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Planning climate adaptation in agriculture

Meta-synthesis of national adaptation plans in West and East Africa and South Asia

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Front cover photo

Many smallholders have started to embrace climate-resilient farming approaches and technologies. Photo credit Neil Palmer (CIAT)

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Abbreviations and acronyms

AfDB	African Development Bank
AIACC	Assessment of Impacts and Adaptations to Climate Change in Multiple Regions and Sectors
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
CC	Climate Change
CCAA	Climate Change Adaptation in Africa programme
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CDM	Clean Development Mechanism
COP	Conference of the Parties to the UNFCCC
EACC	World Bank Economics of Adaptation to Climate Change study
GCF	Green Climate Fund
GCM	General Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
LAPA	Local Adaptation Programme of Action
LDC	Least Developed Country
LDCF	Least Developed Countries Fund
LEG	Least Developed Countries Expert Group
M&E	Monitoring and evaluation
MAGICC/SCENGEN	Model for the Assessment of Greenhouse-gas Induced Climate Change/ Regional and global Climate SCENarioGENerato
MDG	Millennium Development Goal
MEA	Multilateral Environment Agreement
MTP	Medium Term Plan
MRV	Measuring, reporting and verification
NAP	National adaptation plan
NAPA	National adaptation programmes of action
NAPCC	India National Action Plan on Climate Change
NatComm	National Communication to the UNFCCC
NCCC	National Climate Change Council
NCCAP	Kenya National Climate Change Action Plan
NCCAS	National Climate Change Adaptation Strategy
NCCRS	National Climate Change Response Strategy
NGO	Non-governmental organization
NMSA	National Mission for Sustainable Agriculture
OECD	Organization for Economic Co-operation and Development
PPCR	Pilot Program for Climate Resilience
RCM	Regional Climate Models
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCCF	Special Climate Change Fund
SCF	Strategic Climate Fund
SRES	Special Report on Emission Scenario models
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change

Executive summary

This meta-synthesis of national climate change adaptation plans, policies and processes spans twelve countries at various stages of adaptation planning and implementation, in three priority CCAFS regions: West Africa (Burkina Faso, Ghana, Mali, Niger, Sénegal), East Africa (Ethiopia, Kenya, Tanzania, Uganda) and South Asia (Bangladesh, India, Nepal). The national adaptation plan (NAP) process was established in the Cancún Adaptation Framework by the United Nations Framework Convention on Climate Change (UNFCCC) to help facilitate effective medium- and long-term adaptation planning and implementation in developing countries, and in particular Least Developed Countries (LDCs). The scope of this review focused primarily on climate adaptation in the agriculture sector, but also included consideration of related sectors, such as water, forests and land use.

In order to provide a coherent basis for analysis of adaptation processes across all twelve countries and the relationships between national policies and plans and strategies for adapting to climate challenges, an analytical framework was developed. The framework allows for a 'dashboard' view of country progress on key NAP process and policy elements, and can continue to be useful as countries develop and refine their adaptation approaches over time. The countries reviewed are in various stages of developing national strategies to address climate change adaptation. For some countries, NAPs may not represent a significant shift from current practice, however for the majority of countries reviewed, NAPs can provide an important means of focusing climate adaptation planning and response measures. We assessed current practice in the following areas:

Risk assessment and ranking

Countries begin adaptation planning with climate change vulnerability and risk assessments, which the countries reviewed have developed for their national communications to the UNFCCC (NatComm) and national adaptation programmes of action (NAPA) submissions, or for their own climate adaptation strategies and policies. South Asia appears to have the highest technical capacity and region-specific data to assess climate risks through climate models and scenario projections. There is a need for greater capacity building in this area for East Africa and particularly in West Africa.

After assessing vulnerabilities and risk, countries assess impacts on agro-climatic, region-specific, socioeconomic or sector-specific elements. For most countries reviewed, impact assessments are entirely sector based, although some countries also focus on most at-risk sectors and socioeconomic groups. Many countries lack consistent, comprehensive and coordinated approaches in their vulnerability and risk assessments. As such, standardization in methodologies across regions and sectors within a country are often lacking, affecting countries' ability to compare, rank order, or prioritize risks and adaptation activities. Most countries reviewed do create criteria to rank climate risk, though often do not make clear how consideration of such criteria affects prioritization of adaptation actions.

Though identified as an urgent need by many countries, the economic impacts of climate risks are not commonly assessed, although some have made projections. In addition, many future climate change scenarios do not account for the changing socioeconomic status of populations in emerging economies, increased urbanization, and other factors that are too complex to project and model 20-100 years into the future, but which will affect climate impact projections.

Adaptation strategy design and interventions

Most countries reviewed appear to apply more than one method to determine priority adaptation activities, but are not consistently transparent in detailing how these decisions are made. Those countries that include this level of detail (such as in NatComms or national climate change plans) appear to most commonly apply multi-criteria analysis, nominal group methods, criteria weighing and cost-benefit analysis, often in multi-step prioritization processes. While cross- or multisectoral analyses to prioritize adaptation actions can be useful, many countries reviewed have difficulties performing such strategic studies.

Countries reviewed prioritized the following most frequently: 1) protecting the most vulnerable and poor (rural) populations, 2) cost-effectiveness (or overall cost), 3) promoting sustainable development and/or natural resource use, 4) improving livelihoods (or avoiding losses), and 5) promoting adaptive capacity. More can be done to assess socioeconomic impacts of adaptation options.

Once adaptation activities are prioritized, countries must evaluate institutional structures for implementation, particularly as adaptation activities are often cross-sectoral. Some national governments are creating new institutional structures to promote cross-sectoral cooperation. However, many countries reviewed still lack an institutional framework to effectively coordinate and implement adaptation activities. It is also noted that key institutions in most countries reviewed suffer from a shortage of technically well-qualified staff. Further, the private sector—sometimes critical to support implementation—is often noticeably absent from strategic planning, and therefore de-emphasized as an implementation partner.

Countries should assess how to strategically place adaptation priorities within broader national policy frameworks, including national development policies and agricultural sectoral plans. This allows for policies with precedence (such as development and fiscal policies) to guide decision-making and create necessary linkages. Aligning and mainstreaming activities into national development or sector plans can also enable funding for implementation through government budgetary allocations. However, for the majority of countries reviewed, this remains a challenge, sometimes attributed to structural and institutional issues. Countries with multiple adaptation policies and guidance documents often lack clear coordination and linkage between them. Integrated adaptation assessments and action plans can help overcome the barrier of cross-sectoral coordination.

Adaptation plan implementation, monitoring and funding

Almost all countries reviewed are in the early stages of planning and implementation. Therefore, detailed plans of action, including assignment of responsibilities and timelines for implementation, including intention to review the effectiveness of implementation and revise plans, have not yet been developed. Assessment of conflicts and synergies with national development or sectoral plans should be a focus during plan design and implementation, and iteratively assessed. Monitoring and evaluation systems can initially focus on process elements rather than outcomes, and similarly employ an iterative approach to support continuous improvement, particularly as new information becomes available.

Funding for national adaptation planning remains a challenge. Most countries are frustrated by the low level of financing for implementation of NAPA and adaptation projects. Country studies commissioned by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) indicate adaptation and food security programs currently being implemented are not well integrated into a broader national strategy, but appear to be driven by bilateral and/or multilateral funding sources. NAPs hold great potential to reverse this trend, although consideration should be given to how to target and facilitate alternative funding sources, particularly from domestic revenues. This is important if NAPs are to gain more traction and show greater implementation success than NAPAs. Of the countries reviewed for this report, those dedicating domestic fiscal instruments and budgets to NAP development appear to show higher potential for successful implementation. As financing is needed for implementation, adaptation plans should consider how sufficient finance can be mobilized, particularly at local levels where adaptation response measures are most crucial.

Stakeholder engagement and collaboration throughout the entire process of an adaptation strategy—including assessing risk, designing measures, implementation, identification of needs, and improving over time—is critical. CCAFS workshops in the three priority regions, in addition to the CCAFS East Africa regional synthesis report, identified the following challenges with stakeholder engagement: low access to information, low coordination, particularly at regional/local levels, low participation of farmers, low participation of the private sector and media, lack of awareness outside the immediate climate change policy circles in government (in East Africa and West Africa), and the need to build capacity of stakeholders to address adaptation issues.

Capacity constraints are noted across all countries reviewed. The most common include lack of capacity in climate observation systems, technical and institutional capacity, and limited finance. The complexity of adaptation assessment and planning needs, plus the challenges of linking this information into policy making creates a unique capacity challenge, which countries should address at all NAP stages. Capacity building must look beyond government, and include the full suite of actors and interests in adaptation, including local communities and the private sector.

Recommendations

Assessing the twelve countries against the analytic framework provided insights into where countries might take further steps to strengthen their national adaption process, as well as identification of common needs across the countries reviewed. Recommendations for national policy makers, agriculture sector practitioners seeking to shape national adaptation planning processes, CCAFS and research organizations, and the donor community include:

1. Strengthen capacity to project climate risks, rank such risks, and prioritize response activities. The limitations of current information systems points to many countries needing better information on regional variations and future projections of vulnerability and risk. Further, improving the understanding of the economic impacts of climate risks is critical and currently lacking.

2. Given the multiple scales, diversity and complexity in governance, finance, and range of actors involved in defining adaptation solutions, attention to downward accountability and adaptive institutions will be critical. Ongoing assessment of institutional frameworks for adaptation planning and implementation that can effectively coordinate and implement a holistic national adaptation plan will be critical at all levels.

3. It's important to define long-term solutions for adaptation *planning* and *implementation* funding that is sufficient and geared towards building strong institutions and capacity. Funding for the formulation of NAPs should be additional, specific and separate to funding for implementation.

4. Linking adaptation assessments into policy development creates a unique capacity challenge, which countries should address at all NAP stages. In particular, it is critical to strengthen analytic capacity for integrated approaches to adaptation planning that a) considers combinations of crop, livestock, rangeland, forestry, fishery and agroforestry activities, as well as aquatic and ecosystem function needs and b) helps define adaptation and mitigation synergies, which countries often cite interest to identify, but are more challenged to define.

5. Focus policy analysis and action towards integrating adaptation strategies into development objectives and existing sectoral policies. Enable funding for implementation partially through national budgetary allocations, which can decrease dependence on unpredictable donor finance, while securing stronger political support for, and success in, implementation.

6. Consider objective methods to assess quality of stakeholder engagement in assessment, design and implementation of adaptation plans.

1. Introduction

Climate change will have far-reaching consequences for agriculture and food security globally, and its impacts are predicted to disproportionately affect the poor and most vulnerable who depend on agriculture for their livelihoods. Climate change poses considerable challenges for development, food security, and poverty alleviation. Countries are increasingly responding to current and projected climate change impacts by developing national adaptation strategies and action plans. *Adaptation strategies* are typically high-level documents that set out overarching government approaches to adaptation (often as part of national climate change policies), while *adaptation plans* go further by setting out concrete adaptation actions, such as sectoral adaptation policies, adaptation projects and programmes and specific measures to address identified vulnerabilities (Mullan et al. 2013).

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) seeks to inform national adaptation plan development, linking CGIAR research into adaptation planning decisions and processes. This effort falls under the third objective of the CCAFS Theme 1 on Adaptation to Progressive Change, and contributes to the achievement of outcome 1.3: *Integrate adaptation strategies for agricultural and food systems into policy and institutional frameworks.* The purpose of this report is to provide a meta-synthesis of national climate change adaptation plans, policies and processes across 12 CCAFS priority countries in West and East Africa and South Asia (see Table 1), which are at various stages of adaptation planning and implementation.

The CCAFS programme has carried out a policy baseline for several countries in the target regions by evaluating how climate adaptation is considered in current national level activities and policies. These country studies have been communicated through a series of national synthesis reports. A series of national policy workshops were also organized in 2011 and 2012 with national stakeholders involved in the nexus of climate change, agriculture and food security in order to identify research needs and priorities at national levels. Regional syntheses have also been commissioned by CCAFS for the regions of South Asia (on climate-smart agriculture) and East Africa (on adaptation planning).

This meta-synthesis builds on CCAFS country studies and regional syntheses, as well as available government documents, for example National Communications to the United Nations Framework Convention on Climate Change (UNFCCC), climate change or adaptation policy documents, etc. The primary audience is national policy makers and others in the agriculture sector (e.g. NGOs, farmer organizations) seeking to shape national adaptation planning processes. This research also seeks to provide recommendations to CCAFS, inform further CCAFS work with national adaptation focal points and institutions, policy-makers and researchers in each country, as well as to inform the broader adaptation donor community. It is also hoped that the research findings will inform a workshop with national leaders during the UNFCCC Conference of the Parties (COP) 19 in Warsaw, Poland.

Table 1. CCAFS priority countries reviewed and adaptation planning status

Country	Adaptation planning status
East Africa	
Ethiopia	NAPA, Climate-Resilient Green Economy Strategy
Kenya	National Climate Change Response Strategy (NCCRS); National Climate Change Action Plan + NAP in process
Tanzania	NAPA, National Climate Change Strategy
Uganda	NAPA
West Africa	
Burkina Faso	NAPA
Ghana	National climate change adaptation strategy
Mali	NAPA
Niger	NAPA
Senegal	NAPA + climate change plan in process
South Asia	
Bangladesh	NAPA + climate change plan
India	National climate change plan
Nepal	NAPA

1.1. Policy overview

The national adaptation plan (NAP) process was established in 2010 by the UNFCCC to help facilitate effective medium- and long-term adaptation planning and implementation in developing countries, in particular Least Developed Countries (LDCs).[1] NAPs are intended to build upon countries' experiences in preparing and implementing national adaptation programmes of action (NAPAs), which were focused on identifying countries' most urgent and immediate adaptation needs, not medium- to long-term adaptation plans and response measures. The decision acknowledged that national adaptation planning could enable developing and developed country parties to assess vulnerabilities, mainstream climate change risks and address adaptation. Further, the decision recognized the need to address adaptation planning in the broader context of sustainable development planning, but also acknowledged that climate change risks magnify development challenges for least developed countries.

An Adaptation Committee has also been established under the Cancun Adaptation Framework[2] to promote the implementation of enhanced action on adaptation. The Adaptation Committee has developed a three-year work plan that will focus on mainstreaming adaptation into development planning and strengthening national capacity to address adaptation. Its mission is to operate as an advisory body and to raise awareness of and ambition for adaptation, with the ultimate objective of facilitating the implementation of concrete actions by all Parties and empowering communities. In its work plan, the Adaptation Committee pays special attention to facilitating formulation and implementation of NAPs by non-LDC developing country Parties. In addition, the Committee will contribute to, as needed (and not duplicate work of), the Least Developed Countries Expert Group (LEG) efforts to support LDC national adaptation plan processes and the Subsidiary Body for Implementation (SBI) on the work programme concerning loss and damage.

The Least Developed Countries Expert Group (LEG) has completed technical guidelines for the national adaptation plan process (referenced in Section 2 of this report). The LEG was established by the Conference of the Parties to the UNFCCC (COP) in 2001 to provide technical support and advice to LDCs through workshops, development of guides, tools, and technical papers. It has identified support needs for the process of the formulation and implementation of NAPs, and seeks to provide ongoing technical guidance and support to the national adaptation plan process (Least Developed Countries Expert Group, 2012). It also reviews draft NAPAs upon request or provides direct advice.

A variety of funding instruments have been created, including under the UNFCCC, to support adaptation activities. These include:

- **Least Developed Countries Fund (LDCF):** Established to address the special needs of LDCs and has identified adaptation as the top priority. The Global Environment Facility is its operating entity and takes guidance from the COP. Its mandate includes assistance to LDCs with the preparation of national adaptation plans, and to finance the preparation and implementation of NAPAs.
- **Special Climate Change Fund (SCCF):** Established in 2001 to finance, among others, projects related to adaptation activities. The COP has urged developed countries to mobilize financial support for the NAP process for non-LDC developing country Parties through bilateral and multilateral channels, including through the SCCF.[3]
- **Adaptation Fund:** Financed through a 2% share of the proceeds from Certified Emission Reductions issued for projects under the Kyoto Protocol's Clean Development Mechanism (CDM). Its mandate is to fund concrete adaptation projects and programmes in developing countries.
- **Pilot Program for Climate Resilience (PPCR):** A targeted programme of the Strategic Climate Fund (SCF) under the Climate Investment Funds framework, a trust fund of the World Bank. It aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation.
- **The Green Climate Fund (GCF):** Designated as an operating entity of the financial mechanism of the UNFCCC, its objective is to support developing countries in their efforts "to limit or reduce their greenhouse gas emissions and to adapt to the impacts of climate change, taking into account the needs of those developing countries, particularly vulnerable to the adverse effects of climate change."[4] The UNFCCC agreed in the Cancún decisions[5] that "a significant share of new multilateral funding for adaptation should flow through the Green Climate Fund."

The UNFCCC Secretariat presented a report to the Subsidiary Body for Scientific and Technological Advice (SBSTA) in Doha in late 2012, providing insight on common criteria and indicators used in national-level adaptation planning and covered case studies from eight countries.[6] The report identified common approaches as well as differences, and provided a synthesis of relevant examples of adaptation planning and practices occurring under the auspices of the Nairobi work programme on impacts, vulnerability and adaptation to climate change. Lessons and insights from the case studies informed the development of the analytical framework applied in this report (see Section 1.2, as well as criteria to rank climate risk, in Section 2.1)

[1] FCCC/CP/2011/9/Add.1
[2] The Cancun Adaptation Framework was adopted at the 2010 UNFCCC Conference of the Parties, where Parties affirmed that adaptation must be addressed with the same level of priority as mitigation.
[3] FCCC/CP/2012/L.2
[4] http://gcfund.net/about-the-fund/mandate-and-governance.html
[5] FCCC/CP/2010/7/Add.1
[6] Compilation of case studies on national adaptation planning processes: Note by the secretariat" (UNFCCC, 2012a).

1.2. Research objectives and methods

To structure this report and provide a coherent basis for analysis of adaptation processes across multiple countries and the relationships between national policies and plans and strategies for adapting to climate challenges, an analytical framework was developed (see Figure 1). The design of this framework is intended to allow a 'dashboard' view of country progress on process and key NAP policy elements (e.g. integration into existing policies) and, ideally, to provide a framework that can continue to be useful as countries develop and refine their adaptation approaches over time.

The analytic framework was informed by the experiences to date of the 12 countries reviewed as well as the 8 case studies in the UNFCCC report, *Compilation of case studies on national adaptation planning processes: Note by the secretariat* (UNFCCC 2012a), which provided insight on common criteria and indicators used in national-level adaptation planning. Drawing from these experiences the framework highlights common approaches, while recognizing that the high complexity and cross-sectoral nature of adaptation processes will result in nationally-defined programmes that will exhibit unique qualities and differences due to the variety of vulnerabilities and social, economic and ecological systems.

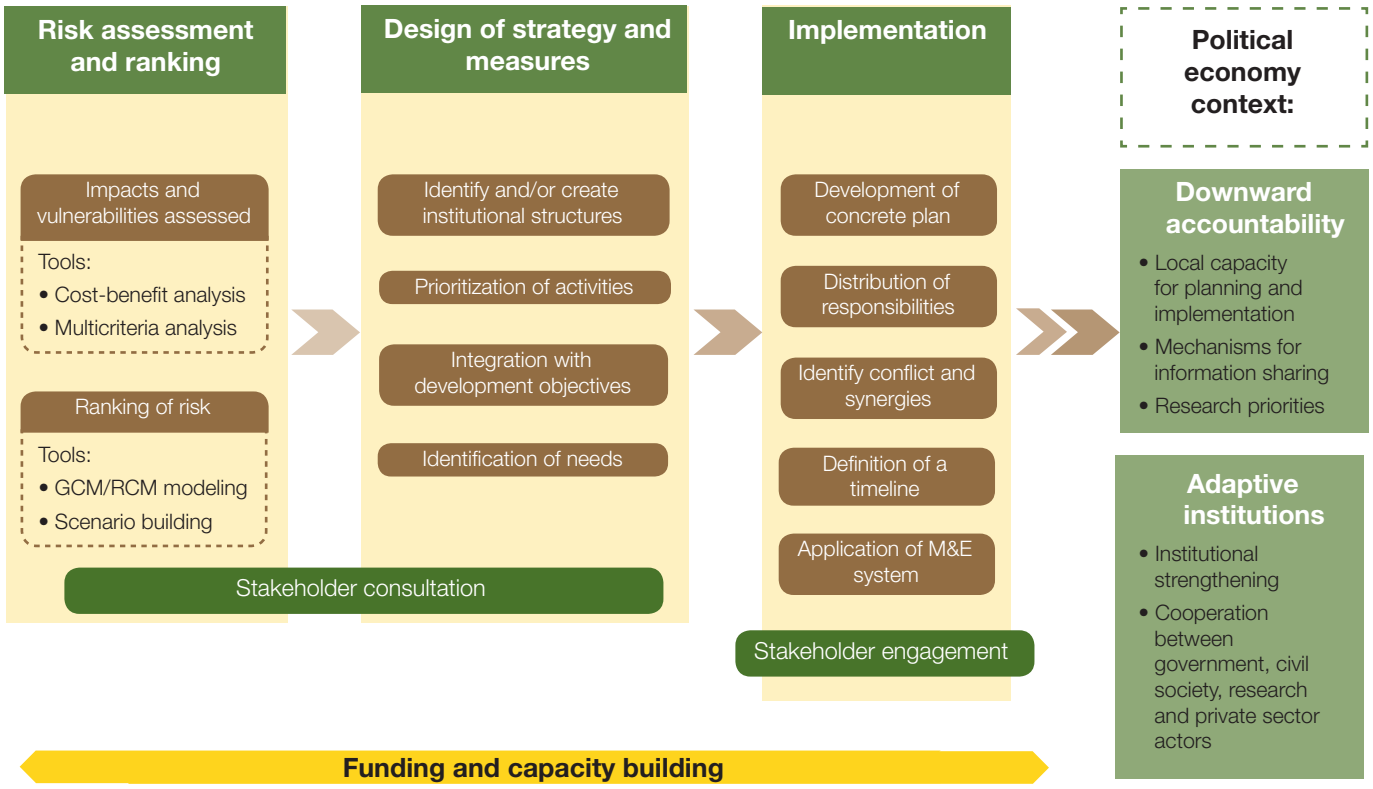

Figure 1. Analytical framework: National adaptation planning processes.

Risk assessment and ranking: Most countries start with evaluating climate risks, based on impacts and vulnerabilities of affected systems. Assessment needs, such as downscaling of climate models, vary by country. Risk assessment also benefits from a comprehensive and coordinated approach that applies the same methodology across regions and sectors, which allows for comparison and a subsequent ranking of risks and prioritization of adaptation activities. The robustness of adaptation risk assessments is often dependent on the technical capacity of the country, and whether climate scenarios and modelling have been conducted by external agents. Countries lacking technical capacity to assess risks through modelling and scenario analyses often rely on expert-qualitative judgment to identify and rank major risks. The process and final outputs are sometimes validated through a participatory approach at country level. For the CCAFS priority countries, risk assessments range from the use of simple projections, application of Intergovernmental Panel on Climate Change (IPCC) global precipitation and surface temperature models to very complex region-specific models with multiple scenarios.

Once risks have been identified, a ranking is usually undertaken in order to direct limited resources to addressing those risks that are considered most urgent or that could result in unmanageable consequences in the future. Such a ranking might be undertaken for different time periods (e.g. short-, medium-, and long-term impacts). A range of tools and methods may be applied to determine the ranking, such as economic evaluation and cost-benefit analysis, multicriteria or multisectoral integrated assessments, and comparative local and regional analysis. To varying degrees, countries reviewed have performed ranking and prioritization using a range of tools or criteria, and we explore this is greater detail in section 2.1.2.

Design of strategy and measures: Once the most important risks have been identified, usually the first step is development of a strategy or action plan that prioritizes actions and outcomes. This should also identify (existing or new) institutional structures that are needed to coordinate and/or implement the strategy. A prioritization of measures will also be needed to optimize efficacy, as well as to determine the availability of financial, technical and human resources. This process should be shaped by national goals and integrated into development objectives and existing policies, institutions and frameworks to increase effectiveness. Finally, capacity building, institutional, financial, legislative, and research/ technical needs should be identified and prioritized.

Collaboration between governments and research institutions helps *bridge gaps between policy and research*, and facilitates better integration of science- and evidence-based risk adaptation planning and implementation. CCAFS seeks to establish regional and national platforms for exchange between researchers and policy makers in each CCAFS pilot country, which can help address this current weakness.

Implementation: A broad structure for the NAP implementation process will be important for countries reviewed as they proceed to develop NAPs, including, at different levels of complexity, the development of a detailed and concrete plan, assignment of responsibilities, alignment with other national plans and strategies, and a timeline. Part of implementation of adaptation activities is the assessment of potential conflicts or synergies of the planned activities with other plans or strategies. In addition, a monitoring and evaluation system should be developed and accompany the implementation process so that corrective measures can be undertaken as required. Monitoring and evaluation should apply at the national policy and project levels, to enable adaptive management and to guide adjustments necessary during implementation. This is particularly important as new information on climate change impacts becomes available in the future.

Funding and capacity building: *Like stakeholder engagement, funding and capacity building should occur at all levels of NAP preparation and implementation.* Sources of financial support, including both domestic and international sources, typically need to be identified for countries reviewed and this is one of the most challenging aspects of implementing adaptation strategies and programmes. In addition, most have capacity-building needs that cut across all steps in the adaptation process. Linking adaptation strategies to planned projects or other non-adaptation efforts can result in significant cost savings. Priority should be placed on exploring low-cost and 'no regret' adaptation strategies.

The political economy context: downward accountability and adaptive institutions: Most countries reviewed have initiated the design of national adaptation plans and strategies with the aim of moving from individual activities (e.g. NAPAs) to a more coherent and long-term approach to addressing potential climate impacts. However, even the best plans fall short of reaching intended outcomes if the political economy is not conducive to effective, accountable and responsible planning and policy making.

Climate change impacts are often local and contextual, with the bulk of responsibility falling on local and national governments. While decentralization places greater responsibility on local and regional level authorities, their capacity to plan and implement adaptation measures may be limited, thus reinforcing the importance of **downward accountability in adaptation** (Agrawal et al. 2009). Promoting local capacity for planning and implementation, and improving the relationships between local and national level adaptation planning processes are critical in NAP processes, as are adequate mechanisms for information sharing, identification of research priorities and outcomes.

Adaptation is best managed through policy coherence and through coordination and cooperation among governments, civil society, and the private sector (Commission on Climate

Change and Development 2009). Participatory decision-making, functioning governance and institutions, and transparency are necessary at all levels, but achieving that will **require adaptive institutions**. However, a general lack of research on institutions and climate change adaptation practices exists (Agrawal et al. 2009), and this warrants further investigation beyond what is achieved in this assessment. Given the multiple scales, diversity and complexity in governance, finance, and range of actors involved in defining adaptation solutions, it may be impossible to devise apolitical adaptation solutions. Rather, a political economy approach can guide an understanding of what may be politically feasible, given the interplay between ideas, power and resources, and where further attention will be required. This is particularly relevant when transferring or translating international initiatives to national and subnational policy contexts (Tanner and Allouche 2011). Ongoing assessment should be made (by all parties involved, at all scales) of downward accountability and adaptive institutions that are responsive to change.

Box 1. Collaboration, stakeholder engagement and shared information

Robust and effective participation of relevant stakeholders should occur when assessing and ranking risks, as well as when designing and prioritizing adaptation measures. **Engagement and collaboration among stakeholders**, including local communities, civil society, non-governmental organizations and the private sector—in addition to relevant government ministries and agencies—**facilitates and strengthens national adaptation planning and implementation**.

Collaboration between governments and research institutions helps **bridge gaps between policy and research**, and facilitates better integration of science- and evidence-based risk adaptation planning and implementation.

Governments should find a balance between acting on their own and providing the right conditions and incentives for other stakeholders to act. **Distributing responsibilities and allocating accountability** for delivering, monitoring and reporting on activities is encouraged.

Finally, **improving access to information** for practitioners and policymakers using regional and scientific networks and organizations can play an important role, building capacity for vulnerability and impact assessment, and also for planning and implementation of adaptation measures.

2. Analysis: State of current practice

This section provides an analysis of the countries reviewed, following the analytic framework elaborated in Section 1.2. It explores the process used by countries for vulnerability and risk assessment, including ranking of risks; processes for designing and prioritizing adaptation response strategies; status of implementation; challenges related to funding; stakeholder engagement; and capacity building.

The countries reviewed are in various stages of developing national strategies to address climate change adaptation (Table 2). All countries reviewed are LDCs, with the exception of Kenya, Ghana and India. All LDCs reviewed have submitted NAPAs as per the decision of the UNFCCC COP at its seventh session in 2001. While NAPAs have been identified to be predominantly project and sector focused, rather than addressing the thematic and transformative approaches required for more effective adaptation planning and implementation (Global Environment Facility 2009), this assessment does not evaluate country progress in implementing NAPAs, but rather assumes that NAPAs will be incorporated to varying degrees into NAPs, depending on country short-, medium and long-term adaptation needs. For LDCs, NAPAs are an essential step in the development of adaptation capacity, methods and tools in order to present and negotiate a country-driven action programme (Osman-Elasha and Downing 2007). Countries reviewed have carried out national adaptation planning elements to varying degrees as part of NatComms. India, Bangladesh, Ghana, Kenya and Niger have national climate change plans that include adaptation or national adaptation strategies or plans.

For some countries, National Adaptation Plans (NAPs) may be more of a change in reporting processes than comprising new research and policies. While Kenya's NAP is still under development, broad adaptation issues are already captured in the National Climate Change Action Plan (NCCAP) that was launched in early 2013 (Orindi and King'uyu 2013; Government of Kenya 2013). Ghana's National Climate Change Adaptation Strategy, developed in 2010 and intended to be in place for ten years, provides a solid foundation. Senegal is in the process of completing national climate change plans and policies. All the countries have prepared either initial and/or second NatComms, detailing climate change vulnerabilities and risks and proposed strategies to address them. Relevant development and sectoral plans are present, which range from those that reflect adaptation priorities or intend to do so in the future, to those that contain no current or planned link to national adaptation priorities and objectives.

2.1. Risk assessment and ranking

2.1.1. Impacts and vulnerabilities

Countries have pursued a range of climate change vulnerability and risk assessments, either specifically for their NatComms and NAPA submissions, or for their own adaptation strategies and policies. Many countries reviewed are already experiencing climate change impacts, particularly countries noticing an increased frequency and intensity of extreme storm events, floods and drought. Nearly a third of Bangladesh is susceptible to tidal inundation and 60% of deaths caused by cyclones worldwide in the last 20 years occurred in Bangladesh. Thus, Bangladesh's BCCSAP draws upon considerable research and experience to project how the country can pursue a resilient and low-carbon development path, while reducing or eliminating risks to the most vulnerable, including the projected 20 million people displaced due to climate change impacts in the future. In Niger, declines in rainfall over the last 30 years have impacted millet, sorghum and cowpea yields, shifting the country from self-sufficiency in food production to increasing reliance on imports. With the population expected to double by 2025, Niger is concerned the currently observed socioeconomic impact of yield reductions and climate impacts on agriculture will lead to permanent food insecurity, land conflicts, and a rural exodus increasing already high rates of poverty.

Most countries build on observed trends in temperature and rainfall patterns, applying models to predict how climate change will affect temperature and rainfall patterns in the future. Table 3 summarizes information on country vulnerability and risk assessments, across all countries reviewed. Most countries (and external experts) chose the most country-appropriate scenario(s) from the Special Report on Emission Scenario (SRES) models of the IPCC Fourth Assessment Report. All countries reviewed have looked at national level trends and projections. Historical baselines for precipitation and temperature are often determined using an average over a specified amount of time (30 years or more), in order to predict future baseline scenarios. Processes that countries reviewed use to assess climate change vulnerability and risk include regional workshops, national workshops, research and background papers, external research and analysis and expert judgment. West Africa appears to have the least technical capacity to assess risks through modelling and scenario projections, and thus has relied to a greater degree than other regions on expert-qualitative judgment to identify vulnerabilities and risks.

Table 2. National agricultural climate change adaptation planning policies and related agriculture and development policies

Country	National adaptation-related policies or plans, including NAPAs		Other climate change policy or planning guidance		Agriculture or development policy	
	Date	Plan or policy	Date	Plan or policy	Date	Plan or policy
East Africa						
Ethiopia	2011	Ethiopia's Climate-Resilient Green Economy Strategy	2001	UNFCCC 1st NatComm		
Kenya	2010	National Climate Change Response Strategy	2002	UNFCCC 1st NatComm	2013	Medium Term Plan (MTP) 2013-2017
	2013	National Climate Change Action Plan 2013-2017				
Tanzania		National Adaptation Plan (NAP) – In process	2003	UNFCCC 1st NatComm	2012	National Strategy for Growth and Reduction of Poverty (MKUKUTA II)
	2007	National Adaptation Programme of Action (NAPA)	2009	Adaptation Strategy and Action Plan	2010	Agriculture Sector Development Strategy (ASDS 2010-2020)
			2012	National Climate Change Strategy	2004	Environmental Management Act (EMA)
Uganda	2007	National Adaptation Programme of Action (NAPA)	2002	UNFCCC 1st NatComm		
West Africa						
Burkina Faso	2007	National Adaptation Programme of Action (NAPA)	2001	UNFCCC 1st NatComm	2011	Stratégie de Croissance Accélérée et de Développement Durable (SCADD)
					2010	Programme National du Secteur Rural (PNSR)
Ghana	2010	National Climate Change Adaptation Strategy (NCCAS) (2010-2020)	2011	UNFCCC 2nd NatComm	2010	Ghana Shared Growth and Development Agenda 2010-2013 (GSGDA)
			2012	National Climate Change Policy Framework (NCCPF)	2002 and 2010	Food and Agriculture Sector Development Policy (FASDEP II) and corresponding investment plan Medium-Term Agricultural Sector Investment Plan (METASIP 2011-2015)
Mali	2007	National Adaptation Programme of Action (NAPA or PANA)	2000	UNFCCC 1st NatComm	2006	Agriculture Act (Loi d'Orientation Agricole)
			2012	UNFCCC 2nd NatComm		
Niger	2003	National Strategy and Action Plan for Climate Changes and Variability (SNPA/CVC)	2000	UNFCCC 1st NatComm	2013	Poverty Reduction Strategy Paper; Economic and Social Development Plan (PDES) 2012-2015.
	2006	National Adaptation Programme of Action (NAPA)	2009	UNFCCC 2nd NatComm		
Senegal	2006	National Adaptation Programme of Action (NAPA)	1997	UNFCCC 1st NatComm	2006 and 2004	National Strategy for Poverty Reduction (PSRP) and Orientation Law on Agro-Silvo-Pastoral Use (LOASP)
			2010	UNFCCC 2nd NatComm	2004	National Plan for Agricultural Development (PNDA) (part of LOASP)
South Asia						
Bangladesh	2009	Bangladesh Climate Change Strategy and Action Plan (BCCSAP)	2002	UNFCCC 1st NatComm	2011	Bangladesh Sixth Five Year Plan
	2005	National Adaptation Programme of Action (NAPA)	2012	UNFCCC 2nd NatComm		
India	2008	National Action Plan on Climate Change (NAPCC)	2004	UNFCCC 1st NatComm	2013	12th Five-year plan (2012-2017)
			2012	UNFCCC 2nd NatComm	2010	National Mission for Sustainable Agriculture (NMSA)
Nepal	2010	National Adaptation Programme of Action (NAPA)	2004	UNFCCC 1st NatComm	2010	Three-Year Plans (2010-2012)

Table 3. Summary of country vulnerability and impact assessment

Country	Models used to assess vulnerability and risk	Impact assessments	Long-term projections?	Region specific?	Multi-sectoral?	Cost-benefit?
Bangladesh	General Circulation Models (GCM's): CGCM 3.1 (T47), CCSM 3.0, CSIRO-Mk 3.0, GFDL-CM 2.0 and 2.1, INM CM-3.0, MIROC 3.2 (medres) and UKMO-HadCM3. Model for the Assessment of Greenhouse-gas Induced Climate Change/ Regional and global Climate SCENarioGENerator (MAGICC/ SCENGEN) A2 and B1 emission scenarios	Agriculture, fisheries, livestock, human health, ecosystems and forests, infrastructure, urbanization and interface with climate change (in Dhaka, Chittagong, and Khulna) Livelihoods: 2nd NatComm does include employment, food security, income, poverty, health and others	To 2050	National data	NAPA: basic assessment of intensity of sectoral impacts	NAPA: livelihoods analysis approach
Burkina Faso	MAGICC/SCENGEN on climate variables, DSSAT crop systems model, GR2M hydrological model	Crop production and water resources	unclear	National, plus ten representative areas in all 3 agro-climatic zones	Most vulnerable sectors identified; not impacts on those sectors	Livelihood approach, based on poverty rates and socio-cultural
Ethiopia	MAGICC/SCENGEN coupled model (Version 4.1)	Impact of current climate variability specifically drought and floods on agriculture and livestock production; Causes of Vulnerability to Climate Conditions; potential future impacts due to climate change and variability largely from the increasing temperatures	To 2080	National	Yes	NAPA: livelihoods analysis approach
Ghana	GCM for main ecoregions	Agriculture, water, coastal resources, fish production, land-use management, linkages with poverty and livelihoods of poor, root crop and cocoa production	To 2080	Yes, based on ecoregions	Yes	Livelihoods approach considering rural and poor
India	HadRM2 and PRECIS models, based on the IPCC A1B scenario (high technological development, with infusion of renewables). IPCC A2 and B2 scenarios and the BIOME4 vegetation response model	Water resources (droughts and floods), water availability and demand, groundwater resources; forests (net primary productivity), vegetation distribution and soil organic carbon; agriculture, based on field studies and simulation models (InfoCrop)	To 2080	Yes	Yes	Yes
Kenya	High resolution Regional Climate Models (RCMs) "nested" within GCMs; current vulnerability of regions and sectors affected by climate change	Causes of impacts, vulnerable regions and affected sectors; extreme phenomena (droughts, floods, etc); influence of climate hazards on agricultural production; shifts of agro-ecological zones; health; environmental degradation; shortage of water for domestic use; landslides; impacts on energy infrastructure	To 2100	National	Yes	Yes – Economic consequences across MTP themes
Mali	SRESA2 and SREB2, then MAGICC/SCENGEN on climate variables, ended with CSIRO GCM-TR after validation tests by climatic zone of the country	Focus is on agriculture and health in the 2nd NatComm, though NAPA also considers other vulnerable sectors	To 2100	Yes, based on agro-climatic zones	No	No
Nepal	GCM and RCM	Sector based	To 2090	Yes, by district		
Niger	IPCC's A2 and B2; does not include socioeconomic scenarios. Discrepancies between global climate models: MPI ECHAM5 and CSIRO K3) indicate an increase in rainfall, while GFDL CM2 and MRI CGCM2 indicate a decline by 2020-2049	General and non-spatial: agriculture, livestock, forestry, health, and water			No	No, though socioeconomic indicators were applied to develop proposed strategies
Senegal	RegCM, based on revised RegCM3	Water resources, health, coastal zones, agriculture, and fishing	To 2050 and 2081-2100	Yes, across all four regions	Yes	Economic impact assessment on: water use, particularly Dakar's municipal supply needs and agricultural demands
Tanzania	High resolution RCMs nested within GCMs; synthesis of available information; participatory assessment of vulnerability to current climate variability and extreme events and/of areas where risks would increase due to climate change; identification of key adaptation measures as well as criteria for prioritizing activities	Droughts; floods; strong winds; shifts in agro-ecological zones; impacts on agriculture, and crop production; erosion of natural resource base; environmental degradation, water, energy, health and forestry; pests and disease outbreaks	To 2080	National	Yes	NAPA: livelihoods analysis approach
Uganda	High resolution RCMs nested within GCMs	Disasters reported in sampled districts; droughts (frequency and intensity); storms (wind, rain, thunder, lightning, hailstones); heavy rains, floods, and landslides; high temperatures; pests, disease and epidemics; impact of a 2°C temperature rise on coffee production	To 2080	National	Yes	NAPA: livelihoods analysis approach

After assessing vulnerabilities and risk, countries assess impacts on eco-regional, region-specific, socioeconomic or sector-specific elements. Burkina Faso's NAPA provides brief assessment of potential impacts on water, agriculture, livestock and forestry sectors. India's "4x4 Assessment," completed after its second NatComm to the UNFCCC, is a sectoral and regional analysis, providing an assessment of the impacts of climate change up to the 2030s on four key sectors of the economy that are climate dependent—agriculture, water, natural ecosystems and biodiversity, and human health—in the four major climate-sensitive regions, including the Himalayas, the northeastern region, the Western Ghats, and the coastal regions. Further, countries such as Bangladesh, Ghana and Burkina Faso consider impacts on populations, particularly those portions of the population highly vulnerable to climatic change, such as the rural poor. Countries have also considered impacts on health—particularly Bangladesh, Senegal and Niger—projecting changes in malarial areas due to temperature and precipitation changes or impacts on availability of drinking water and water-borne disease.

For most countries reviewed, impact assessments are entirely sector based, after first identifying general trends in vulnerability. For example, Nepal's NAPA assessed the climate change vulnerabilities by priority sectors including agriculture and food security, water resources and energy, climate-induced disasters, forests and biodiversity, public health, urban settlements and infrastructure and cross-cutting sectors (gender, industry and transport, tourism).

For many countries, **the vulnerability and impact assessments identify most at-risk sectors and socioeconomic groups.** For instance, Burkina Faso's vulnerability assessment identified the four most vulnerable sectors as agriculture, water resources, animal resources, forestry/ biodiversity, and the most vulnerable groups being the rural poor, including women, youth, and small-scale farmers.

The economic impacts of climate risks are not commonly assessed by countries reviewed, although some have made projections, as outlined below. Countries are encouraged to draw from the methods and aggregated global estimates contained in the World Banks' Economics of Adaptation to Climate Change (EACC) global study on adaptation costs. Seven EACC country case studies were completed (including Ghana, Ethiopia and Bangladesh), based on national data, disaggregated to more local and sector levels, which compare a no-climate change baseline that reflects existing development plans with climate change scenarios.

- Kenya's experience of droughts in 1999 and 2000 caused damages equivalent to 2.4% of the Gross Domestic Product (GDP). Kenya has estimated that the annual cost of climate change impacts could be USD $1 to 3 billion by the year 2030 (Government of Kenya 2010).
- India's assessment of risk and vulnerability carried out in its National Mission for Sustainable Agriculture (one pillar of its national action plan on climate change) focused on ecosystem and agricultural production variables, with only cursory assessment of socioeconomic impacts. However, India's National Action Plan on Climate Change prioritized assessing social exposure and economic impacts in coastal regions, possibly a result of the magnitude and severity of impacts to coastal populations from sea level rise and flooding.

While difficult to quantitatively estimate climate change impacts, **many countries apply socioeconomic criteria to evaluate impacts on the poor and most vulnerable populations**, or apply cost-benefit analyses:

- Bangladesh, Burkina Faso and Ghana apply a livelihoods approach to generally assess impacts. Burkina Faso's approach includes poverty rates and socio-cultural considerations.
- While Niger did not complete a cost-benefit assessment, it did apply socioeconomic indicators in order to guide the development of proposed strategies.
- Senegal chose to prioritize its economic impact assessment on water use, particularly Dakar's municipal supply needs and agricultural demands.

Assessing climate change vulnerability and risk can be a dynamic process, changing as new information becomes available or as future projections and modelling capabilities improve. Ghana's vulnerability assessment formed the basis of evaluating impacts of climate scenarios on agriculture, water and coastal resources in its 1st NatComm, which was further expanded in its 2nd NatComm to include vulnerable economic sectors including fish production, land-use management, linkages with poverty and livelihoods, root crop and cocoa production (Government of Ghana 2011).

Sector-based or geographic-focused assessments can offer a means of assessing adaptive capacity, which can be spatially- or qualitatively-based. Nepal's experience with spatial outputs is based on their climate change vulnerability assessments conducted at district levels to identify the most climate vulnerable districts, which produced climate risk/ exposure maps, sensitivity maps and adaptive capacity maps. Qualitative assessments of adaptive capacity are more common. For instance, many coastal countries reviewed already have experience with flood forecasting systems, and use this experience as a basis for evaluating adaptive capacity in response to future climate change impacts. One example is Bangladesh's well developed flood forecasting system and water and disaster management plans. However, these are designed to provide temporary arrangements to prevent losses due to climate change, and therefore may not help directly support adaptive capacity development in the agriculture sector (Joshi et al. 2013).

Vulnerability and risk assessments benefit from a **comprehensive and coordinated approach that applies the same methodology across regions and sectors**, which allows for comparison and a subsequent ranking of risks and prioritization of adaptation activities (UNFCCC 2012a). However, in practice, many countries reviewed do not achieve such consistency and comprehensiveness in vulnerability and risk assessments.

2.1.2. Prioritization and ranking of risks

Once the vulnerability and impact assessment is completed, countries can apply methods to rank climate risk in order to direct limited resources to addressing risks that are considered most urgent, and/or identify the most vulnerable sectors, populations or geographies. Such a ranking might be undertaken for different time periods (e.g. short-, medium-, and long-term impacts).

Many countries reviewed have followed the UNFCCC prototype guide to assist non-Annex I Parties prepare the vulnerability and adaptation section of their NatComms which focuses on assessment of four sectors. Section V on selected tools and methods focuses attention on assessments in four key areas likely to be impacted by climate change: coastal resources, water resources, agriculture and human health. Perhaps due to the predominant use of this resource for guidance, most countries reviewed are not explicit about the criteria or processes used to rank climate risk. Rather, it appears that most countries follow the guidance of the UNFCCC prototype guide and assess vulnerability and adaptation risk based on the four key areas, as well as others identified as important given national circumstances (e.g. forests, biodiversity).

Some countries apply criteria to assess and rank climate risk rather than focus on specific sectors, though this is rarely done consistently in countries reviewed. The compilation of case studies on national adaptation planning processes prepared by the UNFCCC secretariat in late 2012 offers insights on national and subregional adaptation planning processes that have more explicitly applied criteria to rank climate risk. Commonly used criteria are summarized in Table 4. The United Kingdom's (UK) criteria to rank climate risks offers one useful country example applicable to either developed or developing country contexts, as it assesses: a) magnitude, b) level of confidence, c) urgency of action, d) rates of change and geographical extent, e) connectivity (cross-cutting risks), f) policy relevance, g) agency (can government action address the risk), h) international dimensions (UNFCCC 2012a).

The Least Developed Countries Expert Group reinforces the criteria summarized in Table 4 and the UK's criteria, but adds two more: biophysical sensitivity to the effects of climate change, and the types of impacts, such as human impacts and threat to livelihoods (Least Developed Countries Expert Group 2012).

Most countries reviewed do consider criteria to rank climate risk (i.e. some or all of the elements identified in Table 4), **though often do not make clear how assessment of these elements affect prioritization of adaptation actions**. For instance, many countries are not explicit about their level of confidence in assessing risks, and very few make connections between climate risk ranking criteria and evaluating responses to risks. Further, countries with conflicting vulnerability assessment results are vague about how this is resolved in the prioritization of response options. One example is the level of confidence in Niger's vulnerability assessment of future rainfall patterns, which is very low, as two models out of four (MPI ECHAM5, CSIRO K3) indicate an increase in rainfall in Niger while the other two (GFDL CM2, MRI CGCM2) indicate a decline by 2020-2049. When climate change models present conflicting projections, as in the case of rainfall in Niger, it must be accounted for in climate risk ranking and prioritization.

Table 4. General criteria to rank climate risk

Criteria	Rationale
Magnitude	Evaluating the magnitude of risk can be measured quantitatively, such as judging the order of change from a baseline range (# of 100-year storm events, metres of sea level rise, number of people impacted), or qualitatively.
Probability, likelihood and level of confidence	Climate change models projecting future events inherently involve a degree of uncertainty. Thus, assessments must consider the probability of a risk occurring, the likelihood of the risk resulting in a certain impact and the level of confidence in those estimations. This is an important element in ranking risks.
Reversibility	Irreversible impacts are ranked higher than reversible ones. This may also depend on assessment of technological and practical solutions to addressing impacts.
Urgency of action	Risks with high immediate damage potential or irreversible and high-damage consequences in the longer term, are ranked higher.

Adapted from: UNFCCC, 2012(a): Compilation of case studies on national adaptation planning processes.

Countries can consider both analytical and process responses to the challenge of ranking of climate risks, such as tighter coordination and sharing of analyses and projections among research entities, and knowledge sharing and communication mechanisms with stakeholders. The CCAFS East Africa adaptation synthesis report survey responses in Ethiopia, Kenya, Tanzania and Uganda indicate a few respondents being concerned by the lack of data or adequate explanation of how the risks were assessed (Orindi and King'uyu 2013). In West Africa, vulnerability assessment and ranking of risks are often carried out by expert groups, where the process and final outputs are sometimes validated through a participatory approach.

Countries reviewed exhibit a range of ability to project future climate risks indicating levels of confidence around probability. This is particularly apparent in West Africa, where regional projections on rainfall and temperature patterns are variable. Application of crop models and other tools that can project sectoral or geographic response to climate risks can be useful. Work carried out between 2006 and 2012 under the Climate Change Adaptation in Africa programme (CCAA), and Assessment of Impacts and Adaptations to Climate Change in Multiple Regions and Sectors (AIACC) between 2002 and 2007, have useful information and data that countries could use to strengthen their vulnerability assessment databases and improve in the understanding of future risks (Orindi and King'uyu 2013). However, many future climate change scenarios do not account for the changing socioeconomic status of populations in emerging economies, increased urbanization, and other factors that are complex to project and model 20-100 years into the future, but which will affect impact projections.

Finally, it is important to note that criteria used to rank climate risk is a process step that should precede development of criteria to prioritize and rank adaptation activities, which is covered in the following section.

2.2. Adaptation strategy design and interventions

Once the most important climate change vulnerabilities, impacts and risks are identified and ranked, adaptation activities can be designed and prioritized according to a second set of criteria. The criteria are most often developed in countries reviewed through expert opinion, stakeholder consultation, and through adaptation working groups which often reflect the sectors involved. Criteria are developed with national objectives in mind, as well as the availability of financial, technical and human resources.

Adaptation planning entails defining response measures in the face of varying degrees of uncertainty of future impacts. While both impact-based and capacity-based approaches have timeframe-dependent risks and benefits in adaptation planning, decision makers are encouraged to find solutions to provide robust policy responses (benefitting multiple actors, across various spatial and temporal scales) in the face of uncertainty (Vermeulen et al. 2013).

Once priority adaptation activities have been identified, further consideration should be given to evaluating institutional structures for implementation, particularly as adaptation activities are often cross-sectoral. Furthermore, steps should be taken to integrate climate change adaptation priorities into national development policies and agricultural sectoral plans. This section explores how countries reviewed have approached these climate change adaptation planning and implementation elements so far.

2.2.1. Prioritization and ranking of response activities

Countries can apply a combination of methods to prioritize and rank adaptation activities (as summarized by the Least Developed Countries Expert Group (2012)), including:

- **Group perceptions:** questionnaire methods, with results being scored or ranked.
- **Nominal group method:** assigns the responsibility to prioritize adaptation options to a small expert group.
- **Criteria weighing:** assigns a priority ranking to measures based on how they score against a set of criteria. More appropriately used for prioritizing adaptation activities than vulnerabilities or risks.
- **Weights and indicators:** determines the weights (percentages or fractions) to be assigned to each criterion.
- **Cost-benefit analysis:** assessing the cost of an intervention against the benefit gained from implementing it, expressed in monetary terms. The benefit is that it compares diverse impacts using a single metric. The limitation is the need to express costs and benefits in monetary terms, which can be difficult with climate change impacts.
- **Cost-effectiveness analysis:** involves costing different options that achieve the same objective, in order to find the least costly option. Limitations are that cost-effectiveness may not be the most appropriate tool to discern benefits, particularly when evaluating climate impacts.
- **Multicriteria analysis:** ranking adaptation options against a number of criteria.

Most countries reviewed appear to apply more than one method to determine priorities and ranking, however this process information is often not shared consistently in NAPAs, climate change and sectoral policy documents and UNFCCC national communications. Based on those countries that did include this level of detail, it appears multicriteria analysis, nominal group methods, criteria weighing and cost-benefit analysis are most commonly used, and often in multistep prioritization processes. Ethiopia applied the weights and indicators method, assigning weights to each criterion. Once Bangladesh fixed the general and specific goals for an adaptation measure, the NAPA recommends considering different options to meet them, staying attuned to the potential appropriateness of multicriteria analysis, rather than cost-benefit or cost-effectiveness analysis, due to lack of concrete and quantifiable data in some places.

A cross- or multisectoral analysis to prioritize adaptation actions is critical, but many countries have difficulties performing such strategic studies. A prioritization of measures is needed to optimize efficacy, as well as to determine the availability of financial, technical and human resources. Depending on the country, prioritization may be based on a range of risk factors, country-specific criteria, or multicriteria analyses. For many countries analysing the many interactions between each sector, their individual priorities and set of activities, and integrating them into a coherent plan can be daunting. Below are two examples of countries that have engaged in relatively complex processes for performing such analyses:

- Nepal organized its work around "Thematic Working Groups" for its NAPA completion, led by different line ministries. These included: Agriculture and Food Security, Forests and Biodiversity, Water Resources and Energy, Climate Induced Disasters, Public Health, and Urban Settlements and Infrastructure. Each working group was composed of government, NGOs, academic institutions, and UN agencies. Besides applying aggregated criteria to develop high priority adaptation options, the thematic working groups also agreed to combine priority activities and develop combined project profiles.
- Ghana has created the "Akropong Approach" (see Figure 2), a method for analysis that results in a cross-sectoral project plan. In this approach, a logical framework analysis is used to identify problems and policy solutions. Then a multicriteria analysis is performed to identify overall preferences among alternative options, i.e. to identify and rank the relative importance of activities. Out of the analysis, 10 adaptation projects (of which several, including improved land-use management and agricultural diversification, were directly related to agriculture and food security) were identified and packaged into programmatic adaptation plan, which fed into Ghana's national adaptation strategy.

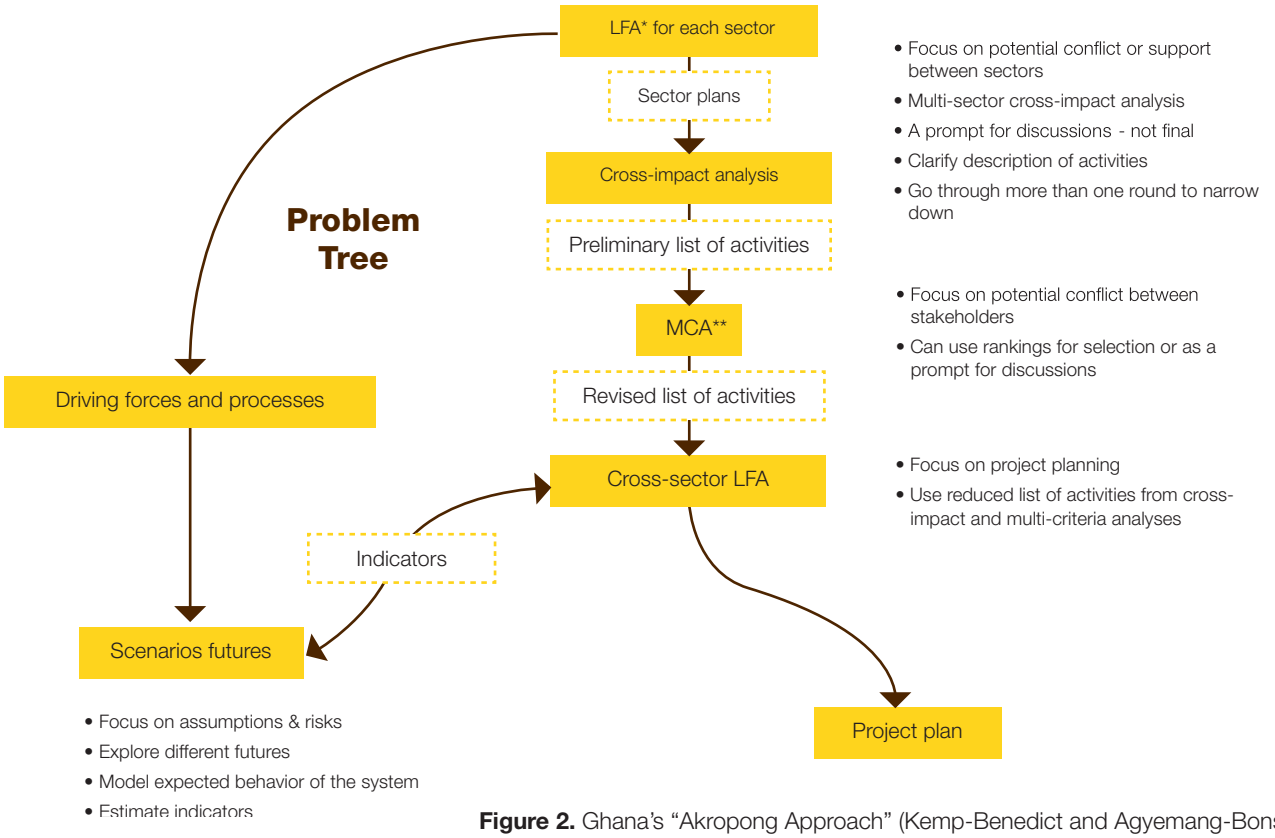

Figure 2. Ghana's "Akropong Approach" (Kemp-Benedict and Agyemang-Bonsu 2008).

** Logical Framework Analysis (LFA) ** Multi-Criteria Analysis (MCA)*

Countries have also derived priorities and ranking through expert consultations or a participatory decision-making approach:

- Niger conducted surveys to determine impacts of climate change, and then classified and prioritized activities based on field missions conducted among vulnerable populations. Consideration was also given to potential socioeconomic consequences deduced from a very general, non-spatial assessment of future vulnerabilities of agriculture, livestock, forestry, health, and water. The drafting process then identified sectors, areas and communities most vulnerable, and developed 14 adaptation options.
- Mali also used a participatory approach, but based its priority projects on successful past and current practices. For example, some of the adaptation solutions proposed in the area of land-use management are those already being widely practised due to their positive impact on agriculture yields, e.g. use of appropriate crop varieties.

Some countries have also used local analyses or additional geographic assessments to inform the national adaptation planning. As stated in Nepal's NAPA, "in countries with diverse ecosystems, microclimates, cultures, and socioeconomic circumstances, any national scale adaptation plan programme would have to be complemented by a series of Local Adaptation Programme of Action (LAPAs)" (Government of Nepal 2010). India has also used geographic transects for its "4x4 Assessment" which analyses four sectoral areas (agriculture, water, natural ecosystems and biodiversity) against four regions (the Himalayas, north-eastern region, Western Ghats and the coastal region). This '4x4 Assessment' occurred after India's 2nd NatComm in 2012, demonstrating the role of continuous improvement and refinement of prioritization and sectoral assessment in adaptation planning.

Consistency and transparency in the application of criteria across multiple policy and planning frameworks, for prioritization and ranking purposes, is important. While the criteria applied to prioritize and rank activities in Bangladesh's NAPA is clear, Bangladesh's Climate Change Strategy and Action Plan (BCCSAP) is not explicit in what criteria were used to develop the six pillars, which form the basis of its action plan. However, it is clear in the BCCSAP that Bangladesh wishes to build upon its history of climate proofing activities, to ensure an integrated approach linking sectors and Ministries and to respond to the needs of the poorest and most vulnerable groups.

Table 5 outlines the processes and criteria applied by countries for prioritization and ranking of adaptation activities as part of NAPA development, national climate change policy and guidance, and national adaptation planning.

Countries reviewed listed in Table 5 prioritized the following criteria most frequently (in order, covering the top five): protecting the most vulnerable and poor (rural) populations, cost-effectiveness (or overall cost), promoting sustainable development and/or natural resource use, improving livelihoods (or avoiding losses), and promoting adaptive capacity. Alignment or synergy with national development or sector plans was a priority for a few countries, though the intent differed between them. In the case of Bangladesh, Ethiopia, Niger and Uganda this included national development priorities, Millennium Development Goals (MDGs), and MEAs, whereas Tanzania and Nepal favoured focusing more narrowly on national priorities and goals (which may or may not include MDGs, etc.). Every country reviewed developed criteria based on national circumstances and needs.

More can be done to assess socioeconomic impacts of adaptation options. A number of countries assess potential impacts of activities on vulnerable groups, reducing poverty, food security, and the potential to support local livelihoods, but the basis of these assessments can be improved. Understanding the economic implications of decision-making to support climate change was a key priority identified in CCAFS' Kenya workshop in 2011 (CCAFS 2011). The World Bank/GFDRR website notes a better understanding of the differential nature of vulnerability within Mali's high-risk geographic regions is needed, and based on that, analyses of sector impacts must be complemented by social, economic and political assessments of vulnerability and resilience (GFDRR 2013b).

2.2.2. Identification of (existing or new) institutional structures needed to coordinate and/or implement strategy activities

Most countries reviewed have national level coordinating committees on climate change. These coordinating committees are often UNFCCC focal points (e.g. Bangladesh, India), are comprised of representatives from line-agencies, and sometimes also comprise representatives from civil society, research and industry (e.g. Bangladesh, India). They oversee technical bodies and NAPA development and implementation of adaptation (and mitigation) strategies (e.g. Burkina Faso, Kenya, Tanzania).

National governments have recognized the importance of adaptation and are creating new institutional structures to promote cross-sectoral cooperation. In Ethiopia, coordination of climate change activities was moved from the National Meteorological Agency to the office of the Prime Minister a few years ago, while in Kenya, the National Climate Change Action Plan (NCCAP) proposes the establishment of a high-level National Climate Change Council (NCCC) anchored

Table 5. Process and criteria applied by countries for prioritization and ranking of adaptation activities

Country and (Source)	Process and criteria for prioritization and ranking
Bangladesh (NAPA)	• Impact of climate change on the lives and livelihoods of the communities • Poverty reduction and sustainable income generation of communities • Enhancement of adaptive capacity in terms of skills and capabilities at community & national levels • Gender equality (as a cross-cutting criteria) • Enhancement of environmental sustainability • Complementary and synergy with national and sectoral plans and programmes & other Multilateral Environment Agreements (MEAs) • Cost-effectiveness
Burkina Faso (NAPA)	Three-step process based on a) pre-selection of priority actions, based on the vulnerability assessment, b) selection of priority actions based on a second set of criteria, including a rough cost-benefit assessment and ranking of possible impact, and c) prioritization of actions based on a hierarchy.
Ethiopia (Orindi and King'uyu 2013 on NAPA)	Assigned weight based on the level of risk, poverty reduction potential, and cost-effectiveness, which helped in qualifying the actions.
Ghana (NCCAS)	Priority actions selected based on: (a) resilience of the adaptation intervention; (b) how sustainable the intervention will be; (c) the potential to have multiplier effects (co-benefits) as a result of the implementation of the adaptation intervention; (d) extent of replicability of the intervention; and (e) how feasible the whole intervention is.
India (NAPCC)	Unclear how the National Missions were identified, and there is an unclear linkage between observed and future climate impacts, and what criteria were used to assess response measures and proposed interventions through the National Missions. However, the NAPCC does define principles which guided the NAPCC, which include protecting the poor and vulnerable through inclusive, sustainable growth that is sensitive to climate change; achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability, for further mitigation of Greenhouse gasses (GHGs); efficient and cost-effective strategies; appropriate technologies; new forms of market, regulatory and voluntary mechanisms for sustainable development; and others.
Kenya (Orindi and King'uyu 2013 on NAP)	Managing climate risks as well as alignment with Medium Term Plan (MTP) 2013-2017 priorities - an approach that recognizes that adaptation actions should address socioeconomic development deficits as well as climate impacts. Four broad criteria were used to further refine the actions to synergize and maximize their anticipated impacts across the sectors, namely: • Urgency and ease of implementation in the short term • Compatibility with the NCCAP adaptation actions • Compatibility with the MTP actions • Visualized to have no regrets if implemented
Mali (PANA or NAPA)	Multicriteria analysis: A sensitivity matrix, based on priority sectors identified. Selection criteria included: • Degree of impact on poverty reduction • as measured by a score (0-5) • Degree of losses avoided for the poor (scored 0-5) • Synergies between MEAs • Costs of the options To compare options, scales of ranking were standardized, and then criteria were weighed and a sensitivity analysis of options applied. This was completed through a participatory approach including all regions and circles. Local NGOs organized consultations.
Nepal (NAPA)	A multistep prioritization process: Involved a series of expert teams and wider reference groups. These groups derived thematic criteria and elements (multicriteria analysis), applied a sector-specific lens, and this was tested and affirmed by the multistakeholder thematic working groups. Primary criteria: • Potential to reduce adverse impact of climate change • Potential to support local livelihoods • Synergy with national priorities • People's participation • Cross-sectoral benefits • Cost-effectiveness • Ease of implementation
Niger (NAPA and 2nd NatComm)	Multicriteria analysis, based on results of field missions conducted among vulnerable populations. NAPA following criteria: • Impact on groups and vulnerable resources • Impact on the economic growth rate of poor populations • Avoided losses for poor populations • Synergy multilateral environmental agreements, projects and programmes • Cost Three years after the NAPA, the 2ndNatComm built on the NAPA and also deduction of the consequences on some socioeconomic indicators (not mentioned in draft) of the results of climate change projections made during the study on future vulnerability.
Senegal (2nd NatComm and NAPA)	While specific criteria for prioritization and ranking is not explicit, it appears decisions were guided by: • The goal of the national adaptation strategy is to prevent and reduce the impacts of climate change on growth and economic and social development, specifically: (i) protect populations against the consequences of climate change, especially vulnerable groups, (ii) develop the capacities of socioeconomic actors in society to adapt to climate risks and (iii) promote the rational management of natural resources. • Based on those goals, the adaptation strategy is recommended to follow three priority axes: (i) knowledge development of climate change effects and the transfer of adapted technologies (ii) strengthening the prevention and fight against climate shocks and (iii) promoting sustainable management of natural resources.
Tanzania (Orindi and King'uyu 2013 on NAPA)	Sectors were ranked: agriculture ranked first, then water and energy second, followed by forestry, health, wildlife and tourism industry coastal and marine resources, human settlements, and wetlands. The NAPA criteria to select priority project activities included: • Level or degree of adverse effects of climate change • Poverty reduction to enhance adaptive capacity • Improvement of the livelihood of the rural communities • Vulnerable groups in the communities, e.g. rural poor • Cost of the project • Complimentarily to national goals and objectives • Country driven
Uganda (Orindi and King'uyu 2013)	Three tiers of criteria were developed: • The first tier (national level) criteria: development priorities and MDGs, environment concerns including Multilateral Environmental Agreements (MEAs); and equity and gender issues, taking into consideration disadvantaged groups. These were largely used to establish the relevance of an intervention area. • Second tier criteria: community/ecosystem level and included enhancing resilience, multiple benefits, replication, sustainability, cost-effectiveness and cultural acceptance. • Third tier criteria: urgency and immediacy, severity and intensity.

in the cabinet office in the Office of the President with the clout to convene ministries and demand accountability on matters related to climate change (Orindi and King'uyu 2013). Similarly, the recent creation in many countries reviewed of national climate change committees, with cross-sectoral and ministerial coordination mandates, and direct access to a high-level political official, provides greater profile for climate change within government, and greater ability to develop adequate adaptation policies, responses and implementation. Table 6 summarizes climate change coordination and policy-making institutions in the countries reviewed.

Few countries reviewed identify in their national adaptation planning documents how subregional and local institutions and capacity will be developed. Given the increasing decentralization in many countries reviewed, identification at the outset of the institutional structures needed to coordinate and implement adaptation activities is essential for success. The Commission on Climate Change and Development (2009), identified three main institutional ingredients necessary to improve people's adaptive capacity: targeted capacity development, inclusive governance, and ownership. Hence, governments must ensure that devolved administrative responsibilities are matched by resources and technical capacity. Nepal provides a model of inclusiveness in its support for local level adaptation programmes in the most climate vulnerable districts of the Mid- and Far-Western regions of Nepal.

Box 2. Organization for Economic Co-operation and Development (OECD) experience

Success of adaptation plans and measures may be more due to prominence in national-level priorities and commitment than where such plans sit in the organizational structure of government. The OECD and the Independent Evaluation Group's assessment of the World Bank's interventions to support adaptation have historically recommended that adaptation plans and strategy coordination be led by an executive office, in order to provide adaptation efforts with sufficient convening and leadership powers to effectively co-ordinate actions across departments or sectors, and to overcome political power and funding imbalances. However, an advantage of coordination by an Environment or Climate Change Ministry is their greater depth of awareness of the technical requirements of national adaptation plans. Recent analysis of approaches taken in OECD countries does not find any relationship between the location of the adaptation coordination unit and the effectiveness of the programme. Further, the existence of high-level formal structures, such as ministerial coordination groups, does not necessarily indicate the effectiveness of on-the-ground coordination (Mullan et al. 2013).

Many countries still lack an institutional framework to effectively coordinate and implement adaptation activities. Identification and prioritization of adaptation activities are largely led by institutions that serve as the climate change focal point. This can be challenging because the focal point is often not the same agency, ministry or department responsible for implementation. For instance, Mali does not have a national institution that is assigned the responsibility for implementing adaptation activities. In this absence, the Environment and Sustainable Development Agency has stepped in to coordinate environment-related projects. Ethiopia has been challenged by weak institutional coordination, including dysfunctional arrangements for inter-agency integration, inadequate financing and investment in research, legislative aspects, inter-sectoral coordination and cooperation. This has raised concern over the effectiveness of investments in climate adaptation without addressing critical governance aspects (Ethiopia Ministry of Agriculture 2011). In Uganda, an institutional framework for coordinating and streamlining climate change issues at local and national levels is critically needed (Mungai et al. 2012).

Key institutions in most countries suffer from a shortage of technically well-qualified staff. For example, it was noted that in Burkina Faso, one of the major capacity-building needs is in the area of human development and training, and all agencies suffer from a shortage of technically well-qualified staff and lack of good local and regional educational and training institutions (Zougmoré and Samari 2011b). Orindi and King'uyu (2013) note that Ethiopia, Kenya, Tanzania and Uganda have limited assessments of potential future impacts from climate change in current research and planning documents, which can be attributed to limited analytical capacity and poor coordination among institutions that are supposed to carry out these assessments. Several reports also suggest that dependence on donor funding can hinder the development of institutions.

The private sector—also needed to support implementation—is often noticeably absent from strategic planning. Very few adaptation plans highlighted a role for the private sector; however, a few exceptions exist. For example, Kenya has paid greater attention to the role of the private sector in adaptation—in terms of resource mobilization, development and transfer of appropriate technologies, and the need to climate-proof their business operations. Kenya's private sector was represented at all the levels of the Action Planning process, including representation in the coordinating national taskforce and in several thematic working groups (Orindi and King'uyu 2013). Similarly, the Tanzanian process also included representatives of the private sector during preparation of the NAPA. Ethiopia did not include the private sector in NAPA preparation, but did include private sector and other actors in the proposed institutional framework for implementing the priority actions *(ibid)*. India and Bangladesh include representation of the business and private sector on their national climate change committees, to obtain input and seek partnerships for implementation.

Table 6. Overview of climate change adaptation coordination and policy-making institutions

Country	Climate change institutions
Bangladesh	National Steering Committee on Climate Change (NSCCC), provides coordination and its focal point, is multisectoral and includes stakeholders. Reports to the National Environment Committee, chaired by the Prime Minister.
Burkina Faso	National Council for Environment and Sustainable Development (under Prime Minister)- coordinating body and overseeing NAPA.
Ethiopia	Climate-Resilient Green Economy (CRGE) Ministerial Steering Committee (under Prime Minister's Office); agriculture is a technical subcommittee.
Ghana	National Committee on Climate Change coordinates mitigation/adaptation for all sectors, but Ministry of Environment, Science and Technology is lead on Climate Change (CC). EPA is technical body.
India	Advisory Council on Climate Change, chaired by Prime Minister, provides coordination and focal point. Is multisectoral and includes stakeholders.
Kenya	National Climate Change Secretariat is currently the focal point and oversees technical issues. Proposed establishment of a high-level National Climate Change Council (NCCC) in the Office of the Presidents' cabinet office, with authority to convene ministries.
Mali	National Climate Change Committee (CNCCM) (est. 2011) coordinates government strategies; Environment and Sustainable Development Agency (est. 2010) developing national CC policy.
Nepal	Ministry of Environment is focal point, oversees multisectoral CC Thematic Working Groups. Multistakeholder CC Initiative Coordination Committee (dialogue and consultation).
Niger	Executive Secretariat of the National Environmental Council for Sustainable Development oversees 6 sustainable Development plans, one of which is the Climate Change and Variability Program (which oversees NAPA; also has technical commission).
Senegal	National Committee on Climate Change (COMNAC) and Planning and Coordinating Agency: Climate Change and Natural Resource Management (NEPAD); Ecological Monitoring Centre (CSE) helps define policy on adaptation and mitigation.
Tanzania	National Climate Change Steering Committee (NCCSC) chaired by the Permanent Secretary in the Vice President's Office (VPO); VPO is National Climate Change Focal Point (NCCFP), also chairs National Climate Change Technical Committee.
Uganda	The Ministry of Water, Lands and Environment is the focal institution for the UNFCCC and Kyoto Protocol. National Climate Change Secretariat assists with coordination of implementation.

2.2.3. Integration with development and agriculture sector plans

The integration or mainstreaming of adaptation goals and strategies into development and sectoral (particularly agriculture) policies and priorities is critical to NAP success. Early experience in Germany with adaptation strategy implementation identifies mainstreaming as the most effective approach to adaptation, and emphasis has been placed on looking for existing gaps and weaknesses in systems (UNFCCC 2012a). Further, adaptation assessment and response measures must integrate in all levels of planning, from local to national and across all relevant sectors. Parties acknowledge that mainstreaming the NAP process into existing and planned adaptation and development planning is important and that the NAP process should build upon existing/planned adaptation and development plans/strategies, and should avoid the fragmentation and duplication of activities (UNFCCC 2012b). However, achieving such integration will require innovative and new inter-ministerial and cross-sectoral commitments, which may require new political and institutional mechanisms.

Integrating adaptation strategies into development objectives and existing policies remains a challenge for most developing countries. The process of designing and prioritizing adaptation actions should be shaped not only by consideration of adaptation needs, but also through consideration of national goals in order to increase effectiveness. Integrating climate change adaptation strategies into development processes is a continuous process. In some cases, countries are making good efforts to integrate adaptation priorities with development and poverty reduction frameworks, but for many this remains a challenge. Table 7 summarizes current intent and status of adaptation priorities and plans linking to key sectoral and development plans. This desk-based review did not allow for consistent analysis across all countries—for some, relevant sectoral and development policies and plans were assessed, and for others, reliance on third party assessment (e.g. CCAFS national workshop and country reports or World Bank/Global Facility for Disaster Reduction and Recovery (GFDRR)) or self-assessment by the country in its NatComms (if recently updated and submitted) was required.

Those countries that have adopted national climate change policies and have high levels of commitment to integrating those into sectoral policies are succeeding in making the necessary policy linkages. The most robust examples amongst countries reviewed of where adaptation priorities are being integrated into development objectives is in India, Ethiopia, Kenya, Mali and Tanzania:

- Across countries reviewed, India provides one of the most robust examples of integration of national adaptation planning priorities into development objectives and plans. Our review identifies strong policy integration linking priorities in the National Action Plan on Climate Change to the 12th Five Year Plan and also to sectoral plans.

- Bangladesh's BCCSAP directs government to review and revise (where appropriate) all government policies (sector by sector) to ensure they take full account of CC and its impacts, and for CC to be mainstreamed in national, sectoral and spatial development planning (in government ministries and agencies, local government, private sector, civil society and communities, and ensure impacts on vulnerable groups and women are prioritized in plans).

- Kenya's NCCAP informed the mainstreaming of climate change in the second Medium Term Plan (MTP 2013-2017) for the implementation of Vision 2030.

- Mali's newly created (2010) Environment and Sustainable Development Agency seeks to promote sustainable development by mainstreaming environment components into the policies, development projects and programmes. Progress should be monitored to test effectiveness of this strategy. A national policy on climate change is under development.

- Tanzania is in the NAP drafting process, but the Vice President's Office already has established "Guidelines for Integrating Climate Change Adaptation into National Sectoral Policies, Plans and Programmes of Tanzania" (United Republic of Tanzania 2012).[7] The Guidelines urge sectoral assessment of vulnerability, stakeholder involvement, adequate reference in sectoral policies to climate change policies, offers general potential interventions, and details steps to operationalize the guidelines.

Table 7. Adaptation plan objectives/goals linked to key sectoral and development plans

Country	Intent to link adaptation objectives to sectoral or development plans + status
Bangladesh	• BCCSAP directs government to review and revise (where appropriate) all government policies (sector by sector) to ensure they take full account of CC and its impacts, and for CC to be mainstreamed in national, sectoral and spatial development planning (in government ministries and agencies, local government, private sector, civil society and communities, and ensure impacts on vulnerable groups and women are prioritized in plans. • Adaptation activities are to be mainstreamed into Vision 2021 development targets, the 6th Five Year plan (the policy document to guide actions to meet Vision 2021), as well as into its poverty reduction strategy. It is unclear whether these linkages are being made and to what extent.
Burkina Faso	• Currently does not have an overarching adaptation strategy, and 1st NatComm is from 2001, so very limited. The 2nd NatComm is expected to be submitted in the near future. • To address climate-related crises, government has developed numerous policy instruments, planning and action programmes that often overlap and with limited the implementation is very limited. This is further aggravated by the lack of any common vision for all interventions or actions (World Bank 2011). • National Council on Environment and Sustainable Development (CONEDD) and National Council for Emergency Relief and Rehabilitation (CONASUR) address climate change adaptation and mitigation, and disaster risk reduction and management separately. However, there is no functional relationship between the two entities and lack of communication.
Ethiopia	The Climate Resilient Green Economy strategy integrates economic growth, mitigation and adaptation concerns into a government wide development strategy under the leadership of the Prime Minister's Office.
Ghana	• Ghana Shared Growth and Development Agenda: the agriculture section completely lacks climate change and adaptation information, however CC adaptation and low carbon growth are referenced in the natural resource section. • Climate is not addressed in any of the six policy objectives of the Agricultural policy of the country (FASDEPII). • The Ghana Poverty Reduction Strategy (GPRS) "hardly tackles the potential impacts of Climate Change and climate variability" (Government of Ghana 2011).
India	Strong policy integration linking priorities in the National Action Plan on Climate Change to the 12th Five Year Plan and sectoral plans, which also provides the basis for State Plans.
Kenya	Aligns adaptation actions with sectoral plans that are integrated into five-year Medium Term Plans for the implementation of Vision 2030 (e.g. 2013-2017) -an approach that recognizes that adaptation actions should address socioeconomic development deficits as well as climate impacts.
Mali	Limited integration of climate change considerations into current development activities needs to be addressed by strengthening coordination among the country's relevant institutions (GFDRR 2013b).
Nepal	The government's current five-year plan, as well as the Medium-Term Expenditure Framework (sectoral budgetary allocation), focus on poverty reduction but lack explicit consideration of climate change risks and suggestions for possible responses. Mainstreaming climate variability and change into national policy and planning processes not yet achieved (GFDRR 2013c).
Niger	• Intended to link to the Rural Development Strategy (SDR) and the Poverty Reduction Strategy (PDES), however, the NAPA does not create a roadmap to do this. • Similarly, the 2nd NatComm does not provide guidance on this linkage. One source notes a lack of mainstreaming of climate risk into development strategies (De Vit, Parry 2011). Review of the Poverty Reduction Strategy (PDES) (2012-2015 version) indicates that while there is brief mention of the need to consider climate change impacts and adaptation, the policy does not reference the NAPA or 2nd NatComm, or mirror the adaptation priorities identified in national CC adaptation documents.
Senegal	• The National Plan for Agricultural Development (PNDA), National Strategy for Poverty Reduction and Orientation Law for Agro-Sylvio-Pastoral Use do not mention climate change adaptation. • The 2nd NatComm suggests a need for climate change adaptation to be integrated into the national development strategy.
Tanzania	The Vice President's Office released (in 2012), "Guidelines for Integrating Climate Change Adaptation into National Sectoral Policies, Plans and Programmes of Tanzania".
Uganda	• NAPA builds on the country Vision 2025 (Note: The President has launched Vision 2040 in 2013). While the National Development Plan (2010/11-2014/15) lists climate change as an enabling sector, the chapter on agriculture largely misses climate change issues entirely (except for brief mention of need for better metrological info on rainfall patterns. • NAPA process was informed by the need to achieve the UN MDG's commitments addressing the eradication of hunger, ensuring environmental sustainability and gender equity and combating major diseases.

[7] Our desk assessment did not include assessing Tanzanian sector plans to identify whether guidelines are being adopted.

Countries with multiple adaptation policies and guidance documents lack clear coordination and linkage between them. Some examples:

- There appears to be a lack of coherent coordination between India's NAPCC (Government of India 2008), the refinement of the agriculture component of the NAPCC via the NMSA (Government of India 2010), and 2nd NatComm (Government of India 2012). Adaptation strategies for agriculture are proposed in the 2nd NatComm. This document predates the 12th Five Year Plan by one year, but comes after the NMSA. However, adaptation strategies proposed do not seem entirely congruent with the NMSA, nor is the NMSA directly referenced (however, the NAPCC is referenced briefly in Chapter 4 of the 2nd NatComm, entirely separate from the vulnerability and adaptation section (Chapter 3) which covers agricultural adaptation).

- Senegal's 2nd NatComm reinforces commitment to its 2006 NAPA, but reflects on the isolation of proposed projects in administrative regions and options, resulting in a lack of synergy between actions. Further, the strategic axes identified have not sufficiently taken into account the development and strengthening of knowledge in climate change, even as research and mobilization of additional funding has occurred. However, Senegal is now developing regional plans of action for climate change adaptation, in order to decentralize national plans.

The lack of integration of adaptation priorities and strategies can sometimes be attributed to structural and institutional issues. For instance, at present climate is not addressed in any of Ghana's six policy objectives of the Agricultural policy of the country (FASDEPII). While a coordinating body has been appointed at the centre (NCCC), there is no corresponding body at the regional/local level, raising questions about extent to which environment related activities percolate down to the district level and are incorporated by the district director of food and agriculture department (Zougmoré and Narasimhan 2012).

Integrated adaptation assessments and integrated action plans can help overcome the common barrier of lack of cross-sectoral coordination. India's 2nd NatComm portends more robust and integrated assessments to come, noting "integrated assessments are essential for facilitating the optimal development of institutional and research linkages, projects, and policy recommendations as they enable the best available synthesis of current scientific, technical, economic, and socio-political knowledge" (Government of India 2012). The NatComm states that India has initiated modest steps in this direction, but strengthening is required on all fronts. Ghana also notes the challenge to combine individual sector plans into a coherent integrated plan, finding there are complementary strengths as well as conflicts.

Countries should assess how to strategically place adaptation priorities within the broader national policy framework, so that policies with precedence over others (such as development and fiscal policies) guide decision-making and the necessary linkages. Ethiopia's low carbon development plan may provide a means to accomplish this, however adaptation priorities are largely absent from this key policy. Senegal's 2ndNatComm seeks to provide a roadmap to enhance strategic decisions for better climate change adaptation, and notes the need for this strategy to be later integrated into the national strategy of development. Nepal's 2nd NatComm contains a forward by the Prime Minister, noting the next step for the Climate Change Council after submission of the NAPA (in 2010) was to integrate adaptation aspects into national development processes (Government of Nepal 2010). One model for how to promote better linkage and integration is the 2012 "Guidelines for Integrating Climate Change Adaptation into National Sectoral Policies, Plans and Programmes of Tanzania" issued by the Tanzanian Vice President's Office.

Aligning and mainstreaming activities into national development or sector plans can enable funding for implementation through government budgetary allocations. Countries that build plans wholly dependent on external sources for financing may be disappointed, as already experienced by many countries in their NAPA processes. Kenya has learned from LDC experiences with NAPAs, and now aims to also mobilize resources internally (from public and private sources) to implement priority adaptation actions (Orindi and King'uyu 2013).

Current climate change experience and information systems should increase the likelihood of countries effectively translating vulnerability and risk into adaptation policies and practice, but this is not always the case. Burkina Faso has experience in assessing, detecting, and monitoring risks related to droughts and food insecurity. However, there is no harmonized mechanism to unite available information on climate change and disaster risk, and assessment of hydro-meteorological risks and disaster prevention is carried out only selectively and solely through projects (Zougmoré and Samari 2011b). As mentioned earlier, Bangladesh has established mechanisms for flood forecasting and to address temporary arrangements to protect losses due to climate change under its Comprehensive Disaster Management Plan. Its National Water Management Plan seeks to address water-induced disasters, such as flooding, erosion and drought, however these provide temporary arrangements to protect losses due to climate change, and do not directly support adaptive capacity development in the agriculture sector. It is unclear how the BCCSAP will respond to this need.

2.3. Adaptation plan implementation and funding

2.3.1. Implementation

Almost all countries reviewed are in the early stages of planning and implementation and have not yet created a detailed, concrete plan consistent with an overall adaptation strategy. For most countries reviewed, adaptation plan elements are still under development and therefore a more detailed plan of action, including assignment of responsibilities, has not yet been developed. National adaptation plans should also include a timeline for implementation of activities, including intention to review the effectiveness of implementation and revise the plan as needed. Furthermore, assessment of conflicts and synergies with national development or sectoral plans should be part of an ongoing process, and a crucial focus for plan implementation (as mentioned in Section 2.2.3). Limited financial resources, technical capacity, and institutional mechanisms are additional reasons for limited implementation to date.

However, countries are sharing information on experiences thus far, such as Tanzania's identification of elements and steps, including methodological issues to resolve, submitted in response to SBI's call for submissions by 13 February 2013 on application of the guidelines for the national adaptation plan process for LDCs (UNFCCC 2013), as outlined in Box 3.

A monitoring and evaluation (M&E) system should also be developed and accompany the implementation process so that corrective measures can be undertaken as required. Experiences from the IDRC/DFID Climate Change Adaptation in Africa (CCAA) programme show that it is more beneficial to have M&E components built in from the beginning rather than later, particularly given the iterative and evolving nature of adaptation planning and response measures (Orindi and King'uyu 2013).

M&E systems can initially focus on process elements rather than outcomes. Given the early stages of many OECD country adaptation processes, most countries are monitoring processes (e.g. the number of government departments that have assessed their exposure to climate risks) rather than outcomes (e.g. reductions in vulnerability to climate change) (Mullan et al. 2013). Challenges involved in conducting M&E assessments include generating baselines for use in assessing progress, attributing causality of outcomes to actions, the high costs of data gathering, and the long time horizons of climate change. Thus, Mullan et al. note that countries with more developed M&E frameworks—including Finland, France, Germany and the UK—are more focused on creating the right enabling environment for adaptation at the outset.

Box 3. Tanzania's tasks to formulate the NAP

After laying the groundwork, addressing key gaps and engaging preparatory elements, Tanzania intends to undertake the following tasks in the formulation of its NAP:

1. Assess the institutional arrangements, programmes, policies and capacities in the context of NAPs;
2. Assess status of integration of Climate Change Adaptations into National and local Government Authorities Plans;
3. Assess available information on climate change impacts, vulnerability and adaptation, measures taken to address climate change, and gaps and needs at all levels;
4. Undertake comprehensive assessments of development needs and climate vulnerabilities;
5. Undertake stakeholders consultations including national stakeholders workshop to review draft NAP document;
6. Assess and indicate linkage between NAPA and NAP priorities;
7. Develop criteria for selecting priority programmes and themes;
8. Identify thematic/sectoral areas that require further assessment;
    i) Assess and develop appropriate medium and long term adaptation needs and propose relevant interventions including institutional and policy measures;
9. Develop programme profiles based on a proposed set of criteria and steps;
10. Propose NAP implementation strategies; and
11. Prepare NAP reporting, monitoring, evaluation and review.

M&E frameworks should be designed to ensure results from assessments feed into the development and evolution of national adaptation programmes. This iterative approach is critical to support continuous improvement, particularly as new information becomes available. Further, consideration of how to monitor and evaluate mainstreaming of adaptation into development plans and policies must be identified at the outset. Relevant country experiences include:

- The Bangladesh BCCSAP stipulates that the individual sectors should develop internal mechanisms for monitoring progress and the continuous evaluation of impacts. In addition, an ad hoc committee is to be set up to assess overall progress, consisting of sectoral technical experts

and community representatives. That committee should also periodically verify the defined indicators (UNFCCC 2012a).

- Kenya's NCCAP includes a proposed National Benefits and Performance Measurement System (referred to as "MRV+") that includes indicators to measure and report benefits from adaptation actions, and synergies between adaptation and mitigation. Integrated within the system is also a climate change actions tracking tool to monitor and evaluate the progress of implementation of proposed climate change response actions in different sectors (Orindi and King'uyu 2013).

- Senegal's adaptation monitoring and evaluation process is overseen by the National Committee on Climate Change, with sectoral focal points reporting on performance based on indicators linked to the National Strategy for Poverty Reduction and the Millennium Development Goals (Government of Sénégal 2010).

- One model M&E framework that can be used to assess progress and evaluate updated baselines for measuring adaptation interventions against is the UK's "preparedness ladder." This approach allows policy makers to combine progress and outcome indicators, and should help in making the connection between adaptation policies and observed outcomes (Mullan et al. 2013).

Downward accountability M&E systems is crucial, given the degree to which impacts and implementation occur at subregional and local levels. Countries should consider how M&E can be monitored at various scales, including community-levels.

2.3.2. Funding

The low level of implementation of NAPA and adaptation project financing thus far frustrates countries reviewed. The African Development Bank (AfDB) estimates adaptation costs in Africa will be in the region of US$ 20-30 billion per annum over the next 10 to 20 years (African Development Bank 2011). The AfDB believes this is a reasonable 'approximate' estimate that can be used in the purposes of discussions on raising levels of and allocation of international climate finance. The AfDB estimated that by late 2011, there has been approximately USD 350million of adaptation funding approved for spending in Africa, of which just USD 130million has been disbursed. The Adaptation Partnership has commissioned a series of "Reviews of Current and Planned Adaptation Action" across key global regions, which provide a broad view of activities and sources of funding (which we will not duplicate here). Table 8 offers a snapshot of the status of implementation if NAPA projects in three West African countries, to give an indication of how few NAPA priority projects are being funded and implemented.

The UNFCCC SBI secretariat report[8] on the September 2012 meeting of the LEG notes:

- 49 LDCs had been supported with funding from the Global Environment Facility (GEF) for the preparation of their NAPAs with grants amounting to USD $11.76 million. Out of those, 47 LDCs have successfully completed their NAPAs.

- Of those 47 LDCs that have completed their NAPAs, 45 had officially submitted one or more NAPA projects to the GEF in the form of a project identification form (PIF). The new ceiling for each LDC for implementing NAPA projects has been set at USD 20 million, based on the principle of equitable access.

Table 8. : Implementation of NAPA projects in three selected countries

Country	Source of information	Status of Implementation
Burkina Faso	GFDRR, 2013(a)	Among the 12 priorities identified in the NAPA, 2 are under implementation
	CCAFS, 2011	5 projects related to adaptation and food security funded with bilateral/ multilateral funding (Japan, IFAD/OPEC, AfDB, etc.)
Ghana	CCAFS, 2011	Work has not yet begun on two key agriculture activities identified in top 10 priorities (agricultural diversification, improved land management); however, at least 4 projects related to adaptation and agriculture being funded through bilateral/multilateral funding (World Bank, GEF/IFAD, USAID, UNDP)
Mali	CCAFS, 2011	Only 2 of 19 projects have been financed; of those only one is effectively implemented (second under development by FAO); however, over 7 projects are being funded by bilateral/multilateral sources

[8] FCCC/SBI/2012/27

As of June 2013, the governing Council of the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF), managed by the Global Environment Facility, announced approval a total of USD 847.47 million in projects, of which USD 605.6 million has gone to LDCF projects and USD 241.87 million has gone to SCCF projects.[9] The LDCF disbursements have largely gone to sub-Saharan Africa (70%), while LDCs in Asia and the Pacific accessed 29%.[10]

What has been implemented to date are largely ad hoc projects that are primarily funded externally by donors. Country studies commissioned by CCAFS for several countries indicate adaptation and food security programmes currently being implemented do not appear to be integrated into a broader strategy, but appear to be driven by bilateral and/or multilateral funding sources. NAPs hold great potential to reverse this trend, although consideration should be given to how to target and facilitate alternative funding sources, particularly from domestic revenues, if NAPs are to gain more traction and show greater implementation success than NAPAs (Orindi and King'uyu 2013).

Those countries that are dedicating domestic fiscal instruments and budgets to NAP development and implementation may have more success overall. In its NAP design, Kenya sought to decrease dependence on foreign or external assistance to fund adaptation activities, which it believed could lead to a lack of sustainability of actions taken. Thus, Kenya seeks to influence the allocation of some funding from domestic sources by integrating the priority adaptation actions in national planning through mainstreaming of the adaptation and mitigation actions proposed in the NCCAP in the Medium Term Plan (MTP 2013-2017). As India is committed to aligning sustainable development and climate change concerns, it appears a significant portion of its adaptation planning efforts have been domestically funded, though India makes clear it seeks international support for implementation (Government of India 2012). Though not part of this review, Nigeria intends to develop a detailed funding plan by the ministries, departments and agencies of the government, which will incorporate domestic as well as international funding sources (UNFCCC 2012a). OECD statistics point to a general decline in developed country funding for climate change adaptation over the last few years, which may be partly attributed to the recession and Eurozone crisis.[11]

Some support does exist for adaptation planning, and this existing financial and technical support is undertaken through a variety of channels (including bilateral and multilateral channels), from a variety of sources (inside and outside the UNFCCC), and in different sectors (UNFCCC 2012b). NAPs are expected to benefit from multiple funding streams such as the Green Climate Fund, the Adaptation Fund, regional funding mechanisms, bilateral and multilateral funding arrangements.

- Nepal notes in its submission to the SBI that LDCs who are participating in the Strategic Programme for Climate Resilience (SPCR) as a part of the PPCR with support from the Climate Investment Fund are engaged in developing climate adaptation planning as a long-term effort for making development and infrastructures climate resilient (UNFCCC 2012b).

Funding for the formulation of NAPs should be additional, specific and separate to funding for implementation. It is important that this distinction be made to ensure countries can be clear that funds for planning activities are not being diverted from sources for implementation. Some Parties to the UNFCCC have noted funding for NAP development should be purely grants-based, from public funds and not made through concessional lending, and funding for NAP implementation should be made separate (UNFCCC 2012b).

As sufficient financing should be available during implementation, adaptation plans should seek to describe how their implementation will be financed. However, in practice, this is often not the case. Many OECD countries do not specify how their adaptation programmes will be funded, or the scale of resources required for implementation (Mullan et al. 2013). Mullan et al. speculate there are a number of reasons for this, including postponing financing decisions until after policy objectives and adaptation plans have been agreed to, as explicit mention of costs can create barriers to the discussion. Countries reviewed that are farther along in the adaptation planning process are identifying levels of funding needed, and sources of funds. The Kenyan National Climate Change Response Strategy (NCCRS) has provisional budgets assigned to priority actions that have been refined further in the NCCAP 2013-2017. Bangladesh has developed estimates of the cost of implementation of the BCCSAP, but notes a distinction is made between activities that are part of the regular national development programme and the incremental work to be financed under the BCCSAP (Bangladesh MoEF 2009).

2.4. Stakeholder engagement

Stakeholder engagement and collaboration throughout the entire process of an adaptation strategy—including assessing risk, designing measures, implementation, identification of needs, and improving over time—is critical. All countries reviewed identify stakeholder involvement at some stage in adaptation planning (see Table 9 for examples). However, it is inherently difficult to judge whether there has been robust engagement of multiple parties through a desk study, which requires reliance on documentation, often by Governments with vested interests in demonstrating that a broad consultative process has occurred.

[9] http://www.thegef.org/gef/news/nations-pledge-198-million-ldcfsccf-climate-change-adaptation

[10] http://www.thegef.org/gef/sites/thegef.org/files/documents/GEF-LDCF.SCCF_.14-03.%20Progress%20Report%20on%20the%20Least%20Developed%20Countries%20Fund%20and%20Special%20Climate%20Change%20Fund,%202013-05-23_1.pdf

[11] http://stats.oecd.org/Index.aspx?DataSetCode=RIOMARKERS.

Orindi and King'uyu (2013) evaluated the extent of stakeholder engagement and participatory processes used in NAPA and NAP development in East Africa, based on survey results[12], which provides the following insights:

- Stakeholder responses on Ethiopia, Tanzania and Uganda's NAPA processes: 79% viewed the NAPA preparation process as participatory, while 21% felt it was not. Reasons given: too much focus on meteorological agencies in Ethiopia, and non-representation of smallholder farmers in Tanzania.

- Stakeholder responses on Kenya's NAP: Viewed as participatory as all the actors (government, private sector, development partners, civil society, the academia, and the communities) were part of the process. The involvement of the relevant stakeholders in the NCCAP, Ministry of state for Planning, National Development and Vision 2030 will maintain stakeholder involvement in the monitoring and evaluation processes related to adaptation.

Some issues identified through CCAFS country workshops regarding stakeholder involvement and participation include:

- Low access to information, low coordination, particularly at regional/local level, low participation of farmers (two aspects: farmers not involved in setting adaptation priorities (in Ghana's Akropong Approach) and challenge of dissemination information to farmers).

- Low participation of the private sector.

Table 9. Select country description of stakeholder engagement in adaptation planning

Country	Source of information	Engagement of stakeholders as described by source
Bangladesh	NAPA	Writing team consisted of representatives from sectoral Working Groups and from Regional Workshops; final prioritization done through a national consultative workshop with over 100 stakeholders from different sectors including government and NGOs.
	BCCSAP	Developed through a participatory process involving all relevant Ministries and agencies, civil society, research organizations, academia and business community; expectation of further consultation at the time of implementation.
India	2nd NatComm	Involved more than 1000 participants in 30 conferences, seminars, workshops and consultations across the country.
Nepal	NAPA	Includes details of "Consultations and awareness raising" including 28 meetings on the NAPA draft; the Government led a multistakeholder Thematic Working Group to ensure engagement and ownership of a wide range of stakeholders (key ministries, NGOs, academia, UN agencies); sought to establish vertical linkages between national level assessments and those from community members through creation of Local Adaptation Plans of Action. Created a web-based platform for knowledge management and learning, publicly available, hosted by Nepal Academy of Science & Technology; moderated mailing list on climate and development topics; regular updates on NAPA developments to keep stakeholders informed.
Niger	NAPA	Indicates that stakeholder participation was a priority. Four great meetings including regions, local authorities, experts, local communities, private sector, NGOs and civil society organizations held; interviews also held with vulnerable communities, technical services, project managers and NGOs. • The NAPA seeks to broadly disseminate adaptation activities towards stakeholders, actors and other beneficiaries (though is unclear in how to achieve this).
Senegal	2nd NatComm	Based on these sectoral reports, an interim NatComms report was drafted and shared at a meeting with stakeholders (though it is unclear who this was), which formed the basis for the recommendations section. This was carried into a validation workshop with stakeholders. The NatComm mentions some stakeholders may have a role to coordinate implementation, but does not offer specifics.

[12] For the survey 149 respondents were targeted—104 in Ethiopia, Tanzania and Uganda for NAPA and 45 from Kenya for the NAP. The response rate was 36% from NAPA countries and 38% from Kenya.

- Lack of awareness outside the immediate climate change policy circles in government (in East Africa and West Africa).
- Need to build capacity of stakeholders to address adaptation issues (this can also include compensation for stakeholders to be involved in dialogue and decision-making).
- Lack of synergy among stakeholders working on climate change issues (in Mali).

The CCAFS East Africa regional synthesis notes that private sector and media involvement are critical in supporting adaptation, yet are often forgotten (Orindi and King'uyu 2013). It suggests that the private sector is needed to identify opportunities and the link between adaptation and their investments, and media for increased and effective awareness creation.

The SBSTA Secretariat, in its review of adaptation planning processes, notes:

- Collaboration with national governments and research institutions **helps in bridging gaps between policy and research, and facilitates better integration of science- or evidence-based risk adaptation planning** and implementation.
- More involvement of local stakeholder groups is **required to catalyse the inclusion of local needs, including the needs of vulnerable groups**, into national plans and policies.
- Governments should **find the most effective balance** between acting on their own and providing the right conditions and incentives for other stakeholders to act.
- The distribution of responsibilities **emphasizes the importance of allocating accountability** for delivering, monitoring and reporting on activities, such as according to sectors of expertise and responsibility (UNFCCC 2012a).

2.5. Capacity building

As outlined in the analytical framework (Section 1.2), capacity building cuts across all steps in the adaptation planning and implementation process. Capacity building for climate change adaptation also occurs across a range of scales, actors and institutions. This section focuses on those capacity-building elements most important in NAP development (versus the range of capacity-building needs that come into play in the implementation phase) as most countries are currently engaged in NAP development and in early stages of implementation. However, **countries are encouraged to plan for implementation capacity requirements at the outset**, particularly involving subregional and local governments, civil society, researchers and the private sector, and to draw those actors into decision-making at all levels.

Capacity constraints are noted across all countries reviewed (see Table 10). The most commonly occurring ones include lack of capacity in climate observation systems, technical and institutional capacity, and limited finance.

The CCAFS East Africa regional synthesis finds the major challenges to implementation of priority actions are: limited resources, limited analytical capacity, and ineffective coordination and institutional arrangements. The limited analytical capacity is prioritized as an urgent need. Current efforts in the region are focused on strengthening national meteorological and hydrological service capacities. However, more attention must be focused on strengthening the capacity of other institutions especially vulnerable sectors (e.g. agriculture, water, infrastructure) and coordinating agencies (like Finance and Planning ministries) as climate change is more than an environmental problem and requires active participation of all sectors and actors (Orindi and King'uyu 2013).

- Kenya has focused attention on "enablers" in its NCCAP to specifically address identified barriers including issues of technology, finance, capacity building and knowledge management; and measuring, reporting and verification (MRV), in order to increase success in NAP implementation (Orindi and King'uyu 2013).
- A survey of East African government staff, researchers, donor agencies and NGOs indicates that 62% of institutions faced technical capacity challenges in implementing adaptation projects (Nzuma 2012).

The complexity of adaptation assessment and planning needs, plus the challenges of linking this information into policy making creates a unique capacity challenge, which countries should address at all NAP stages. For example, India's top capacity-building need is to integrate diverse scientific assessments and link them with policy making. The development of integrated assessments by interdisciplinary teams, that can interpret complex information across both multiple risks and multiple scales (national, state, local) is needed to provide the type of comprehensive analysis that policy-makers need to develop appropriate responses. Thus, the capacity-building needs in this area are two-fold—first, to provide the robust scientific foundation necessary for policy making, and second, to provide the right policy orientation to the scientific assessments (Government of India 2012). Chapter 7 of India's 2nd NatComm contains perhaps the most detailed assessment of capacity constraints and capacity-building needs among those reviewed. India's NMSA (which further defines and implements the national climate change plan) is noteworthy as it allocates 5% of budget to capacity building (Government of India 2012).

Table 10. Summary of capacity-building needs across countries reviewed

Country and (source)	Capacity needs noted
Burkina Faso (Zougmoré and Samari 2011b)	CCAFS report notes, "serious material and financial limitations as well as technical and technological handicaps." As some critical agencies suffer from limited financial resources and technical capabilities (e.g. National meteorology system - Direction Nationale de la Météorologie), the National Council for Environment and Sustainable Development (CONEDD) is weakened significantly.
Bangladesh (Bangladesh MoEF 2009)	The 6th Pillar of the BCCSAP is "Capacity building and institutional strengthening," the goals of which are: review and revise (where appropriate) all government policies (sector by sector) to ensure they take full account of CC and its impacts; mainstream CC in national, sectoral and spatial development planning (in government ministries and agencies, local government, private sector, civil society and communities, and ensure impacts on vulnerable groups and women are prioritized in plans; build capacity of key government ministries and agencies to take forward CC adaptation; build governments capacity for international and regional negotiations on CC and similarly on climate finance to access global climate finance; and build capacity for education and training of environmental refugees to ease and facilitate their migration to other countries and integration in new societies.
Ethiopia (Orindi and King'uyu 2013)	Lack of strong coordination mechanisms to maximize benefits from ongoing and planned activities, lack of effective outreach to communities, limited internal capacity to finance the projects.
Ghana (Zougmoré and Narasimhan 2012).	Capacity building on methodologies, tools and guidelines to conduct vulnerability studies, as well as technical capacity for data collection and monitoring. Capacity building for public and private sector institutions to access emerging international financing opportunities. The technical focal point (Environment Protection Agency) has a high level of capacity with a qualified team with PhDs; several capacity-building projects have already been completed.
India (2nd NatComm)	Top capacity-building need is development of integrated assessments by interdisciplinary teams, that can interpret complex information across both multiple risks and multiple scales (national, state, local) to provide the type of comprehensive analysis that policy-makers need to develop appropriate responses.
Kenya (Orindi and King'uyu 2013)	Deliberate effort via the NAP to address enabling environment through policy, national climate change funding mechanism, capacity building and knowledge management, and integration into national M&E system.
Mali (Zougmoré and Samari 2011c)	Institutional capacity is the biggest priority, as no national institution exists yet with a dedicated remit for adaptation. However, the Environment and Sustainable Development Agency (AEDD) has been created and a national policy on climate change is under development. Building the capacity of the various agriculture stakeholders on climate change issues is also needed.
Nepal (NAPA)	The Pilot Program on Climate Resilience (PPCR) is anticipated to significantly contribute towards building national capacity and institutions, and help develop and implement a Strategic Program for Climate Resilience (SPCR) for Nepal.
Niger (2nd NatComm)	Capacity building on observation systems, but it is unclear to what degree this is ongoing, with the assistance of partners and donors, and how it is being integrated into existing institutions. Need for socioeconomic data is also stressed.
Senegal (2nd NatComm) (Zougmoré and Samari 2011a)	A lack of funding for research projects related to climate change; capacity building is not realized on the basis of real needs and priority, but rather based on the opportunities offered; technical constraints including lack of national experts and robust data, such as a regional climate model with adequate spatial resolution; and a framework for exchange between research structures and observation both at national and regional levels is needed.
Tanzania (Orindi and King'uyu 2013)	Limited analytical capacity concerning threats and potential impacts of climate change and limited internal capacity to fund the projects.
Uganda (Orindi and King'uyu 2013)	Inadequate understanding of climate change and its impacts, thus creating a barrier to resource allocation, inadequate technical capacity, inadequate financial resources, weak institutional and coordinating mechanisms.

Capacity building must look beyond government, and include the full suite of actors and interests in adaptation. Capacity building among stakeholders is identified by a few countries as important, particularly those that face high risks from projected climate change impacts, and those who are critical to implementing adaptation measures and collecting climate change data and information, such as farmers. Countries are investigating a range of options to support capacity building among stakeholders, including workshops, targeted outreach, participatory arrangements and communications.

- Through the 6th Pillar of Bangladesh's BCCSAP, and reinforced in its 6th Five Year Plan, Bangladesh is investing in enhancing the capacity of government ministries and agencies, civil society and the private sector together to meet the challenge of climate change and mainstream approaches as part of development actions (Bangladesh Planning Commission 2011(a,b).

- In the East African context, it is noted that capacity building must be broadened to include the private sector (to identify opportunities and the link between adaptation and their investments) and media (for increased and effective awareness creation)—two groups often forgotten, and yet critical in supporting adaptation (Orindi and King'uyu 2013).

The LDC Expert Group stresses that an important early step in the NAP process is stocktaking to assess current capacity and capacity constraints and institutional strengths and weaknesses that should be addressed to enable effective engagement in the NAP process. Specifically, the LEG:

- **Outlines several processes within and outside of the UNFCCC exist that can support Parties in assessing and establishing capacity** that will be useful for the NAP process.

- **Recommends performing a systematic capacity gap analysis of the national adaptation structures and systems,** and to set up a strategy to address shortcomings, as an important step in addressing adaptation at the national level.

- **Suggests adapting the national adaptive capacity (NAC) framework developed by the World Resources Institute to the NAP process**, as it provides a systematic approach for assessing institutional strengths and weaknesses that may help or hinder adaptation. It provides questions that can assess institutional capacity at the national level for performing the core set of functions critical for adaptation.

- **Advocates developing an M&E system for capacity**, and provides sample indicators for monitoring adaptation capacity at national levels (Least Developed Countries Expert Group 2012).

Investments in climate projections and impact assessments are necessary, but not sufficient for building capacity for adaptation among the public and private sectors. Capacity development and the provision of climate change information are central in establishing enabling environments for adaptation, and are therefore a particular focus of adaptation strategies, based on experience in OECD countries. However, adaptation planning also needs to include capacity building, both to support general actions and because plans give rise to additional, more targeted needs (such as sectoral or geographically localized climate impacts data, and capacity development for specific adaptation tools). Part of the challenge are the demands for both more sophisticated climate change projections and data, and that they be made easier for end users to apply (which has seen less progress) (Mullan et al. 2013).

3. Recommendations

This report created and applied an analytic framework of the key policy elements and steps a country might take to develop and implement a robust adaptation programme. The opportunity to assess 12 countries against this single analytical framework provided insights into where countries might take further steps to strengthen their national adaption process, as well as a sense of where there are common needs across the target countries. These recommendations are summarized below, including areas that require further study and analysis to better understand the state-of-play and key needs in areas where a desk study is inadequate.

1. **Strengthen capacity to project climate risks, rank such risks, and prioritize response activities.** Most countries have been able to perform vulnerability assessments, but could improve their abilities to rank and prioritize the expected impacts, which is critical to direct limited resources to addressing risks that are most urgent or affect the most vulnerable sectors, populations, or geographies. To accomplish this, the following is recommended:
   - **Refinement of adaptation, vulnerability and risk assessments**, including at different scales, to support NAP development. The limitations of current information systems points to many countries reviewed needing better information on regional variations within countries, and future projections of vulnerability and risk.
   - **Improvement in the understanding of the economic impacts of climate risks;** few countries have been able to perform such analyses.
   - **Strengthen skill and capacity to rank and prioritize response activities**, which can be particularly challenging, as it requires consistency in the application of criteria used to prioritize actions across multiple policy and planning frameworks. Similar to the point above, this also requires an understanding of the socioeconomic impacts of various adaptation options.

2. **Given the multiple scales, diversity and complexity in governance, finance, and range of actors involved in defining adaptation solutions, attention to downward accountability and adaptive institutions will be critical.** New institutional structures have been created to address climate change and promote cross-sectoral cooperation, but are often lodged in institutions that are not responsible for implementation (such as agencies that serve as the climate change focal point for the country, not the development or finance ministries). There are notable gaps in institutional coordination in many countries that hinder necessary cooperation across ministries and between different levels of government. Closing the gaps will require much more than just technical solutions, and depends on understanding the interplay between ideas, power and resources, in order to forge new governance pathways. While NAPs are national processes, all relevant levels of government should have a role, particularly as many adaptation needs and responses are localized. Similarly, climate adaptation knowledge and information systems must span from local and national to regional and international scales. Key institutions in most countries reviewed suffer from a shortage of technically qualified staff, which further hinders development of an effective institutional structure.

3. **Define long-term solutions for adaptation planning and implementation funding that are sufficient and geared towards building strong institutions and capacity.** Funding remains a challenge for development of NAPs, as well as implementation of projects and activities. Currently what is funded tends to be ad hoc projects, primarily by donors or multilateral institutions. Funding for the adaptation process, (including the steps outlined in the analytic framework presented in this paper) and not just projects is critical to success. Movement away from donor dependency for funding is also important, in order to build local institutional strength.

4. **Linking adaptation assessments into policy development creates a unique capacity challenge, which countries should address at all NAP stages.** Integrated, scientific assessments of impacts and vulnerabilities can be complex technical information that is difficult to integrate and translate into policy making. There is a unique capacity-building need in this regard, both to provide a robust scientific foundation in ways that are digestible for policymakers, and also to provide the right policy orientation to the scientific assessments (Government of India 2012).
   - Consider how CCAFS can help bolster analytic capacity for integrated approaches to adaptation planning that a) considers combinations of crop, livestock, rangeland, forestry, fishery and agroforestry activities, as well as aquatic and ecosystem function needs and b) helps define adaptation and mitigation synergies, which countries often cite interest to identify, but are more challenged to define.

5. **Focus policy analysis and action towards integrating adaptation strategies into development objectives and existing sectoral policies.** This is crucial, yet remains a challenge for most countries reviewed, partly due to the capacity and institutional challenges noted above. However, robust integration should be a priority and can enable funding for implementation partially through national budgetary allocations (less fickle than donor finance) and ensure stronger linkages to development priorities, which in turn can help to secure higher level political support for and success in implementation.

6. **Consider objective methods to assess quality of stakeholder engagement in assessment, design and implementation of adaptation plans.** This would require more direct inquiry with a range of stakeholders in countries, similar to the survey done for the CCAFS East African adaptation synthesis report, as it is inadequate to assess such engagement via a desk study. Most countries reviewed documented a variety of efforts related to engaging stakeholders from multiple government agencies and sectors, from civil society and research institutes, and at different levels of government (from national to local). However, whether groups felt they had full and effective participation is unknown (with the exception of the East Africa survey). The private sector, farmers, and the media were groups that were mentioned in several cases as not being adequately engaged. NAPs are likely to have a higher chance of being implemented and mainstreamed if diverse interest groups are represented and the result is broader ownership of the contents of in the final NAP (Orindi and King'uyu 2013).

Finally, a review of country progress in NAP processes through communication with national focal points on adaptation could be useful to analysing further needs. Such a dialogue and/or study could identify critical needs and challenges unique to each country. While government documents, recent NatComms, and CCAFS reports informed this desk review, a more targeted assessment of needs focused solely on NAPs would be useful, and could also accurately, and in a timely manner, identify research needs and potential partnership needs for CCAFS to support NAP efforts. This is particularly important, as most countries have not created detailed, concrete plans that clarify responsibilities and include a timeline, monitoring and evaluation system, and a budget for implementation. This is due, in part, to the fact that most countries are in early stages of planning and implementation, while at the same time engaged in a national process to create a high-level policy document on adaptation. The NAP plan and process elements should guide the development of more detailed implementation plans.

References

African Development Bank. 2011. *The Cost of Adaptation to Climate Change in Africa.* Available at: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Cost%20of%20Adaptation%20in%20Africa.pdf

Agrawal A, Kononen M, Perrin N. 2009. *The Role of Local Institutions in Adaptation to Climate Change.* Washington DC: World Bank.

Agrawal A, Perrin N, Chhatre A, Benson C, and Kononen M. 2009. *Climate Policy Processes, Local Institutions, and Adaptation Actions: Mechanisms of Translation and Influence.* Social Development Papers. Social Dimensions of Climate Change. Paper No. 119 / June 2009 Washington DC: World Bank. Available at: http://siteresources.worldbank.org/EXTSOCIALDEVELOPMENT/Resources/244362-1164107274725/sdp119.pdf

Bangladesh MoEF. 2009. Bangladesh Climate Change Strategy and Action Plan, 2009. Dhaka, Bangladesh. Ministry of Environment and Forests, Government of the People's Republic of Bangladesh. Available at: http://www.moef.gov.bd/climate_change_strategy2009.pdf

Bangladesh Planning Commission. 2011a. *Sixth Five Year Plan (FY 2011-2015); Part 1: Strategic directions and policy framework.* Dhaka, Bangladesh: Planning Commission, Ministry of Planning, Government of Bangladesh.

Bangladesh Planning Commission. 2011b. *Sixth Five Year Plan (FY 2011-2015); Part 2: Sectoral strategies, programmes and policies.* Dhaka, Bangladesh. Planning Commission, Ministry of Planning, Government of Bangladesh.

CCAFS. 2011. Kenya National Planning Workshop on Climate Smart Agriculture: Research Needs and Priorities. 1 July 2011. Nairobi, Kenya.

CCAFS and Climate Change Forum. 2011. Workshop Summary: National Planning Workshop on Climate Smart Agriculture: Research Needs and Priorities. Addis Ababa, Ethiopia.

CCAFS and CSIR. 2011. Report on One-Day National Workshop on Comprehensive Climate Change Action Plan: Research Needs and Priorities in Ghana.

Commission on Climate Change and Development. 2009. 'Governance Gaps', Chapter 4 in Closing the Gaps, Disaster Risk Reduction and Adaptation to Climate Change in Developing Countries. Stockholm, Sweden: Report of the Commission on Climate Change and Development.

De Vit C, Parry J and International Institute for Sustained Development. 2011. Review of Current and Planned Adaptation Action: West Africa. Adaptation Partnership. Available from CAKE at: http://www.cakex.org/virtual-library/review-current-and-planned-adaptation-action-west-africa.

Ethiopia Ministry of Agriculture. 2011. Report of the National Conference on Climate Change Vulnerability and Risk Assessment of Agriculture and Food Security in Ethiopia: Which Way Forward? Addis Ababa, Ethiopia. Ethiopia Ministry of Agriculture, Climate Change Forum - Ethiopia, CGIAR CCAFS and USAID. 6-7 July 2011.

GFDRR. 2013a. Burkina Faso dashboard. World Bank. Global Facility for Disaster Reduction and Recovery (GFDRR). Accessed on: 12-10-13. Available at: http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=BFA&ThisTab=Dashboard

GFDRR. 2013b. Mali dashboard. World Bank. Global Facility for Disaster Reduction and Recovery (GFDRR). Accessed on: 12-10-13. Available at: http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=MLI

GFDRR. 2013c. Nepal dashboard. World Bank. Global Facility for Disaster Reduction and Recovery (GFDRR). Accessed on: 12-10-13. Available at: http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile&CCode=NPL&ThisTab=Adaptation

Global Environment Facility. 2009. Joint external evaluation: Operation of the Least Developed Countries Fund for Adaptation to Climate Change. Prepared by DANIDA Evaluation Department and GEF Evaluation Office. Ministry of Foreign Affairs of Denmark.

Government of Bangladesh. 2005. National Adaptation Programme of Action (NAPA). Dhaka, Bangladesh. Ministry of Environment and Forest Government of the People's Republic of Bangladesh.

Government of Ethiopia. 2011. Ethiopia's Climate-Resilient Green Economy strategy. Environmental Protection Authority, Federal Democratic Republic of Ethiopia.

Government of Ghana. 2011. Second National Communication to UNFCCC. Available at: http://unfccc.int/resource/docs/natc/ghana_second_nationalcommunication_final_version.pdf

Government of India. 2008. National Action Plan on Climate Change. Prime Minister's Council on Climate Change.

Government of India. 2012. Second national communication to the United Nations Framework Convention on Climate Change. New Delhi, India. Ministry of Environment and Forests, Global Environmental Facility, United Nations Development Programme.

Government of India, Ministry of Agriculture. 2010. *National Mission For Sustainable Agriculture: Strategies for Meeting the Challenges of Climate Change.* New Delhi, India.

Government of India, Planning Commission. 2013. *Twelfth Five Year Plan (2012-2017): Faster, More Inclusive and Sustainable Growth.* Volume 1. New Delhi, India. Sage Publications.

Government of Kenya. 2010. National Climate Change Response Strategy; Executive Brief. Nairobi, Kenya.

Government of Kenya. 2013. National Climate Change Action Plan 2013-2017. Nairobi, Kenya. Ministry of Environment and Mineral Resources. Available at: http://www.kccap.info

Government of Mali. 2007. National Adaptation Programme of Action on Climate Change. Ministry of Public Infrastructure and Transport.

Government of Nepal. 2010. National Adaptation Programme of Action (NAPA) to Climate Change. Ministry of the Environment.

Government of Sénégal. 2006. National Adaptation Programme of Action. Submitted to UNFCCC.

Government of Sénégal. 2010. Second National Communication to UNFCCC. Submitted on 16 September 2010; Ministère de l'Environnement et de la Protection de la Nature.

Government of Tanzania. 2011. Tanzania Agriculture and Food Security Investment Plan (TAFSIP).

Government of Uganda. 2007. Uganda National Adaptation Programmes of Action. Government of Uganda, Global Environment Facility and United Nations Environment Programme.

Joshi PK, Aggarwal P, Pal PD, Pandey D, Rajkhowa P. 2013. Government Policies for Climate-Smart Agriculture in South Asia—CCAFS Synthesis Report. Zero Draft, submitted to CCAFS.

Kemp-Benedict E, Agyemang-Bonsu WK. 2008. The Akropong approach to multi-sector project planning. *Futures* 40:9. Available at: http://dx.doi.org/10.1016/j.futures.2008.07.014.

Least Developed Countries Expert Group. 2012. National Adaptation Plans. Technical guidelines for the national adaptation plan process. Bonn: UNFCCC secretariat. Bonn, Germany. December 2012. Available at: http://unfccc.int/NAP

Mullan M, Kingsmill N, Kramer AM and Agrawala S. 2013. National Adaptation Planning: Lessons from OECD Countries, OECD Environment Working Papers, No. 54, OECD Publishing. http://dx.doi.org/10.1787/5k483jpfpsq1-en

Mungai C, Radeny M, Thiong'o O. 2012. Climate Smart Agriculture: Research Needs and Priorities in Uganda. Ministry of Agriculture, Animal Industry and Fisheries and CCAFS. National Planning Workshop Report: 27 March 2012, Kampala, Uganda.

Nzuma JM. 2012. A Review of Agricultural Food Security, Food Systems and Climate Change Adaptation Policies, Institutions and Actors in Eastern Africa. CGIAR CCAFS.

Orindi V and King'uyu SM. 2013. Evaluation of the status of NAPA/NAP in Ethiopia, Tanzania, Uganda and Kenya. Report. CCAFS.

Osman-Elasha B, and Downing T. 2007. *Lessons Learned in Preparing National Adaptation Programmes of Action in Eastern and Southern Africa.* Oxford, United Kingdom. European Capacity Building Initiative.

Republic of Niger. 2013. Poverty Reduction Strategy Paper; Economic and Social Development Plan (PDES) 2012-2015. Ministry of Planning, Land Management, and Community Development. Available at http://www.imf.org/external/pubs/ft/scr/2013/cr13105.pdf

Republic of Niger. 2003. National Strategy and Action Plan for Climate Changes and Variability. Niamey, Niger. Office of the Prime Minister and National Environmental Council of Sustainable Development.

Republic of Niger. 2006. National Adaptation Programme of Action. Niamey, Niger. Executive Secretariat of the National Environmental Council of Sustainable Development, Global Environmental Facility, United Nations Development Programme.

Republic of Niger. 2009.Second National Communication on Climate Change. Niamey, Niger. Office of the Prime Minister and National Environmental Council of Sustainable Development.

Tanner T and Allouche J. 2011. *Towards a New Political Economy of Climate Change and Development.* IDS Bulletin. Volume 42 Number 3.

UNFCCC. 2012a. Compilation of case studies on national adaptation planning processes. Note by the Secretariat. Subsidiary Body for Scientific and Technological Advice. FCCC/SBSTA/2012/INF.6.

UNFCCC. 2012b. Synthesis report on the support for the national adaptation plan process for the least developed countries. Note by the Secretariat. Subsidiary Body for Implementation. FCCC/SBI/2012/8

UNFCCC. 2013. Experience with the application of the guidelines for the national adaptation plan process for the least developed country Parties. Subsidiary Body for Implementation. 3 May 2013. Available at: http://unfccc.int/resource/docs/2013/sbi/eng/misc02.pdf

United Republic of Tanzania. 2012. Guidelines for Integrating Climate Change Adaptation into National Sectoral Policies, Plans and Programmes of Tanzania. Vice President's Office; Division of Environment.

United Republic of Tanzania. 2010. Second National Strategy for Growth and Reduction of Poverty (NSGRP II) (MKUKUTA II) -- 2010/11 - 2014/15. Ministry of Finance and Economic Affairs.

Vermeulen SJ, Challinor AJ, Thornton PK, Campbell BM, Eriyagama N, Vervoort JM, Kinyangi J, Jarvis A, Läderach P, Ramirez-Villegasa J, Nicklin KJ, Hawkinsh E, Smith D. 2013. Addressing uncertainty in adaptation planning for agriculture. Proceedings of the National Academy of Sciences, vol. 110, no. 21.

World Bank. 2011. Burkina Faso: Country Note on Disaster Risk Management and Adaptation to Climate Change. World Bank. Available at: https://openknowledge.worldbank.org/handle/10986/2752

Zougmoré R, Narasimhan P. 2012. Status & trends in Climate change adaptation and mitigation policy in agriculture in Ghana: Synthesis Report. CCAFS. Available at: http://ccafs.cgiar.org/publications/climate-change-adaptation-and-mitigation-agriculture-status-trends-ghana

Zougmoré R, Samari H. 2011a. Status & trends in climate change adaptation and mitigation policy in Senegal: Synthesis report. CCAFS.

Zougmoré R, Samari H. 2011b. Status & trends in climate change adaptation and mitigation policy in agriculture in Burkina Faso: Synthesis Report. CCAFS.

Zougmoré R, Samari H. 2011c. Status & trends in climate change adaptation and mitigation policy in agriculture in Mali: Synthesis Report. CCAFS.

This meta-synthesis of national climate change adaptation plans, policies and processes spans twelve countries at various stages of adaptation planning and implementation, in three priority CCAFS regions: West Africa (Burkina Faso, Ghana, Mali, Niger, Sénegal), East Africa (Ethiopia, Kenya, Tanzania, Uganda) and South Asia (Bangladesh, India, Nepal). The national adaptation plan (NAP) process was established in the Cancún Adaptation Framework by the United Nations Framework Convention on Climate Change (UNFCCC) to help facilitate effective medium- and long-term adaptation planning and implementation in developing countries, and in particular Least Developed Countries (LDCs). The scope of this review focuses primarily on climate adaptation in the agriculture sector, but also included consideration of related sectors, such as water, forests and land use.

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