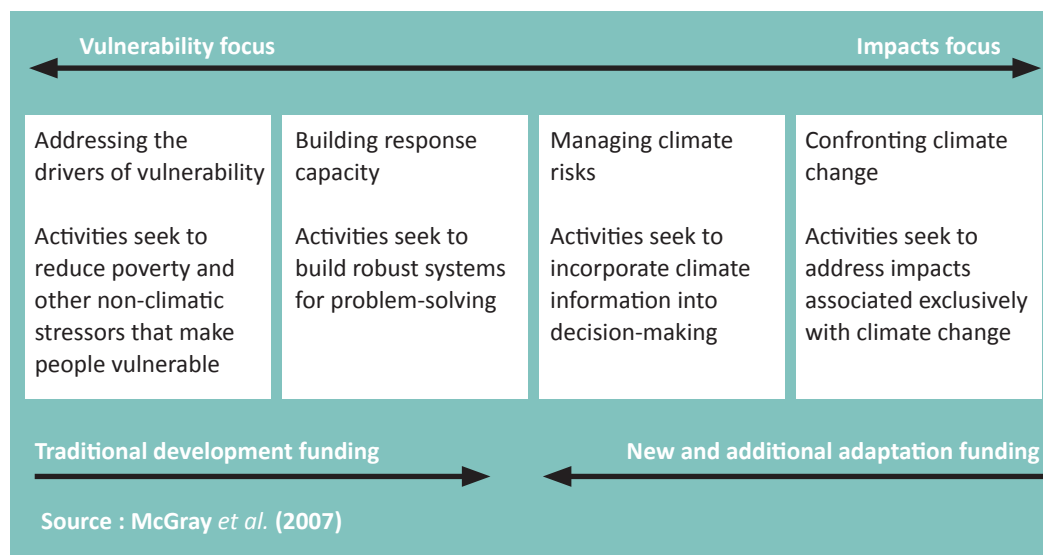
benefit of adaptation interventions. On the other hand, the Hyogo Framework for Action (HFA) targets set to be achieved by 2015, have bought evaluation concerns back within the DRR community. In order to avoid duplication of efforts and tools, several suggestions have been made to apply DRR evaluation methods and tools to adaptation interventions (Valencia, 2009; Hedger et al., 2008). The recognition that climate change may lead to more extreme events provides the direct link from this line of research to climate change vulnerability and adaptation work (Schipper and Pelling, 2006). It is argued that reducing risk to climate change should be the starting point for adaptation and hence DRR M&E frameworks could be used for the evaluation of adaptation programmes. However, the DRR community has given low priority to M&E (Twigg, 2004). This is for example reflected in the lack of technical manuals in relation to methods for assessing the performance of DRR programmes and projects where the need for regular M&E is occasionally mentioned but methods are rarely discussed. There is a similar neglect in training courses, which concentrate on raising awareness, understanding concepts, hazard/risk/vulnerability/capacity assessment, and identification and implementation of risk reduction options. Monitoring and Evaluation training is more likely to focus on emergency response applications or learning from the impact of past emergencies for disaster planning (Wilkinson and Twigg, 2007).

At the most evaluation of DRR programmes have tended to focus on describing and categorizing elements of a disaster resilient community (this is further explored in section 2) where most M&E of DRR work concentrates on activities and outputs – providing limited insights on the processes that lead to vulnerability reduction. Typically used evaluation tools tend to concentrate on the calculation of risk and exposure in order to determine the effectiveness and efficiency of such interventions and as a result, probabilistic approaches remain at the heart of any technique for evaluating DRR efforts – but now more than ever such approaches need to be subject to extensive scrutiny. Climate change and its related levels of uncertainty and possibilities of ‘surprise events’ challenge risk and exposure calculation exercises, and M&E approaches to DRR. In addition, adaptation to climate change does not only imply adjusting to one-time disaster but also to changes in mean condition. This working paper thus concentrates on more recent debates, which call attention to the fact that there is a risk that a business as usual DRM may not only fall short of contributing to adaptation, but also even increase the vulnerability of communities to climate variability and change if it does not address climate change considerations, its associated uncertainty, and the underlying causes of vulnerability and poverty (Mitchell et. al., 2010a).

The intersection between these two fields and development has also become of particular interest (Kelman, 2010). The adaptation framework developed by McGray et al. (2007) (Figure 1), presents a way of understanding the different types of adaptation activities based upon how closely different approaches target specific climate change impacts. The framework presents adaptation as a continuum and suggests that the distinction between adaptation and development is difficult to distinguish in practice:

If there are uniquely ‘adaptive’ elements to these efforts, they are those involved in defining problems, selecting strategies, and setting priorities, not in implementing solutions. (McGray et al. 2007:15)

Figure 1 The adaptation-development continuum



Source: McGray et al. (2007)

In recognition of such critical issues, calls for integrating disaster risk management and climate change adaptation in ongoing development have grown in recent years. At the heart of both adaptation and DRR lies the concern about development pathways that exacerbate or reduce risk posed by hazards to society. Rather than considering disasters outside the developmental context, reducing and adapting to changing disaster risk also requires addressing the root causes of vulnerability and poverty such as access to resources, productive assets and livelihood promotion. It is on this basis that integrating these three areas of work must become an imperative. From a DRM perspective, the climate smart disaster risk management (CSDRM) approach calls for a DRM approach that goes beyond managing climate risk to building adaptive capacity and addressing the drivers of vulnerability (Mitchell *et al.*, 2010a). This, for example, would imply that it may not be enough preventing people from setting in hazardous areas – as these are the same locations that often provide resources on daily basis (such as coastal zones) – but also focusing on livelihood promotion and access to assets and resources, building people’s capacity to deal with change and promoting government accountability.

From an M&E point of view, four critical implications arise from the integration debate. First, progress on adaptation and risk reduction may be difficult to distinguish from wider development interventions that deal with climate risk and variability. Second, different types of adaptation and risk reduction strategies require different typology of indicators, as these will vary according to the objective of the intervention and the climatic factor or extreme event that is being strategised. Third, the similarities between adaptation, disaster risk reduction and development activities means that

M&E methodologies used in development can provide useful insights into the designing of M&E frameworks for adaptation (Hedger et al., 2008; Prowse and Snilstveit, 2010). The limitations of existing DRR M&E activities for dealing with climate change and underlying causes of vulnerability were identified earlier. Fourth, in order to foster integrated approaches, M&E frameworks need to embrace comprehensive approaches that reflect the multi-dimensional nature of adaptation and disaster risk reduction and its contribution to developmental outcomes.

It is within this context that this working paper reviews existing M&E approaches to adaptation so that findings can be then incorporated in M&E efforts towards Climate Smart Disaster Risk Management.

1.2 What are the challenges of M&E in the context of adaptation and disaster risk management?

Monitoring and Evaluation is constantly evolving as it has had to respond to changing conceptualizations of development and the various types of agency involved (Engel and Carlsson, 2002). With adaptation becoming a headline issue in development practice, debates and concerns on its implications for M&E practice have emerged. This is reflected in, for example the recent World Bank publication tackling issues around the evaluation of adaptation interventions in 2009 and that for the first time, an M&E session was held at the 5th International Conference of Community Based Adaptation (2011). However, very few evaluations of adaptation interventions have been undertaken. This section briefly introduces and reviews key challenges for M&E in the context of adaptation and disaster risk management:

Lack of conceptual clarity

Discussions about M&E need to define not only what is to be evaluated, but also needs to define what ‘success’ is in order to establish a benchmark against which programmes need to be evaluated – these two aspects then inform the development of an M&E framework and set of indicators. Adaptation strategies aim to reduce vulnerability to expected impacts of climate change. However, a key conceptual challenge remains in the adaptation agenda as the lack of agreement about this concept persists and in particular in what constitutes ‘successful’ adaptation³. As the purpose of this research is to discuss practical M&E aspects of adaptation interventions, the conceptual debate is not detailed here however lack of conceptual agreement translates into critical challenges for M&E in practice.

A key conceptual and practical issue is whether to view adaptation as an outcome (that is the adjustment) or as a process. There seems to be an agreement within the literature that adaptation refers to both, the process of adapting – ‘adaptation is a continuous stream of activities actions and decisions’ (Adger *et al.*, 2005: 78) – and to the condition of being adapted (outcome). Hence, from an M&E perspective both processes and outcomes need to be taken into consideration. From this, however, a second critical challenge arises for M&E. Researchers have identified building adaptive

Definitions

Adaptation

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2007:869).

Adaptive Capacity

The ability of human systems to adapt to and cope with climate change depends on such factors as wealth, technology, education, information, skills, infrastructure, access to resources, and management capabilities (IPCC 2007:8).

³ This is reflected, for example, in the varied number of definitions of adaptation in the literature and policy documents.

capacity as key to reducing vulnerability to climate change. Most authors and practitioners refer to adaptive capacity as the ability of a system to adapt. Thus, it is expected that building adaptive capacity (process) will lead to adaptation and vulnerability reduction (outcome) – meaning that both adaptive capacity and vulnerability become the targets for measuring progress in adaptation. The lack of conceptual clarity and empirical and concrete links between adaptation, adaptive capacity and vulnerability translates into a practical challenge on how adaptation should be ‘measured’. In addition, ‘indicators of adaptive capacity will represent factors that do not determine current vulnerability but that enable a society to pursue adaptation options in the future’ (Adger *et al.*, 2004: 45), meaning that ‘expected’ outcomes may only be seen in long-term timeframes.

Persisting ambiguity about the definition of adaptation – as well as both its determinants and their inter-relationship – raises questions about the intelligibility of the concept, but even more so, it highlights the importance of M&E to gain a deeper understanding of adaptation in practice.

Independently from the objective of a particular adaptation intervention, adaptation to climate change means learning to live with more extreme weather events and changing weather patterns.

It requires an ongoing change process whereby people can make informed decisions about their lives and livelihoods. Thus, ‘learning to adapt is as important as any specific adaptation intervention’ (Pettengell, 2010: 2). Monitoring and evaluation needs to highlight learning for adaptation as an essential component of the process.

Diversity in types of adaptation

Because of its diverse nature, monitoring and evaluation of adaptation is challenging. Adaptation strategies and activities cut across a myriad of sectors and are implemented at different scales (from international to household level) and encompass a broad range of approaches (i.e. hard structural adaptation to policy measures). The objective of adaptation interventions may vary according to the organization’s expertise, mission or strategies. This will then be reflected in how ‘successful’ adaptation is defined and hence in the set of indicators used in M&E. Few attempts have been made to identify key principles of successful adaptation (Adger *et al.*, 2005; Hedger *et al.* 2008; Doria *et al.* 2009; DEFRA 2010). This type of research is still in the early stages of development, and empirical research to support the theoretical understanding of success is still very much required. However, recognizing the commonalities in existing research, this working paper works on the basis of these common principles identified in the literature (Adger *et al.*, 2005; Hedger *et al.*, 2008; DEFRA 2010).

These are: effectiveness, efficiency, equity, legitimacy and sustainability. It is important to note that some researchers (Wilby and Dessai, 2010) have also identified flexibility – the ability to change in response to altered circumstances – and robustness – the ability to cope with a range of potential outcomes. It is considered here however, that rather than principles, the latter could be indicators to measure the efficiency of

Table 1 Principles of successful adaptation

Principles	Description
Effectiveness adaptation programmes (Adger <i>et al.</i> , 2005)	An effective intervention is one that achieves its stated objectives. Effectiveness may be framed according to the objective i.e.: reducing risk, building adaptive capacity or increasing resilience. However, effectiveness may depend, for example, on the level of uncertainty involved. An 'effective' adaptation is one that is flexible –to change in response to altered circumstances–and therefore robust against uncertainty.
Efficiency	Efficiency refers to the cost-effectiveness of a particular project. It compares the cost of alternative ways of producing similar results. However, efficiency alone may not justify the intervention itself as trade-offs may arise when balancing risk with resource investment. Efficient adaptation actions involve deciding on acceptable levels of risk in a collaborative way.
Equity	The aim of adaptation programmes is to reduce vulnerability to climate shocks and stresses. Vulnerability to climate change also depends on a wider set of socio-economic factors. Successful adaptation actions should not reinforce existing inequalities between communities, sectors or regions.
Legitimacy	Decisions must be accepted by participants and non-participants that are affected by these decisions.
Sustainability	Sustainability of adaptation intervention refers to looking beyond project duration and its immediate impact. 'Those activities that are effective and equitable are more likely to be sustainable' (Hedger <i>et al.</i> , 2008:28).

Source: Modified from Adger *et al.* (2005), Hedger *et al.* (2008)

Ultimately, successful adaptation may be seen over a timeframe of decades based on the achievement of development outcomes. Monitoring and evaluation needs to extend beyond programme or project lifetimes in order to assess such long-term achievements.

Adaptation as a decision-making process

Currently the evidence base for bringing about change and the factors that influence decisions about adaptation actions is minimal. More importantly, although adaptive capacity may provide the foundations for adaptation to occur, whether or not that capacity leads to adaptation actions depends on a further set of decision-making processes and the operational environment within which this may take place (Vincent, 2007).

How to adapt is subject to the values underlying individuals' perspectives on what the objectives of adaptation are or should be (O'Brien and Wolf, 2010; Adger *et al.*, 2009). What is considered successful, effective or legitimate adaptation depends on what people perceive to be worth achieving and protecting. For example, Schipper and Dekens (2009) argue that numerous efforts to reduce risk in the past have been unsuccessful because they did not pay attention to cultural factors. There is a growing body of research and evidence indicating that values and perspectives play

a critical role in individual decision-making of adaptation options (O'Brien, 2009; Grothmann and Patt, 2005; Carr, 2008; Heyd and Brooks, 2009; Patt and Siebenhuner, 2005; Weber, 2010). Hence, the 'measurement issue' is quite different if adaptation is understood as a social process. In this framing, adaptation is undertaken by people that act in specific ways to anticipate, to respond to current trends, and to change their livelihoods strategies. Then, in measuring progress of adaptation, such processes become critical for any M&E approach. In order to meaningfully plan and evaluate adaptation options, it thus becomes crucial to understand local beliefs, perceptions and values, and how in turn these influence individual and community response and decision-making patterns. In other words, the challenge is to assess and understand how and why people adapt or completely change their lifestyles and what interventions may enable these processes.

Avoiding maladaptation

An effort to define successful adaptation highlights that adaptation can also be unsuccessful (Barnett and O'Neil, 2010). While the measurement of success is important, measurement of failure is too. Any adaptation, risk reduction or developmental intervention can create unintended impacts. Unsuccessful adaptation does not only refer to not having achieved the stated objective but also when adaptation actions increase the vulnerability and exposure of other groups or sectors. Alternatively, while progress towards adaptation may be achieved in the short term this may lead to and increase of vulnerability in the long term. This is what authors refer to as maladaptation (Barnett and O'Neil, 2010). The risk of maladaptation highlights the importance of using M&E frameworks that can: account for unintended consequences and potential trade-offs (i.e. short-term versus long-term benefits); allow for flexibility, corrective action; and capture the impact of project interventions beyond project related activities contributing to an evidence-based understanding of adaptation in practice. Otherwise, there is a risk that adaptation processes may become 'locked in' to policies and procedures that may prove inappropriate in the mid- to long-term. Hence, while M&E can play a critical role in learning from successful pathways towards adaptation, it can also be a critical tool for identifying maladaptation pathways. There is therefore a compelling need for M&E to include a basket of indicators that move beyond risk and exposure to, for example, livelihood and access to resources

Tracking moving 'targets'

Adaptation processes will take place against a backdrop of evolving hazards, which may become more frequent, severe and unpredictable. From an adaptation perspective, baseline information needs to include climate variability and hazards. However, these hazards are often changing in light of climate conditions. As a result traditional M&E practices, which tend to focus on measuring progress against a set of baselines (comparison before and after programme scenarios), may not be sufficient to understand the complexity of the adaptation process. This challenge is compounded by the long-standing challenge in M&E of DRM and the reverse logic of such interventions: the success of an initiative is that something – 'the disaster' – does not happen.

In addition, the climate is not the only changing variable; both adaptive capacity and vulnerability are dynamic and multidimensional variables – related both directly and indirectly to a range of environmental, social, economic and political factors that change over time. Monitoring and evaluation will take place against a moving target and changing scenarios, and encompass a wider set of indicators (beyond climatic factors). In addition, M&E frameworks need to embrace comprehensive approaches that reflect the multidimensional nature of adaptation and disaster risk reduction and its contribution to developmental outcomes.

Box 1 Implications for development of indicators

- The need to make a distinction between ‘generic’ and ‘specific’ indicators of vulnerability and adaptive capacity. M&E of adaptation projects may need to capture two types of indicators: those that target the specific measures undertaken to reduce vulnerability to a specific hazard (such as disaster risk reduction programmes), and generic indicators that capture underlying causes of vulnerability (Adger et al., 2004)
- Vulnerability and adaptive capacity are dynamic rather than static variables that change over time (Eriksen and Kelly, 2007). Evaluation processes may capture a snapshot of levels of vulnerability and adaptive capacity at the end of a programme intervention, but this needs to be followed up by constant monitoring and long-term evaluation processes.
- A distinction needs to be made between indicators that may capture the existence of vulnerability and adaptive capacity and those processes that may have an effect on the distribution of vulnerability or how capacity leads to action (Eriksen and Kelly, 2007). M&E approaches need to capture such nuances.

Dealing with uncertainty

Projected climate scenarios are still highly uncertain at local, national and regional levels. ‘Modelists often say that uncertainty in projections is integral to the adaptation challenge’ (Denton, 2009: 120). This implies that in a scenario characterized by high levels of uncertainty, neither means nor ends can be fully known in advance. Uncertainty about the timing and intensity of climate events highlights the key role that learning plays in the search of adaptive options. Emerging from maladaptation thinking is also the acknowledgement that uncertainty not only remains in future climate scenarios, but also in the socio-economic impacts of climate change and thus, in the inter-relationship between the different factors that determine vulnerability and adaptive capacity. Recent thinking on vulnerability has led to examining vulnerability to climate change and disasters through social dimensions rather than climate or disaster impacts per se (O’Brien et al., 2004; Wisner *et al.*, 2004). From this perspective, vulnerability is not caused by hazards per se, but is determined by socio-economic factors such as poverty, marginalization, access to information, resources and decision making (Smit and Pilifosova, 2003). Social vulnerability is, however, not independent of the nature of hazard to which societies may be exposed. Put another way, the factors that make communities vulnerable to disasters and climate variability depends on socio-economic factors and the type of hazard in question. M&E processes need to embrace such complex and uncertain scenarios and promote learning by doing, and flexible approaches for effective adaptation and robust monitoring. From this perspective,

M&E plays a critical role in facilitating learning not from what results are achieved, but rather from how, under what circumstances, and why or not they were achieved. In turn, M&E plays a central role in generating an evidence-based understanding of adaptation interventions.

Box 2 Issues of temporality, scale and uncertainty in adaptation

- While adaptation may consist of the process of adjustment of practices to respond to long-term climate variability, authors refer to coping with actual climate stresses, where the actions performed are often aimed at short-term duration (Eriksen and Kelly, 2007). In other words, enhancement of adaptive capacity represents practical means of coping with changes and uncertainties in climate. The significance of this distinction for M&E is that the factors that facilitate long-term adjustment may be different from the ones that enable response to short-term hazards.
- The extent to which adaptation occurs depends on processes at a range of scales (Adger *et al.*, 2005). At the local level, adaptive capacity reflects broader conditions, and while some determinants will be local, they may also be enabled or constrained by higher levels of scales. The scale of adaptive capacity is not independent: ‘the capacity of a household to cope with climate risk depends on some degree on the enabling environment of the community’ (Smit and Wandel, 2006:287). For this to be captured in an M&E system, indicators must encompass all the processes that can capture whether adaptation takes place, and to what extent and why.
- Adaptation interventions are implemented in a context of uncertainty and change. However, it is probable that as new information is made available and understanding improves, existing strategies may need revision and updating (Perez and Yoher, 2004; GEF, 2008). Monitoring climate information is a critical part of any M&E function.

The rest of the paper is based on the following premises:

- a. Reducing vulnerability to climate change and climate-related disasters requires addressing specific vulnerabilities to climate variability and extreme events as well as the underlying causes of vulnerability.
- b. Increasing adaptive capacity (generic and specific) of the most vulnerable is the key objective of adaptation initiatives.
- c. M&E of adaptation interventions requires capturing dynamic variables that change over time and place and understanding the decision-making processes at the household level that lead to action and sustainable change.

2. Evaluating adaptation interventions – current state of the art

2.1 Analysis of existing approaches and methodologies

This section presents a review of the existing M&E approaches and methodologies being used to evaluate adaptation interventions. Different approaches to evaluation reflect different understandings of what ‘successful’ adaptation is. The review presents the diverse conceptual approaches that have been developed and how these in turn have been adopted by different organizations. The findings of this review are presented in Table 2. An analysis and examination of each is further developed below.

Table 2 Existing approaches and methodologies for the evaluation of adaptation interventions

M&E Methodologies	Focus on	Approach	Assumption
Input-Output-Outcome evaluation	Effectiveness	Elements of adaptive capacity/ risk are pre-determined and evaluated against a set of indicators	Increased adaptive capacity will ultimately lead to reduced vulnerability Risk is probabilistically determined and known
Process-based evaluation			
Evaluation of behavioural change			
Economic evaluations	Efficiency	Benefits of adaptation is measured in terms of economic loss	The ability to determine a baseline and projected benefits and losses

2.1.1 Input-Output-Outcome based evaluations

Despite the inherent uncertainty in determining adaptive capacity, there remains a policy need for empirical assessment and evaluation. Research on evaluation of adaptation measures tends to focus on categorizing and analysing elements of adaptive capacity, reflected in the number of research efforts aimed at outlining generic and specific adaptive capacities at various scales (Smit et al., 2001; Yohe and Richard, 2002; WRI, 2009; Lindsey et al., 2010). In this type of evaluation the analysts select the factors (inputs) that determine adaptive capacity. To date, there is limited knowledge of tested elements of adaptive capacities beyond broad factors or determinants. Yohe and Richard (2002) suggest that adaptive capacity is determined by the following group-level characteristics:

Table 3 Determinants of adaptive capacity

Technology	The range of available technological options for adaptation
Economic Resources and Equity	The availability of resources and their distributions across population
Institutions	The structure of critical institutions and the derivative allocation of decision-making authority
Information and Skills	The ability of decision makers to manage information, the processes by which these decision makers determine which information is credible, and the credibility of the decision makers themselves
Social Capital	The stock of human capital, including education and personal security
Access	The system's access to risk-spreading processes
Awareness	The public perception of attribution of source of stress

Source: Yohe and Richard (2002)

These determinants have also been supported by many others (IPCC, 2007), where resources and access are identified as the key for adaptive capacity (Bryan *et al.*, 2009). This coupled with the need for measuring the success of adaptation interventions has translated into a wide range of efforts for developing indicators that capture the achievement of those determinants – as outputs or outcomes. Although the literature does not claim that adaptive capacity leads to vulnerability reduction, there is a common underlying assumption that by identifying what the determinants are and ensuring these are in place will lead to vulnerability reduction.

At the practical level, M&E tools have followed this input-output-outcome approach. However evaluation methodologies seem to have bifurcated, with different agencies using different understandings of evaluating adaptation programmes and evaluation methods. This bifurcation could be explained by the different conceptual understandings of adaptation as a process or as an outcome. Monitoring and evaluation tools have emerged, developing a set of indicators that capture and measure the required determined inputs for adaptive capacity. Inputs and outputs are placed within the casual chain of intervention in order to measure progress against indicators of adaptive capacity and to determine the success of a project.

An example of this is the UNDP M&E framework for adaptation (2007). This framework is based on the logical framework⁴ (LFA) approach. The structure of the framework identifies five sector specific areas and five critical processes⁵. It then develops output and outcomes indicators. The framework is multi-scalar as it aims at evaluating adaptation initiatives across its project portfolios from local, national to international levels. It suggests quantitative and qualitative indicators. The framework focuses on capturing issues of attribution (Frankel-Reed *et al.*, 2009).

4 The Logical Framework (LFA) is the most widely used management tool in the design, monitoring and evaluation of international development projects.

5 Key sectors identified are: natural resource, food security, water, health, and disaster risk management, coastal zones. Processes include: policy/planning, capacity building/awareness, information management, investment decisions and practices/livelihood/resource management.

Box 3 Examples of indicators in the UNDP Adaptation Framework

Project objective: Coastal development secured in the face of increasing coastal hazard as a result of measures to reduce vulnerability of coastal systems and enhance adaptative capacity of coastal populations.

Outcomes	Indicators	Type
1. Policies and plans revised on the basis of the scenario planning to accomodating increasing coastal risk associated with the sea-level rise, accelerated erosion, and more destructive storms	1.1 Number of policy makers and planners trained in scenario planning (alternatively number of government departments represented among those trained).	Coverage
	1.2 Number of policies and plans relating to coastal development under review, in order to ensure climate change issues are addressed.	Coverage
	1.3 Number of new policies introduced or existing policies and plans are updated as a result of scenario planning exercises.	Impact
2. Investment decision made on basis of risk assessment based on climate change scenario planning	2.1 number of private sector bodies (organisation and individual business) engaged by project and provided with training in climate risk management and scenario planning.	Coverage
	2.2 Value of planned new development in high-risk areas compared with projected baseline value.	Impact
	2.3 Number of private planning application of development in high-risk areas.	
3. Resilience of coastal geomorphological and ecological system enhanced	3.1 Length of coastline covered by project interventions, coupled with population of adjacent coastal areas.	Coverage
	3.2 Number of different resilience-enhancing measures employed by project, combined with number of ecological and geomorphological system addressed.	Coverage
	3.3 Number of sites/locations where resilience building measures are piloted.	Coverage
	3.4 Area and length of coast where project leads to changes associated with enhanced resilience (e.g. rehabilitation of dune systems , (re-) establishment of mangroves, corals, resumption of sediment transport to eroding beaches etc.	Impact
4. Capacity to plan for and respond to changes in climate-related coastal risks improved through awareness building and enhance access to information on potential climate changes impacts, coupled with guidance on and improved access to available adaptation measures.	4.1 Population covered by awareness building programmes to increase understanding of risks associated with climate change among general and public and key stakeholder groups.	Coverage
	4.2 Understanding of climate changes related coastal risks among general and public and key stakeholder groups (QBS).	Coverage
	4.3 Percentage of population with access to key resources for adaptation compared with project baseline, measures (EWS storms shelters, post-disaster financial assistance).	Impact
	4.4 Perceived change in likely ability to respond effectively to future change in coastal risks.	Impact
5. Construction of storm shelters and improvements in the resilience of settlements, to reduce vulnerability to tropical storms and associated storm surges.	5.1 Numbers of stakeholders involved in piloting of vulnerability reduction measures at local level.	Coverage
	5.2 Percentage of population benefiting from access to shelters and other improvements in physical infrastructure such as installations of storm shutters etc.	Impact
	5.3 Perceived changes in individual vulnerability by members of coastal communities (QBS).	Impact

Source: UNDP and GEF(2007)

As noted in section 1, to avoid duplication of efforts and tools, several suggestions⁶ have been made to apply DRR evaluation methods and tools to adaptation interventions (Valencia, 2009; Hedger *et al.*, 2008). However, similarly to the input-output-outcome based approach for the evaluation of adaptive capacity, evaluation of DRR programmes has tended to focus on describing and categorizing elements of a disaster resilient community. An example of this is Twigg's (2007) framework, or more recently the community-based resilience framework being developed by GNDRR (2010). These frameworks define characteristics of what disaster resilient communities 'might look like' (Twigg 2007, : 5). As with the determinants of adaptive capacity, these tend to emphasize infrastructure, technology and planning processes.

Box 4 Example of output indicators of a disaster resilient community

Thematic area 2: Characteristics of a resilient community	
Risk assessment	
Component of resilience 1: Hazards/risk data and assessment	Community hazard/risk assessments carried out which provide comprehensive picture of all major hazards and risks facing community (and potential risks).
	Hazard/risk assessment is participatory process including representatives of all sections of community and sources of expertise.
	Assessment findings shared, discussed, understood and agreed among all stakeholders, and feed into community disaster planning.
	Findings made available to all interested parties (within and outside community, locally and at higher levels) and feed into their disaster planning.
	Ongoing monitoring of hazards and risks and updating of assessments.
	Skills and capacity to carry out community hazard and risk assessments maintained through support and training.

Source: Twigg (2007)

At the practical level, M&E tools have also been developed converting such characteristics into indicators. In particular, these types of evaluations focus on tracking risk profiles of the area of intervention with a focus on measuring and monitoring risk. The aim is to determine the effectiveness and efficiency of the intervention through calculating the possible economic, social and environmental consequences of a disaster in a specific place and time (before and after project implementation) (Pelling, 2004).

In other words, risk is handled and evaluated as known. Evaluations are built upon probabilistic risk modelling, where the probability of a hazard occurring is estimated for a range of hazard magnitudes. The impacts (and associated reduction in impacts that come about with risk reduction) are then weighted by the probability of an event happening.

⁶ Participants of the on-line forum at the recently launch GEF portal on evaluation of adaptation and mitigation interventions also suggested DRR frameworks and methodologies as starting point. See: <http://climate.esevaluation.org/gefeo/forum>

Tools at international level are the disaster risk index (DRI), or the local disaster index (LDI). However, the probability of hazard occurrence, and associated impacts, can be very difficult to estimate, therefore often within these indices, indicators of exposure tend to dominate⁷ while the underlying causes of vulnerability tend to be largely ignored. Examples of international and national evaluation frameworks include the Hyogo Framework for Action (HFA) (UNISDR, 2005). This is presently the internationally accepted framework for DRR interventions.

7 See for example: Pelling (2004); Inter-American Development Bank (2005)

Box 5 Example of indicators within the HFA

Priority for action	Recommended indicators
1. Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation.	i National institutional and legal frameworks for disaster risk reduction exist with decentralised responsibilities and capacities at all levels.
	ii Dedicated and adequate resources are available to implement disaster risk reduction plans at all administrative levels.
	iii Community participation and decentralisation is ensured through the delegation of authority and resources to local levels.
	iv A national multi-sectoral platform for disaster risk reduction is functioning.
2. Identify, assess and monitor disaster risks and enhance early warning.	i National and local risk assessments based on hazard data and vulnerability information are available and include risk assessments for key sectors.
	ii Systems are in place to monitor, archive and disseminate data on key hazards and vulnerability.
	iii Early warning systems are in place for all major hazards, with outreach to communities.
	iv National and local risk assessments take account of regional/trans-boundary risks, with a view to regional cooperation on risk reduction.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.	i Relevant information on disasters is available and accessible at all levels, to all stakeholders (through networks, development of information sharing system.
	ii School curricula, education material and relevant trainings include risk reduction and recovery concepts and practices.
	iii Research methods and tools for multi risk assessments and cost benefit analysis are developed and strengthened.
	iv Country wide public awareness strategy exists to stimulate a culture of disaster resilience, with outreach to urban and rural communities.
4. Reducing the underlying risk factors.	i Disaster risk reduction is an integral objective of environment-related policies and plans, including for land use, natural resource management and climate change adaptation.
	ii Social development policies and plans are being implemented to reduce the vulnerability of economic activities.
	iii Economic and productive sectoral policies and plans have been implemented to reduce the vulnerability of economic activities.
	iv Planning and management of human settlements incorporate disaster risk reduction elements, including enforcement of building codes.
	v Disaster risk reduction measures are integrated into post-disaster recovery and rehabilitation processes.
	vi Procedures are in place to assess disaster risk impacts of all major developments projects, especially infrastructure.
5. Strengthen disaster preparedness for effective response at all levels.	i Strong policy, technical and institutional capacities and mechanisms for disaster management, with a disaster risk reduction perspective are in place.
	ii Disaster preparedness plans and contingency plans are in place at all administrative levels, and regular training drills and rehearsals are held to test and develop disaster response programmes.
	iii Financial reserves and contingency mechanisms are in place to enable effective response and recovery when required.
	iv Procedures are in place to exchange relevant information during disasters and to undertake post-event interviews.

This framework and evaluation approach has also percolated to community-level DRR interventions. Examples include the ADPC (2006) indicator guidelines for community-based DRR and the Provention Consortium collection of good practices⁸ of DRR evaluation interventions. The latest compiles several case studies of DRR evaluation frameworks of several developmental agencies, where a similar chain of indicators is used. Typically used evaluation tools are vulnerability and risk assessments. The potential use of this tool for the evaluation of CCA programmes has been widely discussed (Van Aalst *et al.*, 2008). In fact, they are increasingly being used in adaptation interventions (CARE, 2009). However, while DRR indicators may be a good start to capture the amount of risk reduced, this may fall short in monitoring and evaluating changes in the underlying causes of vulnerability, accounting for uncertainty and learning in relation to decision-making processes.

The limitations of logical frameworks

Both input-output-outcome based approaches of adaptive capacity (UNDP) or DRR (HFA), come as a result of evaluation methodologies based on the logical framework and results-based management approaches to M&E, which keeps the greatest number of variables possible under control, so as to attribute the identified results and changes to the programme's actions (Bakewell and Garbutt, 2005). Within the logical framework, expected results (adaptive capacity built or reduction of risk) are aligned with activities in a cause-effect chain. Activities produce outputs (goods and services), which result in immediate, intermediate and final outcomes. Although the UNDP acknowledges that adaptation is a continuous process, indicators used tend to reflect tangible outputs and outcomes. The same can be observed in the HFA framework.

The logical framework and result-based management approaches have come to play a central role in the planning and management of development interventions over the last twenty years (Bakewell and Garbutt, 2005). There is widespread agreement within the literature that conventional M&E has been a donor driven exercise, characterized by a focus on measuring achievement of results and ensuring accountability to funding agencies (Mosse, 1998; Jackson and Kassam, 1998; Estrella, 2000). However, this framework is limited for adaptation due to its reliance on linear, cause-effect thinking in which programmes or projects are explicitly laid out with their assumptions in logical frameworks. Outcomes are examined with respect to the degree to which particular activities and outputs are met, as well as the degree to which these activities and their outputs contribute to larger objectives and goals. The underlying assumptions within this approach are that 'we know' and can measure impact and progress through objective variables and 'we can', to a reasonable degree, predict the impact of the programme during the design stages (Bakewell and Garbutt, 2005). However, as discussed in the previous section, climate change means living with high levels of uncertainty and surprise events, and therefore assuming potential outcomes is questionable. Section 1 also highlighted how it is critical to understand decision-making processes and how these are determined by individuals' values, perceptions and culture. By assuming a given

⁸See: www.proventionconsortium.org/?pageid=61

cause-effect relationship of a predetermined intervention, it limits the understanding of how adaptive capacity develops and the dynamics of the changing environment within which this takes place. This calls for attention to the common understanding of the purpose and role of M&E frameworks – which should not overlook improving practice, understanding and accountability to those affected by programme interventions.

2.1.2 Process-based evaluations

A process-based methodology seeks to define the key stages in a process that would lead to the best choice of end point, without specifying that point at the outset. Within these stages, indicators for adaptive capacity are then developed. This is an ‘upstream’ approach in the sense that it seeks to foresee outcomes, or to build capacity to manage a variety of outcomes (Horrocks *et al.*, 2005: 4).

The key difference between this and the previous methodology is that it does not define what type of outcomes will emerge – and thus it does not consider the identification of outcome indicators. Underpinning this methodology is the idea that the ‘what’ is more important than the ‘how’, as this is seen to restrict the flexibility of programmes. An example of this is the proposed framework⁹ for DEFRA (Horrocks *et al.*, 2005). This framework sets out a four-stage process for climate change adaptation, including the making of a public commitment, undertaking a climate change risk assessment of service delivery, infrastructure and local communities, and developing action. Within this framework, two sets of indicators are suggested: a first set of indicators to provide a profile of current risks and responses, and a general benchmark of progress towards stated objectives, and; a second set of indicators to specifically measure adaptive capacity. In order to evaluate and monitor adaptation programmes, it suggests that indicators could include categorical checklists that measure progress in adaptation as a process. These could then be measured against a predetermined benchmark of adaptive capacity (Horrocks *et al.*, 2005). This type of evaluation is also reflected in the UK framework to monitor the UK’s adaptation status (DEFRA, 2010a).

An example of how a process based methodology is implemented at the local level is found in DEFRA’s framework for evaluating progress of local level authorities towards adaptation. It is a process indicator-based framework that aims to measure progress in adapting to climate change over five levels.

9 Proposed by AEA Technology Environment with Stockholm Environment Institute and Metre-economica. For further details see: Horrocks *et al.*, (2005).

Box C Example of process-based evaluation

Level 1: Public commitment and prioritised risk-based assessment

The Authority has made a public commitment to identify and manage climate-related risk. It has undertaken a local risk-based assessment of significant vulnerabilities and opportunities to weather and climate, both now and in the future. It can demonstrate a sound understanding of those not yet addressed in existing strategies and actions (e.g. in land use planning documents, service delivery plans, flood and coastal resilience planning, community-risk register/strategies etc.). It has communicated these potential vulnerabilities and opportunities to department/service heads and other local partners and has set out the next steps in addressing them.

Criteria	Evidence
a. Made public commitment to identify and manage climate related risk.	<ul style="list-style-type: none"> Signed Nottingham Declaration or equivalent local Declaration <i>or</i> Executive has formally made a commitment to identify and manage climate related risk which has been published <p><i>Other or additional evidence</i></p>
b. Undertaken local risk-based assessment of significant vulnerabilities and opportunities to weather and climate, both now and in the future.	<ul style="list-style-type: none"> Local risk based assessment completed Significant vulnerabilities and opportunities identified Executive or senior management team are aware of the findings of the risk-based assessment <p><i>Other or additional evidence</i></p>
c. Has a sound understanding of significant vulnerabilities and opportunities not yet addressed in existing strategies and actions.	<ul style="list-style-type: none"> Report or documentation to Executive or senior management team on significant vulnerabilities or opportunities not yet addressed <i>or</i> <p><i>Other or additional evidence</i></p>
d. Has communicated significant vulnerabilities and opportunities to department /service heads and other local partners that have an influence over these.	<ul style="list-style-type: none"> Information about significant vulnerabilities and opportunities communicated to department/service heads, and other local partners that have an influence over these, by distributing written information and/or meetings or workshops <i>or</i> <p><i>Other or additional evidence:</i></p>
e. Set out the next steps in addressing significant vulnerabilities and opportunities.	<ul style="list-style-type: none"> Programme plan in place for next steps <i>or</i> <p><i>Other or additional evidence:</i></p>

Source : DEFRA (2010b)

Although this framework focuses on measuring progress against benchmarks and not final outcomes, similarly to the LFA, it assumes a clear linear set of stages within a predetermined objective. As the indicators illustrate, measurement of tangible outputs dominate, but the processes within which these are developed are not considered.

The limitation of this type of evaluation is that issues related to how those processes are followed, and the outcomes of those processes, may not

be captured. This approach recognizes adaptation as a process but it emphasizes that while short-term process indicators are useful and needed, outcome indicators would be required to measure long-term impacts.

2.1.3 Evaluation of behavioural change

This type of evaluation focuses on documenting behavioural changes in practices as outcomes. In contrast with the previous two mechanisms, it seeks to demonstrate influence (contribution) rather than quantifying impact (attribution) or benchmarking processes and measuring progress against them. One example of this approach is outcome mapping (OM). Outcome mapping, developed by IDRC, is currently being used to evaluate the Climate Change Adaptation in Africa (CCAA) research and capacity development programme (Beaulieu *et al.*, 2009) funded by IDRC and DFID.

This approach uses qualitative and quantitative indicators of specific adaptive capacity at project level. The methodology is centred on the identification of 'boundary partners' with whom the programme interacts directly and which the programme hopes to influence (Earl *et al.*, 2001). Outcome mapping focuses on one specific type of result: outcomes as behavioural change, i.e. changes in the behaviour, activities or actions of the people, groups and organizations that the programme works with directly. Instead of trying to prove that a specific change can be attributed to a specific programme, one of OM's tenets is that one actor can only contribute to outcomes (Beaulieu *et al.*, 2009). Outcome mapping does not assume causal relationships between a programme and changes occurring; they are often linked to a programme but cannot be exclusively explained by it. Another central assumption of the OM approach is that focusing on impact does not necessarily provide the information necessary to learn and improve development performance (Earl *et al.*, 2001). The OM approach suggests 'graduated progress markers' which indicate the level of progression towards an ideal outcome (Beaulieu *et al.*, 2009).

Boundary partner		Villages			
Outcome challenge	Village with high adaptation capacity to hurricanes have housing that resist well to hurricanes, have shelters where people can protect themselves, have community foods reserves kept in a safe places and improve their capacity in provision for the next hurricane				
Function level	Have adequate housing	Have community shelters	Have food reserves	Improve their practices	
Situation	When hurricane occurs...				
0	All houses are destroyed	Each person is left to him (her) self	There are no food reserves kept in safe places	Resources inefficient to improve housing or food reserves	
1 (expected to see)	Most houses are destroyed but some remain intact	Inhabitants of the better houses take in their neighbours but some people are stranded nonetheless	Some members of the community have reserves that they share with some members of the community	Individuals are more conscious of the risk and build better houses, keep food reserves in safer places	
2 (like to see)	Houses are not destroyed but heavily damaged	Inhabitants of the better houses take in their neighbours and nobody is left stranded	Some members of the community have reserves that they share with other members so that nobody is left without food	Owners of the better houses help the poorer ones in the community to rebuild their houses with more resistant material or configurations	
3 (love to see)	All houses remain intact if well barricaded	There is a community shelter	There are community food reserves, administered by a committee	The community has an emergency fund to help the rebuilding of damaged houses.	

Source : Beaulieu et.al (2008)

The focus on process, learning and change in behaviour and actions and activities of people makes OM an innovative learning tool for assessing and evaluating adaptation interventions. However, OM does not explicitly address existing behaviours, or evaluate what the drivers of change are, nor the individual or community decision-making processes that lead to action. In other words, it may not be enough to measure what has changed, but why and how change took place. OM is a learning tool for evaluation of adaptive capacity used to inform management practice, however it may fall short in providing a comprehensive M&E framework. IDRC recognizes that the OM approach needs to be combined with other approaches (Beaulieu *et al.*, 2009). This is also reflected in the fact that OM is not seen as a replacement of the LFA, and indeed many organizations have embedded outcome mapping progress markers into logical frameworks (Simister and Smith, 2010).

2.1.4 Economic evaluations

Decision-making in international development is highly influenced by economic and financial considerations. The basic principles of this type of evaluation are quite straightforward: for an action to be justified, the cost of the action should be less than the benefits derived from them (Munasinghe *et al.*, 1996). Within the adaptation agenda, Stern (2006)

following Frankhauser (1998) shows that, in principle, the benefits of adaptation would be the climate-related damage costs avoided by taking adaptive measures (assuming that climate change would have adverse consequences). Thus, if one quantifies the potential impacts of climate change on a system (assuming no adaptation) as well as its residual impacts, the benefits of adaptation are given by the difference between the two (Klein, 2003). From the value thus obtained one can subtract the costs of implementing the adaptation options to arrive at the net benefits of adaptation. This type of methodology is referred to as cost-benefit analysis. Although the basic principles are quite upfront, within the climate change agenda, many complexities arise.

Traditional cost-benefit analysis requires that all cost and benefits be expressed in a common monetary unit to facilitate comparison (Munasinghe *et al.*, 1996). In recent years, cost-benefit analyses for adaptation have started to emerge at the international level. The Stern Review (2006) has drawn most of the attention, reflected in the amount of publications following the release of the review and the widespread debate about methodological issues and the results it presents (Pielke, 2007; Dietz *et al.*, 2007; Neumayer, 2007). Within the economics debate of cost-benefit exercises, a key factor being discussed is the use of discount rates that discount future costs and benefits and calculate net present value, reflecting the value-laden nature of decision making. In addition, calculating future costs/benefits in a field where lack of certainty around the probability of events (such as floods, droughts or storms), their magnitudes, impacts or historical analogies on which to base risk calculations, or information on the relationship between possible adaptive actions taken and the changes in resulting exposure/sensitivity, may limit the use of such approaches for the evaluation of adaptation and risk reduction efforts.

Another approach to economically evaluate adaptation options is through a cost-effectiveness analysis (UNFCCC, 2010; Bosello *et al.*, 2009). Within this approach the objective is to compare the cost of alternative ways of achieving similar results (efficiency). The thinking behind this approach is: 'how much to adapt is an economic problem' (World Bank, 2010b: 19). However, cost-effectiveness evaluations also involve deciding on acceptable levels of risk as a trade-off with the resources invested (Hedger *et al.*, 2008). Perceptions of risk, which may vary from individual to individual, play a critical role in determining efficiency.

Economic evaluations have often been used to assess adaptation at the international level but very few projects at a national or sub-national level thus far have been subject to in-depth and rigorous economic analysis (World Bank, 2010a). At the national level, guidelines on how to conduct such evaluations have started to emerge. In the UK for example, the Green Book, which provides a methodology to make economic assessments of the costs and benefits of public policies, has a recently published a supplementary guideline, which explains how to incorporate climate change into the development, appraisal and evaluation of policies and programmes (DEFRA, 2009). At the community level, the use of cost-benefit and cost-effectiveness analysis is also emerging. Although community-based CBA may overcome some of the challenges highlighted (Chadburn *et*

al., 2010), for example, by engaging more with the communities, there is still the need to recognize that, by nature, cost-benefit or cost-effectiveness evaluations are based on economic and risk-assessment methodologies, where values and decision-making processes play a critical role.

Figure 2 Current methodologies and tools used for evaluating planned adaptation interventions

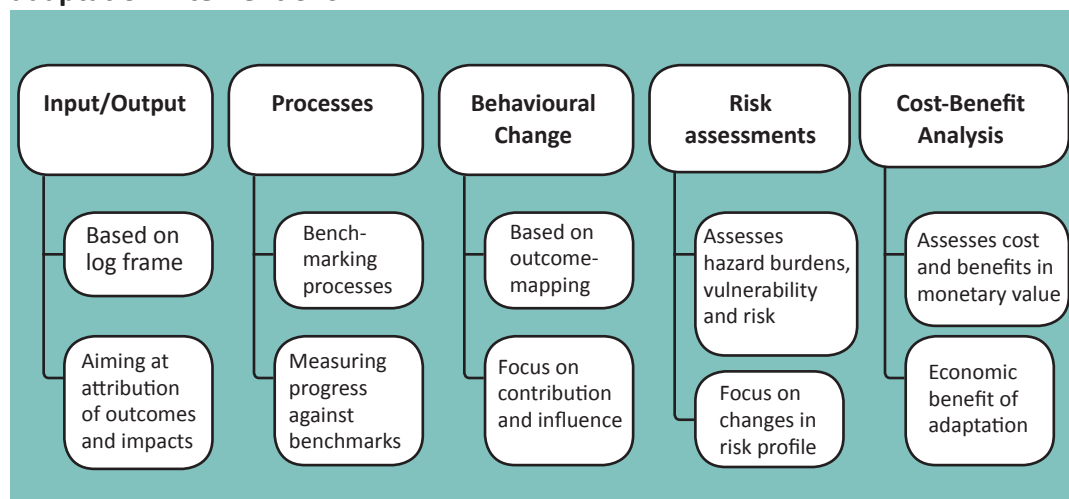


Figure 2 summarises the existing approaches, methodologies and tools analyzed in this section. While these may be useful tools for assessing and predicting adaptive capacity, this section has explored how their use does not contribute to the understanding of how adaptive capacity develops. As discussed in section 1, such understanding needs to be prerequisite to the task of enhancing and evaluating adaptation interventions.

3. Research findings and analysis

3.1 Three key issues common to the M&E of adaptation

The focus of current approaches to evaluating adaptation lies on defining and measuring adaptive capacity and risk reduction against a predefined set of indicators and on how to deliver those in the most efficient manner. Due to the limited number of evaluations carried out to specifically evaluate adaptation programmes to date, it is difficult to reach conclusions as to what amounts to successful or unsuccessful practice. Nevertheless, three common issues arise:

1. Deterministic approaches focus on inputs/outputs not processes

Current approaches focus on determining the preferred inputs and outputs required to build adaptive capacity, reduce disaster risk and on measuring the success of adaptation interventions. Evaluation approaches implicitly assume that once appropriate measures are identified and projects implemented this will protect communities against climate impacts. Such an approach appears linear and favours determining adaptation and risk reduction actions. A major limitation of this deterministic approach is that by focusing on predetermined characteristics of what an adaptive or disaster resilient community might look like, opportunities for learning

how and why decision-making processes of adaptation take place, or how capacity develops into action, might be missed. In other words, the focus is on the 'what' rather than on the how or why. The focus on evaluating measurable results has resulted in a lack of inclusion of social indicators and processes and not accounting for the social dimensions of climate change, such as perceived risk or capacity by individuals.

Practitioners interviewed during the research reflected that this is as a result of a top down approach, where the question, 'what is successful adaptation or risk reduction?' is answered at the national or international level by agencies and researchers instead of by communities themselves and therefore they do not account for people's perceptions of risk and capacity, which 'should be at the heart of evaluation processes'.¹⁰

2. Most approaches remain static rather than dynamic

As highlighted in section 1, vulnerability and adaptive capacity are dynamic variables that change over time. By using static evaluation before, during or after adaptation interventions, snapshots of these variables at a given point in time may be captured at the very most. The temporality associated with these variables is critical, and the limitations of M&E and its long-term applicability need to be acknowledged.

Interviewees feel that the evaluation of adaptation has been dominated by a focus on climate change impacts and static quantitative indicators without embracing the dynamism and flexibility required in an environment characterized by high levels of uncertainty and complexity. Dealing with uncertainty requires evaluation approaches that can deal with 'complex arenas' and allow for flexibility, which none of the current approaches provide. Different adaptation activities require different types of evaluation but where high uncertainty is a key barrier, there is a need to embrace frameworks that provide space for flexibility and learning. *The analysis of current approaches suggests that a focus on outputs tend to stress the evaluation of the delivery of adaptation interventions sidelining long-term processes of change.*

In the current parameters used in evaluation processes, outputs are far too limited and outcomes too unpredictable. Adaptation and risk reduction interventions are directly related to processes of change and hence, monitoring the operating environment and ensuring that this enables those changes is critically important. A shift in focus is therefore much needed: from measurement of immediate results to the drivers of adaptation processes. There is a need for a flexible and dynamic framework that encourages learning on how the environment constrains or enables adaptation and what factors allow capacity to develop into action. Interviewees reflected upon the current focus on project-based evaluation approaches. In particular they highlighted how given the uncertainty involved in adaptation processes, post evaluations may not be useful in measuring the impacts of adaptation, as these may only be seen in decades to come. However they stress the fact that post-evaluation can provide illuminating insights on adaptation processes, knowledge generation and learning. 'We need to learn and understand the perspectives at the

¹⁰ Personal communication

microscopic level on shocks and stresses on daily basis'.¹¹

Most individuals interviewed agreed that what is needed is a dynamic tool that can capture the reality of evolving events and that can support learning. Interviewees highlighted the need of M&E frameworks that are flexible and adaptive to local contexts and constantly changing circumstances and concerns of stakeholders.

3. Efficiency and effectiveness predominate as key principles

Different approaches to evaluation reflect different understandings of what successful adaptation is. And this is reflected in the development of indicators: adaptation as an end itself (outcome), or as a means to achieve predetermined processes or changes. However, two characteristics arise in the indicators used. The first is the use of SMART indicators – the standardized approach to indicators. Because the main idea is that indicators should be measurable and focus on results in a particular time-based project, there is a bias towards developing indicators that are measurable. Quantifying results as means to measure effectiveness leads to the development of indicators that are detached from the underlying reasons of a particular result.

The second common characteristic is that specific predetermined indicators of adaptive capacity and risk are dominant across the frameworks. Current evaluation approaches focus on measuring the effectiveness (achievement of results) and efficiency (in monetary value) in terms of risk and capacity to manage stresses and shocks. As a result, important issues discussed in section 1 in relation to equity and sustainability are sidelined. As highlighted in section 1, it is not just success that needs to be measured, but also failure. In short, existing approaches are not run against indicators of maladaptation such as the distribution of vulnerability (Barnett and O'Neil, 2010). Embedding generic indicators – such as poverty and access to and control over resources – of adaptive capacity and vulnerability is critical, in particular, to ensure that adaptation and disaster risk reduction interventions do not exacerbate existing vulnerabilities, or vulnerabilities of other groups or sectors. Not doing so translates into current M&E frameworks as being project focused and not addressing issues about the operational environment and longer-term developmental context.

Research in recent years has demonstrated the relation between disaster risk reduction, adaptation and development. In fact, recent frameworks highlight that in practice it may be difficult to distinguish between development and adaptation interventions (McGray et al., 2007). These frameworks focus on ex-ante evaluation, on evaluating potential adaptation options along the whole spectrum of activities, in order to inform planning processes and policymaking. For post-evaluation approaches, more recently, the Hedger et al. (2008) framework provides a holistic approach to evaluation from a development perspective that allows for a comprehensive understanding of the overlaps between evaluation approaches of development interventions and adaptation, and the need to integrate both at all levels and scales. Nevertheless, the development of such frameworks has been dominated by academic research but these have not yet transformed into practical applications of holistic M&E

methodologies at the intervention level. Learning thus becomes central to the design of pragmatic frameworks that go beyond theoretical approaches.

In summary, what the current approaches offer is the identification of potential areas of intervention and an evaluation of value for money. They also contribute to the understanding of the technical challenges involved in evaluation processes in the context of climate change. However a focus on technical challenges to measure impact sidelines the set of challenges that emerge by deepening the debate around decision-making processes. As a result, current approaches limit the understanding of how adaptation and disaster risk reduction actions take place.

3.2 What is missing?

The 2010 World Bank guideline on M&E of adaptation recognizes that the decision-making process that leads to the choice and implementation of a particular set of adaptation measures is, per se, ‘an important outcome of the project that should be monitored and evaluated as such’ (2010c: 7). On the other hand, it also states that, ‘an adaptation process is successful only if it delivers measurable improvement in the adaptive capacity of natural and managed systems, and increased resiliency of communities to climatic shocks’ (2010c: 7). While current approaches seem to address the second set of indicators, what is missing is a comprehensive set of M&E frameworks that capture the factors that lead to particular set of adaptation and disaster risk reduction choices. A clear gap emerging from the above review is that existing approaches do not address perceptions of risk and capacity or how capacity leads to action; as a result, little attention has been given to capturing the decision-making processes at household level.

These findings suggest that evaluation approaches and M&E methodologies currently used in adaptation initiatives and disaster risk management are missing an orientation towards learning and understanding of how adaptation and adaptive capacity develops. This resonates with the growing recognition of the limitation of mainstream M&E approaches to capture change (Guijt, 2007). These findings point to the need to revise the deterministic view of adaptation within M&E frameworks and to consider more carefully the intricacies of individuals’ and communities’ decision-making processes. Recent research demonstrates how choices and decisions about whether to cope with or adapt to are socially and culturally driven (O’Brien, 2009; Heyd and Brooks, 2009). A large literature pertaining to human decision-making and action, traditionally outside of the climate change field suggests, for example, that both motivation and perceived abilities are important determinants of action (Kollmuss and Agyeman, 2002). People’s perceptions of change and risk, are formed by their past experiences, the social and cultural environment that they live in and the information that they are able to access (Grothmann and Patt, 2005). The decisions that people and communities make regarding adaptation options will be influenced by their own perceptions of the changes that are happening and the impacts that they have had or may have in the future (Hoon *et al.*, 2008).

Grothman and Patt (2005) applied a ‘model of private proactive adaptation to climate change’ to study decision-making processes of farmers in Zimbabwe in response to seasonal climate forecast information received to help inform their decisions and improve their yields. Grothamn and Patt revealed that farmers did not change their decisions in response to the climate information: farmers that used to plant maize did not change their crop to others such as millet, which, given the climate forecast, would have been more productive. Further, the socio-cognitive model demonstrated that farmers were not limited by a lack of means – but by a lack of ‘adaptation intention’. Farmers’ perception of the risks associated with not taking adaptive measures deviated from the ‘objectively assessed risks’. The farmers were reluctant to believe that their actions could protect themselves from harm – indicating low they perceived adaptive capacity.

The findings of a deterministic or economic evaluation most probably would have been different. They would have captured that a seasonal climate forecast was in place, that trainings had been carried out, and even that the level of awareness was high among the farmers’ community. Economic evaluation would have chosen millet – more abundant, economic and more profitable under the given climate forecasts. However, none of these approaches would have captured if the information was or was not used, why it was used, and in turn how this would impact the overall vulnerability of the communities.

The importance of analysing decision-making processes at the household level is not new in development (Thomas, 1988), but what might be new is the design of M&E frameworks for adaptation interventions that can capture such issues. Adaptation, constrained by the capacity to adapt, involves a further set of uncertainties in decision-making processes. Put differently, the ability to manage shocks is a complex function of existing behaviour, decision making and change. Hence, it becomes critical to learn how capacity is put into action and how this action leads to a reduction of vulnerability at large. In spite of growing empirical research examining the link between cognitive factors and adaptation (Kromker et al., 2008; Weber 2010; Pelling and High, 2005) these have been largely ignored in existing M&E approaches.

The importance of cognitive and social factors in individual decision-making processes is also highlighted in the IPCC:

Adaptation will be vital and beneficial. However, financial, technological, cognitive, behavioural, political, social, institutional and cultural constraints limit both the implementation and effectiveness of adaptation measures. (2007: 56)

Adger *et al.* identify barriers to adaptation, where cognitive factors and decision making emerge:

- Informational and cognitive barriers are where attitudes to risk and understanding of climate change and its implications affect prospects for adaptation. It is suggested that policymakers need to be aware of these barriers, provide structural support to overcome them, and concurrently

- work towards fostering individual empowerment and action. (2007: 736)
- Social and cultural limits to adaptation can be related to the different ways in which people and groups experience, interpret and respond to climate change. (2007: 737)

Research on the determinants of human behaviour¹² highlights how it is not only critical to understand how change happens at the individual level, but also to look at the social context and the operational environment within which change takes place. Put differently, building adaptive capacity is largely an internal process. But how that capacity develops into action and change is highly dependent on the broader operational environment within which communities live.

Monitoring and evaluation frameworks that support learning and space to gather evidence of such issues will allow for improved practice – the ultimate goal of M&E.

4. Learning to adapt: Principles for M&E of Climate Change Adaptation from a Climate Smart Disaster Risk Management perspective

Preceding sections have demonstrated that the field of adaptation is rapidly evolving with different approaches and initiatives to M&E rapidly emerging. Although technical and conceptual understanding of what is required is increasing, there is limited understanding of the relationship between adaptive capacity and the processes by which adaptation takes place. The assessment and learning on how adaptation processes develop means recognizing the specific features of such processes and then accommodating these methodologically. How then could M&E frameworks be designed in a way that promote learning? Drawing from the findings of this research and the views shared by the interviewees, the following section proposes a set of guiding principles for the future development of M&E approaches for climate change adaptation

One critical area where more debate and research is necessary is to rethink current M&E practices. Traditional M&E practices focus on tracking and measuring results. In section 1, the significant challenges that adaptation poses to M&E practice were explored. Namely: the lack of conceptual agreement on successful adaptation and its identity within wider development processes; the diversity in types of adaptation; uncertainty in both future climate scenarios and the inter-relationship between adaptive capacity and vulnerability; dependency of scales and long-time frames and the cultural and social factors that may enable or constrain adaptation actions. Section 2 and 3 have demonstrated that in particular what is missing is an effort to capture the latter and that a new M&E approach is necessary in order to promote a better understanding of how individuals deal with a changing environment. This gap has been explained by the dominance of approaches that prioritize deterministic and static approaches with an over emphasis on short-term results rather than learning.

These findings resonate with long-standing literature questioning M&E in

¹² For a literature review of the application of human behaviour theories in the climate change context see: Kollmuss and Agyeman (2002); Allen (2002).

development practice. Climate change adaptation offers the opportunity to question such approaches and to identify M&E principles and development of indicators that contribute to an improved understanding of adaptation. If M&E frameworks are to continue as they are, understanding of adaptation processes will be limited by narrow predetermined checklists. While the development of M&E frameworks in the context of climate change faces a number of complex challenges, these can be reduced through a clear focus on the specific purpose of M&E. In order to ensure that learning and knowledge promotion becomes the focus of M&E, a shift in perspectives may need to take place. *A perspective on M&E that enhances learning and knowledge promotion would examine the linkages between capacity and action by looking at the driving forces of individuals and communities towards change. It would embrace constant monitoring, allow flexibility and enhance capacities to deal with uncertainty.*

A clear message emerging from the literature review and analysis of current M&E approaches is that beyond tracking progress towards a particular set predefined objectives, the monitoring process is critical to ensure that adaptation and disaster risk reduction actions are constantly reviewed; to provide space for learning and reflection and, in turn, to support adaptive management. In order for policymakers, programme managers and stakeholders to manage uncertainty in climate scenarios the identification and planning of actions needs to be flexible enough to be able to incorporate information collected through the monitoring process. Otherwise, there is a risk that the adaptation and disaster risk reduction process may become 'locked in' to policies and procedures that may prove inappropriate in the mid- to long-term. The evaluation stage presents an opportunity to generate new knowledge, support learning, question assumptions and to motivate broader organizational/policy or programming changes. Exploring the 'success' or 'failure' of a particular adaptation intervention tends to obscure the determinants and influential factors of adaptive capacity and disaster risk reduction at the local level. Beyond measuring, the evaluation process should be aimed at understanding and improving practice.

In order to support the re-thinking of M&E practices for climate change adaptation and disaster risk reduction, the **ADAPT** principles (**A**daptive, **D**ynamic, **A**ctive, **P**articipatory and **T**horough) are proposed, to guide the development of future M&E approaches, frameworks and indicators which embrace learning and contribute to build an evidence-based understanding of the processes that lead to adaptation.

The ADAPT principles emphasise:

Adaptive learning: this emphasizes the need for methodological flexibility and triangulation (Reed et al., 2006) and adapting the M&E framework to dynamic and heterogeneous local conditions. The lack of empirical evidence as to what does and does not work in a changing climate requires M&E methodologies that are flexible and emphasize learning. Traditional M&E frameworks tend to focus on the outputs and impacts of development interventions. However, the uncertainties and lengthy timescales associated with climate change impacts do not permit the evaluation of interventions

and strategies in the long term (Adger et al., 2007; Hedger et al., 2008; Frankel-Reed et al., 2009). In addition, a focus on outputs tends to stress the evaluation of the delivery of programme interventions, for example, how many training programmes have been carried out or how many participants have been trained, sidelining the long-term developmental context identifying factors that enable or constrain community action. In order to support adaptive management and learning a shift in focus to the changes in the processes is required, which allows for a holistic M&E approach that accounts for complex and uncertain scenarios within which adaptation processes will take place. Equally important, a focus on processes enables flexible planning of programmes and policies that can deal with uncertainty and changing scenarios. A framework of process-based indicators will allow the introduction of new information and activities to shape the course of adaptation at later stages following incremental reviews (adaptive management) and to evaluate the progress of adaptation and disaster risk reduction interventions. An adaptive M&E process evolves as understanding of the situation improves and searches for innovative strategies that will enable adaptation for development.

Dynamic Monitoring: establishes dynamic baselines, which provides real time feedback to inform practice. Adaptation and disaster risk reduction processes will take place against a backdrop of evolving climate hazards, which may become more frequent, severe and unpredictable. From an M&E perspective, baseline information needs to include climate variability and hazards. However, hazards are always changing in the light of new climatic conditions – so that M&E will take place against a ‘moving target’. Key implications are: i) DRM must be assessed against changing hazard profiles; ii) climate data is indispensable in setting the context of a project/policy and planning, and; iii) uncertainty about climate data means that DRM will take place in highly uncertain scenarios. Conventional M&E reflects progress against past circumstances. In the context of climate change adaptation, indicators and targets need to be set within a framework that considers changes overtime. Continuously tracking climate data needs to be a key part of a climate smart DRM approach, which needs to be flexible enough to incorporate any required changes before, during and after programme implementation. The ability to deal with uncertainty and the dynamics of the changing environment therefore becomes a key component of the M&E process.

Active: in understanding the social, cultural and personal issues such as values, confidence, motivation, risks and perception. At the core of adaptation lies the recognition that in the context of the changing climate, there is a need to change current DRM and development practices. In other words, adaptation is about change. The understanding of the adaptation requires paying attention to the decision-making processes and the cultural and behavioural factors that may facilitate or constrain the adaptation process. Learning about local people’s perspectives, perceptions and priorities is key to understanding how capacity develops and designing more responsive adaptation processes. Identifying, recognizing and understanding the values and interests of a diverse set of actors is critical in the advance of purposeful adaptation interventions. People’s perceptions of risk and capacity should be at the core and purpose of M&E frameworks

in order to understand the social determinants of adaptation, to what extent these constrains or enable the adaptation process, and evaluate effectiveness interventions within such a context. Furthermore, active M&E processes will contribute to building an evidence-based understanding on how capacity leads to action and to expand the currently limited understanding of adaptation decision-making.

Participatory: approaches in the monitoring and evaluation process of those with a stake in the programme. There are many different approaches to describe adaptation, but what they all have in common is that, ultimately, actions are locally specific and the result of a process that considers local climatic, environmental, socioeconomic and cultural factors. Stakeholder participation beyond data gathering, should promote self-reliance in decision making and problem solving – thereby strengthening people’s capacities to take action and promote change (Gaventa and Blauert, 2000; Guijt 2007). Participatory monitoring and evaluation (PM&E) strives to be an internal learning process that enables people to reflect on past experience, examine present realities, revisit objectives, and define future strategies, by recognizing different needs of stakeholders and negotiating their diverse claims and interests (Estrella, 2000). In short, a participatory M&E process is more likely to be able to support flexibility and adaptability to local context and address the needs and concerns of all stakeholders.

Thorough: captures the wider operational environment, accounts for underlying causes of vulnerability and checks and rectifies possible maladaptation. The extent to which adaptation processes and risk reduction measures take place may depend on processes over a range of scales. Processes across different levels are not independent. For example, adaptation processes at programme level depend to some degree on the enabling environment of the funding community and/or national policy frameworks. For this to be captured, M&E needs to reflect indicators that keep track of the larger operational environment within which adaptation and DRM interventions take place. A thorough M&E process will include variables that contain specific vulnerabilities to climate variability and extreme events as well as the underlying causes of vulnerability. This will support a deeper understanding of whether adaptation takes place, to what extent and why, and the inter-relationship between the socioeconomic factors that lead to vulnerability. In short, M&E processes need to reflect thoroughness and embrace a wider range of indicators, which facilitate the identification of maladaptation pathways.

Following from these principles, it is suggested that ADAPT indicators – Adaptive, Dynamic, Active, Participatory, Thorough – could be useful for M&E that support learning to adapt.

Table 4 Suggested ADAPT indicators

Adaptive	Indicators reflect possibility of changing conditions
Dynamic	Indicators capture the way processes are changing
Active	Indicators capture actions rather than states
Participatory	Indicators are developed by and with those affected by interventions
Thorough	Indicators include maladaptation indications and capture how, or not, the intervention addresses the underlying causes of vulnerability

The objective here is not to increase the quantity of indicators but to ensure the quality of indicators used. ADAPT indicators are a suggestion towards this direction. The main point of the ADAPT principles and indicators is to question the thinking and practice underpinning current M&E approaches, as to meaningfully improve understanding and practice of adaptation a start is required at rethinking the role of M&E and the critical variables that need to be taken into consideration in the evaluation process. To do so, the ADAPT principles point towards the development of indicators that capture processes of change and the wider operational environment within which these changes take place.

It is also important to highlight that indicators are common means to quantify progress made. However, a key message emerging from this review is that the process of identifying such indices needs to go beyond deterministic checklists which determine such indices from the outside – limiting the role of M&E to a data collection exercise that aims to quantify ‘results’ and, as a result, the scope for learning and ability to capture unexpected processes remains highly limited. The ADAPT principles detailed above highlight that along with ADAPT indicators, the M&E process needs to provide space for open discussion, flexibility and enabling learning processes within organizations.

This working paper has presented M&E approaches currently being used within the climate change adaptation and disaster risk reduction community. However, a main message here is that there is a vital need to rethink current M&E approaches and practice, and to embrace M&E methodologies that emphasize and promote learning. To this end, it is suggested that a starting point could be developmental evaluations (Dozois *et al.*, 2010), which have not yet been used in the field of adaptation interventions. Developmental evaluations have recently emerged as a response to the limitations of traditional development outcomes, targets and indicators, in situations characterized by high levels of uncertainty and complexity (Gamble, 2008). This type of evaluation promotes adaptive learning and innovation in the evaluation process in complex and emergent initiatives. Rather than an evaluation framework that focuses on measurement and assessment, developmental evaluation embraces a learning-based framework (Dozois *et al.*, 2010). The real need is for the DRM and CCA community to develop comprehensive M&E frameworks that embrace, promote and expand the knowledge and evidence base available

on adaptation and disaster risk reduction processes. In other words, we need to learn how to adapt but we also need to change in order to adapt.

5. Conclusion and recommendations

Incorporating M&E considerations of adaptation interventions into climate smart disaster risk management can increase the understanding and evidence base on the role disaster risk management can play in contributing to climate change adaptation. In line with this thinking, this paper has explored the limitations of current M&E approaches to support learning about how adaptation takes place. Section 1 briefly reviewed issues at the interface of climate change adaptation and disaster risk reduction from an M&E perspective, and identified critical challenges and areas where further understanding is required. Individual and community decision-making processes of adaptation options and the role of perceptions of risk and social values in those processes were identified as critical areas as well as a challenge for M&E. It then analysed existing approaches and methodologies of adaptation and disaster risk reduction interventions to examine the room for learning about adaptation processes that these currently provide. The findings of the analysis conclude that existing approaches are dominated by a deterministic and linear view of adaptation and disaster risk reduction that favours the determination of inputs, processes and resources, and focuses on measuring programme results and impacts. A focus on effectiveness and efficiency without assessing individual and community level decision-making processes limits the use of existing approaches to support learning and generate knowledge about how adaptation takes place. Academics, policy makers and practitioners alike have largely ignored the opportunity M&E offers for understanding and building adaptive capacity. As a result, the dynamics of the changing environment have been sidelined and the very processes of change that lead to adaptation obscured (Tschakert and Dietrich, 2010).

Currently the evidence base for bringing about change and the factors that influence decision making about adaptation actions is minimal. Whether adaptation is seen as a process or final outcome, adaptation entails individuals' adjustments to a changing environment. In short, adaptation is about change. Adaptation and disaster risk reduction interventions cannot be evaluated without taking into consideration the social dimensions of change and decision making. Research, including the IPCC report (2007), highlights the critical role of individuals' behaviour and decision making. However, this has not yet translated into evaluation approaches that analyse and understand the influence of such processes.

This suggests that a new interpretation of M&E is required. As many adaptation interventions are at an early stage of implementation, this is an opportune time to design M&E approaches and methodologies that promote learning to adapt. Monitoring and evaluation that enables learning and captures change is identified as an effective tool for generating knowledge that embraces complexity and uncertainty. The policy implications emerging from this work add weight to existing calls for a shift in focus towards a greater understanding of adaptation and its linkages with adaptive capacity, rather than on the impacts of such interventions.

Monitoring and evaluation needs to go beyond business as usual and climate change opens a window of opportunity to rethink current M&E practices – the ADAPT principles and indicators presented in this paper offer one way to facilitate this process. The ADAPT principles and indicators propose a new avenue for M&E to gain a deeper understanding of the processes that may enable or constrain capacity to adapt. The objective here is not to increase the quantity of indicators but to ensure the quality of indicators used. At the heart of the ADAPT principles is the need for integrated and thorough M&E approaches that emphasize constant monitoring and flexibility, reflect local context, perceptions and needs, enhance capacities to deal with uncertainty, and evaluates the processes of change. There is a need for M&E frameworks that embrace comprehensive approaches, which reflect the multidimensional nature of adaptation and disaster risk reduction and its contribution to developmental outcomes. Recommendations for DRM and adaptation practitioners to improve current M&E practices are given below:

- Support further research to study both the individual and community processes of change in current adaptation interventions.
- Design an M&E-learning tool that supports the generation of evidence-based knowledge about the processes that lead to adaptation. This needs to be dynamic, flexible and adaptive to local contexts and constantly changing circumstances and concerns of stakeholders.
- Use of the ADAPT principles which identifies key guiding principles for the future development of M&E frameworks.
- Engage with adaptation and development practitioners to develop a comprehensive basket of integrated process-based indicators that account for wider operational environmental household dynamics and perceptions and underlying causes of poverty and vulnerability.
- Develop **ADAPT indicators – Adaptive, Dynamic, Active, Participatory, Thorough** – in order to ensure that the complexities and dynamics involved in a constantly changing environment are captured.
- Establish M&E systems that go beyond programme/project timelines and that facilitate and promote organizational learning.
- Engage with M&E methodologies that promote and emphasise learning such as developmental evaluation

There is an urgent need for coherent and integrated approaches to managing and adapting to disasters and climate risk. This can only be achieved through greater coordination and learning amongst DRR, adaptation and development practitioners and policymakers. ADAPT M&E frameworks can potentially facilitate this process.

Without a doubt, committing to a learning process that aims to enhance understanding of adaptation takes time and resources. However,

discussions on M&E would be enriched if these address the need for improving the understanding of what adaptation means at the community level. This will ensure that processes of learning are not extracted from evaluation approaches.

If monitoring and evaluation in adaptation and disaster risk reduction do not address the issues raised in this paper then the political opportunity represented by the current high interest in M&E approaches of adaptation and disaster risk reduction policy, programming and funding may be wasted. The unique nature of adaptation to climate change calls for experience-based learning M&E processes for discovering the key insights into adaptive capacity and its links to adaptation processes and vulnerability reduction at large. While the development of M&E frameworks in the context of climate change face a number of complex challenges, these can be reduced through a clear focus on the specific purpose of M&E. If the purpose of M&E is to improve practice in a situation where there is limited knowledge about what works, then learning needs to be an essential intention. Effective adaptation is an important part of adapting well, but the purpose of evaluation should not be about determining the success or failure of adaptation interventions, but rather learning from the process.

6. References

- Adger, N., Agrawala, S., Mirza, M. M. Q., Conde, C., O'Brien, K., Pulhin, J., Pulwarty, R., Smit, B. and Takahashi, K. 2007. Assessment of adaptation practices, options, constraints and capacity. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., Van der Linden, P. J. & Hanson, C. E. (eds.) *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of the Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.
- Adger, N. W., Arnell, N. W. and Tompkins, E. L. (2005) Successful adaptation to climate change across scales. *Global Environmental Change*, Vol.15: 77 - 86.
- Adger, N. W., Brooks, N., Bentham, G., Maureen, A. and Eriksen, S. (2004) New Indicators of vulnerability and adaptive capacity. Tyndall Centre for Climate Change Working paper. Technical Report 7 [Online]. Available from: www.tyndall.ac.uk/publications/view/328.
- Adger, N. W., Dessai, S., Goulden, M., Humle, M., Lorenzoni, I., Nelson, D. R., Næss, L. O., Wolf, J. and Wreford, A. (2009) Are there social limits to adaptation to climate change? *Climatic Change*, Vol.93: 335 - 354.
- ADPC (2006) *Critical Guidelines. Community-Based Disaster Risk Management*. Available from: www.adpc.net/pdrsea/pubs/guidefull.pdf.
- Allen, W., Kilvington, M. and Horn, C. (2002) Using participatory and learning-based approaches for environmental management to help achieve constructive behaviour change. New Zealand: Ministry of Environment [Online]. Available from: <http://www.pacificwater.org/userfiles/file/IWRM/Toolboxes/STAKEHOLDER%20Engagement/participatory%20methods-landcare.pdf>.
- Bakewell, O. and Garbutt, A. (2005) The use and abuse of the logical framework approach. Stockholm. Available from: www.sida.se.
- Barnett, J. and O'Neil, S. (2010) Maladaptation. *Global Environmental Change*, Vol.20: 211 - 213.
- Beaulieu, N., Fatima, D., Orindi, V. and Carter, S. (2008) CCAA's approach to using monitoring and evaluation to strengthen climate adaptive capacity. In: *International Workshop on Evaluating Climate Change and Development, 10th - 13th May 2008 of Conference Alexandria* [Online]. Available from: www.esdevaluation.org/images/Vulnerability_-_Beaulieu.ppt
- Beaulieu, N., Fatima, D., Orindi, V., Carter, S. and Anderson, S. (2009) Using Monitoring and Evaluation to Strengthen Climate Adaptive Capacity. In: Van den Berg, R. D. & Feinstein, O. (eds.) *Evaluating Climate Change and Development*. London: Transaction.
- Bosello, F., Carraro, C. and De Cian, E. (2009) *An Analysis of Adaptation as a Response to Climate Change Denmark*. Available from: www.copenhagenconsensus.com.
- Bryan, E., Temesgen, D. T., Glwadys, A. G. and Ringler, C. (2009) Adaptation to climate change in Ethiopia and South Africa: options and constraints. *Environmental Science and Policy*, Vol.12: 413 - 426.
- Burton, I., Diring, E. and Smith, J. (2006) Adaptation to climate change: international policy options. *Advancing the international effort against climate change* [Online]. Available from: <http://www.pewclimate.org/publications>.
- CARE (2009) *Climate Vulnerability and Capacity Analysis*. London: CARE. Available from: www.careclimatechange.org/cvca.
- Carr, E. R. (2008) Between structure and agency: livelihoods and adaptation in Ghana's central region. *Global Environmental Change*, Vol.18: 689 - 699.
- Chadburn, O., Ocharan, J., Kenst, K. and Venton, C. C. (2010) *Cost-Benefit Analysis for community based climate and disaster risk management: synthesis report UK*.
- DEFRA (2009) *Accounting for the Effects of Climate change. Supplementary Green Book Guidance*. London. Available from: <http://www.defra.gov.uk/environment/climate/documents/adaptation-guidance.pdf>.
- DEFRA (2010a) *Measuring adaptation to climate change - a proposed approach*. UK: DEFRA. Available from: www.defra.gov.uk.
- DEFRA (2010b) *Self-Assessment guidance and matrix for National Indicator (NI) 188 - Planning to adapt to climate change*. London: DEFRA [Online]. Available from: <http://www.defra.gov.uk/environment/climate/action/local-authorities.htm>.
- Denton, F. (2009) Challenges for Evaluating Adaptation to Climate Change within the context of Africa. In: Van den Berg, R. D. & Feinstein, O. (eds.) *Evaluating Climate Change and Development*.

London: Transaction Publishers.

Dietz, S., Hope, C. and Patmore, N. (2007) Some economics of 'dangerous' climate change: reflections on the Stern review. *Global Environmental Change*, Vol.17: 311 - 325.

Doria, M. F., Boyd, E., Tompkins, E. L. and Adger, N. W. (2009) Using expert elicitation to define successful adaptation to climate change. *Environmental Science and Policy*, Vol.12: 810 - 819.

Dozois, E., Langlois, M. and Banchet-Cohen, N. (2010) A Practitioner's guide to Developmental Evaluation. Canada: IICRD [Online]. Available from: www.iicrd.org.

Earl, S., Carden, F. and Smutylo, T. (2001) What is Outcome Mapping? In: Earl, S., Carden, F. & Smutylo, T. (eds.) *Outcome Mapping: Building Learning and Reflection into Development Programs*. Canada: IDRC CRDI.

Engel, P. and Carlsson, C. (2002) Enhancing learning through evaluation: Approaches, dilemmas and some possible ways forward. In: Paper commissioned by the Ministry of Foreign Affairs, DG for Development Cooperation, the Netherlands. Presented at EES Conference, October 10-12 2002 of Conference Seville.

Eriksen, S. and Kelly, P. M. (2007) Developing credible vulnerability indicators for climate adaptation policy assessment. *Mitigation and Adaptation Strategies for Global Change*, Vol.12: 495-524.

Estrella, M. (2000) Learning from change. In: Estrella, M., Blauert, J., Campilan, D., Gaventa, J., Gonsalves, J., Guijt, I., Johnson, D. & Ricafort, R. (eds.) *Learning from change. Issues and experiences in participatory monitoring and evaluation*. London: International Development Research Center.

Frankel-Reed, J., Brooks, N., Kurukulasuriya, P. and Lim, B. (2009) A Framework for Evaluating Adaptation to Climate Change: Evaluating Climate Change and Development. In: Van den Berg, R. D. & Feinstein, O. (eds.) *Evaluating Climate Change and Development*. London: Transaction.

Frankhauser, S. (1998) The cost of adapting to climate change. GEF Working Paper [Online].

Gamble, A. A. J. (2008) A Developmental Evaluation Primer. Quebec: Foundation, T. J. W. M. F [Online]. Available from: <http://www.mcconnellfoundation.ca/assets/Media%20Library/Publications/A%20Developmental%20Evaluation%20Primer%20-%20EN.pdf>.

Gaventa, J. and Blauert, J. (2000) Learning to Change by Learning from Change: going to scale with participatory monitoring evaluation. In: Estrella, M., Blauert, J., Campilan, D., Gaventa, J., Gonsalves, J., Guijt, I., Johnson, D. & Ricafort, R. (eds.) *Learning from change: issues and experiences in participatory monitoring and evaluation*. London: ITDG and International Development Research Centre.

GEF (2008) Elements of an M&E Framework for Climate Change Adaptation Projects. Lessons from GEF Climate Change Adaptation Projects. Washington D.C: Global Environment Facility. Available from: http://www.gefcountrysupport.org/report_detail.cfm?projectId=232.

Grothmann, T. and Patt, A. (2005) Adaptive capacity and human cognition: the process of individual adaptation to climate change. *Global Environmental Change*, Vol.15: 199 - 213.

Guijt, I. (2007) Assessing and Learning for social change: A discussion paper. IDS Discussion paper [Online]. Available from: <http://www.ids.ac.uk/index.cfm?objectid=3DE55E83-5056-8171-7B415B53F36972F5>.

Hedger, M., Mitchell, T., Leavy, J., Martin, G. and Downie, A. (2008) Desk Review: Evaluation of adaptation to climate change from a development perspective. Brighton. Available from: http://www.esdevaluation.org/images/IDS_Report_on_Evaluating_Adaptation_for_GE_publication_version.pdf.

Heyd, T. and Brooks, N. (2009) Exploring cultural dimensions of adaptation to climate change. In: Adger, N., Lorenzoni, I. & O'Brien, K. (eds.) *Adapting to Climate Change. Thresholds, Values, Governance*. Cambridge: Cambridge University Press.

Hoon, V., Srikanthan, G., Townsley, p., Cattermoul, B., Bunce, L. and Pomeroy, B. (2008) Socio-economic monitoring guide for coastal managers in South Asia - SOCMON South Asia. SOCMON South Asia. Available from: www.iucn.org/marine.

Horrocks, L., Mayhew, J., Hunt, A., Downing, T., Butterfield, R. and Watkiss, P. (2005) Objective Setting for Climate Change Adaptation Policy. UK: Defra, A. T. E. w. S. E. I. a. M.-e. f. Available from: http://www.ukcip.org.uk/images/stories/Tools_pdfs/Objective_setting.pdf.

Inter-American Development Bank (2005) Indicators of Disaster Risk and Risk Management. Summary Report for the World Conference on Disaster Reduction. Colombia: Inter-American Development

Bank [Online]. Available from: www.rdec.gov.tw/DO/DownloadControllerNDO.asp?CuAttachID=17496.
 IPCC (2007) Climate Change 2007: Synthesis Report, Geneva, Intergovernmental Panel on Climate Change.

Jackson, E. T. and Kassam, Y. (1998) Knowledge Shared. Participatory Evaluation in Development Cooperation, Connecticut, Kumarian Press.

Kelman, I. (2010) Introduction to climate, disasters and international development. *Journal of International Development*, Vol.22: 208-217.

Klein, R. (2003) Adaptation to climate variability and change: what is optimal and appropriate? In: Giupponi, C. & Schechter, M. (eds.) *Climate Change in the Mediterranean: socio-economic perspectives of impacts, vulnerability and adaptation*. UK: Edward Elgar.

Kollmuss, A. and Agyeman, J. (2002) Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? . *Environmental Education Research*, Vol.8: 239 - 260.

Kromker, D., Eierdanz, F. and Stolberg, A. (2008) Who is susceptible and why? An agent-based approach to assessing vulnerability to drought. *Regional Environmental Change*, Vol.8: 173 - 185.

Lindsey, J., Ludi, E. and Levine, S. (2010) Towards a characterisation of adaptive capacity at the local level. ODI Draft Discussion Paper.

McGray, H., Hammill, A., Bradley, R., Schipper, E. L. and Parry, J. E. (2007) *Weathering the Storm: Options for Framing Adaptation and Development*. Washington, DC: Institute, W. R. Available from: www.wri.org/publication/weathering-the-storm.

Mercer, J. (2010) Disaster Risk Reduction or Climate Change Adaptation: are we reinventing the wheel? *Journal of International Development*, Vol.22: 247-264.

Mitchell, T., Ibrahim, M., Harries, K., Hedger, M., Polack, E., Ahmed, A., Hall, N., Hawrylyshyn, K., Nightingale, K., Onyango, M., Adow, M. and Mohammed, S. (2010a) *Climate Smart Disaster Risk Management, Strengthening Climate Resilience*. Brighton: Studies, I. o. D. Available from: <http://community.eldis.org/.59e0ccc0>

Mitchell, T., Van Aalst, M. and Silva-Villanueva, P. (2010b) Assessing progress on integrating disaster risk reduction and climate change adaptation in development processes Strengthening Climate Resilience Discussion Paper Vol.2. Institute of Development Studies Brighton

Mosse, D. (1998) Process-oriented approaches to development practice and social research. In: Mosse, D., Farrington, J. & Rew, A. (eds.) *Development as a process: concepts and methods for working with complexity*. London: Routledge.

Munasinghe, M., Meier, P., Hoel, M., Hong, S. W. and Aaheim, A. (1996) *Applicability of Cost and Benefit Assessments*, Cambridge, Cambridge University Press.

Neumayer, E. (2007) A missed opportunity: The Stern review on climate change fails to tackle the issue of non-substitutable loss of natural capital. *Global Environmental Change*, Vol.17: 297 - 301.

O'Brien, K. (2009) Do values subjectively define the limits to climate change adaptation? In: Adger, N. W., Lorenzoni, I. & O'Brien, K. (eds.) *Adapting to Climate Change. Thresholds, Values, Governance*. Cambridge: Cambridge University Press.

O'Brien, K., Eriksen, S., Schjolden, A. and Nygaard, L. (2004) What's in a word? Conflicting interpretations of vulnerability in climate change research. CICERO Working Paper, Vol.4. Norway: Center for International Climate and Environmental Research [Online] Available from: www.cicero.uio.no/media/2682.pdf

O'Brien, K. and Wolf, J. (2010) A value-based approach to vulnerability and adaptation to climate change. *Climate Change*, Vol.1.

Patt, A. and Siebenhuner, B. (2005) *Agent based modeling and adaptation to climate change*. Berlin: Research, P. I. f. C. i. Available from: http://www.diw-berlin.de/documents/publikationen/73/43460/v_05_2_0.pdf.

Pelling, M. (2004) *Visions of Risk. A Review of international indicators of Disaster Risk and its Management* London: UNDP, U. a. Available from: www.unisdr.org/HFdialogue/download/tp1-visionsofrisk.pdf.

Pelling, M. and High, C. (2005) *Social Learning and Adaptation to Climate Change*. Benfield Hazard Research Center, Disaster Studies Working paper 11.

Perez, R. and Yoher, G. (2004) *Continuing the Adaptation Process*. Cambridge: UNDP [Online]. Available from: <http://www.undp.org/climatechange/adapt/apf.html>.

Pettengell, C. (2010) *Climate Change Adaptation. Enabling people living in poverty to adapt*. London: Oxfam. Available from: <http://www.oxfam.org.uk/>

resources/policy/climate_change/downloads/rr_climate_change_adaptation_summary_290410.pdf.

Pielke, R. (2007) Mistreatment of the economic impacts of extreme events in the Stern review report on the economics of climate change. *Global Environmental Change*, Vol.17: 302 - 310.

Prowse, M. and Snilstveit, B. (2010) *Impact Evaluation and Interventions to Address Climate Change: A Scoping Study*. New Delhi: The International Initiative for Impact Evaluation (3ie). Available from: www.3ieimpact.org/admin/pdfs_papers/Working%20paper%207.pdf.

Reed, M. S., Frase, E. D. G. and Dougill, A. J. (2006) An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics*, Vol.59: 406 - 418.

Schipper, E. L. (2009) Meeting at the cross road?: Exploring the linkages between climate change and disaster risk reduction. *Climate and Development*, Vol.1: 16-30.

Schipper, E. L. and Dekens, J. (2009) Understanding the role of culture in determining risk from natural hazards. *Earth and Environmental Science*, Vol.6.

Schipper, E. L. and Pelling, M. (2006) Disaster risk, climate change and international development: scope for, and challenges to, integration. *Disasters*, Vol.30: 19 - 38.

Simister, N. and Smith, R. (2010) *Monitoring and Evaluating capacity building: Is it really that difficult?* Oxford: INTRAC. Available from: <http://www.intrac.org/resources.php?keyword=monitoring+and+evaluation&title=&author=&type=&format=1&language=&orderby=Publication+Date&sort=Descending&action=search&submitd=Search>.

Smit, B. and Pilifosova, O. (2003) From adaptation to adaptive capacity and vulnerability reduction. In: Smit, B., Richard, J. T. & Huq, S. (eds.) *Climate change, adaptive capacity and development*. London: Imperial College Press.

Smit, B., Pilifosova, O., Burton, I., Challenger, B., Huq, S., Klein, R., Yohe, G., Adger, N., Downing, T. and Harvey, E. (2001) *Adaptation to climate change in the context of sustainable development and equity*. In: McCarthy, J. J., Canziani, O., Leary, N. A., Dokken, D. J. & White, K. S. (eds.) *Climate Change 2001: Impacts, Adaptation and Vulnerability*. Cambridge: Cambridge University Press.

Smit, B. and Wandel, J. (2006) Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*,

Vol.16: 282 - 292.

Solecki, W., Leichenko, R. and O'Brien, K. (2011) Climate change adaptation strategies and disaster risk reduction in cities: connections, contentions and synergies. *Environmental Sustainability*, Vol.3: 135-141.

Stern, N. (2006) *The Economics of climate change*. The Stern Review, Cambridge, Cambridge University Press.

Thomas, B. P. (1988) Household strategies for adaptation and change: participation in Kenyan rural women's associations. *Journal of International African Institute*, Vol.58: 401 - 422.

Twigg, J. (2004) *Disaster Risk Reduction: Mitigation and preparedness in development and emergency programming Good Practice Review Vol.9*. Overseas Development Institute, Humanitarian Practice Network: London

Twigg, J. (2007) *Characteristics of a Disaster-Resilient Community*. A guidance note. Available from: http://www.proventionconsortium.org/themes/default/pdfs/characteristics/community_characteristics_en_highres.pdf.

UNDP and GEF (2007) *Monitoring and Evaluation Framework for Adaptation to Climate Change*. Available from: http://www.undp.org/climatechange/adapt/downloads/Adaptation_ME_DRAFT_July.pdf.

UNFCCC (2010) *Synthesis report on efforts undertaken to assess the cost and benefits of adaptation options, and views on lessons learned, good practices, gaps and needs*. Bonn. Available from: <http://www.adaptationlearning.net/research/synthesis-report-efforts-undertaken-assess-costs-and-benefits-adaptation-options-and-views>.

UNISDR (2005) *Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters (HFA)*. Geneva: UNISDR. Available from: <http://www.unisdr.org/eng/hfa/hfa.htm>.

Valencia, D. (2009) *Lessons on M&E from GEF Climate Change Adaptation Projects*. In: Van den Berg, R. D. & Feinstein, O. (eds.) *Evaluating Climate Change and Development*. London: Transaction.

Van Aalst, M. K., Cannon, T. and Burton, I. (2008) Community level adaptation to climate change: the potential role of participatory community risk assessment. *Global Environmental Change*, Vol.18: 165 - 179.

Van der Berg, R. D. and Spearman, M. A. (2009) The Future of Evaluating Climate Change and Development. In: Van den Berg, R. D. & Feinstein, O. (eds.) Evaluating Climate Change and Development. London: Transaction.

Vincent, K. (2007) Uncertainty in adaptive capacity and the importance of scale. *Global Environmental Change*, Vol.17: 12-24.

Weber, E. U. (2010) What shapes perceptions of climate change? *Wiley Interdisciplinary Reviews: Climate Change* Vol.1: 332- 342.

Wilby, R. and Dessai, S. (2010) Robust adaptation to climate change. *Weather* Vol.65: 180–185, July 2010

Wilkinson, S. and Twigg, J. 2007. Monitoring and Evaluation. A source book for disaster risk reduction
Poventium Consortium

Wisner B, Blaikie P, Cannon T, Davis I. 2004. At Risk: Natural Hazards, People's Vulnerability and Disasters. Routledge: London.

World Bank (2010a) The costs to developing countries of adapting to climate change. New Methods and Estimates. The Global Report of the Economics of adaptation to Climate Change Study. Washington DC: Bank, T. W. Available from: <http://siteresources.worldbank.org/EXTCC/Resources/EACC-june2010.pdf>.

World Bank (2010b) Economic Evaluation of Climate Change Adaptation Projects - Approaches for the Agricultural sector and beyond. Washington DC: Bank, T. W. Available from: http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187511&entityID=000333038_20100713004944&cid=3001.

World Bank (2010c) Guidance Note 8. Monitoring and Evaluation of Adaptation Activities. Washington: Bank, W. Available from: <http://beta.worldbank.org/climatechange/content/note-8-monitor-and-evaluate-adaptation-activities>.

WRI (2009) The National Adaptive Capacity Framework - Key Institutional Functions for a Changing Climate Washington D.C: Institute, W. R. Available from: <http://www.wri.org/project/vulnerability-and-adaptation/nac-framework>.

Yohe, G. and Richard, S. J. (2002) Indicators for social and economic coping capacity - moving toward a working definition of adaptive capacity. *Global Environmental Change*, Vol.12: 25 - 40.

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