



Review of Current and Planned Adaptation Action: Southern Africa

Botswana, Comoros, Lesotho, Madagascar, Malawi,
Mauritius, Mozambique, Namibia, Seychelles, South
Africa, Swaziland, Zambia and Zimbabwe

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About the Adaptation Partnership

The Adaptation Partnership was formed in May 2010 in response to a recognized need for development practitioners to share information and lessons on adaptation efforts. Chaired by Costa Rica, Spain and the United States, the goal of the partnership is to encourage effective adaptation by serving as an interim platform to catalyze action and foster communication among the various institutions and actors engaged in the effort to scale up adaptation and resilience around the world, particularly in the context of fast start finance. The Partnership synthesizes lessons learned and good practices, highlighting needs and priorities, and identifying opportunities for cooperation and alignment of support to build resilience to the adverse effects of climate change. It is also enhancing communities of practice engaged in the adaptation effort.

Adaptation Partnership

Website: <http://www.adaptationpartnership.org/>



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Foreword

In response to a growing awareness of the potential adverse effects of climate change and the particular vulnerability of developing countries to this process, a significant increase in adaptation action has been witnessed in recent years in Africa, Asia-Pacific, and Latin America and the Caribbean. These actions are providing opportunities to: increase understanding of the implications of climate change for the achievement of development objectives in the near and long terms; identify strategies and measures that can be taken to reduce climate vulnerability; communicate and build awareness of climate risks, opportunities and potential solutions; and begin implementing actions on the ground that build capacity to adapt to a changing climate.

Although the recent global upsurge in adaptation action is a welcome development, the emergence of a diverse array of efforts initiated by multiple actors within numerous jurisdictions has the potential to create confusion, lead to duplication of effort and limit the potential for sharing good practice guidance based on past efforts. Enhanced coordination among expanding networks of adaptation actors is needed to ensure resources are deployed quickly and effectively. To this end, the Adaptation Partnership was formed in 2010. Chaired by Costa Rica, Spain and the United States, the goal of the Adaptation Partnership is to encourage effective adaptation by serving as an interim platform to catalyze action and foster communication among the various institutions and actors engaged in the effort to scale up adaptation and resilience around the world.

Toward this goal, the Adaptation Partnership initiated a Review of Current and Planned Adaptation Action in the fall of 2010. Its purpose is to provide a baseline understanding of who is doing what on adaptation in three developing regions—Africa, Asia-Pacific, and Latin America and the Caribbean—and in priority adaptation sectors. Based on available resources, it seeks to provide a rapid assessment of: priority interests and adaptation needs; efforts by governments to support adaptation through policy and planning; the scope of international support for adaptation efforts in different countries and sectors; and potential gaps in adaptation efforts at the country and regional levels.

This document is one of 12 regional profiles completed as a contribution to the Review of Current and Planned Adaptation Action in Africa, Asia-Pacific and Latin America and the Caribbean. It presents a review of current and planned adaptation action in southern Africa. For the purpose of this review, this region is designated as including the countries of Botswana, Comoros, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe. The review first provides an overview of adaptation action at a regional level, highlighting commonalities and differences between these countries. The appendices discuss adaptation action taking place in each country.



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Abbreviations and Acronyms

ACCCA	Advancing Capacity for Climate Change Adaptation
AAP	Africa Adaptation Programme
AfDB	African Development Bank
AGRA	Alliance for a Green Revolution in Africa
ALP	Adaptation Learning Programme
ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
APCCC	Africa Partnership on Climate Change Coalition
BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
BMWTC	Botswana Ministry of Works, Transport, and Communications
CBA	community-based adaptation
CCAA	Climate Change Adaptation in Africa
CCCI	Cities and Climate Change Initiative
CC-DARE	Climate Change Adaptation and Development Initiative
CEEPA	Centre for Environmental Economics and Policy in Africa
CGIAR	Consultative Group on International Agricultural Research
CI	Conservation International
CLACC	Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change
CMDIPTTT	Comoros Ministry of Development, Infrastructures, Post and Telecommunications and International Transports
CMRDFHE	Comoros Ministry of Rural Development, Fisheries, Handicraft and Environment
COI	Commission de l’océan indien (Indian Ocean Commission)
COMESA	Common Market for Eastern and Southern Africa
DEFRA	Department for Environment, Food, and Rural Affairs (United Kingdom)
DFID	Department for International Development (United Kingdom)
DMC	Drought Monitoring Centre
EC	European Commission
ENSO	El Nino-Southern Oscillation
FANPRAN	Food, Agriculture, and Natural Resources Policy Analysis Network
FARA	Forum for Agricultural Research in Africa
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit / German Agency for Technical Cooperation
GCM	Global Circulation Model
GOS	Government of Seychelles
GOSA	Government of South Africa

HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
ICRAF	World Agroforestry Centre
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone
IWMI	International Water Management Institute
LDC	least developed country
LMNR	Lesotho Ministry of Natural Resources
MPF	Mangroves for the Future
MICOA	Ministry for the Coordination of Environmental Affairs
MMEWF	Madagascar Ministry of Environment, Water and Forestry
MMF	Mangroves for the Future
MMNRE	Malawi Ministry of Mines, Natural Resources and Environment
NAPA	National Adaptation Programme of Action
NCAP	Netherlands Climate Assistance Program
NCAR	National Center for Atmospheric Research
NMET	Namibia Ministry of Environment and Tourism
PIK	Potsdam Institute for Climate Impact Research
PPCR	Pilot Program for Climate Resilience
OECD	Organisation for Economic Co-operation and Development
RCM	Regional Climate Model
RMMS	Republic of Mauritius Meteorological Services
ROM	Republic of Mauritius
SADC	Southern Africa Development Community
SADEAT	South Africa Department of Environmental Affairs and Tourism
SASSCAL	Southern African Science Service Centre for Climate Change and Adaptive Land Use
SEI	Stockholm Environment Institute
SIDA	Swedish International Development Agency
SMPWT	Swaziland Ministry of Public Works and Transport
SNCCC	Seychelles National Climate Change Committee
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESA	United Nations Economic and Social Affairs
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
USAID	United States Agency for International Development



USDS United States Department of State
WWF World Wildlife Fund
ZALF Leibniz-Centre for Agricultural Landscape Research
ZMTENR Zambia Ministry of Trade, Environment and Natural Resources



Executive Summary

Growing understanding of the need to adapt to the impacts of climate change has led to a significant rise in ongoing and planned adaptation action in the developing regions of the world, including southern Africa. This upsurge in climate change adaptation action is a welcome occurrence, but enhanced coordination among expanding networks of adaptation actors is needed to ensure resources are deployed quickly and effectively. Responding to this concern, a review of current and planned adaptation action in southern Africa was undertaken by the Adaptation Partnership¹ between October 2010 and April 2011. Covering the countries of Botswana, Comoros, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe, the rapid review examined: priority adaptation needs; efforts by governments to support adaptation through policy and planning; the scope of international support for adaptation efforts in different countries and sectors; and potential gaps in adaptation efforts at the country and regional level. This review of adaptation action in southern Africa is one of 12 profiles covering regions of Africa, Asia-Pacific, and Latin America and the Caribbean completed by the Adaptation Partnership.

This region of southern Africa is characterized by considerable disparity in terms of geography and levels of development. Comprised of coastal, landlocked and island states, its geography includes low-lying coastal areas, high plateaus, forests, open savannas and deserts. While some countries in the region have succeeded in diversifying their economies and achieving relatively high rates of growth (e.g., Botswana, the Seychelles and South Africa), several remain among the least developed in the world (Comoros, Lesotho, Madagascar, Malawi, Mozambique and Zambia). The majority of southern Africans continue to derive their livelihoods from rain-fed agriculture and more than half of the region's population lives below the poverty line (Madzwamuse, 2010). These and other factors contribute to the region's vulnerability to the effects of climate change.

To better understand and assess how southern African countries are preparing for the impacts of climate change, a “desk-based” review of internet sources and relevant documentation was undertaken. The content of these sources was assessed in relation to a set of parameters established to focus the review's scope and ensure consistency across regions. Notably, it examines *discrete* adaptation action, or *policies, programs and projects designed and implemented specifically to address the current and projected impacts of climate change*. The review, therefore, presents only a portion of the breadth of efforts underway to reduce the vulnerability of developing countries to the impacts of climate change. In particular, it does not capture the broader array of development activities that are increasing the adaptive capacity of communities and countries. As well, within the review, adaptation action have been deemed to be “current” if they were ongoing or completed in 2009 or later. As such, the review does not include projects completed prior to 2009 that may have contributed to

¹ Formed in 2010, the Adaptation Partnership is chaired by Costa Rica, Spain and the United States. Its goal is to encourage effective adaptation by serving as an interim platform to catalyze action and foster communication among the various institutions and actors engaged in the effort to scale-up adaptation and resilience around the world.

building local and national adaptive capacity. The review only identifies those actions currently underway; it does not offer judgment of the effectiveness of actions taking place. In addition, reflecting the desk-based nature of the review, it is acknowledged that the content is biased toward identification of large-scale projects funded by international development assistance organizations. As such, small-scale projects that meet the review's definition of adaptation action, particularly those occurring at the community level, are not fully represented within the review.

Climate Vulnerability

The climate of southern Africa is generally subtropical, but is characterized by a varied latitudinal rainfall distribution. The southernmost countries of Botswana, Lesotho, Namibia, South Africa and Swaziland experience a low rainfall index and high variability, while the northernmost countries of Malawi, Mozambique, Zambia and Zimbabwe experience higher annual rainfall and lower variability (UNEP and ICRAF, 2006). This diversity of climatic conditions is reflected in southern Africa's wide array of agro-ecological zones (UNEP and ICRAF, 2006). Studies suggest that the climate of southern Africa changed during the 20th century: mean annual temperature rose by approximately 0.5°C; inter-annual rainfall variability increased since the 1970s; the extent and intensity of drought events grew over the past several decades; and the occurrence of heavy rainfall events escalated in a number of countries (UNEP and ICRAF, 2006; Boko *et al*, 2007, and citations therein; SEI, 2008).

Determination of whether these observed changes are indicators of how southern Africa's climate will change in the future is challenging due to limited understanding of two of the key processes that drive the region's climate—the El Nino-Southern Oscillation and the Inter-Tropical Convergence Zone. Development of climate projections is also hampered by deficiencies in Africa's meteorological data and the limited capacity of current Global Circulation Models to replicate African conditions. Within these limitations, available projections suggest that southern Africa may experience a mean annual temperature rise of between 1.9 and 4.8°C (with a mean of 3.4°C) by the period of 2080 to 2099 (Christensen *et al*, 2007). Greater uncertainty remains regarding how precipitation patterns may shift in southern Africa. Existing studies, though, suggest that mean annual rainfall in the region as a whole will decline by the period of 2080–2099, with the greatest decline occurring during June to August. An increase in the intensity of high-rainfall events is also projected to occur (Christensen *et al*, 2007). Rising air and sea surface temperatures have the potential to lead to more frequent and intense tropical storms in the southern Indian Ocean (Christensen *et al*, 2007) and to more frequent droughts (NCAR, 2005).

These projected climatic trends are anticipated to adversely affect a variety of socioeconomic sectors in southern Africa. Of particular concern to countries in the region are the projected impacts of climate change on agricultural systems, the quantity and quality of freshwater resources, coastal zones, fisheries, forests, biodiversity and tourism. These concerns include:

- *Agriculture*—As rain-fed agriculture is a significant source of employment and a large proportion of many countries' economies, concerns include: potential decreases in the extent of land suitable for rain-fed agriculture; possible impacts on the production potential of

certain crops, including maize; projected shifts in growing seasons; increased rates of evapotranspiration; enhanced vulnerability of the livestock and pastoralism sectors to heat stress and drought; and negative impacts on food security.

- *Freshwater resources*—Particularly in countries that are already water stressed and in island states that have limited access to ground and surface water, concerns include: decreased water quality and availability; saline intrusion in coastal areas; potentially significant decreases in stream flow and runoff; and negative impacts on hydropower production.
- *Coastal zones and fisheries*—As coastal areas are home to large populations and the site of critical economic activities, concerns include: enhanced coastal erosion due to sea level rise; damage to coastal infrastructure; shifts or declines of fish populations due to coral reef bleaching and changes in ocean upwelling and currents, with consequent implications for food security and local economies; loss of marine resources and biodiversity; and associated negative impacts on tourism.
- *Human health*—As human health is already compromised in the region due to factors such as underdeveloped health infrastructure, high levels of poverty and a high incidence of HIV/AIDS, concerns include: increased food insecurity; malnutrition and water scarcity; diarrheal sicknesses; and the possibility of greater spatial and temporal transmission of malaria, cholera and schistosomiasis.
- *Biodiversity and tourism*—The region’s diverse array of agroecological zones and large tourism sector has raised concerns regarding: greater movement of the sand dune fields of the Southern Kalahari basin; an increase in the number of species identified as critically endangered or extinct; changes in ecosystems; and possible negative impacts on tourism.

Identified Adaptation Needs and Priorities

A number of common adaptation priorities have been identified by southern African countries through expert studies, National Communications to the United Nations Framework Convention on Climate Change (UNFCCC), National Adaptation Programmes of Action (NAPAs), national strategies and other sources. These shared concerns stem in part from the high dependence of many countries on climate-sensitive sectors, such as agriculture (crop and livestock), tourism, fisheries and forestry (Madzwamuse, 2010). All countries have identified agriculture as a priority area for adaptation action, with other common priorities including freshwater resources, coastal zones and fisheries, disaster risk management, forestry and human health. A wide range of adaptation priorities in these socioeconomic sectors have been identified, including the following (UNEP and ICRAF, 2006; BMWTC, 2001; WWF, 2011; NMET, 2008; CMRDFHE, 2006; ZMTENR, 2007; MICOA, 2007; MMNRE, 2006; SNCCC, 2009):

- *Agriculture*: crop switching; planting new seed varieties; improving water forecasting systems; raising awareness of the effects of climate change within farming communities; enhancing water efficiency and irrigation measures; instituting rainwater storage systems; agroforestry; and drought early warning systems.
- *Freshwater resources*: water conservation, recycling and efficiency measures; inter-basin water transfer; improved water resource planning; regional water partnerships; short-term

contingency planning; and drought relief measures, as well as better drought monitoring and forecasting.

- *Disaster risk reduction and meteorological research*: the establishment or expansion of weather monitoring stations; meteorological training; the creation of early warning systems for different climate-related threats; and the improvement of channels of communication between weather monitoring stations and remote communities.
- *Coastal zones and fisheries*: formulation of integrated coastal zone management strategies; enhanced climate change research and data collection and the possibility of sea level rise in the region; improved public awareness of the potential impacts of climate change and implications for fishery yields; and economic diversification.
- *Forestry*: reforestation and agroforestry; identification of species that are better adapted to higher temperatures and lower precipitation; development of alternative energy sources; and promotion of natural regeneration of indigenous forests.
- *Human health*: integration of climate change into prevention and monitoring programs for disease prevention; extension of treatment facilities; and improvement of monitoring and forecasting systems.

Policy-Level Actions

At the policy level, regional climate change collaboration is occurring through a few intergovernmental processes and shared projects and programs. At the intergovernmental level, adaptation concerns are being addressed to a limited extent through the Southern African Development Council (SADC),² the Common Market for Eastern and Southern Africa (COMESA)³ and the Indian Ocean Commission (COI).⁴ For instance, during the 29th SADC Summit in September 2009, a “regional campaign against climate change” was announced; and at the November 2009 SADC Meeting of Ministers of Environment and Sustainable, ministers resolved that adaptation to climate change remains a top priority for the region. For its part, COMESA established a Climate Change Initiative in 2007 that aims to encourage climate change protection while promoting economic prosperity. This initiative seems to have a stronger focus on mitigation while recognizing the potential for adaptation co-benefits.⁵ Perhaps the most active intergovernmental organization is the COI, which has established a climate change adaptation unit and is executing the regional project “ACCLIMATE” (adaptation au changement climatique).

At the country level, all countries in the region having submitted National Communications to the UNFCCC and the region’s six least-developed countries have prepared NAPAs. In addition,

² The SADC member states are the southern African countries of Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe, as well as Angola, the Democratic Republic of Congo and the United Republic of Tanzania.

³ The COMESA member states are the southern African countries of Comoros, Madagascar, Malawi, Mauritius, Seychelles, Swaziland, Zambia and Zimbabwe; as well as Burundi, the Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Rwanda, Sudan and Uganda.

⁴ The COI member states are Comoros, Madagascar, Mauritius, Reunion (France) and Seychelles.

⁵ Further information is available at:

http://programmes.comesa.int/index.php?option=com_content&view=article&id=160&Itemid=98&lang=en.



Namibia, Seychelles, South Africa and Zambia have prepared, or are preparing, comprehensive national adaptation plans. The effectiveness of these overarching strategies and the degree to which they are being implemented is not immediately apparent. In addition, Botswana, Lesotho, Madagascar, Malawi, Namibia, Seychelles and Swaziland mention climate change adaptation considerations within their national development plans and/or key sectoral policies. However, it is unclear the degree to which meaningful integration of adaptation has occurred.

Projects and Programs that Support Adaptation

Southern African countries are engaged in the implementation of a breadth of projects designed specifically to meet their individual needs as well as those that bring them together with developing countries from Africa, Asia, the Pacific, Latin America and the Caribbean. Reflecting their individual circumstances, the extent to which countries are participating in these projects varies, with the greatest number appearing to be underway in Mozambique and Malawi, and the least in Botswana, Comoros, Lesotho, Seychelles, Swaziland and Zimbabwe.

In nearly all countries, a greater number of multi-country projects are being implemented than unique national adaptation projects. The focus of these country-specific national projects varies in response to individual country's needs and circumstances, but they generally target agriculture, freshwater resources, disaster risk management, coastal zone management and biodiversity. Other socioeconomic areas in which adaptation is being built include human health, ecosystem conservation, marine management, urban areas, forestry, tourism, migration and fire management.

Several multi-country projects have been developed that specifically aim to support adaptation within southern Africa. Examples include the "Regional Science Service Centre for Adaptation to Climate Change and Sustainable Land Management in Southern Africa," "Southern Africa Regional Climate Change Program" and "Regional Initiative for Smallholder Agriculture Adaptation to Climate Change in the Indian Ocean Islands." The main benefactors of these regional actions are Botswana, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. By socioeconomic area of focus, the majority of southern Africa regional projects are focused on the agricultural sector, disaster risk management and strengthening governance capacity. Projects also target adaptation needs related to urban areas, freshwater fisheries and ecosystems. None of the regional projects identified has as strong focus on freshwater resources, forestry and human health. Southern African countries are also participating in a number of Africa-wide and global projects, such as the Africa Adaptation Program, "Climate Change Adaptation and Development Initiative," "Global Climate Change Alliance" and "Pilot Program for Climate Resilience."

A number of multilateral organizations, bilateral donors and foundations are financing southern Africa's current adaptation projects. Prominent among these are the Adaptation Fund, the EC, Global Environment Facility (GEF), International Development Research Centre (IDRC), Least



Developed Countries Fund, Special Climate Change Fund, and the governments of Denmark, Finland, Germany, Norway, Switzerland, U.K. and U.S.

Adaptation Communities of Practice

To facilitate the exchange of information, ideas and learned practices related to climate change adaptation, a few knowledge sharing networks are active in southern Africa. These include the Africa Partnership on Climate Change Coalition, Climate Action Network Southern Africa, Africa Adapt and fellows of the Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change.

Needs and Gaps

A considerable amount of regional and national adaptation planning and implementation is occurring in southern Africa, much of which is targeted toward these countries' identified adaptation priority areas of agriculture, freshwater resources, disaster risk management and governance capacity. Many of these projects support capacity building, research, knowledge communication, and policy formation and integration. Less action is occurring at the policy level, although some countries have initiated the development of dedicated adaptation strategies and plan to integrate adaptation considerations into policy and planning. At the inter-regional level, SADC, COMESA and COI have initiated a common action on climate change, but greater engagement may be warranted if the potential benefits associated with regional coordination and the sharing of information, knowledge and capacity are to be achieved.

Future adaptation action in southern Africa may need to consider the following:

- It appears that southern African countries are engaged in multiple actions within similar areas of focus, such as agriculture and freshwater sources, and it is important to ensure that current and future initiatives are complementary and build on lessons learned.
- Given that many projects are currently focused on the agriculture and freshwater sectors, and these are priority areas of concern for southern African countries, opportunities may exist for drawing together and sharing initial lessons—possibly through the formation of new communities of practice—particularly between countries that are actively engaged in adaptation projects at present and those where action is lower.
- Although some current projects focus on the priority areas of coastal zones, fisheries, forestry, human health, biodiversity, tourism and climate information services, these areas appear to be under-represented. At the national and regional level, greater adaptation programming in these sectors may be appropriate.
- Although not defined as priority areas by national governments, and addressed through a few current projects, greater effort also be directed towards improving adaptive capacity in urban areas and responding to the differential gender-based impacts of climate change.
- There may also be a need for more rigorous regional level downscaling studies that disaggregate the potential impacts of climate change according to sub-region.



- Where appropriate, future adaptation action in southern Africa could also transition more from capacity building towards more concrete implementation of adaptation action in particularly vulnerable sectors and communities.

Review of Existing and Planned Adaptation Action: Southern Africa

1.0 Introduction

Southern Africa—composed of Botswana, Comoros, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe—is a region characterized by considerable disparity in terms of geographic characteristics, population size and economic strength. The region contains three countries with extensive coastlines along the Indian and Atlantic Oceans (Mozambique, Namibia and South Africa); four island states (Comoros, Madagascar, Mauritius and Seychelles); and several landlocked states (Botswana, Lesotho, Malawi, Swaziland, Zambia and Zimbabwe). South Africa is the largest country in terms of both size (1.219 square kilometers) and population (50.133 million people); while Seychelles is the smallest (covering 455 square kilometers and having a population of 87,000 people) (CIA, 2011; UNESA, 2011). The region includes low-lying coastal areas, high plateaus, forests, open savannahs, and the Kalahari and Namib deserts.

Figure 1: Southern Africa Map



Source: Modified from African Development Bank (2011)

Economically, some countries in the region have been able to diversify their economies and achieve considerable per capita economic growth (e.g., Botswana, the Seychelles and South Africa). However, six countries in the region are characterized as being among the least developed in the world: Comoros, Lesotho, Madagascar, Malawi, Mozambique and Zambia. The majority of Africans within this region remain dependent on rain-fed agriculture for their livelihoods and more than half live below the poverty line (Madzwamuse, 2010). These factors contribute to southern Africa’s vulnerability to the impacts of climate change.

To better understand how southern African countries are preparing for the projected impacts of climate change, this report provides a rapid review of current and planned adaptation action within the region. Based on available resources, it examines: identified priority adaptation needs; efforts by governments to support adaptation through policy and planning; the scope of international support for adaptation efforts in different countries and sectors; and potential gaps in adaptation efforts at the country and regional level. The main body of the report provides an overview of adaptation action at the regional level, highlighting commonalities and differences between the 13 countries within this region: Botswana, Comoros, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe. Adaptation efforts in each of these countries are discussed in the appendices.

2.0 Methodology

A rapid review of current and planned adaptation action in southern Africa—one that gives attention to policies, programs and projects at the national and regional level—presents a considerable task given the breadth of actions that can and are being taken to reduce vulnerability to the short, medium and long-term impacts of climate change. Therefore, prior to undertaking this review it was necessary to clarify the terms that would be used within it and establish a set of parameters to limit its scope. This section provides an understanding of the research parameters established for this rapid review and the process by which the information it contains was gathered. These guidelines are presented to help clarify what the study aims to achieve.

Definition of “Adaptation Action”

Adaptation is generally defined as being an “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.”⁶ Given the breadth of actions that may be taken which are in keeping with this definition, a critical first step in initiating the rapid review was determining the definition of “adaptation action” to be used within it.

This process was influenced by the outcomes of a review of 135 “adaptation” activities undertaken by McGray et al (2007) that led to identification of three different models of adaptation activity:

- *Serendipitous adaptation*—“activities undertaken to achieve development objectives [that] have outcomes that incidentally may also support adaptation” (McGray et al, 2007, p. 13). This type of adaptation reflects the widely acknowledged intimate linkage between sustainable development and building capacity to adapt to the impacts of climate change. Specifically, sustainable development can enhance adaptive capacity by strengthening institutions, promoting sound management of natural resources, improving health and education systems, promoting gender equity and fostering economic growth.

⁶ UNFCCC glossary of climate change acronyms: http://unfccc.int/essential_background/glossary/items/3666.php.

- *Climate-proofing of development efforts*—where activities are “added to an ongoing development initiative to ensure its success under a changing climate. In these cases, adaptation is seen as a means to a development end” (McGray et al, 2007, p. 13); and
- *Discrete adaptation*—where “adaptation to climate change is the primary objective of a project or initiative. From the beginning, implementers and funders of these efforts have climate change in mind” (McGray et al, 2007, p. 13).

While recognizing the critical role of serendipitous adaptation and climate-proofing of development efforts in fostering adaptation to climate change in developing countries, a review of all three types of adaptation activities would be unmanageable. This study therefore focuses on an examination of discrete adaptation activities. Therefore, adaptation action within the review is defined as *policies, programs and projects designed and implemented specifically to address the current and projected impacts of climate change*. As such, specific reference has been made to supporting adaptation to climate change, and/or climate risk reduction in the objectives and/or rationale of each policy, program or project included in the study.

Due to the selection of this definition, the review automatically presents a narrow snapshot of the wide breadth of activity (often funded through official development assistance⁷) that is helping developing countries build adaptive capacity and reduce their vulnerability to the impacts of climate change. Therefore, the review should not be viewed as fully representative of the entirety of adaptation action occurring in developing countries—nor of the degree to which vulnerability reduction is occurring in the countries and regions profiled. Rather, the review aims to contribute to understanding of the identified adaptation needs and priorities of different countries and regions and the degree to which discrete adaptation activities are contributing to meeting these needs.

Definition of “Current” Action

To further focus the study, adaptation action have been deemed to be “current” if they were ongoing or completed in 2009 or later. As such, the review does not include a range of projects completed prior to 2009 that may have significantly contributed to building local and national adaptive capacity. This observation is particularly true of adaptation action in the Caribbean and Pacific; reflecting the early interest and commitment of small island developing states (SIDS) to understanding and reducing their vulnerability to the impacts of climate change, countries in these regions began to explore adaptation concerns as early as the late 1990s.

While the review’s definition of “current” adaptation action limits the scope of the study, the volume of discrete adaptation initiatives has accelerated in recent years, as reflected in the following trends:

⁷ In 2010, official development assistance totaled US\$128.7 billion (OECD, 2011)—a level of funding that significantly outstrips that which is currently provided in support of adaptation to climate change. See, for example, SEI and UNEP (2010).

- Financing for approved projects through the Least Developed Countries Fund has risen from nearly US\$24 million in 2008 to US\$177 million as of mid-2011;⁸
- Adaptation financing through the Special Climate Change Fund has increased from 22 projects worth nearly US\$90.73 million in 2009 (GEF, 2009) to 31 projects approved for financing in the amount of US\$128 million as of mid-2011;⁹ and
- Financing for adaptation by four Bilateral Financial Institutes increased by 31 per cent from US\$3,029 million in 2008 to US\$3,963 million in 2009 (SEI and UNEP, 2010).

Therefore, the review reflects the growing number of adaptation efforts initiated in recent years.

Identification of Projects and Programs

A wide range of climate adaptation related initiatives are underway throughout the world—covering the gamut from original scientific research that informs our understanding of current and future climate patterns, to capacity building and knowledge sharing, to the adoption of new planting practices by farmers, to the building of infrastructure that anticipates future climatic extremes. While acknowledging this diversity, to better achieve the specific objectives of the review, it has focused on time-bounded projects that support preparation for and/or implementation of practical adaptation action. As such, the review does not include projects and programs that focus on:

- conducting original scientific research that enhances knowledge of climate change impacts and development of the tools and techniques for reducing vulnerability;
- ongoing, long-term monitoring efforts (whether climatic or socio-economic) that are needed to inform decision-making;
- stand-alone capacity building and knowledge sharing workshops, conferences and training programs; and
- activities solely related to participation in the ongoing international climate change negotiations.

As well, the review only captures adaptation action financed through international development assistance; it does not capture adaptation efforts financed solely by national governments. This focus reflects the original impetus for conducting the review—the current scaling up of adaptation action and the potential for duplication of effort and limited sharing of good practice—and the challenge of rapidly identifying nationally funded adaptation projects. This parameter is particularly important for countries such as Brazil and China, whose governments are engaged in self-driven and self-funded adaptation efforts that are not included within this review.

Data collection

Projects and programs were primarily identified through a desk-based review of the websites of UN agencies, bilateral development agencies, multilateral financial institutions, international research organizations and non-governmental organizations. Reflecting the desire for a rapid review, a

⁸ GEF, Least Developed Countries Fund website: <http://www.thegef.org/gef/lDCF> (accessed September, 2011).

⁹ GEF, Special Climate Change Fund website: <http://www.thegef.org/gef/sccf> (accessed September, 2011).



comprehensive examination of all of these organizations was not undertaken; rather an emphasis was placed on capturing initiatives involving organizations generally recognized as being actively engaged in fostering climate change adaptation. Additional information regarding current and planned adaptation action was gathered through an examination of relevant reports.

The process by which data were gathered for inclusion in the review has biased its content. Notably, it is highly likely that a number of small-scale projects meeting the review's definition of adaptation action, particularly those occurring at the community level, have not been captured. As well, the accuracy of the data captured in the review significantly depends upon the accuracy and completeness of the internet resources used.

Classification of projects

To support analysis of the degree to which ongoing projects are addressing the priority adaptation needs of developing countries, identified initiatives have been classified in relation to two general characterizations—their sector or areas of focus and the types of activities being implemented. For the sectors or areas in which projects are supporting adaptation action, a classification system comprised of the following 14 macro project categories was developed: food, fiber and forests; ecosystems; freshwater resources; oceans and coastal areas; disaster risk management; migration and security; gender; business; infrastructure; human settlements; human health; climate information services; governance; and multi-sectoral. These macro project categories were then divided further to provide a more detailed picture of the types of projects identified through the review. For example, the macro project category of “food, fiber and forests” was sub-divided into agriculture, pastoralism, forestry and fire management. Current adaptation projects were then labeled in relation to one or more of these sub-categories.

For the types of projects being implemented, a shorter list of categories was developed. Current adaptation projects have been assessed in relation to the degree they support research, assessment, capacity building, knowledge communication, policy formation and integration, field implementation and community-based adaptation. A fuller discussion of the project classification system used during this review is provided at the beginning of the appendices.

Gender analysis

Within the review, assessments of the degree to which gender-sensitive adaptation action are underway in different countries and regions has focused solely upon the extent to which addressing gender inequalities is a specified objective of projects and programs. The review did not assess the degree to which individual projects and programs may or may not have integrated gender issues into their detailed design.¹⁰ Therefore, the gender analysis provided in the review should not be viewed as fully representative of the degree to which current adaptation action is gender-sensitive.

¹⁰ For example, a project may have as its objective building resilience in the agriculture sector and target farmers in general. As no reference to gender is made in the project's objectives, it would not be considered a gender-focused

Assessment of the effectiveness of adaptation action

It should also be noted that this rapid review does not assess the quality or effectiveness of the project and programs it includes. Therefore, the review does not provide a basis upon which to judge the degree to which completed and ongoing projects have either achieved their stated objectives and/or made a positive contribution to increasing the ability of a country or region to adapt to the impacts of climate change. It only provides an indication of the intended outcomes of the identified initiatives, the type of action being taken (e.g., capacity building, policy integration and implementation of practical actions) and their area of focus (e.g., agriculture, water and health).

Scientific Information

Synopsis of projected changes in climate in different countries and regions included in the review are based primarily on the content of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) and national assessment reports (e.g., National Communications). New scientific analysis published since the completion of these reports may have both refined and presented revised understandings of the projected consequences of climate change in different regions of the world. Therefore, the climate projection sections of the review should be viewed as indicative of anticipated trends in climatic change at the time of publication of the cited reports.

Qualification of Degree of Adaptation Action

To evaluate and consistently describe the relative level of adaptation activity occurring by country in each region, a simple benchmarking process has been applied across the review. Using a scale from zero to “X”, where “X” is equivalent to the number of current adaptation projects underway in the country in a particular region with the largest number of current projects,¹¹ the scale was divided into five equivalent quintiles. Each quintile was then assigned a descriptor as follows:

- “Very Low” level of adaptation action = 0 to 20 per cent of “X;”
- “Low” level of adaptation action = 21 to 40 per cent of “X;”
- “Moderate” level of adaptation action = 41 to 60 per cent of “X;”
- “High” level of adaptation action = 61 to 80 per cent of “X;” and
- “Very High” level of adaptation action = 81 to 100 per cent of “X”.

All countries in the region were allocated to one of these quintiles based on the total number of current adaptation projects and programs identified through the review.

This benchmark approach enabled a standard methodology to be applied across all 12 regions examined in the Review of Current and Planned Adaptation Action while also recognizing their

adaptation action within the review. This finding would stand even if the detailed design of the project includes having set targets to ensure the involvement of female farmers.

¹¹ In other words, the country in the region with the highest total number of current adaptation projects was identified and used as a benchmark against which to assess performance in all other countries.

individual differences. (For example, the smaller geographies and populations of SIDS suggest that hosting, for instance, 15 projects might reflect a higher level of activity than what might be possible for larger and more populated countries.) However, this methodology does not assess the financial size of individual projects; small projects are given equal weight in comparison to large projects. This approach also does not account for a country's comparative geographic size, population, level of development and other factors that may affect its level of adaptation activity. Therefore, these contextual influences are discussed within individual country profiles and regional comparisons.

Countries and Regions Incorporated in the Review

The following criteria were considered to identify countries to be included in the Review of Current and Planned Adaptation Action in Africa, Asia-Pacific and Latin America and the Caribbean, and determine their regional allocations:

- Inclusion only of non-Annex I Parties to UNFCCC;
- Allocation by region in accordance with the classification system used by the United Nations Statistics Division (UNSD, 2010); and
- The Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee's list of countries eligible to receive official development assistance in 2009 and 2010 (OECD, 2009).

Definition of "Communities of Practice"

Communities of practice traditionally have been defined as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2006). These groups are usually defined by a shared domain of interest and relationships that enable mutual learning. Broadly speaking, two different types of communities of practice with an interest in adaptation to climate change may be identified as:

- Established communities of practice, usually defined by a sector or issue, which have begun to integrate consideration of adaptation needs and priorities into their existing knowledge sharing efforts (e.g., a community of foresters discussing methods of integrating projected climate risk into their management planning); and
- New communities of practice established specifically due to a shared interest in adaptation to climate change (e.g., community-based adaptation experts).

Of these two broad groupings, the review gives attention only to communities of practice, which originated due to their shared interest in adaptation to climate change. This includes networks of non-governmental organizations actively engaged in sharing information regarding climate change. This focus reflects the greater challenge of identifying and assessing the degree to which the vast array of traditional associations and networks have begun to integrate adaptation concerns into their discussions.

Anticipated Reader

Finally, it should be noted that the review has been written in a manner that assumes that its readers will have a basic understanding of adaptation to climate change. As such it does not provide definitions of terms such as “National Communication” or “National Adaptation Programmes of Action.” Nor are explanations of key concepts included, such as “adaptive capacity,” “mainstreaming,” the relationship between climate change and development, or the challenges associated with the implementation of adaptation actions at the policy and program levels.

3.0 Climate Projections

Broadly speaking, southern Africa has a subtropical climate, but conditions vary considerably across its land area. The region is characterized by a latitudinal distribution of rainfall, with the southernmost countries (Botswana, Lesotho, Namibia, South Africa and Swaziland) experiencing a low rainfall index and high variability, and northernmost countries (Malawi, Mozambique, Zambia and Zimbabwe) experiencing higher annual rainfall and lower variability (UNEP and ICRAF, 2006). Rainfall in the region is also variable inter-annually, especially in the more arid, western regions. This diversity of climatic conditions is reflected in southern Africa’s wide array of agro-ecological zones (UNEP and ICRAF, 2006).

Studies suggest that southern Africa warmed by approximately 0.5°C over the course of the 20th century (UNEP and ICRAF, 2006), and that the number of warm spells in the region increased between 1960 and 2000. Observations in South Africa, for example, indicate warming at a rate of 0.1 to 0.3°C per decade, with minimum temperatures increasing slightly more quickly than maximum and mean temperatures (Boko *et al*, 2007, and citations therein). In contrast, no changes in long-term precipitation trends have been identified, although there has been an observed increase in: inter-annual rainfall variability since the 1970s; an increase in the extent and intensity of drought events over the past several decades; an escalation in below-normal annual rainfall; a considerable increase in heavy rainfall events in countries like Angola, Namibia, Mozambique, Malawi and Zambia; and a statistically significant rise in the duration of the dry season from 1961 to 2005 (UNEP and ICRAF, 2006; Boko *et al*, 2007, and citations therein; SEI, 2008). These recent climate trends have had a discernible impact upon the economy, food security and broader development of southern African countries—impacts that may be exacerbated in the future with the anticipated impacts of climate change (Eriksen *et al*, 2008; UNEP and ICRAF, 2006).

Long-term forecasts of climate change in southern Africa is challenging due to a combination of factors. First, climatic patterns in the region are highly influenced by the El Nino-Southern Oscillation (ENSO) and the Inter-Tropical Convergence Zone (ITCZ)—both of which are difficult to capture in climate models. The ENSO phenomenon is the dominant perturbation responsible for inter-annual climate variability in southern Africa (Obasi, 2005; Hulme *et al*, 2005). During its warm El Niño phase, southern Africa typically experiences drier conditions between December and

February, while the reverse occurs due the cooler La Niña phase. This pattern has been linked to the occurrence of severe droughts and floods¹² in the region (Werft *et al*, 2004; Boko *et al*, 2007). The ITCZ is a low pressure and heavy precipitation weather system the moves throughout the year from north to south as the Earth rotates (Conway, 2009). Its movement contributes to the formation of southern Africa rainy (November to April) and dry (May to October) seasons. The mechanisms of these phenomena are not well understood, and it is unclear how the ENSO and ITCZ might be altered as global temperatures rise (Conway, 2009).

In addition, understanding of historical climatic conditions and trends in Africa

is limited by a paucity of detailed meteorological data. Across the continent, but particularly in central Africa and the Horn of Africa, the density of meteorological stations is below the global standard set by the World Meteorological Organization (Conway, 2009). Finally, in general, Global Circulation Models (GCM) for Africa are limited with respect to their capacity to simulate: feedback mechanisms responsible for rainfall variability; vegetation feedback; dust aerosol feedbacks; land surface modifications, such as deforestation in equatorial Africa; soil moisture in southern Africa; and sea surface temperature anomalies—the latter of which is particularly important for southern Africa (Boko *et al*, 2007; Christensen *et al*, 2007, and citations therein).

Within these limitations, available climate predictions indicate that southern African countries may experience a mean annual temperature increase of between 1.9 and 4.8°C (with a mean of 3.4°C) by the period of 2080 to 2099 as presented in Table 1 (Christensen *et al*, 2007).¹³ Warming is likely to be greatest during the period of September to November (Christensen *et al*, 2007).

Table 1: Projected changes in surface air temperature and precipitation in southern Africa 2080 to 2099

Season	Projected Temperature Change (°C)				
	Min.	25%	50%	75%	Max.
DJF	1.8	2.7	3.1	3.4	4.7
MAM	1.7	2.9	3.1	3.8	4.7
JJA	1.9	3.0	3.4	3.6	4.8
SON	2.1	3.0	3.7	4.0	5.0
Annual	1.9	2.9	3.4	3.7	4.8
Projected Precipitation Change (%)					
DJF	-6	-3	0	5	10
MAM	-25	-8	0	4	12
JJA	-43	-27	-23	-7	-3
SON	-43	-20	-13	-8	3
Annual	-12	-9	-4	2	6

Projections based on use of 21 global Atmosphere-Ocean General Circulation Models for the A1B scenario. Projections compared to mean temperature and precipitation responses for each model between 1980 and 1999 period from the 20th Century Climate in Coupled Models (20C3M) simulations. The table shows the minimum, maximum, median (50%), and 25 and 75% quartile values among the 21 models. Projections represent an average over the area of 35°S to 10°E and 12°S and 52°E.
Source: derived from Christensen *et al*, 2007, p. 854

¹² For example, most of the major floods that have occurred in Mozambique can be associated to La Niña events. These include the flooding of the Save River in 1972, Buzi River in 1973, the Incomati River in 1976, the Limpopo River in 1977, the Umbeluzi River in 1984, and the floods in the central and southern regions of the country in 2000 that caused the worst flooding in Mozambique in almost 50 years (Hoffmann *et al*, 2009).

¹³ This projection is based on averages generated by 21 global models in the multi-model data set for the A1B emissions scenario (a medium-high emissions scenario) and assessed in comparison to a base time period of 1980 to 1999. A 3.4°C rise in temperature represents the mean level within a projected range of 1.9 to 4.8°C (Christensen *et al*, 2007, p. 854). Other studies using the A1F1 emissions scenario (a high emissions scenario) suggest that temperatures could rise by up to 7°C in September to November for the period of 2070 to 2099 (Boko *et al*, 2007).

Shifts in precipitation patterns are expected in southern Africa, although greater uncertainty persists regarding the degree of change and the implications of climate change with respect to shifts in the timing, duration and intensity of seasonal rains. Certain areas of southern Africa are anticipated to experience increases and others decreases from current norms (BMWTC 2001; NMET 2002). Available data, as summarized in the 2007 Assessment Report of the IPCC and presented in Table 1, suggest that mean annual rainfall will decline by the period of 2080 to 2099 (Christensen *et al*, 2007). The greatest change is projected to be a decline in precipitation during austral winter (June to August) over much of the region, particularly in the extreme west of southern Africa¹⁴ (Christensen *et al*, 2007). A study released since publication of the IPCC's 2007 report suggests that precipitation declines may occur in the near future—forecasting significant reductions in annual rainfall and water availability by 2030 (Tingiu and Ringler, 2010). As in other parts of Africa, the intensity of high-rainfall events is projected to increase in southern Africa (Christensen *et al*, 2007).

Rising temperatures, accompanied by warming of the Indian Ocean, could also lead to changes in the patterns of extreme weather events in southern Africa. Although research on extreme events specifically within Africa is limited (Christensen *et al*, 2007), more frequent and intense tropical storms are projected to arise in the southern Indian Ocean by the period of 2080 to 2100 (Boko *et al*, 2007), with implications for the island states of Comoros, Madagascar, Mauritius and the Seychelles, as well as for Mozambique. However, uncertainty remains regarding the frequency and intensity of tropical storms and the potential impact of tropical cyclones¹⁵ on Africa's southeast coast (Christensen *et al*, 2007). In addition, warming of the Indian Ocean is likely to cause increased frequency of droughts (NCAR, 2005).

Sea level rise, which is projected to be between 0.18 and 0.6 meters¹⁶ globally over the course of this century, will affect the coastal areas of southern Africa as well. Southern Africa identified as being one of five regions of the world at particular risk of coastal and deltaic flooding (Boko *et al*, 2007). Sea level rise is also expected to bring about the intrusion of saltwater into lagoons, coastal lakes and coastal aquifers, with impacts on local fisheries, aquaculture and drinking water sources. A rise in sea level and an increase in storm surges could likewise threaten coastal infrastructure and industry, and could lead to short-term migration from coastal settlements (Boko *et al*, 2007).

¹⁴ During this season, rainfall in the period of 2080 to 2099 could decline by 23 per cent in comparison to its seasonal mean level in 1980 to 1999 and could decline by up to 40 per cent in the extreme west of southern Africa. Projections are based on the use of the A1B emissions scenario (Christensen *et al*, 2007).

¹⁵ Projections of tropical cyclones are challenging due to limited historical data and because their significant fluctuations in frequency and intensity make it difficult to detect long-term trends. As such, projections of changes in particular basins are currently uncertain. However, when looking at the Earth as a whole current models suggest that warming due to greenhouse gas will lead to more intense storms on average, a decrease in the frequency of tropical cyclones, and an increase in the frequency of the most intense cyclones among those that occur (Knutson *et al*, 2010).

¹⁶ IPCC emissions scenarios present a range of sea level rise predictions, based on various emissions scenarios and resulting from thermal expansion of the oceans and land ice changes. On one end of the spectrum, under the B1 emissions scenario of the Special Report on Emissions Scenarios (2001), global sea levels are expected to rise from between 0.18 to 0.38 metres over the course of the century. On the opposite end of the spectrum, emissions scenario A1F1 predicts a global sea level rise of between 0.25 and 0.6 metres over the same time period. There is still a significant amount of uncertainty in these projections because records on sea level rise remain relatively short and there are uncertainties relating to the loss of land ice (Meehl *et al*, 2007).

Regional climate models (RCM) are more readily available for southern Africa than other regions of the continent (Christensen *et al.*, 2007). Temperature scenarios generated by RCMs often anticipate smaller temperature increases in comparison to GCMs. For southern Africa, RCM results have projected (using the A2 emissions scenario) that mean surface air temperatures would increase by 3.72°C (+/- 0.66°C) during the period of December to February and by 3.97°C (+/- 0.77°C) between June and August from 2071 to 2100 (Hudson and Jones, 2002).¹⁷

Other downscaling studies have revealed nuances in future precipitation changes in the region. For example, a downscaling experiment for South Africa suggests that the central and eastern plateau of this country will experience increased summer rainfall. Other modeling results have predicted a decrease in early summer rainfall (October to December) on the western side of the continent and an increase in late summer (January to March) rainfall over the eastern areas of southern Africa (Boko *et al.*, 2007, and citations therein). RCM results have also supported projections of greater rainfall intensity (Christensen *et al.*, 2007). Although a number of downscaled regional climate models for southern Africa are being developed by various research institutes, they are not yet widely accessed and used by local adaptation actors. There is a need to further this work to anticipate the future impacts of climate change in southern Africa (SEI, 2008).

Collectively, these warming trends, changes in precipitation patterns and the incidence of droughts, floods and other extreme weather events are expected to lead to altered river flows, biodiversity loss, damage to infrastructure, and compromised agriculture and food security, among other impacts (Boko *et al.*, 2007; Erikson *et al.*, 2008). These changes represent a potentially significant challenge to the region's sustainable development.

4.0 Needs and Priorities within Southern Africa

Although the national circumstances of southern African countries are diverse, encompassing a range of levels of economic and social development, they share similar vulnerabilities to climate change, as identified in Table 2. Through National Communications to the UNFCCC, NAPAs, expert studies and national climate change strategies countries in the region have identified similar adaptation priorities. These shared concerns stem in part from the fact that the economies of many countries in the region are dependent on climate sensitive sectors, such as agriculture (crops and livestock), tourism, fisheries and forestry (Madzwamuse, 2010). The region's priority areas for adaptation are captured by the following key categories: agriculture, including crop production and livestock; freshwater resources; coastal zones and fisheries; disaster risk management and meteorological research; and forestry. Additional areas of concern for many countries are: human

¹⁷ Results based on a study by Hudson and Jones (2002) using the HadRM3H RCM with the A2 emissions scenario and defining southern Africa as being from the equator to 45°S and from 5° to 55°E, which includes parts of the surrounding oceans (Boko *et al.*, 2007).

Table 2: Priority areas of concern in southern African countries

	Botswana*	Comoros	Lesotho	Madagascar*	Malawi*	Mauritius	Mozambique	Namibia*	Seychelles*	South Africa	Swaziland	Zambia	Zimbabwe*
Agriculture	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Freshwater resources	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Coastal zones & marine fisheries		✓		✓	✓	✓	✓	✓	✓				
Forestry				✓	✓	✓		✓			✓	✓	✓
Human health		✓		✓				✓		✓		✓	
Land use management	✓	✓	✓							✓		✓	
Biodiversity and ecosystems	✓		✓					✓				✓	
Governance capacity			✓					✓	✓		✓		✓
Disaster risk management and climate research	✓	✓		✓	✓		✓		✓			✓	✓
Tourism	✓			✓		✓			✓	✓			

* Some priority sectors were identified from other studies or workshops independent and/or in conjunction with national studies.

Sources: Botswana (BMWTC 2001; Wingqvist and Dahlberg, 2008); Comoros (CMRDFHE, 2006; CMDIPTIT, 2002); Lesotho (LMNR, 2004, 2007); Madagascar (MMEWF, 2006, 2010; CI & WWF, 2008); Malawi (ActionAid, 2006; MMNRE, 2006); Mauritius (RMMS, 2009; ROM, 1999); Mozambique (MICOA, 2003, 2007); Namibia (Reid et al, 2007; NMET 2009); Seychelles (GOS, 2000; IFRC, 2010); South Africa (Benhin et al, 2006; SADEAT, 2003, 2004; GOSA, 2000; Madzwamuse, 2010); Swaziland (SMPWT, 2002); Zambia (ZMTENR, 2007; CEEPA], 2006); and Zimbabwe (Man and Nhemachena, 2006; Zvigadza et al, 2010)

health; land use management; biodiversity and ecosystems; governance capacity; and tourism. It is notable that many of the least developed countries in the region prioritized agriculture and freshwater as areas in which action is most urgently required, ahead of other priority areas.

Agriculture

Across Africa, by the 2080s, the IPCC projects climate change will significantly reduce the extent of land suitable for rain-fed agriculture and the production potential of cereal crops. In southern Africa, maize production, for example, could be noticeably reduced should ENSO conditions become more frequent. Agriculture production in the region as a whole could decline by 0.4 to 1.3 per cent (Boko et al, 2007, and citations therein). Additional concerns include projected shifts in growing seasons

and increased rates of evapotranspiration, as well as the adverse impacts of more frequent droughts and floods (Madzwamuse, 2010; UNEP and ICRAF, 2006). These changes will likely further challenge efforts to achieve food security in the region (Boko *et al*, 2007).

Given these anticipated changes, all of the countries in southern Africa identify their agricultural sector—and, by extension, food security—as being vulnerable to the effects of climate change. This focus reflects the region’s dependence on this sector. Although southern African countries like Botswana, Seychelles and South Africa have diversified and developed their economies, rain-fed agriculture remains a critical component of the economies of many countries in the region and the main livelihood activity of their populations (UNEP and ICRAF, 2006). For example, subsistence agriculture supports the livelihoods of approximately 50 per cent of the population of Botswana (BMWTC, 2001), 75 per cent in Madagascar (WWF, 2011), 80 per cent in Zimbabwe (Madzwamuse, 2010), and 90 per cent in Malawi (USDS, 2010). To reduce their vulnerability, many countries identify similar priority measures, including: crop switching; planting new seed varieties; improving weather forecasting systems; raising awareness of the effects of climate change within farming communities; enhancing water efficiency and irrigation measures; instituting rainwater storage systems; agroforestry; and early warning systems for drought.

In addition, many southern African countries—including Botswana, Lesotho, Madagascar, Mozambique and South Africa—are concerned about the vulnerability of their livestock production and pastoralism sectors. In response, they have identified a number of adaptation needs, including the expansion of protected areas, community-based natural resource management, improved rangeland management, sustainable herd management, monitoring of fire hazards, and diversification of breeds and species.

Freshwater resources

Future availability of freshwater resources is also a particular concern of many countries in the region, several of which currently experience water stress due to a combination of climate variability and governance concerns (Boko *et al*, 2007). By 2025—due solely to population growth rates and not taking into consideration climate change—water availability in Malawi and South Africa is projected to be 1,000 cubic meters per person per year, and between 1,000 and 1,700 cubic meters per person per year in Madagascar, Mauritius, Mozambique and Zimbabwe (Bates *et al*, 2008).¹⁸ The challenge is particularly acute in the region’s island states due to their limited access to ground and surface water (GOS, 2000; MMEWF, 2006). In continental southern Africa, climate change could bring about significant reductions in stream flow and, in some parts of the region, significant losses of runoff (Boko *et al*, 2007, and citations therein). These losses could affect hydropower production in the region, such as in the Zambezi Basin (Bates *et al*, 2007).

¹⁸ Water basins are defined as being water stressed if their availability of water per capita per year is less than 1,000 cubic meters based on long-term average runoff (Bates *et al*, 2007).

Priority adaptation measures listed by countries to address the risk of heightened water shortages and stress include: water conservation, recycling, and efficiency measures; inter-basin water transfer; improved water resource planning; regional water partnerships; short-term contingency planning; and drought relief measures, as well as better monitoring and forecasting of droughts (NMET, 2008; CMRDFHE, 2006; ZMTENR, 2007).

Disaster risk management and meteorological research

Reflecting the uncertainty associated with current climate projections, particularly with respect to extreme weather events (such as tropical cyclones, droughts and floods), southern African countries point to a need for enhanced research, data collection and monitoring capacity within the fields of meteorology. They also highlight a need to develop early warning systems that will enable governments to better anticipate and generate awareness of possible floods, droughts, disease outbreaks, coastal inundations and other climate-related threats. Adaptation actions put forward include: the establishment or expansion of weather monitoring stations; meteorological training; the creation of early warning systems for different climate-related threats; and the improvement of channels of communication between weather monitoring stations and remote communities (MICOA, 2007; MMNRE, 2006; ZMTENR, 2007; SNCCC, 2009).

Coastal zones and fisheries

The region's coastal countries and island states have all identified coastal zones as an area of concern; many also mention the challenge climate change presents for their fishing industry. Sea level rise will likely enhance coastal erosion and damage coastal infrastructure. By altering estuaries, coral reefs (e.g., through bleaching) and upwelling, climate change is also expected to adversely affect marine resources and lead to a loss of biodiversity. Should there be a reduction in river water flowing into deltaic areas, estuaries will also be affected by a decline in the availability of freshwater resources (Boko *et al*, 2007).

Particularly in conjunction with the ongoing degradation of coastal and marine resources (due to factors such as weak management structures and expanding populations), these changes potentially will have negative implications for national economies, local livelihoods and food security (as fisheries are an importance source of protein for many communities). For example, the fisheries sector generates 6 per cent of Namibia's GDP (Boko *et al*, 2007). In Mozambique, fisheries, tourism and sport provide livelihoods to 60 per cent of the population that lives within 50 kilometers of the country's extensive coastal zone—the majority of which is below sea level (GIZ, 2006; MICOA, 2007). And in the Seychelles, tourism and fisheries constitute the country's two largest economic sectors, and more than 90 per cent of its population and nearly all of its economic activities are concentrated in the narrow coastal zone of Mahe island (SNCCC, 2009).

Coastal and island countries within southern Africa have proposed a number of ways to reduce the vulnerability of their coastal areas and fisheries sectors, including: the formulation of integrated coastal zone management strategies; enhanced research and data collection on climate change and



the possibility of sea level rise in the region; improved public awareness of the potential impacts of climate change and its implications for fisheries yields; and economic diversification (MMEWF, 2006; MICOA, 2006; MMNRE, 2006; SNCCC, 2009).

Forestry

Forestry is another priority for a majority of southern African countries. Many countries in the region depend on biomass to meet their energy needs¹⁹—a situation that can promote deforestation and lead to reduced soil quality, exacerbation of desertification and soil erosion and reduced water retention. These current challenges are anticipated to be compounded by the effects of climate change (NMET, 2008; MICOA, 2007; ZMTENR, 2007). A number of adaptation options have been identified to address these vulnerabilities, including: reforestation and agroforestry; identification of species that are adapted to higher temperatures and lower precipitation; development of alternative energy sources; and promotion of natural regeneration of indigenous forests (NMET, 2007; MMNRE, 2006; ZMTENR, 2007).

Human health

Within the region, human health is already compromised by a number of factors, including an underdeveloped health infrastructure and high poverty levels. Southern Africa also has been particularly hard hit by HIV/AIDS, with 10 to 15 per cent of the population infected in Namibia, Zambia and Zimbabwe; 17.8 per cent in South Africa; and more than 20 per cent in Botswana, Lesotho and Swaziland.²⁰ Although the rate of infection has stabilized or declined in countries like Zambia in recent years (UNAIDS, 2010), the epidemic has led to steep declines in the level of human development in some southern African countries (Boko *et al*, 2007).

Nearly all countries within the region consider climate change to pose a considerable threat to human health. Anticipated impacts include increased food insecurity, malnutrition and water scarcity, as well as diarrheal sicknesses and—due to changes in the ecology of some disease vectors—greater spatial and temporal transmission of diseases such as malaria, cholera and schistosomiasis (Madzwamuse, 2010). Greater research has been undertaken on how climate change may alter the prevalence of malaria, demonstrating the potential for expansion and contraction of locations in which this disease may be transmitted. Models suggest that although the southern central part of Africa will likely become unsuitable for malaria transmission by the 2080s, areas of southern Africa are likely to become more suitable. For example, by 2100 it has been suggested that higher temperatures and changes in rainfall patterns will lead to malaria becoming prevalent in densely populated regions of Zimbabwe that currently are unsuitable for its transmission. A southward expansion of the malaria transmission zone in South Africa is also projected (Boko *et al*, 2007).

¹⁹ An estimated 80 per cent of sub-Saharan energy is derived from biomass sources (such as wood and crop residues) (Boko *et al*, 2007).

²⁰ See: <http://www.avert.org/hiv-aids-africa.htm>.

Adaptation actions proposed to address vulnerability within the human health sector include the integration of climate change into prevention and monitoring programs for disease prevention, the extension of treatment facilities, and improvement of monitoring and forecasting systems to warn of disease outbreaks.

Biodiversity, ecosystems and tourism

Southern Africa's diverse array of agroecological zones and high plant and animal biodiversity have made the region a popular tourist destination, and Botswana, Madagascar, Mauritius, Namibia, Seychelles and South Africa all have large tourism sectors. Climate change is anticipated to endanger plant and animal biodiversity within the region; ecosystems in southern Africa are already changing, and at a faster rate than anticipated. Some of the region's biomes, such as the Fynbos and Succulent Karoo, are viewed as being among the most vulnerable ecosystems in Africa (Boko *et al*, 2007). Across Africa, climate change could contribute to an increase in the number of species identified as critically endangered or extinct; estimates range from approximately 10 to 20 per cent to 25 to 40 per cent of species, depending on degree to which they are able to migrate (Boko *et al*, 2007).²¹

Other anticipated changes include greater movement of the sand dune fields of the Southern Kalahari basin (northern South Africa, Angola and Zambia) by the end of 21st century (Boko *et al*, 2007). Biodiversity changes such as these could have negative implications for countries in which tourism constitutes a significant portion of the national economy. For example, a study conducted in Namibia estimates that it may lose up to 6 per cent of its GDP annually due to the impact of climate change on its natural resources, including on the country's tourism sector (Reid *et al*, 2007).

Governance

Many countries within the region, including Malawi, Namibia, Seychelles and South Africa, have identified a need for enhanced capacity building within institutions and government in order to ensure that adaptation considerations are effectively addressed within existing policies (development plans, sectoral plans, etc.) and through overarching climate change adaptation strategies. A lack of expertise and technical capacity has been noted as a barrier preventing countries from launching strategies to address climate change across sectors (GOSA, 2000; MMNRE, 2006; SNCCC, 2009).

5.0 Assessment of Adaptation Action within Southern Africa

Adaptation action is occurring in southern Africa at the regional and national levels. At the regional level, action is occurring through intergovernmental processes and through a number of targeted programs and projects. At the national level, some countries are more actively engaged than others

²¹ Findings based on a study that examined the sensitivity of African mammals in 141 national parks in sub-Saharan Africa using A2 and B2 emissions scenarios with the Hadley Centre Coupled Model, version 3 (HadCM3) GCM, for 2050 and 2080. In a separate study, it has been estimated that 66 per cent of nyala and zebra species could be lost from Kruger Park (Boko *et al*, 2007).



in the development of policies and projects to facilitate adaptation to climate change, reflecting different national interests, capacities and perceived vulnerabilities.

5.1 Regional Level Action

Adaptation action within southern Africa is primarily occurring at the program or project level, with some evidence of activity at the policy level. Policy actions are occurring through inter-governmental forums such as the SADC and COMESA. Regional programs and projects are addressing needs within priority sectors for adaptation, including agriculture, freshwater and governance.

Regional Policy Actions

At the policy level, regional collaboration on climate change is occurring to some extent through the SADC.²² For example, during the 29th SADC Summit in September 2009, a “regional campaign against climate change” was announced, and at the November 2009 SADC Meeting of Ministers of Environment and Sustainable, ministers resolved that adaptation to climate change remains a top priority for the region. Climate change adaptation is also being addressed indirectly through the SADC’s Food, Agriculture and Natural Resources Directorate’s environmental and food security programs. Furthermore, the SADC Secretariat appears to be promoting regional cooperation to address adaptation in areas such as freshwater management, human health, economics, policy, energy and institutional strengthening (SADC, 2008). As well, the SADC supports weather and climate monitoring through the actions of its Drought Monitoring Centre (DMC) and the Southern Africa Regional Climate Outlook Forum. This forum brings together climate scientists from SADC National Meteorological and Hydrological Services and the DMC to present reports on seasonal climate forecasts and analyzes their application across various socioeconomic issues.²³

In addition, COMESA²⁴ established a Climate Change Initiative in 2007 that aims to encourage climate change protection while promoting economic prosperity. The initiative’s objectives include: articulating a shared vision for Africa on climate change; fostering regional and national cooperation to address climate change; promoting integration of climate considerations into regional, national, and sectoral planning policies; enhancing the institutional capacities of the COMESA Secretariat to effectively address the challenges of climate change; and promoting collaboration, synergy and partnerships amongst stakeholders on adaptation initiatives. This initiative seems to have a stronger

²² The members of SADC are the southern African countries of Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia and Zimbabwe, as well as Angola, the Democratic Republic of Congo and the United Republic of Tanzania.

²³ This event was the result of collaboration between the SADC, the Meteorological Services Department of Zimbabwe, World Meteorological Organization, the Food and Agricultural Organization, USAID, Famines Early Warning Systems Network and other partners. Further information is available here: <http://www.sadc.int/index/browse/page/779>.

²⁴ The 19 members states of COMESA are the southern African countries of Comoros, Madagascar, Malawi, Mauritius, Seychelles, Swaziland, Zambia and Zimbabwe, as well as Burundi, the Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Rwanda, Sudan and Uganda.



focus on mitigation while recognizing the co-benefits for adaptation.²⁵ Leading up to the 2009 climate change negotiations in Copenhagen, the COMESA Secretariat, with funding from IDRC, organized a dialogue amongst East African policymakers on agriculture, food security and climate change. Its ongoing climate change work seeks to strengthen African positions in international negotiations.

SADC and COMESA's involvement in climate change adaptation could increase in the future through the announced "Programme on Climate Change Adaptation and Mitigation in the Eastern and Southern African Region." The program aims to support adaptation and mitigation actions with a particular focus on increasing investments in climate resilient and carbon efficient agriculture, forestry, land use and energy practices across SADC, COMESA, and East African Community member states. This Norwegian-led multi-donor program was to start in 2011 and extend into 2016.²⁶

Comoros, Madagascar, Mauritius and Seychelles, along with Reunion (France), are also members of the COI. The Member States of COI have affirmed their commitment to addressing climate change on several occasions and a climate change adaptation unit was established within its secretariat in January 2009. As well, COI is currently executing the shared project "ACCLIMATE" (adaptation au changement climatique), which aims to build the capacity of COI and its members, and to support the development of adaptation projects and policies. Activities implemented as part of this project include: capacity building for climate change observation and for regional vulnerability analyses; the identification of priority axes for regional alert systems and risk prevention plans; demonstrative actions; elaboration of a regional adaptation action plan and policy; and improving conditions for national and regional knowledge sharing.²⁷

Regional Project and Program Actions

At the program and project level, there is a considerable amount of adaptation activity occurring in the region that brings together two or more southern African countries, as illustrated in Table 3. Participation in southern African regional projects is largely clustered around a number of core countries. The main benefactors of these regional actions are Botswana, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe, each of which is participating in about half of the identified initiatives. A smaller number of initiatives are taking place in Comoros, Lesotho, Seychelles and Swaziland.

²⁵ COMESA,

http://programmes.comesa.int/index.php?option=com_content&view=article&id=160&Itemid=98&lang=en

²⁶ COMESA, <http://www.comesa.int/lang-en/component/content/article/34-general-news/603-eucomesa-sign-three-programmes-worthy-over-55-million-to-support-regional-integration-and-comesas-strategic-plan>.

²⁷ Further information about the COI's climate change activities is available here: <http://www.coi-ioc.org/index.php?id=158>.



By socioeconomic area of focus, the majority of southern African regional projects are focused on the agricultural sector, disaster risk management and creating an enabling environment for adaptation by strengthening governance capacity. One of the projects targets adaptation in urban areas while others address adaptation in the areas of freshwater fisheries and ecosystem conservation. None of the regional projects identified has as strong a focus on the shared priority areas of freshwater resources, forestry and human health. By project type, the majority of regional projects are focused on capacity building, research and policy formation and integration; about one-third of the identified regional projects also include a community-based adaptation component.

Although there are several regional projects taking place in southern Africa, it is unclear to what extent they are being coordinated and implemented jointly, with meaningful exchange of information between the countries involved and sharing of lessons learned. An example of a project that does aim specifically to achieve this objective is the “Southern Africa Regional Climate Change Program” funded by the Swedish International Development Agency (SIDA) and U.K. Department for International Development (DFID). It is specifically designed to build transboundary responses to climate change within southern Africa, including the sharing of scientific information and developing targeted regional research plans.

The most significant donors to these regional projects are the government of Germany, DFID and IDRC through their “Climate Change Adaptation in Africa” program. Other donors include the International Food Policy Research Institute (IFPRI), the International Red Cross and the governments of France, Sweden, and the U.K.

In addition to the regional projects described in Table 3, southern African countries are also participating in a diversity of Africa-wide and global adaptation programs and projects. As described in Table 6, a number of these continental and global projects focus on addressing issues related to agriculture, freshwater resources, governance capacity, urban areas and disaster risk management. Many emphasize the building of capacity, research, knowledge communication and policy formation and integration.

Prominent projects and programs in which multiple southern African countries are participating include the “Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa” program (the Africa Adaptation Program or AAP) that involves 20 African countries.²⁸ Funded by Japan and implemented by UNDP, participating southern African countries are Lesotho, Malawi, Mauritius, Mozambique and Namibia. The purpose of the program is to ensure that national development processes incorporate climate risks and opportunities, aiming to assist participating countries to design, finance and implement cost-effective adaptation policies and plans.²⁹

²⁸ UNDP, <http://www.undp-aap.org/>.

²⁹ Further information is available here: <http://www.undp-adaptation.org/africaprogramme/>.

In addition to the AAP, Denmark is funding the major program “Climate Change Adaptation and Development Initiative” (CC-DARE) that is being jointly implemented by UNEP and UNDP. It is active in three southern African countries Malawi, Mozambique and Seychelles. The purpose of the program is to provide demand-driven, flexible and rapid financial support to 11 sub-Saharan African countries to remove barriers and create opportunities for integrating climate change adaptation into national development planning and decision-making frameworks.³⁰

The “Climate Change Adaptation in Africa” (CCAA) program funded by DFID and IDRC was launched in 2006 and is a research and capacity development program that supports African-led projects that address the following objectives: strengthen the capacity of African organizations and decision makers to contribute to adaptation to climate change; support adaptation by rural and urban populations; generate better understanding of climate variability and change; and inform policy processes across the continent.³¹ As noted in Tables 3 and 6, various projects are being funded through this program in Malawi, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe.

Finally, the EC is funding the “Global Climate Change Alliance,” which is benefitting Mozambique, Mauritius and Seychelles. The program was initiated in September 2007 and provides funding to the most vulnerable developing countries to focus on disaster risk reduction and to integrate climate change considerations into poverty reduction efforts.³²

Other ongoing or recently completed African adaptation projects in which southern African countries are participating include:

- “Community Based Adaptation to Climate Change in Africa”³³ (Malawi, South Africa, Zambia and Zimbabwe)
- “Resilience and the African Smallholder: Enhancing the capacities of communities to adapt to climate change”³⁴ (Mozambique, Zambia and Zimbabwe)
- “Groundwater in sub-Saharan Africa: Implications for food security and livelihoods”³⁵ (Malawi, Mozambique and Zambia)
- “Enhancing the Disaster Risk Reduction Capacity in Agriculture and Rural Development”³⁶ (Comoros, Madagascar and the Seychelles)

³⁰ Further information is available here: <http://www.ccdare.org/>.

³¹ IDRC, http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Climate_Change_and_Adaptation_in_Africa/Pages/default.aspx.

³² GCCA, http://www.gcca.eu/pages/1_2-Home.html.

³³ African Centre for Technology Studies, http://www.acts.or.ke/index.php?option=com_content&view=article&id=60&Itemid=53 and IDRC, http://web.idrc.ca/en/ev-118898-201_104898-1-IDRC_ADM_INFO.html.

³⁴ IDRC, http://www.idrc.ca/en/ev-127586-201_104140-1-IDRC_ADM_INFO.html.

³⁵ Project profile accessible here: <http://gw-africa.iwmi.org/>.

³⁶ Global Facility for Disaster Reduction and Recovery (GFDRR), http://gfdrr.org/gfdrr/ca_projects/detail/1228.

Southern African countries are also participating in the following adaptation projects that involve developing countries from Asia-Pacific, African and/or Latin American and Caribbean regions:

- “Advancing Capacity for Climate Change Adaptation (ACCCA)”³⁷ (Malawi and South Africa)
- “Preparedness for Climate Change”³⁸ (Madagascar, Malawi, Mauritius, Namibia, Seychelles and Zimbabwe)
- “Pilot Program for Climate Resilience” (Mozambique and Zambia)
- “Mangroves for the Future” (Seychelles)
- “Cities and Climate Change Initiative” (Mozambique and Namibia)
- “Capacity Development for Policy Makers: Addressing climate change in key sectors”³⁹ (Namibia)
- “Community-based Adaptation Programme”⁴⁰ (Namibia)

Funding for these initiatives is being provided by a range of sources, with supporters of multiple African-wide or global adaptation projects, including DFID and IDRC through the CCAA program, the EC, and the governments of Denmark, Finland, Germany, Norway, Switzerland and the U.K.

Table 3: Regional-level adaptation action in southern Africa (as of May 2011)

Name		Objectives	Participating Countries	Project Details	
1.	Building Adaptive Capacity to Cope with Increasing Vulnerability due to Climate Change ⁴¹	To enhance the educational, research and extension competencies to develop strategies that help rural communities adapt to climate variability and change.	Zambia, Zimbabwe	Funder(s)	DFID and IDRC through the CCAA program
				Total Budget	
				Implementing Agency(s)	International Crop Research Institute for the Semi-Arid Tropics (ICRISAT)
				Duration	2007 – 2010
				Project Type	Knowledge communication; Research; Capacity building
	Focus Area	Agriculture			
2.	Strategies for Adapting to Climate Change in Rural Sub-Saharan	“Promote adaptation among vulnerable populations through developing comprehensive	Botswana, Lesotho, Madagascar,	Funder(s)	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit

³⁷ ACCCA, http://www.acccaproject.org/accca/files/ACCCA_Brochure_19pilotactions.pdf.

³⁸ Red Cross, <http://www.climatecentre.org/site/preparedness-for-climate-change-programme>.

³⁹ UNDP, <http://www.undp.org/climatechange/capacity-development.html>.

⁴⁰ UNDP, http://www.undp-adaptation.org/projects/websites/index.php?option=com_content&task=view&id=203.

⁴¹ ICRISAT, <http://www.icrisat.org/what-we-do/agro-ecosystems/aes-adaption-table.htm>.

Name		Objectives	Participating Countries	Project Details	
Africa: Targeting the most vulnerable ⁴²		systems for assessing global changes and the changes of these impacts across disaggregated systems, groups and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.”	Malawi, Mauritius, Mozambique, Namibia, South Africa, Zambia and Zimbabwe <i>Plus:</i> Angola, Tanzania		(BMZ)
				Total Budget	US\$91,241
				Implementing Agency(s)	IFPRI (lead), Association for Strengthening Agriculture Research in Eastern and Central Africa (ASARECA), Food, Agriculture, and Natural Resources Policy Analysis Network (FANRPAN), Potsdam Institute for Climate Impact Research (PIK), Leibniz-Centre for Agricultural Landscape Research (ZALF)
				Duration	2008–2011
				Project Type	Capacity building; Community-based adaptation; Policy formation and integration
				Focus Area	Rural areas; Agriculture; Government
3. “ACCLIMATE” (adaptation au changement climatique) ⁴³		This project aims to promote regional cooperation between the Indian Ocean Commission (COI) countries on climate change adaptation. This objective consists of reinforcing the COI’s capacities in the area of climate change adaptation in the short and long term through the development of projects and policies. Several activities are implemented, including: capacity building for climate change observation and for regional vulnerability analyses; the identification of priority axes for regional alert systems and risks prevention plans;	Comoros, Madagascar, Mauritius, Réunion (France), Seychelles	Funder(s)	European Union, Fonds Français pour l’Environnement Mondial, French Ministry of Foreign and European Affairs
				Total Budget	€3.645 million
				Implementing Agency(s)	COI
				Duration	2008–2011
				Project Type	Capacity building; Policy formulation and integration
				Focus Area	Climate information services; Government;

⁴² FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf.

⁴³ ACCLIMATE, <http://www.acclimate-oi.net/en>.

Name		Objectives	Participating Countries	Project Details	
		demonstrative actions; elaboration of a regional adaptation action plan and policy; and improving the conditions for national and regional knowledge sharing.			Disaster risk management
4.	Five-City Network to Pioneer Climate Change Adaptation in sub-Saharan Africa ⁴⁴	Local governments and coastal cities in southern Africa face a serious threat associated with climate change. This project aims to design a framework for managing increased risk from climate change, and is anticipated to lay the groundwork for a local climate change adaptation strategy and action plan in the five urban areas in the participating countries: Cape Town (South Africa); Dar es Salaam (Tanzania); Maputo (Mozambique); Windhoek (Namibia); and Port Louis (Mauritius).	Mauritius, Mozambique, Namibia, South Africa <i>Plus:</i> Tanzania	Funder(s)	DFID and IDRC through the CCAA program
				Total Budget	
				Implementing Agency(s)	International Council for Local Environmental Initiatives
				Duration	2009–2012
				Project Type	Capacity building; Policy formation and integration
				Focus Area	Urban area
5.	Regional Science Service Centre for Adaptation to Climate Change and Sustainable Land Management in Southern Africa ⁴⁵	The objective is to develop a program that will conduct problem-oriented research in the area of adaptation to climate change and sustainable land management and provide evidence-based advice for all decision-makers and stakeholders. Research will be geared towards filling current regional or local gaps in integrated knowledge. The research will aim to: integrate research on land and resource management; link science and theory to practice and decision-making; and compile, analyze and disseminate best practices.	Botswana, Namibia, South Africa, Zambia <i>Plus:</i> Angola	Funder(s)	Germany Federal Ministry of Education and Research
				Total Budget	
				Implementing Agency(s)	
				Duration	2009–2012
				Project Type	Research; Capacity building; Knowledge communication
				Focus Area	Ecosystem conservation

⁴⁴ IDRC,

http://www.idrc.ca/EN/Regions/Eastern_and_Southern_Africa/Pages/ProjectDetails.aspx?ProjectNumber=105868.

⁴⁵ SASSCAL, <http://www.sasscal.org/>.

Name		Objectives	Participating Countries	Project Details	
6.	Zambezi River Basin Initiative ⁴⁶	In recognition of increasing flood events within the Zambezi River Basin, this project aims to reduce the vulnerability of communities within the basin to extreme weather events and climate change, including the impact of flooding. Activities include developing community hazard maps, training staff in community disaster preparedness, implementing community based early warning systems, and training in adaptation techniques.	Botswana, Malawi, Mozambique, Namibia, Zambia Zimbabwe	Funder(s)	International Foundation of Red Cross and Red Crescent Societies
				Total Budget	
				Implementing Agency(s)	National Red Cross and Red Crescent societies
				Duration	2009–2013
				Project Type	Capacity building; Community-based adaptation
				Focus Area	Disaster risk management
7.	Southern Africa Regional Climate Change Program ⁴⁷	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region's voice in international platforms and enhance its ability to access necessary finance for climate change adaptation.	Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia, and Zimbabwe <i>Plus:</i> Angola, Congo, DRC, Tanzania	Funder(s)	DFID, SIDA
				Total Budget	
				Implementing Agency(s)	OneWorld Sustainable Investments
				Duration	2009–2014
				Project Type	Policy formation and integration; Research
				Focus Area	Government; Climate information services
8.	Regional Initiative for Smallholder Agriculture Adaptation to Climate Change in the Indian Ocean Islands ⁴⁸	The objective is to support the adaptation of small-scaled productive systems to climate changes in the islands of the Indian Ocean to improve incomes and living conditions of family scaled farmers. It entails four main components: knowledge sharing, information and awareness, improvement of operational skills and support to	Comoros, Madagascar, Mauritius, Seychelles	Funder(s)	International Fund for Agricultural Development (IFAD)
				Total Budget	US\$0.75 million
				Implementing Agency(s)	COI
				Duration	2010–2013
				Project Type	Capacity building; Community-based adaptation; Knowledge

⁴⁶ ICP, <http://www.icp-confluence-sadc.org/projects/zambezi-river-basin-initiative-zrbi>.

⁴⁷ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en.

⁴⁸ COI, http://www.coi-ioc.org/fileadmin/multimedia_francais/activites/downloads/R/%E9sum%E9%20projet%20Agro%E9cologie%20Englis h%20version.pdf.

Name		Objectives	Participating Countries	Project Details	
		small-scale farms.			communication
				Focus Area	Agriculture
9.	Enhancing Adaptive Capacity to Climate Change Impacts through well-managed Water Use for Aquaculture integrated with small-scaled Irrigation in the Chinyanja Triangle in Africa ⁴⁹	The project goal is to contribute to improving food security and well-being of sub-Saharan rural households trapped in a cycle of poverty and vulnerability exacerbated by climatic vagaries and climate change impacts, through well-managed water use for aquaculture integrated with small-scale irrigation. The project will enhance the benefits of integrating aquaculture and small-scale irrigation by reducing conflicts over water use and improve capacity for adapting to drought and flood events that are expected to be increasingly frequent in the face of climate change.	Malawi, Mozambique, Zimbabwe	Funder(s)	BMZ
				Total Budget	
				Implementing Agency(s)	International Center for Living Aquatic Resources Management (WorldFish Center), International Water Management Institute (IWMI)
				Duration	2010–2013
				Project Type	Assessment; Research
				Focus Area	Freshwater fisheries

5.2 National Level Action

At the country level, as summarized in Table 4, governments throughout southern Africa are pursuing policy and project level adaptation actions.

Policy Level Action

Countries in southern Africa have primarily identified their priority adaptation actions through National Communications to the UNFCCC and NAPAs; a few countries in the region—Namibia, Seychelles, South Africa and Zambia—have also prepared, or are in the process of preparing, comprehensive national adaptation plans. Botswana, Lesotho, Madagascar, Malawi, Namibia, Seychelles and Swaziland mention climate change adaptation considerations within their national development plans and/or key sectoral policies. However, the degree to which meaningful integration has occurred is unclear. Recent research suggests that meaningful implementation of climate change adaptation policies at the national level in southern Africa is being hampered by: the weak governance capacity of local and decentralized institutions; insufficient coordination among

⁴⁹ Consultative Group on International Agricultural Research (CGIAR), <http://ongoing-research.cgiar.org/factsheets/enhancing-adaptive-capacity-to-climate-change-impacts-through-well-managed-water-use-for-aquaculture-integrated-with-small-scale-irrigation-in-the-chinyanja-triangle-in-africa/> and Forum for Agricultural Research in Africa (FARA), http://www.infosysplus.org/db/db_index.php/door/upcome/main_unit/project/dataset_id/1215/URL_NAME/fara.

Table 4: Comparison of adaptation action at the policy and program level in southern Africa (as of April 2011)

Countries	Policy Action				Participation in Projects/Programs		
	1st National Communication	2nd National Communication	NAPA	National Adaptation Strategy/plan	Country-specific/national	Multi-country	Total
Botswana	2001		Non-LDC		1	4	5
Comoros	2002		2006		1	3	4
Lesotho	2000		2008		3	3	6
Madagascar	2004	2010	2006		5	7	12
Malawi	2002		2006		5	14	19
Mauritius	1999		Non-LDC		3	8	11
Mozambique	2003		2007		7	17	24
Namibia	2002		Non-LDC	In development	2	9	11
Seychelles	2000		Non-LDC	2009	1	8	9
South Africa*	2000		Non-LDC	2004	5	8	13
Swaziland	2002		Non-LDC		2	1	3
Zambia	2002		2007	In development	2	11	13
Zimbabwe	1998		Non-LDC		1	8	9

*The number of projects identified as underway in South Africa may be artificially low as the review only captures projects through international development assistance.

Note: Information contained in this table is based on research completed as of April, 2011. Additional project and programs, for example, may be underway in each country. Full information regarding adaptation action in each country as of April, 2011 is available in the Appendix of this report.

key areas of government; and a lack of finance and inadequate investment in strategic areas of importance (Madzwamuse, 2010).

South Africa distinguishes itself from other countries in the region by stating its intention to use public sector funding to address climate change adaptation (SADEAT, 2004), although there is a lack of available literature discussing the government's progress in moving forward on this commitment. Also of note are the various local and sub-national adaptation policies and strategies that have emerged in South Africa over the past five years. These policies and strategies seem to have emerged independently in response to local needs and priorities.

Project-based Action

Current action on climate change adaptation in southern Africa is heterogeneous, with certain countries more actively engaged in the implementation of adaptation projects and programs than others. Based on available information, the greatest number of adaptation projects is being implemented in Mozambique and Malawi. In both countries, about 20 discrete adaptation projects are underway. A moderate number of projects (between 10 to 14 projects each) are being implemented in Madagascar, Mauritius, Namibia, South Africa and Zambia. Few or very few



adaptation projects are being implemented in Botswana, Comoros, Lesotho, Seychelles, Swaziland and Zimbabwe. This variation in engagement in adaptation activities likely reflects national governments' differing levels of interest in climate change adaptation relative to other development priorities, variances in technical capacity, the interests of major bilateral donors active in each country, and the degree to which a favorable environment for project implementation exists. The indicated extent of adaptation action in South Africa may be artificially low since this review only captures projects that are externally funded through international development assistance.

The number of projects developed specifically to meet the needs of individual countries is relatively less than the number of multi-country projects being implemented in southern African countries. Generally speaking, the countries with the greater number of ongoing national adaptation projects are those that also are most actively engaged in regional, Africa-wide and global adaptation projects (as seen in Table 4). While considerable variation exists with respect to the focus and objectives of these national projects, broadly speaking, more are being implemented in the sectors of agriculture, freshwater resources, disaster risk management, coastal zone management and biodiversity. To a lesser extent, countries are directing national attention to concerns in areas such as human health, ecosystem conservation, marine management, urban areas, forestry, tourism, migration and fire management.

Funding for projects specifically developed for implementation in individual southern African countries is being provided by a variety of sources. Prominent among these are the Least Developed Countries Fund, which is supporting initiatives in Comoros, Lesotho, Malawi, Mozambique and Zambia; the Special Climate Change Fund, which is financing projects in Mozambique, South Africa, Swaziland and Zimbabwe; and the Adaptation Fund, which is supporting projects in Mauritius and Seychelles. Other prominent funds are DFID and IDRC through the CCAA program, the GEF, and the governments of Germany, Norway (particularly in Madagascar) and the U.S.

5.3 Communities of Practice

To facilitate the exchange of information, ideas and learned practices, a few knowledge sharing networks have been established around climate change adaptation. These networks bring together individuals and organizations within individual countries, across southern Africa and throughout Africa. Examples of these networks are presented in Table 5, and include Climate Action Network Southern Africa, fellows of the Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change, AfricaAdapt and the Africa Partnership on Climate Change Coalition.

Table 5: Selected climate change communities of practice in East Africa

Organization		Geographic Scope	Type of Action	Sector / area of work
1.	Climate Action Network Southern Africa ⁵⁰	Southern Africa	Advocacy; Knowledge communication	Network mostly of NGOs working to promote government and individual action to limit human-induced climate change to ecologically sustainable levels.
2.	Africa Partnership on Climate Change Coalition (APCCC) ⁵¹	East Africa, southern Africa	Capacity building; Policy formation and integration; Knowledge communication	Founded in 2007, the APCCC was created to address gaps in public awareness efforts and knowledge sharing on climate change in Africa. APCCC seeks to mainstream local awareness and empowerment, disaster risk reduction and sustainable adaptation measures to communities vulnerable to climate change.
3.	Capacity Strengthening of Least Developed Countries for Adaptation to Climate Change (CLACC) ⁵²	West Africa, southern Africa, East Africa	Knowledge communication; Capacity building	CLACC was initiated by the International Institute for Environment and Development and the Ring alliance of policy research organizations in 2004. CLACC receives financial and technical support from northern institutions and it is a global network that seeks to strengthen capacity of civil societies in least developed countries (LDCs) to adapt to climate change, facilitate information and knowledge transfer to countries addressing climate change and mainstream the NAPA process for LDCs.
4.	AfricaAdapt ⁵³	Africa-wide	Capacity building; Knowledge communication	AfricaAdapt serves as a facilitation instrument within Africa to share knowledge for sustainable livelihoods between researchers, policy makers, civil organizations and communities who are vulnerable to climate variability and change.

6.0 Conclusions

A considerable amount of regional and national adaptation programming is occurring within southern Africa, much of which is targeted toward these countries' identified adaptation priorities. The majority of this activity is occurring at the project level. However, there may be opportunities for expansion of policy-level collaboration in the future. Less action is occurring at the policy level, although some countries have initiated the development of dedicated adaptation strategies and plans (e.g., Seychelles and South Africa), and are integrating adaptation considerations into policy and planning (e.g., Zambia's "National Development Plan 2011–2015"). At the inter-regional level, SADC, COMESA and COI have initiated common action on climate change, but greater engagement may be warranted if the potential benefits associated with regional coordination and the sharing of information, knowledge and capacity are to be achieved.

⁵⁰ CAN-Southern Africa, <http://www.sacan.org.za/>.

⁵¹ ENVAYA, <http://envaya.org/apccc/home>.

⁵² CLACC, <http://www.clacc.net>.

⁵³ AfricaAdapt: <http://www.africa-adapt.net/AA/>.



In general, the majority of current project-level action is focused on the areas of agriculture, freshwater resources, disaster risk management and governance capacity, sectors which are highly representative of the needs and priorities identified by national governments. Many of these projects support capacity building, research, knowledge communication and policy formation and integration. Fewer projects emphasize community-based adaptation and field implementation of dedicated adaptation measures.

It appears that southern African countries are engaged in multiple actions within similar areas of focus, and it is important to ensure that current and future initiatives are complementary and build on lessons learned. For example, as demonstrated in Tables 3 and 6, there are many large multi-country regional programs that focus on the area of governance capacity, including the Africa Adaptation Initiative (active in Lesotho, Malawi, Mauritius, Mozambique, Namibia and Zambia) as well as the CC-DARE program (Malawi, Mozambique and Seychelles) and the Global Climate Change Alliance (Mozambique, Mauritius and Seychelles).

In addition, given that many projects are currently focused on the agriculture and water sectors, there may be an opportunity to draw together initial lessons learned from these projects. As they are priority areas of concern for southern African countries, these areas may be amenable to the sharing of lessons, particularly between countries that are actively engaged in adaptation projects at present and those in which action is lower. This sharing of emerging lessons learned and best practices could take place through the establishment of new communities of practice focused on adaptation to climate change and expansion of inter-governmental policy initiatives.

Going forward there may be a need to ensure that future adaptation work becomes more diversified in order to address areas of importance that are currently receiving less attention. Although there is some current action occurring within the priority areas of coastal zones, fisheries, forestry, biodiversity, tourism, health and climate information services, at present these areas appear to be under-represented. In addition, at present it appears only four projects are focused on urban areas. Activities in this focus area could also be expanded, particularly given the potential exposure of coastal urban communities to sea level rise and potentially more frequent and intense tropical storms. As well, only one regional project being implemented in one southern African country explicitly targets the needs of women with respect to the impacts of climate change. Furthermore, there may be a need for more rigorous regional level downscaling studies that disaggregate the potential impacts of climate change according to sub-region.

Future adaptation action in the region could also transition from research, tools development and policy guidance and advice toward specific, concrete adaptation work in particularly vulnerable sectors and communities. The research, capacity building and policy focused activities underway in southern Africa may lay the foundation for action and create a body of research and knowledge upon which future activities may be based. However, many southern African countries appear well-placed to move to the next phase of more targeted, concrete adaptation action.

Table 6: African and global adaptation projects and programs in which southern African countries are participating (as of May 2011)

Name	Objectives	Participating Countries	Project Details		
Africa-wide Projects and Programs					
1.	Food and Water Security under Global Change: Developing adaptive capacity with a focus on rural Africa ⁵⁴	This project aims to understand the impacts of global change on agriculture and water resources at the global, national and river basin levels; to assess the effects of global change on water and food security in vulnerable rural areas of Africa, particularly rural Ethiopia and South Africa; and to identify adaptation measures that reduce the impacts of global change on these communities.	Ethiopia and South Africa	Funder(s)	German government through the Advisory Service on Agricultural Research for Development
				Total Budget	
				Implementing Agency(s)	IFPRI
				Duration	2007–2009 (closed)
				Project Type	Assessment
2.	Resilience and the African Smallholder: Enhancing the capacities of communities to adapt to climate change ⁵⁵	This project aims to enhance the ability of households, communities and relevant institutions to respond to changing circumstances with a view to reducing future threats to food security and environmental integrity. It will work with farmers to identify improved farming technologies, and translate the results into action plans at the appropriate institutional level whether local or national. Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.	Ghana, Mali, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe	Funder(s)	DFID and IDRC through the CCAA program
				Total Budget	CAD\$1,319,800
				Implementing Agency(s)	University of Zimbabwe, IFPRI
				Duration	2007–2011
				Project Type	Community based adaptation; Policy formation and integration
	Focus Area	Agriculture			

⁵⁴ IFPRI, <http://www.ifpri.org/book-1043/ourwork/program/food-and-water-security-under-global-change> and <http://ongoing-research.cgiar.org/factsheets/food-and-water-security-under-global-change-developing-adaptive-capacity-with-a-focus-on-rural-africa/>.

⁵⁵ IDRC, http://www.idrc.org/en/ev-159492-201-1-DO_TOPIC.html.

Name		Objectives	Participating Countries	Project Details	
3.	Strengthening Local Agricultural Innovation Systems in Less Favorable and High-Potential Areas of Tanzania and Malawi ⁵⁶	“This action-research project aims to bring together institutions and individuals from the research, policymaking and farming communities to develop agricultural innovation systems that are better able to adapt to climate change and variability. They will do so with reference to case studies of farmers in two different agro-climatic sites—one disadvantaged and the other high-potential—in each of Malawi and Tanzania.”	Malawi and Tanzania	Funder(s)	DFID and IDRC through the CCAA program
				Total Budget	
				Implementing Agency(s)	Institute of Resource Assessment
				Duration	2007–2011
				Project Type	Research; Capacity building
				Focus Area	Agriculture
4.	Enhancing the Disaster Risk Reduction Capacity in Agriculture and Rural Development ⁵⁷	Preparation of 10 capacity building modules on pre- and post-disaster risk management and mainstreaming of disaster risk reduction in agriculture and rural development, with a focus on climate change adaptation.	Burkina Faso, Comoros, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Niger, Rwanda, Senegal and Seychelles	Funder(s)	GFDRR
				Total Budget	US\$50,000
				Implementing Agency(s)	Agriculture and Rural Development & Sustainable Agriculture Systems, Knowledge and Information
				Duration	2008–2010 (closed)
				Project Type	Capacity building
				Focus Area	Agriculture; Disaster risk management
5.	Climate Change Adaptation and Development Initiative (CC-DARE) ⁵⁸	The joint UNEP–UNDP program provides demand-driven, flexible and rapid financial and technical support to 15 sub-Saharan countries. The emphasis of CC-DARE support is on short-term (3–6 months) initiatives that contribute to addressing key gaps for national climate change adaptation. The support is made available to improve the ability of sub-Saharan African countries to remove barriers and create opportunities for integrating climate change adaptation into national development planning	Benin, Ghana, Ethiopia, Malawi, Mozambique, Rwanda, Senegal, Seychelles, Tanzania, Togo and Uganda	Funder(s)	Government of Denmark
				Total Budget	
				Implementing Agency(s)	UNEP, UNDP
				Duration	2008–2011
				Project Type	Policy formation and integration
				Focus Area	Government

⁵⁶ IDRC, http://www.idrc.org/ccaa/cv-127586-201_104141-1-IDRC_ADM_INFO.html.

⁵⁷ GFDRR, http://gfdrr.org/gfdrr/ca_projects/detail/1228.

⁵⁸ CC-DARE, <http://www.ccdare.org/>.

Name		Objectives	Participating Countries	Project Details	
		and decision-making frameworks. The three main types of activities undertaken through the program are country-level activities, regional training courses, and national and regional workshops to communicate project results and share experiences and lessons learned.			
6.	Community Based Adaptation to Climate Change in Africa ⁵⁹	The project involves identifying ways of communicating climate information to poor and vulnerable communities and from communities to other stakeholders. Capacity building and support is being given to NGOs and communities through training to facilitate integration of climate change into their plans and activities. The project will generate information on community-based climate change adaptation, and disseminate the information to inform other stakeholders including researchers, NGOs, national and international policy and decision makers, among others.	Kenya, Malawi, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe	Funder(s)	DFID and IDRC through the CCAA program
				Total Budget	CAD\$1,398,500
				Implementing Agency(s)	African Centre for Technology Studies
				Duration	2008–2011
				Project Type	Field implementation; Community-based adaptation; Research; Capacity building
				Focus Area	Multi-sectoral
7.	Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa (or Africa Adaptation Program – AAP) ⁶⁰	Under this program, UNDP will assist 20 African countries in implementing integrated and comprehensive adaptation actions and resilience plans. The projects will ensure that national development processes incorporate climate change risks and opportunities to secure development gains under a changing climate. UNDP will help	20 African countries ⁶¹ including: Lesotho, Malawi, Mauritius, Mozambique and Namibia	Funder(s)	Japan International Cooperation Agency
				Total Budget	US\$92.1 million
				Implementing Agency(s)	UNDP
				Duration	2008–2011
				Project Type	Capacity building; Policy formation and integration; Knowledge

⁵⁹ ACTS, http://www.acts.or.ke/index.php?option=com_content&view=article&id=60&Itemid=53 and IDRC, http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Climate_Change_and_Adaptation_in_Africa/Pages/ResultDetails.aspx?ResultID=36.

⁶⁰ Adaptation Learning Mechanism, <http://www.adaptationlearning.net/program/africa-adaptation-programme> and UNDP-APP, <http://www.undp-aap.org/>.

⁶¹ These countries are Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome et Principe, Senegal, Tanzania and Tunisia.

Name		Objectives	Participating Countries	Project Details	
		countries establish an enabling environment and develop the capacity required to design, finance, implement and monitor long-term and cost-effective adaptation policies and plans.			communication
				Focus Area	Government
8.	Supporting the Vulnerable: Increasing the adaptive capacity of agro-pastoralists to climate change in West and Southern Africa using a transdisciplinary research approach ⁶²	The purpose of this project is to co-generate methods, information and solutions between local communities, local and international scientists, policy makers and other actors involved in climate change and adaptation programs for coping mechanisms and adapting strategies to climate change and variability in West and Southern Africa, and more particularly in Mali and Mozambique.	Mali and Mozambique	Funder(s)	BMZ
				Total Budget	
				Implementing Agency(s)	International Livestock Research Institute
				Duration	2008–2011
				Project Type	Research; Community-based adaptation
				Focus Area	Agriculture; Pastoralism
9.	Groundwater in sub-Saharan Africa: Implications for food security and livelihoods ⁶³	The project aims to enhance the role of groundwater in providing improved food security and livelihoods in the countries targeted by AGRA. The specific objectives include: assessing groundwater availability and sustainability, including the impacts associated with its use and role in adapting to climate change; identifying opportunities and constraints in using groundwater, and provide advice to investors in groundwater interventions; and developing a groundwater strategy for the region.	Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Tanzania, Uganda and Zambia	Funder(s)	Alliance for a Green Revolution in Africa (AGRA)
				Total Budget	
				Implementing Agency(s)	IWMI
				Duration	2009–2011
				Project Type	Research; Policy formation and integration
				Focus Area	Freshwater supply
10.	Urban-Rural Interdependence and the Impact of Climate Change in Malawi and Tanzania ⁶⁴	Urban populations in Africa are anticipated to grow significantly in the coming years, which will increase demand for food and shelter, among others, in urban	Malawi and Tanzania	Funder(s)	DFID and IDRC through the CCAA program
				Total Budget	
				Implementing Agency(s)	University of Dar es Salaam

⁶² Consultative Group on International Agricultural Research (CGIAR), <http://ongoing-research.cgiar.org/factsheets/supporting-the-vulnerable-increasing-the-adaptive-capacity-of-agro-pastoralists-to-climatic-change-in-west-and-southern-africa-using-a-transdisciplinary-research-approach-2/>.

⁶³ IWMI, <http://gw-africa.iwmi.org/>.

⁶⁴ IDRC, http://www.idrc.org/en/ev-83053-201_105836-1-IDRC_ADM_INFO.html.

Name		Objectives	Participating Countries	Project Details	
		areas while placing pressure on increased food production in rural areas. This project will attempt to explain rural-urban interdependence in Malawi and Tanzania, document vulnerabilities and coping strategies of communities and offer communities alternatives for adapting to climate change.		Duration	2009–2012
				Project Type	Research; Capacity building
				Focus Area	Agriculture; Urban area; Rural area
11.	Strengthening the Role of Civil Society in Water Governance in African Cities: Durban, Maputo, Nairobi ⁶⁵	This project aims to increase the capacity of civil society to influence water sector governance in the context of climate change adaptation. Researchers will identify stakeholders' vulnerability to and perception of climate change and examine how civil society institutions adjust programs to cope with climate change.	Kenya, Mozambique and South Africa	Funder(s)	DFID and IDRC through the CCAA program
				Total Budget	
				Implementing Agency(s)	York University (Canada)
				Duration	2010–2013
				Project Type	Research; Capacity building
				Focus Area	Freshwater supply; Civil society; Urban areas
12.	Adaptation Learning Programme (ALP) ⁶⁶	The overarching goal of ALP is to increase the capacity of vulnerable households in sub-Saharan Africa to adapt to climate variability and change with a particular focus on gender equality and diversity. The program: <ul style="list-style-type: none"> • Develops and applies innovative approaches to community-based adaptation (CBA) to generate best practice models; • Empowers local communities and civil society organizations to have a voice in decision-making on adaptation; • Promotes best practice models for CBA among adaptation practitioners; and • Influences national, regional 	Ghana, Kenya, Mozambique, and Niger	Funder(s)	DFID, the Ministry of Foreign Affairs of Denmark and the Ministry of Foreign Affairs of Finland
				Total Budget	£5,000,000
				Implementing Agency(s)	CARE International
				Duration	2010–2014
				Project Type	Capacity building; Community-based adaptation; Policy formation and integration
				Focus Area	Rural areas; Civil society; Gender

⁶⁵ IDRC,

http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Climate_Change_and_Adaptation_in_Africa/Pages/ProjectDetails.aspx?ProjectNumber=106002.

⁶⁶ CARE, <http://www.careclimatechange.org/files/adaptation/ALP.pdf>, DFID, <http://projects.dfid.gov.uk/project.aspx?Project=200658> and CARE, <http://www.careclimatechange.org/adaptation-initiatives/alp>.

Name		Objectives	Participating Countries	Project Details	
		and international adaptation policies and plans.			
Participation in Global Projects					
13.	Preparedness for Climate Change ⁶⁷	<p>The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks.</p> <p>Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs and developing climate change resilient plans.</p>	<p>39 countries globally, including (in Phase 1): Madagascar, Malawi, Mauritius, Seychelles and Zimbabwe</p>	Funder(s)	Red Cross/Red Crescent Climate Centre
				Total Budget	
				Implementing Agency(s)	National Red Cross/Red Crescent Societies
				Duration	Phase 1: 2006–2009 Phase 2: ongoing
				Project Type	Capacity building; Policy formation and integration
				Focus Area	Disaster risk management
14.	Mangroves for the Future (MFF) ⁶⁸	<p>The projects two main objectives are to strengthen the environmental sustainability of coastal development and to promote the investment of funds and efforts in coastal ecosystem management. MFF reorients the current focus of coastal investment by moving from a reactive response to disasters, to progressive activities that address long-term sustainable management needs. These include building awareness and capacity for improved food and livelihood security, disaster preparedness and climate change adaptation. Initially focused on countries that were highly affected by the 2004 tsunami—India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand—the project has expanded to include Pakistan and Viet Nam.</p>	<p>India, Indonesia Maldives, Pakistan, Seychelles, Sri Lanka, Thailand and Viet Nam</p>	Funder(s)	2007–2009: Australia, Germany, Norway, Sweden, UNDP, UNEP 2010 to now: Norway and Sweden
				Total Budget	
				Implementing Agency(s)	National governments with CARE International, FAO, International Union for the Conservation of Nature, UNDP, UNEP and Wetlands International with NGOs and CBOs
				Duration	2006–present
				Project Type	Research; Knowledge communication; Policy formation and implementation
				Focus Area	Coastal zone management

⁶⁷ Red Cross, <http://www.climatecentre.org/site/preparedness-for-climate-change-programme>.

⁶⁸ MFF, <http://www.mangrovesforthefuture.org/> and <http://www.mangrovesforthefuture.org/Assets/documents/IUCN-MFF-Brochure-Web.pdf>.

Name		Objectives	Participating Countries	Project Details	
15.	Advancing Capacity for Climate Change Adaptation (ACCCA) ⁶⁹	The rationale for this project is that countries lack scientific knowledge and understanding of climate risks which is an impediment to addressing climate variability. Activities include the following: identify and prioritize climate risks; assess available knowledge about risks and adaptation opportunities; develop, test, and disseminate risk communication materials that are designed to assist adaptation decisions; and identify critical knowledge gaps that impede effective adaptation decisions.	17 countries in Asia and Africa ⁷⁰ including Malawi and South Africa	Funder(s)	IDRC, Department for Environment, Food, and Rural Affairs (U.K.) (DEFRA), Swiss Federal Office for the Environment, Netherlands Climate Assistance Program (NCAP), EC
				Total Budget	
				Implementing Agency(s)	United Nations Institute for Training and Research (UNITAR)
				Duration	2007–2010
				Project Type	Assessment; Capacity building; Policy formation and integration
			Focus Area	Multi-sectoral	
16.	Capacity Development for Policy Makers: Addressing climate change in key sectors ⁷¹	The project is a targeted capacity development initiative that supports two goals: to increase national capacity to co-ordinate ministerial views for more effective participation in the UNFCCC process and to assess investment and financial flows to address climate change for selected key sectors. As a result of this project, both the technical understanding of key climate change issues and their economic and policy implications within the context of the UNFCCC will be enhanced.	19 countries, ⁷² including Namibia	Funder(s)	United Nations Foundation, Switzerland, Finland, Spain and Norway
				Total Budget	US\$6,953,413
				Implementing Agency(s)	UNDP
				Duration	2008–2010
				Project Type	Capacity building; Policy formation and integration; Knowledge communication
			Focus Area	Government	
17.	Economics of Adaptation to Climate Change ⁷³	The two specific objectives of the study were: to develop a global estimate of adaptation costs to	Bangladesh, Bolivia, Ethiopia, Ghana,	Funder(s)	Netherlands, Switzerland and the U.K.

⁶⁹ ACCCA, <http://www.acccaproject.org/accca/>.

⁷⁰ African countries include: Burkina Faso, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mali, Niger, Nigeria, Tanzania, Tunisia and South Africa. Asian countries include: Bangladesh, India, Mongolia, Nepal and the Philippines.

⁷¹ UNDP, <http://www.undp.org/climatechange/capacity-development.html>

⁷² These countries are Algeria, Bangladesh, Colombia, Costa Rica, Dominican Republic, Ecuador, Gambia, Honduras, Liberia, Namibia, Nepal, Nicaragua, Niger, Paraguay, Peru, St. Lucia, Togo, Turkmenistan, and Uruguay.

⁷³ World Bank, <http://climatechange.worldbank.org/content/economics-adaptation-climate-change-study-homepage>.

Name		Objectives	Participating Countries	Project Details	
		inform the international community's efforts to tailor support and provide new and additional resources to help vulnerable developing countries meet adaptation costs; and to support decision-makers in developing countries to better evaluate and assess the risks posed by climate change and to better design strategies to adapt to climate change.	Mozambique, Samoa and Viet Nam	Total Budget	
				Implementing Agency(s)	World Bank
				Duration	2008 – 2010
				Project Type	Research; Policy formation and integration
				Focus Area	Multi-sectoral
18.	Global Climate Change Alliance ⁷⁴	The Global Climate Change Alliance seeks to deepen the policy dialogue between the EU and developing countries on climate change; and to increase support to target countries to implement priority adaptation and mitigation measures, and integration climate change into their development strategies. The program's five priority areas for funding are: improving the knowledge base of developing countries to the effects of climate change; promoting disaster risk reduction; mainstreaming climate change into poverty reduction development strategies; reducing emissions from deforestation and degradation; and enhancing participation in the Clean Development Mechanism.	Bangladesh, Belize, Cambodia, Ethiopia, Guyana, Jamaica, Maldives, Mali, Mauritius, Mozambique, Nepal, the Pacific Region, Rwanda, Senegal, Seychelles, Solomon Islands, Tanzania and Vanuatu	Funder(s)	EC, Czech Republic, Sweden, 10th European Development Fund
				Total Budget	€140 million
				Implementing Agency(s)	National governments
				Duration	2008–ongoing
				Project Type	Policy formation and implementation; Knowledge management
				Focus Area	Disaster risk management; Government
19.	Pilot Program for Climate Resilience (PPCR) ⁷⁵	PPCR aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation in a way that is consistent with poverty reduction and sustainable development goals. In this way, the PPCR provides incentives for scaled-up action and initiates transformational change. The	Bangladesh, Bolivia, Cambodia, Mozambique, Nepal, Niger, Tajikistan, Yemen and Zambia Regional Programs: Caribbean and Pacific (includes	Funder(s)	World Bank's Strategic Climate Fund
				Total Budget	US\$971.75 million pledged as of February 2011
				Implementing Agency(s)	World Bank
				Duration	2008–ongoing
				Project Type	Policy formation and integration

⁷⁴ GCCA, http://www.gcca.eu/pages/1_2-Home.html.

⁷⁵ CIF, <http://www.climatefundsupdate.org/listing/pilot-program-for-climate-resilience>.

Name		Objectives	Participating Countries	Project Details	
		pilot programs and projects implemented under the PPCR are country-led and build on NAPAs and other relevant country studies and strategies.	Papua New Guinea, Samoa, and Tonga)	Focus Area	Multi-sectoral
20.	Cities and Climate Change Initiative (CCCI) ⁷⁶	The first phase of this project was designed to promote policy dialogue, develop tools and implement pilot activities in the cities of Sorsogon (Philippines), Esmeraldas (Ecuador), Maputo (Mozambique) and Kampala (Uganda). The project aims at advising and supporting cities and towns prone to the different impacts of climate change by offering innovative approaches and solutions for national and local development planning. In 2010, efforts were initiated to up-scale lessons from this initiative by launching CCCI-Asia/Pacific with UN-HABITAT partners in China, Fiji, Indonesia, Mongolia, Nepal, Papua New Guinea, Samoa, Sri Lanka, Vanuatu and Viet Nam. The project was also upscaled in Africa.	Burkina Faso, Ecuador, Fiji, Indonesia, Kenya, Mongolia, Mozambique, Namibia, Nepal, Papua New Guinea, the Philippine, Rwanda, Samoa, Senegal, Sri Lanka, Uganda and Vanuatu	Funder(s)	Government of Norway
				Total Budget	
				Implementing Agency(s)	UN-HABITAT, UNEP, National governments
				Duration	2008–ongoing
				Project Type	Knowledge communication; Capacity building; Assessment
				Focus Area	Urban areas
21.	Community-based Adaptation Programme ⁷⁷	The objective of the program is to enhance the capacity of communities in the pilot countries to adapt to climate change including variability. Planned outcomes are: enhanced adaptive capacity allows communities to reduce their vulnerability to adverse impacts of future climate hazards; national policies and programs include community-based adaptation priorities to promote replication, up-scaling and integration of best practices	Bangladesh, Bolivia, Guatemala, Jamaica, Kazakhstan, Morocco, Namibia, Niger, Samoa and Viet Nam	Funder(s)	GEF (Strategic Priority on Adaptation), co-financing
				Total Budget	US\$6.7 million
				Implementing Agency(s)	UNDP
				Duration	2009–2011
				Project Type	Knowledge communication; Capacity building; Community-based adaptation
				Focus Area	Multi-sectoral

⁷⁶ UN-HABITAT, http://www.fukuoka.unhabitat.org/programmes/ccci/index_en.html and http://www.fukuoka.unhabitat.org/programmes/ccci/pdf/CCCI_Asia-Pacific_Flyer.pdf.

⁷⁷ GEF, <http://www.gefonline.org/projectDetailsSQL.cfm?projID=2774> and UNDP, http://www.undp-adaptation.org/projects/websites/index.php?option=com_content&task=view&id=203.



Name	Objectives	Participating Countries	Project Details	
		derived from community-based adaptation projects; and cooperation among member countries promotes global innovation in adaptation to climate change including variability.		

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Appendices: Country Profiles

Within this review of current and planned adaptation action, Southern Africa is defined as including: Botswana, Comoros, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia, and Zimbabwe.

To assess the level of adaptation action occurring in each of these countries, a desk-based review of internet sources and relevant documentation was undertaken. The content of these sources was assessed in relation to a set of parameters established to focus the review's scope and ensure consistency across regions. Notably, it examines *discrete* adaptation actions, or *policies, programs and projects designed and implemented specifically to address the current and projected impacts of climate change*. Therefore, the review presents only a portion of the breadth of the efforts underway to reduce the vulnerability of developing countries to the impacts of climate change. In particular, it does not capture the broad array of development activities that are increasing the adaptive capacity of communities and countries. As well, within the review, adaptation efforts have been deemed to be “current” if they were ongoing or completed in 2009 or later. Therefore, the review does not include projects completed prior to 2009 that may have contributed to building local and national capacity to adapt. The review also only identifies those actions currently underway; it does not offer judgment of the effectiveness of actions taking place. In addition, reflecting the desk-based nature of the review, it is acknowledged that the content is biased toward identification of large-scale projects funded by international development assistance organizations and those projects about which information is available online. Therefore, small-scale projects that meet the review's definition of adaptation action, particularly those occurring at the community level, are not fully represented within the review. A fuller explanation of the methodology used to develop the country profiles that follow is provided in the methodology section of this report.

To facilitate analysis of the degree to which current adaptation projects and programs identified through the review are helping to meet the adaptation needs and priorities of developing countries, a common classification system was developed. This system examined identified projects and programs from two perspectives—their sector or areas of focus and the types of activities they are supporting. A fuller description of these two types of classifications is provided below.

Sector or Area of Focus

To support development of a general classification system for adaptation projects on the basis of their sector or area of focus, a review of the categories used by the Adaptation Learning Mechanism, Intergovernmental Panel on Climate Change (IPCC), United Nations Environment Programme (UNEP) and the Nairobi Work Programme was completed and used to guide development of a series of

categories for characterizing activities included in this review. Based on this review and expert judgment, a set of 14 macro project categories were identified: food, fiber and forests; ecosystems; freshwater resources; oceans and coastal areas; disaster risk management; migration and security; gender; business; infrastructure and transportation; human settlements; human health; climate information services; governance; and multi-sectoral. Where appropriate, these macro project categories were further refined through the identification of various sub-categories. These sub-categories were then used to label the discrete adaptation projects included in the review.

Definitions of the macro project categories used in the review along with descriptions of the types of projects included within their individual sub-categories are presented below.

1. **Food, Fiber and Forests** – Defined as the management and use of terrestrial natural resources to directly improve human well-being. Its sub-categories are:
 - *Agriculture* – Encompassing subsistence agriculture, commercial agriculture and the rearing of confined domestic animals.
 - *Pastoralism* – Encompassing the use of domestic animals as a primary means for obtaining resources from habitats (UNEP, 2007), particularly in nomadic and semi-nomadic communities.
 - *Forestry* – Encompassing afforestation, reforestation, agroforestry, commercial forestry, community-based forest management and woodland management.
 - *Fire management* – encompassing monitoring, planning and management to address the impact of fires on settlements and ecosystems, including forested and grassland ecosystems.

2. **Ecosystems** – Defined as a system of living organisms interacting together and with their physical environment, the boundaries of which may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2007). Its sub-categories are:
 - *Biodiversity* – Encompassing activities related to the maintenance of living organisms at various spatial scales, including the establishment and protection of parks and bio-reserves.
 - *Ecosystem conservation* – Encompassing efforts to *maintain* the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves and coral reefs.
 - *Ecosystem restoration* – Encompassing efforts to *restore* the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves and coral reefs.

3. **Freshwater Resources** – Defined as the management and use of freshwater contained in terrestrial ponds, lakes, rivers, watersheds, among others. Its sub-categories are:
 - *Freshwater fisheries* – Encompasses the catching, packing and selling of fish and shellfish derived from lakes, rivers and ponds, as well as through freshwater aquaculture.
 - *Watershed management* – Encompassing management of the basins that supply water to different streams, rivers, lakes and reservoirs, including integrated watershed management.
 - *Freshwater supply* – Encompassing efforts to access and preserve freshwater for human consumption and use including drinking water sources, groundwater resources, rainwater harvesting and water infrastructure such as wells, dams and dikes.

4. **Oceans and Coastal Areas** – Defined as the management and use of coastal areas and oceans. Its sub-categories are:
 - *Coastal zone management* – Encompassing the management of land and water resources in coastal areas, including through integrated coastal zone management and the establishment and maintenance of coastal infrastructure.
 - *Marine management* – Encompassing the management and use of off-shore ocean and sea resources.
 - *Marine fisheries* – Encompassing the catching, packing and selling of fish, shellfish and other aquatic resources found in the oceans and seas, including through marine and coastal aquaculture.

5. **Disaster Risk Management** – Defined as the “systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster” (UNISDR, 2009, pp. 10). It includes emergency response measures, preparation for extreme events and early warning systems. No sub-categories were established in relation to this macro project category.

6. **Migration and Security** – Defined as efforts to support the movement of people and maintain their personal security in the face of incremental climate changes or climate shocks.
 - *Migration* – Encompassing preparations for and responses to the potential movement of people from one location to another due to climate change impacts.
 - *Security* – Relates to personal security and freedom from violence, crime and war due to natural and human-induced disasters (UNEP, 2007) and encompasses peace building, conflict reduction and conflict avoidance activities.

7. **Gender** – Defined as the social attributes and opportunities associated with being male and female and the relationships between women and men, and girls and boys, as well as the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes (UN Women, undated). It includes efforts to understand the vulnerability of women to the impacts of climate change, gender-sensitive adaptation strategies, and measures to improve the situation of women at the local and policy level, including through gender mainstreaming. No sub-categories were established in relation to this macro project category.

8. **Business** – Defined as the purchase and sale of goods and services with the objective of earning a profit. Its sub-categories are:
 - *Tourism* – Encompassing the adjustment and development of tourist facilities and operations to account for current and future vulnerabilities, including these actions in relation to ecotourism.
 - *Private sector* – Encompassing potential impact of climate change and potential adaptation strategies on the diverse activities underway in the portion of the economy in which goods and services are produced by individuals and companies including industry, mining and other economic sectors.
 - *Trade* – Encompassing the exchange of goods and services within and between countries.
 - *Insurance* – Encompassing the development, testing and adjusting of insurance and risk-management schemes, including weather-based index systems.

9. **Infrastructure** – Defined as the basic equipment, utilities, productive enterprises, installations, institutions and services essential for the development, operation and growth of an organization, city or nation (IPCC, 2001). Its sub-categories are:
 - *Energy* – Encompassing energy-related systems and infrastructure, including small-scale and large-scale energy generation through hydroelectric power generation, wind, solar and other forms of traditional and new energy sources, as well as transmission networks.
 - *Transportation* – Encompassing the components of the system required to move people and goods, including roads, bridges, railway lines, shipping corridors and ports.
 - *Waste management* – Encompassing sanitation, sewage systems, drainage systems and landfills.
 - *Buildings* – Encompassing actions related to built structures such as houses, schools and offices, including changes to building codes, building practices and green ways of construction.

10. **Human Settlements** – Defined as a place or area occupied by settlers (IPCC, 2001). Its sub-categories are:
- *Peri-urban areas* – Encompassing the outskirts of urban centers, and the transition zone between rural and urban areas.
 - *Urban areas* – Encompassing municipalities, towns and cities, as well as areas in these centers (such as slums).
 - *Rural areas* – Encompassing villages and other small settlements, as well as rural landscapes and integrated rural development.
11. **Human Health** – Defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, undated). It includes efforts to assess vulnerabilities to and the impacts of climate change on human health directly and indirectly, and the development and implementation of appropriate adaptation strategies at the local, regional and national levels. No sub-categories were established in relation to this macro project category.
12. **Climate Information Services** – Defined as the production and delivery of authoritative, timely and usable information about climate change, climate variability, climate trends and impacts to different users at the local, sub-national, national, regional and global levels.⁷⁸ It includes efforts to develop, adjust and provide short- and long-term climate forecasts, including climate change projections, to different audiences. No sub-categories were established in relation to this macro project category.
13. **Governance** – Defined as the institutions (laws, property rights systems and forms of social organization) through which societies define and exercise control over resources.⁷⁹ Its sub-categories are:
- *Government* – Encompassing efforts to build the capacity of government officials, either at the national or sub-national level, to prepare for and facilitate adaptation to climate change, including through the development of policies, plans, frameworks and strategies, as well as the establishment and operation of climate change trust funds.
 - *Civil society* – Encompassing efforts to build the capacity of the public including non-governmental organizations, to understand, prepare for and respond to climate change.
14. **Multi-sectoral** – Defined as actions that simultaneously address more than one sector in one and/or multiple locations. It includes efforts that address more than one sector, which are challenging to tease apart, and in the context of this review includes large, multi-country projects in which the specific sector of focus is nationally determined and, therefore, varies from country to country. No sub-categories were established in relation to this macro project category.

⁷⁸ Derived from: <http://www.joss.ucar.edu/cscc/climate-service-definition-condensed.pdf>

⁷⁹ Derived from UNEP, 2007.

Types of Activities

The following categories were used to organize the types of activities being completed as part of current adaptation projects and programs identified through the review:

- *Research* – Encompassing efforts to develop new knowledge and/or organize existing information so as to increase understanding of the links between climate change, human society and ecosystems and inform adaptation decision-making.
- *Assessment* – Encompassing risk, impact and vulnerability assessments, as well as monitoring of ecological and societal trends.
- *Capacity building* – Encompassing the provision of technical training, technical assistance, institutional strengthening and education.
- *Knowledge communication* – Encompassing efforts to share information, knowledge and practices related to climate change adaptation, including awareness raising and engagement of media.
- *Policy formation and integration* – Encompassing efforts to inform, develop and implement climate change adaptation plans, strategies, frameworks and policies at the local, sub-national, national and international levels.
- *Field implementation* – Encompassing physical measures to reduce vulnerability to the impacts of climate change, including the implementation of pilot projects, construction of infrastructure, development and modification of technologies and the management of physical resources.
- *Community-based adaptation* – Encompassing actions that directly engage community members in efforts to understand, plan for and respond to the impacts of climate change.

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1.0 Botswana

AIACC	Assessments of Impacts and Adaptation to Climate Change
ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
DFID	Department for International Development (United Kingdom)
GDP	Gross Domestic Product
GEF	Global Environment Facility
FANRPAN	Food, Agriculture, and Natural Resources Policy Analysis Network
IFPRI	International Food Policy Research Institute
MFDP	Botswana Ministry of Finance and Development Planning
MFDP	Ministry of Finance and Development Planning
MWTC	Ministry of Works, Transport, and Communications
NDP	National Development Plan
NC	National Communication to the UNFCCC
PIK	Potsdam Institute for Climate Impact Research
SCCF	Special Climate Change Fund
SIDA	Swedish International Development Agency
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USDS	United States Department of State
ZALF	Leibniz-Centre for Agricultural Landscape Research

Botswana is a landlocked country within Southern Africa that shares borders with Angola, Namibia, South Africa, Zambia and Zimbabwe. The country is located within the shallow basin formed by the interior plateau of southern Africa, and nearly three-quarters of the country is covered by the Kalahari sands. The southeast of the country has slightly more fertile soils (MWTC, 2001).

Botswana has a thriving diamond mining sector, the revenue from which the government has used to drive one of the fastest growth rates per capita in the world (USDS, 2010). The diamond sector accounts for around one-third of the country's Gross Domestic Product (GDP) and 70 per cent of its export earnings (USDS, 2010). Tourism is also a major industry in Botswana, accounting for 10 per cent of the country's GDP. The major tourist attraction in the country is the Okavango Delta, located in northwest Botswana, which is popular for gaming and safaris (USDS, 2010). Approximately 50 per cent of Botswana's rural population is still dependent on subsistence agriculture for their livelihoods, despite less than 5 per cent of the country being suitable for cultivation (MWTC, 2001; USDS, 2010). In addition, almost 50 per cent of the population of Botswana relies on livestock for in-kind income, including food, draught, milk and skins. This activity is culturally very significant (MWTC, 2001).

A. Adaptation Needs and Priorities

Much of Botswana's land area is semi-arid, with very erratic rainfall patterns. The majority of precipitation falls from October to April in localized showers (MWTC, 2010). Botswana's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) notes that the country is expected to be 1 to 3°C warmer by 2050 compared to current average temperatures. Models disagree regarding future rainfall trends, with most predicting that rainfall will decline by 10 to 25 per cent by 2050 and some predicting an increase of 10 per cent. The document outlines key vulnerabilities by sector along with potential adaptation actions as summarized below (MWTC, 2001):

- *Human health:* Climate change is expected to impact human health by altering disease transmission, including malaria and pediatric diarrhea. Actions required to adapt to these climate change related diseases include improvement of the health care system, disease surveillance, enhanced public awareness, improvement in drinking water supplies and sanitation, and improved drainage.
- *Freshwater supply:* Ground water comprises 64 per cent of all water consumed in the country, with 80 per cent of the population and the majority of livestock depending on boreholes and well fields. The main adaptation options for Botswana's freshwater sector are inter-basin water transfers, water purchase agreements with neighboring countries, and an increase in internal water recycling and conservation.
- *Forestry:* With a decline in annual precipitation, climate change models foresee an expansion of thorn and shrub savanna, with a decline in grasslands, forests and woodlands; however Botswana's National Communication notes that there is considerable uncertainty associated with these projections. It recognizes that many adaptive actions are already taking place in this area, including control of deforestation and community based natural resource management.
- *Grazing and Livestock:* The livestock sector, which almost 50 per cent of the population relies for in kind income, is dependent on grazing in natural rangeland and therefore it is very susceptible to changes in climate, especially increased occurrences of drought.

Adaptation options in this sector include community based natural resource management, the introduction of policy incentives to encourage sustainable herd management, regulation of animal numbers and grazing practices, and a diversification of livestock species.

- *Agriculture*: Should annual rainfall levels decrease going forward, potential yields from the staple crops of maize and sorghum may decline by around 30 per cent. Should the future be wetter and warmer, sorghum production and maize yields may increase slightly. Adaptation options in this sector include national food security programs, drought early warning systems, the import of cereals, crop shifting, yield sharing, minimum tillage farming, analysis of optimal planting dates, and food aid for rural populations.
- *Research*: Botswana's National Communication identifies a need for improved interpretive capacity of environmental observations and climate models, including a need for technology transfer and capacity building in predictive modeling methods.

The Swedish International Development Agency (SIDA) published an environmental policy brief on Botswana in 2008 which also identifies several of these key adaptation priorities for Botswana. In particular, the report highlights key adaptation priorities for the water sector, including: inter-basin water transfers, water purchase from neighboring countries, internal recycling of water, and water conservation (Wingqvist and Dahlberg, 2008). Other adaptation priorities identified in the report are: community-based natural resources management to address woodlands and grazing practices; policy incentives and regulatory measures for sustainable herd management; and encouragement of traditional coping mechanisms such as shifting to other agricultural activities, early drought warning systems, and minimum tillage farming methods in order to conserve soil, water, and carbon.

B. National Level Policies

Through its goal of attaining sustainable management of natural resources, Botswana's recently released National Development Plan (NDP) of 2010 calls for a strategy that mainstreams environment and climate change into development processes, improved numerical weather predictions, and the implementation of a community based natural resource management policy (MFDP 2010). The NDP recognizes the importance of adaptation for the country's broader development efforts, noting that "Without proper planning, the lack of adaptation to climate change may impact heavily on the country's long-term development" (MFDP 2010). As well, through a national Environmental Protection Program, the country plans to focus on developing adaptation strategies for economic diversification, agriculture, malaria eradication, etc. The program will also undertake a study of the most vulnerable sectors and priority areas to advance early adaptation, serving as an update to the National Communication research which was undertaken in 2001.

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	First National Communication to the UNFCCC ⁸⁰	Ministry of Works, Transport and Communication	Submitted in 2001	Multi-sectoral	Botswana's National Communication provides an overview of the country's anticipated climate change impacts, analyzes key areas of vulnerability, sets out adaptation options, highlights technology transfer and capacity building needs, and provides a review of its sources of emissions.
2.	National Development Plan ⁸¹	Ministry of Finance and Development Planning	Released in 2010	Multi-sectoral	Under the "Sustainable Environment Section," the National Development Plan entails a strategy to mainstream the environment and climate change into national development processes (MFDP 2010).

C. Current Adaptation Action

There is currently a low level of adaptation programming occurring in Botswana relative to its southern African neighbors. These current projects focused on capacity building, research, policy formation and integration, and community based adaptation in the areas of governance, agriculture, human health, disaster risk management and ecosystem conservation. International organizations involved in the funding and implementation of these activities include the International Development Research Centre (IDRC), International Foundation of Red Cross and Red Crescent Societies, German Federal Ministry for Research and Education, German Ministry for Economic Cooperation and Development, SIDA and the United Kingdom's Department for International Development (DFID).

Table 2: Current Adaptation Projects and Programs active in Botswana

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1.	An Ecohealth Approach to Flood-recession Farming to Reduce Climate Vulnerability in the Okavango Delta, Botswana ⁸²	Expected outcomes include better understanding of the likely impacts of climate variability and climate change on the Molapo farming system; knowledge about its potential contribution to food security and	IDRC	The University of Botswana/Harry Oppenheimer Okavango	Assessment; Knowledge communication; Field implementation	2009 – ?	Agriculture; Human health Okavango Delta

⁸⁰ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=3149#beg

⁸¹ MFDP, <http://www.finance.gov.bw/templates/mfdp/file/File/NDP%2010%20final%2016th%20Dec%202009%20edit%20in%2019%20Jan%202010.pdf>

⁸² IDRC, http://www.idrc.org/en/ev-149407-201-1-DO_TOPIC.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	the health risks associated with Molapo farming, especially under changing climate conditions; improved crop productivity and food security; improved farming practices that minimize adverse environmental impacts; and a policy environment that is supportive of a sustainable Molapo farming system.		Research Centre, Ministry of Agriculture, and the Department of Environmental Affairs.	n			
Participation in Regional and Global Actions							
2.	Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ⁸³	BMZ Budget: US\$91,241	IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF	Capacity building; Community based adaptation; Policy formation and integration	2008 – 2011	Rural areas; Agriculture; Government	African: Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
<i>In Botswana: Further information required.</i>							
3.	Regional Science Service Centre for Adaptation to Climate Change and Sustainable Land Management in Southern Africa ⁸⁴	Germany Federal Ministry of Education and Research		Research; Capacity building; Knowledge communication	2009 – 2012	Ecosystem conservation	Regional: Angola, Botswana, Namibia, South Africa, Zambia
<i>In Botswana: Further information required.</i>							

⁸³ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

⁸⁴ SASSCAL, <http://www.sasscal.org/>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	integrated knowledge. The research will aim to: integrate research on land- and resource management; link science and theory to practice and decision-making; compile, analyze and disseminate best practices.						
4. Zambezi River Basin Initiative ⁸⁵	In recognition of increasing flood events within the Zambezi River Basin, this project aims to reduce the vulnerability of communities within the basin to extreme weather events and climate change, including the impact of flooding. Activities include developing community hazard maps, training staff in community disaster preparedness, implementing community based early warning systems, and training in adaptation techniques.	International Foundation of Red Cross and Red Crescent Societies	National Red Cross and Red Crescent societies	Capacity building; Community based adaptation	2009 – 2013	Disaster risk management	<i>Regional:</i> Botswana, Malawi, Mozambique, Namibia, Zambia Zimbabwe
<i>In Botswana:</i> Further information required.							
5. Southern Africa Regional Climate Change Program ⁸⁶	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region's voice in international platforms, and enhance its ability to access necessary finance for climate change adaptation.	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	<i>African:</i> Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe

⁸⁵ ICP, <http://www.icp-confluence-sadc.org/projects/zambezi-river-basin-initiative-zrbi>

⁸⁶ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en



Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
		In Botswana: Further information required.					

D. Proposed Adaptation Action

Botswana is proposed to be part of a regional project submitted to the Special Climate Change Fund (SCCF) for consideration. The project “Community Adaptation to Climate Change in the Limpopo Basin” would be undertaken with Mozambique, South Africa and Zimbabwe. Outside of this initiative, the Government does not appear to have formally proposed projects, although its 2010 National Development Plan establishes a commitment to do so.

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
1. Community Adaptation to Climate Change in the Limpopo Basin ⁸⁷				Botswana, Mozambique, South Africa and Zimbabwe
Notes: Project submitted for funding from the Special Climate Change Fund. Proposed funding from the SCCF: US\$4.45 million. Proposed co-financing: US\$12.0 million.				

E. Assessment

Botswana’s National Communication identified a number of specific adaptation policy measures that may be used to address the impacts of climate change in the areas of human health, freshwater resources, woodlands and forests, grazing and livestock, and crop agriculture. The country’s few current adaptation activities do address some of these adaptation options, namely agriculture and human health. Analysis as to whether Botswana’s most pressing adaptation needs are being addressed is hampered by the lack of prioritization of adaptation options according to level of urgency. The National Development Plan of 2010 indicates that this analysis is forthcoming, which will help ensure that future adaptation programming addresses priority needs. In light of existing gaps, this programming could address identified needs in the areas of freshwater resources, woodlands and forests, and grazing and livestock. There is also a need to address a wider variety of adaptation measures within the agriculture, health, disaster risk management, governance and ecosystem conservation sectors, and potentially to projects that specifically address the gender dimensions of climate change..

⁸⁷ GEF, http://www.thegef.org/gef/sites/thegef.org/files/publication/adaptation-actions_0.pdf



References:

Ministry of Finance and Development Planning [MFDP] (2010). National Development Plan 10. Accessed in April 2011 from: <http://www.finance.gov.bw/templates/mfdp/file/File/NDP%2010%20final%2016th%20Dec%202009%20edit%20in%2019%20Jan%202010.pdf>

Ministry of Works, Transport, and Communications [MWTC] (2001). Initial National Communication to the United Nations Framework Convention on Climate Change. Accessed in April 2011 from: <http://unfccc.int/resource/docs/natc/botnc1.pdf>

United States Department of State [USDS] (2010). Background Note: Botswana. Accessed in April 2011 from: <http://www.state.gov/r/pa/ei/bgn/1830.htm>

Wingqvist, G.O. and Dahlberg, E. (2008). Botswana Environmental and Climate Change Analysis. Prepared by the University of Gothenburg with funding from the Swedish International Development Agency. Accessed in April 2011 from: <http://www.hgu.gu.se/Files/nationalekonomi/EEU/Helpdesk/EnvPolicyBrief/2008/Environmental%20policy%20brief%20Botswana.pdf>

2.0 Comoros

GDP	Gross Domestic Product
GEF	Global Environment Facility
IFAD	International Fund for Agricultural Development
MDIPTTT	Ministry of Development, Infrastructures, Post and Telecommunications and International Transports
MRDFHE	Ministry of Rural Development, Fisheries, Handicraft and Environment
NAPA	National Adaptation Programme of Action
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UOC	Union of the Comoros
USDS	United States Department of State

The Union of Comoros is an archipelago comprised of four islands and is located within the northern entry of the Mozambique channel between Madagascar and the east coast of Africa.⁸⁸ The archipelago is primarily of volcanic origin and has a very high rate of biodiversity, including one of the world's most important nesting sites for marine turtles (MRDFHE, 2006). The population of Comoros is around 750,000 people, with roughly 50 per cent of the population living along the islands' coasts (MDIPTTT, 2002; USDS, 2010). One of the least developed countries in the world, the country's income has largely stagnated since the 1970s. The majority of the inhabitants of the Comoros depend on subsistence agriculture and fishing for their livelihoods (USDS, 2010), with the agricultural sector employing 70 to 80 per cent of the population (MRDFHE, 2006). Agriculture accounts for 40 per cent of Comoros' Gross Domestic Product (GDP) and contributes to nearly all of its foreign exchange earnings. Major exports products include vanilla, cloves, perfume essences, bananas and coconuts (USDS, 2010).

⁸⁸ From east to west, the islands are called: Mayotte (370 km²), Anjouan (424 km²), Moheli (290 km²) and Grand-Comoro (1,148 km²).

A. Adaptation Needs and Priorities

The islands of the Comoros are tropical, experiencing a long wet season between December and June or July, and a dry season between August and November (McSweeney et al, 2009; MRDFHE, 2006). The country experiences the tropical cyclones and hurricanes of the Indian Ocean, which typically take place during January and April (McSweeney et al, 2009). There is evidence that Comoros has begun to change, with annual temperatures increasing by 0.9°C since 1960, and mean annual rainfall having decreased—particularly in the last decade (McSweeney et al, 2009; MRDFHE, 2006). In addition, the country's agriculture sector is report to have been affected by a delay in fruit maturation, and certain crops have been affected by drought in recent years (MRDFHE, 2006). Land degradation and the disappearance of around 400 acres of forest per year also have had a negative effect on the country's socioeconomic development.

Anticipated impacts of climate change in Comoros include mean annual temperature increases of between 0.8 to 2.1°C by the 2060s, and 1.2 to 3.6°C in the 2090s (McSweeney et al, 2009). There is less certainty around the impact of climate change on precipitation in the country, with a large range in projected future rainfall (from -15 to 39 per cent by mid-century) (McSweeney et al, 2009). Sea level rise within the country may increase by 0.13 to 0.56 m by the 2090s (McSweeney et al, 2009).

The coral reefs that surround the islands of Comoros are anticipated to be adverse affected by a rise in ocean temperatures of 1.5°C, which could result in coral whitening and the disappearance of the reef (MRDFHE, 2006). Additional climate risks listed in the country's National Adaptation Programme of Action (NAPA) include: both seasonal and acute drought; increased incidence of heavy rains and cyclones; and a rise in sea level (MRDFHE, 2006). Comoros' Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) also discusses the potential impacts of climate change in key sectors of the country, including: an expected increase in the occurrence of malaria; a decrease in crop yields, agricultural production and fisheries; and flooding and internal displacement (MDIPTTT, 2002). To respond to these concerns, Comoros' NAPA identifies thirteen priority adaptation actions as listed in Table 3. These actions focus on improving adaptive capacity within the areas of agriculture, freshwater supply, human health, fisheries, disaster risk reduction and climate information services (MRDFHE, 2006).

B. National Level Policies and Strategic Documents

Comoros has prepared a NAPA as well as an Initial National Communication for the UNFCCC, outlining the country's approach to addressing climate change as well as its key adaptation needs. Further efforts towards the development of a dedicated national adaptation plan or strategy, or of integration of climate change adaptation concerns into national policies, has not been identified.

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Initial National Communication to the UNFCCC ⁸⁹	Ministry of Development, Infrastructure, Planning, Post, Telecommunications and International Transit	Submitted in 2002	Multi-sectoral	The document provides an overview of Comoros' national circumstances, including its vulnerability to climate change in key sectors and its greenhouse gas emissions profile.
2.	National Adaptation Programme of Action ⁹⁰	Ministry of Rural Development, Fisheries, Handicraft and the Environment	Submitted in 2006	Multi-sectoral	Provides an overview of Comoros' national circumstances, the anticipated impacts of climate change on the country, as well as the country's key adaptation priorities.

C. Current Adaptation Action

A very low number of adaptation projects are being implemented in Comoros at present, relative to other southern African countries. This engagement includes implementation of the nationally focused project, “Adapting Water Resource Management in Comoros to Increase Capacity to Cope with Climate Change,” financed by the Least Developed Countries Fund. This project responds to a priority identified in the country’s NAPA, and aims to encourage adaptation in the water management sector. Comoros is also involved in a small number of regional projects, one of which focuses on adaptation within the smallholder agriculture sector and another which encourages regional cooperation between the Indian Ocean Commission countries to formulate effective climate change policies and climate monitoring capacities.

Table 2: Current Adaptation Projects and Programs active in Comoros

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1.	Adapting Water Resource Management in Comoros to Increase Capacity to Cope with Climate Change ⁹¹	The goal of the project is to help vulnerable communities adapt to climate change. The project objective is to reduce the risk of climate change on lives and livelihoods from impacts on water resources in Comoros.	Least Developed Countries Fund	UNDP, UNEP	Capacity building; Field implementation	2010 – 2014	Freshwater supply

⁸⁹ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=COM/COM/2%20B#beg

⁹⁰ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=COM/NAPA/1%20E%20COPY%201%20ENG#beg

⁹¹ GEF, <http://www.gefonline.org/projectDetailsSQL.cfm?projID=3857>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
	Expected outcomes of the project include: greater institutional capacity to integrate climate change information into water resources management; improved water supply and water quality for selected pilot communities to combat impacts of climate change; and increased awareness and knowledge of adaptation good practice for continued process of policy review and development. The project will work on the three islands comprising Comoros.	Budget: US\$13,156,318						
Participation in Regional and Global Actions								
2.	“ACCLIMATE” (adaptation au changement climatique) ⁹²	This project aims to promote regional cooperation between the Indian Ocean Commission (IOC) countries on climate change adaptation. This objective consists of reinforcing the IOC’s capacities in the area of climate change adaptation in the short and long term through the development of projects and policies. Several activities are implemented, including: capacity building for climate change observation and for regional vulnerability analyses; the identification of priority axes for regional alert systems and risks prevention plans; demonstrative actions; elaboration of a regional adaptation action plan and policy; and improving the conditions for national and regional knowledge sharing.	European Union, Fonds Français pour l’Environnement Mondial, French Ministry of Foreign and European Affairs Budget: € 3.645 million	Indian Ocean Commission	Capacity building: Policy formulation and integration	2008 – 2011	Climate information services; Government; Disaster risk management	Regional: Comoros, Madagascar, Mauritius, Réunion (France), Seychelles
			In Comoros: Further information required.					
3.	Enhancing the Disaster Risk	Preparation of 10 capacity building modules	Global	Agriculture and	Capacity	2008 – 2010	Agriculture;	African:

⁹² IOC, <http://www.coi-ioc.org/index.php?id=158> and ACCLIMATE, <http://www.acclimate-oi.net/en>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Reduction Capacity in Agriculture and Rural Development ⁹³	on pre- and post-disaster risk management and mainstreaming of disaster risk reduction in agriculture and rural development, with a focus on climate change adaptation.	Facility for Disaster Reduction and Recovery Budget: US\$50,000	Rural Development & Sustainable Agriculture Systems, Knowledge and Information	building	(closed)	Disaster risk management	Burkina Faso, Comoros, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Niger, Rwanda, Senegal, Seychelles
In Comoros: Further information required.							
4. Regional Initiative for Smallholder Agriculture Adaptation to Climate Change in the Indian Ocean Islands ⁹⁴	The objective is to support the adaptation of small-scaled productive systems to climate changes in the islands of the Indian Ocean to improve incomes and living conditions of family scaled farmers. It entails four main components: knowledge sharing, information and awareness, improvement of operational skills and support to small-scale farms.	IFAD Budget: US\$0.75 million	Indian Ocean Commission	Capacity building; Community based adaptation; Knowledge communication	2010 – 2013	Agriculture	Regional: Comoros, Madagascar, Mauritius, Seychelles, Reunion Island
In Comoros: Further information required.							

D. Proposed Adaptation Action

Comoros' NAPA identifies a number of priority adaptation actions to reduce the country's vulnerability to climate change, as presented in Table 3. This list of projects focus on capacity building, community based adaptation, research, and awareness raising/training within the areas of agriculture, freshwater supply, human health, fisheries, disaster risk reduction and meteorology. The LDCF project "Adapting Water Resource Management in Comoros to Increase Capacity to Cope with Climate Change" is currently helping to implement some of these priority actions.

⁹³ GFDRR, http://gfdrr.org/gfdrr/ca_projects/detail/1228

⁹⁴ COI, http://www.coi-ioc.org/fileadmin/multimedia_francais/activites/downloads/R%E9sum%E9%20projet%20Agro%E9cologie%20English%20version.pdf

Table 3: Proposed Adaptation Projects and Programs in Comoros' NAPA

Name		Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
2.	Seed varieties that are more adapted to drought	The objective of the project is to ensure the production and distribution quality seeds and varieties of food-producing crops which are more adapted to drought.	Capacity building; Community based adaptation	Agriculture	
Notes:					
3.	Defense and restoration of degraded soils	The objective of the project is to restore the degraded soils, protect soils against erosion in order to increase useful agricultural surface area and reduce land pressure and limit the introduction of agriculture into the forests.	Community based adaptation	Agriculture; Ecosystem restoration	
Notes:					
4.	Reconstitution of basin slopes	The objective of the project is to increase the water reserves through the restoration of basin slopes.	Capacity building	Freshwater supply; Ecosystem restoration	
Notes:					
5.	Increase in water supply	The objective is to enable communities from the most arid areas to adapt to drought, and in particular to develop water harnessing, collection and storage infrastructure.	Community based adaptation; Field implementation	Freshwater supply	
Notes: This project is currently receiving funding through the GEF.					
6.	Improvement of water quality	The objective of the project is to enable communities to have access to drinking water in order to preserve health in a context of precipitation fluctuations and degradation of the quality of the resource. The main activities include setting up water treatment infrastructure, training in water treatment, etc.	Capacity building; Field implementation	Freshwater supply	
Notes:					
7.	Fight against malaria	The objective is to fight against the geographic intensification and extension of malaria caused by climate vulnerability, and to reduce the transmission vectors of malaria.	Knowledge communication; Capacity building	Human health	
Notes:					
8.	Use of local nonmetallic construction materials	The project objective is to reinforce the resistance of traditional housing in order to increase people security. Studies will include study of impact on the environment, manufacture of clay bricks, research of relevant technological procedures, etc.	Knowledge communication; Research	Human settlements	
Notes:					
9.	Fodder production for goat breeding	The project objective is to increase the fodder and improve quality of pastures to improve the productivity of good breeding. Main activities include training of goat breeders,	Knowledge communication; Capacity building	Agriculture	
Notes:					

Name		Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
		planting of fodder trees, etc.			
10.	Poultry farming	The objective of this project is to increase the production of chicken and eggs, with main activities including creating a national grouping of Comorian Poultry farmers, construction of a provender unit, and purchase and installation of equipment.	Community based adaptation	Agriculture	
Notes:					
11.	Introduction of Fish Concentration Mechanisms	The objective of the project is to increase fish availability in order to allow communities to face the shortages of resource aggravated by climate variability. This includes training and education of fishermen, and the making and assembly of fish concentration mechanisms.	Capacity building; Knowledge communication	Marine fisheries	
Notes:					
12.	Short conservation of fish under ice	The objective of this project is to reduce the losses of fish after catches due to increases in temperatures. This will include making ice silos, ice production, training of fishermen and retailers in fish conservation, and dissemination of conservation techniques.	Knowledge communication; Capacity building; Field implementation	Marine fisheries	
Notes:					
13.	Setting up an early warning and surveillance system	The objective of the project is to establish a surveillance network to monitor climate phenomena and ensure preparedness and a relevant response in order to minimize negative consequences.	Capacity building	Disaster risk management; Climate information services	
Notes:					
14.	Support to eye medical and surgical care	The objective of this project is to reduce the rate of blinding cataract through surgical care, in favor of populations which do not currently have access to ophthalmologic plans, and increase the care of those affected by this disease.	Capacity building	Human health	
Notes:					

E. Assessment

Comparatively speaking, Comoros has a very low quantity of projects but this lower level of engagement may be expected given its relatively smaller size and limited capacity. These adaptation projects address some of the country's articulated priority actions, including efforts to reduce vulnerability in the agriculture and freshwater sectors, as well as to improve the capacity of policymakers to identify and address key risks emerging from climate change and regional capacity to monitor weather and reduce the risks associated with extreme weather events. The country has identified a number of additional sectors anticipated to be vulnerable to climate change for which there



currently appears to a lack of adaptation action. These areas include fisheries and health. Future actions that address identified vulnerabilities in these sectors may be appropriate.

References:

McSweeney, C. et al (2009). UNDP Climate Change Country Profiles: Comoros. Accessed in April 2011 from:

<http://ncsp.undp.org/sites/default/files/Comoros.oxford.report.pdf>

Ministry of Development, Infrastructures, Post and Telecommunications and International Transports [MDIPTTT] (2002). Initial National Communication on Climate Change. Accessed in April 2011 from:: <http://unfccc.int/resource/docs/natc/comnc1e.pdf>

Ministry of Rural Development, Fisheries, Handicraft and Environment [MRDFHE] (2006). National Action Program of Adaptation to Climate Change. Accessed in April 2011 from: <http://unfccc.int/resource/docs/napa/com01e.pdf>

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United States Department of State [USDS] (2010). Background Note: Comoros. Accessed in April 2011 from:

<http://www.state.gov/r/pa/ei/bgn/5236.htm>

3.0 Lesotho

GOL	Government of Lesotho
DFID	Department for International Development (United Kingdom)
LDCF	Least Developed Countries Fund
NAPA	National Adaptation Programme of Action
PRSP	Poverty Reduction Strategy Paper
MNR	Ministry of Natural Resources
SADC	Southern African Development Community
SIDA	Swedish International Development Agency
START	Global Change Systems for Analysis, Research and Training
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USDS	United States Department of State

Lesotho is a small country surrounded by the country of South Africa. Often referred to as the “mountain kingdom,” its small territory of 30,000 square kilometers is dominated by craggy mountains and some plateaus (USDS, 2010). Its climate can be characterized as temperate, with a rainy season in the austral summer and dry winters (USDS, 2010).

A. Adaptation Needs and Priorities

Lesotho’s National Adaptation Program of Action (NAPA) was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in November 2008, outlines the projected changes to Lesotho’s climate in the decades to come, increased frequency and severity of droughts, heat waves, wind storms, dust storms, early frost, extreme cold spells, heavy snowfall and a shortened rainfall season (MNR, 2007). The NAPA also identifies a number of future adaptation needs to address these projected changes, and provides a list of priority adaptation options that also aim to support and improve livelihoods—especially in the livestock and agriculture sectors where impacts are expected to be the most severe. The priority adaptation options identified are as follows:

- Improving the resilience of livestock production systems;
- Promoting sustainable crop-based livelihood systems;
- Capacity building and policy reform for climate change integration in development plans;
- Improvement of early warning systems against disasters and other hazards;
- Securing village water supply in the Southern Lowlands;
- Management and reclamation of degraded and eroded land in flood prone areas;
- Conservation and rehabilitation of degraded wetlands;
- Improvement of community food security; and
- Strengthening and stabilizing eco-tourism based rural livelihoods.

Lesotho has also highlighted its adaptation technology needs through a report submitted to the UNFCCC (MNR, 2004). The needs it identifies include agricultural technologies to improve productivity in light of climatic changes as well as measures/strategies to enhance soil quality in Lesotho's rangelands.

B. Policy Level Actions

Development activity in Lesotho is currently guided by the document *Lesotho Vision 2020*. Completed in 2005, this document identifies climate change as a critical factor in achieving Lesotho's environmental goals (GOL, 2005). Implementation of *Lesotho Vision 2020* is presently being guided by the "Interim National Development Framework", which covers the period of 2009 to 2011. The document is meant to serve as a bridge between the end of Lesotho's Poverty Reduction Strategy Paper and publication of the National Development Plan, which is anticipated to be released in 2011. The National Development Plan will guide future implementation of *Vision 2020* (GOL, 2009).

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	First National Communication to the UNFCCC ⁹⁵	Ministry of Natural Resources	Submitted in April 2000	Multi-sectoral	Discusses the impact of climate change on Lesotho, current circumstances, and its greenhouse gas profile, as well as mitigation and adaptation needs.
2.	National Vision 2020	Government of Lesotho	2005	Multi-sectoral	Under the environment section, the document notes climate change as a critical factor in achieving the goal of a “well managed environment.”
3.	National Adaptation Programme of Action ⁹⁶	Ministry of Natural Resources, Lesotho Meteorological Services	Submitted in November 2008	Multi-sectoral	The NAPA outlines future adaptation needs to address the expected impacts of climate change on Lesotho.

C. Current Adaptation Action

A low number of current adaptation projects are underway in Lesotho when compared to other countries in southern Africa. These projects address some of the adaptation priorities identified in Lesotho’s NAPA, including promoting sustainable crop-based livelihood systems, capacity building and policy reform for climate change integration in development plans, improvement of community food security, and the improvement of early warning systems against disasters and other hazards. The latter of these projects was the fourth prioritized project in Lesotho’s NAPA and is implemented with funding provided by the Least Developed Countries Fund (LDCF).

Current projects in Lesotho mainly focus on the agriculture sector and improving governance capacity. In addition, certain projects aim to enhance ecosystem resilience, disaster risk management, and understanding of climate risks. By type, the majority of projects involve capacity building and research, with a minority focused on field implementation (mostly through national projects).

⁹⁵ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=2621#beg

⁹⁶ UNFCCC, <http://unfccc.int/resource/docs/napa/lso01.pdf>

Table 2: Current Adaptation Projects and Programs active in Lesotho

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
National Action								
1.	Strengthening Capacity for Climate Change Adaptation in the Agricultural Sector ⁹⁷	The major expected outcome would be strengthened capacity of national, district and local stakeholders and rural communities to achieve household food security and ecosystem resilience through climate change adaptation.	FAO <i>Budget:</i> US\$372,000	Lesotho Government; One World Sustainable Investments, possibly others	Capacity building; Assessment; Field implementation	2009 – 2011	Agriculture; Biodiversity	Lesotho
2.	Impacts and Adaptation to Climate Change for Subsistence Farming Communities ⁹⁸	The study will look at impacts of climate change on livelihoods of subsistence farming communities in Lesotho and current coping strategies and mechanisms that communities employ to adapt to climate change. Capacity building to make communities less vulnerable is also part of the project.	START through a grant from the US National Science Foundation	UNEP	Research; Capacity building	2010 – ?	Agriculture	Lesotho
3.	Improvement of an Early Warning System to Reduce Impacts of Climate Disasters and Hazards ⁹⁹	Development of an early warning system and technical capabilities to monitor and issue warnings on climate and weather extreme events.	LDCF <i>Budget:</i> US\$1.8 million	UNEP with various government ministries ¹⁰⁰	Capacity building; Field implementation	2011 – 2015	Disaster risk management	
Participation in Regional and Global Actions								
4.	Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa:	“Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global	BMZ <i>Budget:</i>	IFPRI (lead); ASARECA; FANRPAN; PIK;	Capacity building; Community	2008 – 2011	Rural areas; Agriculture; Government	African: Angola, Botswana,

⁹⁷ One World, <http://www.oneworldgroup.co.za/projects/climate-change/strengthening-capacity-for-climate-change-adaptation-in-the-agricultural-sector-of-lesotho/> and FAO, <http://www.fao.org/docrep/014/i2228e/i2228e00.pdf>

⁹⁸ START, <http://start.org/programs/africangec/caxton-matarira.html>

⁹⁹ UNFCCC, http://unfccc.int/files/adaptation/application/pdf/lesotho_napa_proj.pdf and GEF, http://www.thegef.org/gef/sites/thegef.org/files/documents/document/5-17-2011%20ID3841%20%20%20Council%20letter_0.pdf

¹⁰⁰ These ministries are: Ministry of Planning, Economic and Manpower Development; National Curriculum, Development Centre; Ministry of Communications, Science and Technology; Disaster Management Authority; and the Ministry of Agriculture and Food Security.

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Targeting the most vulnerable ¹⁰¹	changes and the changes of these impacts across disaggregated systems, groups, and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.”	US\$91,241	ZALF	based adaptation; Policy formation and integration			Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
<i>In Lesotho: Further information required.</i>							
5. Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa (or Africa Adaptation Program –AAP) ¹⁰²	Under this program, UNDP will assist 20 African countries in implementing integrated and comprehensive adaptation actions and resilience plans. The projects will ensure that national development processes incorporate climate change risks and opportunities to secure development gains under a changing climate. UNDP will help countries establish an enabling environment and develop the capacity required to design, finance, implement, and monitor long-term and cost-effective adaptation policies and plans.	Japan International Cooperation Agency Budget: US\$92 million	UNDP	Capacity building; Policy formation and integration; Knowledge communication	2008 – 2011	Government	African: 20 African countries ¹⁰³ including: Lesotho, Malawi, Mauritius, Mozambique, Namibia
<i>In Lesotho: The project is focused on: Focused on strengthening: (1) adaptive long-term planning capacities (2) institutional and human resource capacities, (3) policies and measures, (4) a sustainable financing strategy (5) knowledge management activities. Implementation is being led by the Ministry of Natural Resources.</i>							
6. Southern Africa Regional Climate Change Program ¹⁰⁴	The program aims to synthesize relevant climate change science, develop strategic	DFID, SIDA	OneWorld Sustainable	Policy formation and	2009 – 2014	Government; Climate	African: Angola,

¹⁰¹ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

¹⁰² ALM, <http://www.adaptationlearning.net/program/africa-adaptation-programme> and UNDP-APP, <http://www.undp-aap.org/>

¹⁰³ These countries are Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome et Principe, Senegal, Tanzania and Tunisia.

¹⁰⁴ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region’s voice in international platforms, and enhance its ability to access necessary finance for climate change adaptation.		Investments	integration; Research		information services	Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
<i>In Lesotho: Further information required.</i>							

D. Proposed Adaptation Action

Lesotho’s NAPAs identifies eleven projects in order of priority to help it address its urgent and immediate adaptation needs. These projects are presented in Table 3 below. Following completion of the NAPA, the government of Lesotho invited the UNDP to support implementation of two projects: “Improvement of Crop Production Systems to Reduce Food Insecurity in the Lowlands of Lesotho” and “Improve Resilience of Livestock Production Systems under Extreme Climatic Conditions in various Livelihood Zones in Lesotho.”¹⁰⁵ Neither of these projects appears to have received funding as of yet. However, the LDCF financed project “Improvement of an Early Warning System to Reduce Impacts of Climate Disasters and Hazards” does respond to the fourth priority identified in Lesotho’s NAPA.

¹⁰⁵ UNDP, <http://www.undp.org/ls/energy/napa.php>

Table 3: Proposed Adaptation Projects and Programs in Lesotho's NAPA

Name		Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
1.	Improve Resilience of Livestock Production Systems Under Extreme Climatic Conditions in Various Livelihood Zones in Lesotho	To improve agriculture's resilience to climate change, in particular to: (a) promote conservation agriculture technologies and drought resistant crop varieties to support dryland farming in the Lowlands and Senqu River Valley; (b) improve horticultural production of fruits and vegetables in the lowlands and foothills; and (c) promote water conserving irrigation systems in the southwestern lowlands and Senqu River Valley.	Capacity building	Agriculture; Freshwater supply	Lowlands, Senqu River
Notes:					
2.	Promoting Sustainable Crop Based Livelihood Systems in Foothills, Lowlands and Senqu River Valley	To address and mitigate the effect of prolonged droughts on Lesotho's livestock industry (including sheep and goat wool production as well as dairy production). Two objectives are to (a) stabilize wool and mohair production systems against climate change in the mountain zone, and (b) improve the state of dairy enterprises in the lowlands and foothills livelihood communities.	Capacity building; Research; Community based Adaptation	Agriculture	Lesotho
Notes:					
3.	Capacity Building and Policy Reform to Integrate Climate Change in Sectoral Development Plans	To mainstream the issues of climate change into the national dialogue, policy development, planning and program implementation.	Capacity building; Policy formation and integration	Government	Lesotho
Notes:					
4.	Improvement of an Early Warning System Against Climate Induced Disasters and Hazards	Development of an early warning system and technical capabilities to monitor and issue warnings on climate and weather extreme events.	Capacity building; Field implementation	Disaster risk management	Lesotho
Notes: This project is currently being funded through the LDCF.					
5.	Securing Village Water Supply for Communities in the Drought Prone Southern Lowlands	To improve community access to clean and optimal water supply; increase a network of water collection systems and points for the affected communities; and improve community capacity to manage the demand and usage of water.	Capacity building; Community based development	Freshwater supply	Lesotho
Notes:					
6.	Management and Reclamation of Degraded and Eroded Land in the Flood Prone Areas	Objectives identified as follows: (a) to implement soil erosion combatting measures; (b) to build the capacity in communities for participatory land use planning; (c)	Capacity building; Policy formation and integration	Agriculture; Coastal zone management	Western lowlands

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)	
	to implement integrated catchments management systems.	Notes:			
7.	Conservation and Rehabilitation of Degraded Wetlands in the Mountain Areas of Lesotho	To rehabilitate degraded and eroded wetlands in the mountain areas; protect and conserve wetlands ecosystems; and raise public awareness about the important of wetlands.	Capacity building; Knowledge communication	Ecosystem restoration	Mountain regions
		Notes:			
8.	Improvement of Community Food Security through the Promotion of Food Processing and Preservation Technologies	To expand the food processing industry by: (a) enhancing availability and accessibility of food processing and preserving technologies; and (b) reinforcing commercialization in agricultural products.	Capacity building	Agriculture	Lesotho
		Notes:			
9.	Strengthening and stabilizing eco-tourism based rural livelihoods		Capacity building	Tourism	Lesotho
		Notes:			
10.	Promote Wind, Solar and Biogas Energy Use as a Supplement to Hydropower Energy		Knowledge communication; Field implementation	Energy	Lesotho
		Notes:			
11.	Stabilizing Community Livelihoods which are Adversely Affected by Climate Change Through Improvement of Small Scale Industries		Community based adaptation	Private sector	
		Notes:			

E. Assessment

Despite its low number in adaptation projects, Lesotho has made progress in identifying and responding to many adaptation priorities as described in the country's NAPA. In particular, the country has made progress in securing funding for projects focused on resilience to climate change in the agriculture sectors, which is noted as particularly critical to livelihoods and economic activity in Lesotho. It is also enhancing the capacity of its national government to develop and implement adaptation strategies through its participation in projects such as the Africa Adaptation Programme.



Even with this progress, gaps in Lesotho's adaptation action persist. At present, there is weak integration of climate change considerations in the Interim National Development Strategy and *Vision 2020*, although this may be resolved with the release of the National Development Plan in 2011. In addition, certain NAPA projects remain unfunded, including those focused on capacity building and public education measures to address soil erosion and degraded lands, wetlands, food security, and water resources management. Of note, however, is that some of the objectives of these unfunded NAPA projects are being at least partly addressed through projects currently underway in the country.

Based on the priority adaptation areas identified in Lesotho's NAPA, the following gaps persist:

- Securing village water supply in the southern lowlands: implementation of the proposed project "Improvement of Crop Production Systems to Reduce Food Insecurity in the Lowlands of Lesotho" might address this need through a focus on water conserving irrigation systems in the south-western lowlands.
- Management and reclamation of degraded and eroded land in flood prone areas: There are no current projects that address this priority.
- Conservation and rehabilitation of degraded wetlands: There are no current projects that address this priority.
- Strengthening and stabilizing eco-tourism based rural livelihoods: There are no current projects that address this priority.

In addition, gender concerns related to climate change due not seem to have been clearly articulated through existing reports, and are presently not directly addressed in ongoing projects.

References:

Ministry of Natural Resources [MRN] (2004). *Adaptation to Climate Change: Technology Needs in Lesotho: Energy and land use change and forestry*. Accessed in April 2011 from: <http://unfccc.int/ttclear/pdf/TNA/Lesotho/TNA%20report%20lesotho.pdf>

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<http://www.state.gov/r/pa/ei/bgn/2831.htm>

4.0 Madagascar

ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
CCAA	Climate Change Adaptation in Africa
CI	Conservation International
COI	Indian Ocean Commission
DFID	Department for International Development (United Kingdom)
FANPRAN	Food, Agriculture and Natural Resources Policy Analysis Network
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit / German Agency for Technical Cooperation
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
MEF	Ministry of Environment and Forests
MEWF	Ministry of Environment, Water and Forests
NAPA	National Adaptation Program of Action
NORAD	Norwegian Agency for Development Cooperation
PIK	Potsdam Institute for Climate Impact Research
SIDA	Swedish International Development Cooperation Agency
UNFCCC	United Nations Framework Convention on Climate change
USAID	United States Agency for International Development
USDS	United States Department of State
WWF	World Wildlife Fund
ZALF	Leibniz-Centre for Agricultural Landscape Research

The large island of Madagascar located off the southeast coast of Africa in the Indian Ocean is one of the most biologically diverse countries in the world (CI and WWF, 2008). Approximately 21 million people live on the island (USDS, 2010), with 80 per cent living in rural areas and 20 per cent in urban areas (MEWF, 2006). Its rich natural resources contribute significantly to the country's economy,

which is dominated by the agriculture, livestock and fishery sectors. Together these sectors comprise 95 per cent of the nation's food supply (MEWF, 2006) and are the source of livelihoods for 75 per cent of the rural population (WWF, 2011). The country currently experiences a number of environmental issues that exacerbate its vulnerability to climate change, including deforestation, soil erosion, and the degradation of water resources. Deforestation has claimed 90 per cent of the country's natural forests (Hannah, 2008). The country is also experiencing an overall decline in fish stocks as well as in agricultural production (USAID, 2008).

A. Adaptation Needs and Priorities

The country's current climate is varied; the southwest is semi-arid and the east is tropical and humid. The rainy season lasts from November to April, and the dry season from May to October (Heath, 2010; MEWF, 2006). There is evidence that the island's average temperature has been increasing over recent decades, and that its rainfall has decreased and become less predictable.¹⁰⁶ In 2005, around 80 per cent of the country's coral reefs in the northeast of the island experienced bleaching, an event associated with warmer ocean waters (WWF, 2011).

In the decades to come, it is expected that climate change will result in areas of increased and decreased precipitation in Madagascar. Rainfall is expected to increase through the summer months of January through April (MEWF, 2006). During the winter months, the southeast portion of the island is anticipated to be drier by 2050, whereas the remainder of the country is expected to be wetter (CI and WWF, 2008). It is also anticipated that Madagascar will experience a shortened dry season, prolonged periods of drought, more frequent storms (MEWF, 2006) and potentially three to five tropical cyclones per year that are more intense (MEWF, 2010).

The country's National Adaptation Program of Action (NAPA), prepared in 2006, and its Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), published in 2010, notes that these climatic changes will likely have an impact on food and water security, human health, infrastructure and biodiversity. They identify the following impacts of climate change by sector, highlighting key vulnerabilities (MEWF, 2006; MEWF, 2010):

- *Agriculture and livestock:* Along with factors that include deforestation and the exhaustion of soils, climate change is expected to have many negative effects on the agriculture/livestock sector, including losses in soil fertility, declining productivity due to water stress and parasites, compromised nutrition, migration and disrupt rice cultivation in certain areas of Madagascar

¹⁰⁶ According to a recent community-level survey, unpredictability of rainfall has been the "most consequential" change in climate over the past twenty years (USAID, 2008).

- *Public health:* Warmer climates may cause disease vectors, including malaria, diarrhea, respiratory infections, to shift and become more pronounced.
- *Freshwater resources:* Climate change may cause changes to the rate of precipitation, difficulties in water management (due to droughts and arid conditions) and a change in natural ecosystems.
- *Coastal resources:* The gradual disappearance of Madagascar's coasts had removed 5 to 6.5 meters of coastline by 1997; by 2100, this figure could reach as much as 225 meters. Coastal infrastructure is endangered in many cities and historical sites, and beaches are exposed to increased risk of degradation.
- *Forestry sector:* As a result of rising temperatures, declining soil quality, desertification and other anticipated effects of climate change, critical forest ecosystems in Madagascar, including mangrove forests, may lead to a considerable decline in the country's forested areas; and some plants and animal species may disappear.

Lesotho's Second National Communication also identifies the country's key adaptation needs, including: strengthening the management of natural resources; enhancing the system to protect coastal zones against erosion; improvement of information and public education at all levels, and improvements to the country's weather service and communications networks. With respect to the latter, the Second National Communication highlights insufficient data, archaic data collection systems, and a variety of other technical and financial barriers as being key barriers prohibiting adaptation to climate change in Madagascar (MEWF, 2010).

The country also identified a number of priority adaptation actions in its NAPA, as listed in Table 3. In addition to this document, a workshop organized by the government in collaboration with Conservation International and the World Wildlife Fund (WWF) identified a number of other adaptation needs for the country, including (CI and WWF, 2008):

- Protection of mangrove ecosystems that are particularly vulnerable to the impacts of climate change;
- Ecological protection and restoration, including integrated coastal zone management;
- Enhanced climate monitoring data, including over marine, terrestrial and freshwater sites;
- Creation and enforcement of land tenure regulations; and
- Environmentally sound agricultural intensification and diversification.

B. National Level Policies and Strategic Documents

Madagascar has developed a number of reports that describe its vulnerability to the impacts of climate change and possible adaptation measures, including its two National Communications for the UNFCCC and NAPA. Beyond this analysis, the country's national development strategy, *Vision 2030*, mentions the need to adapt to climate change (see Table 1).

The aforementioned 2008 workshop on climate change adaptation in Madagascar also produced a number of policy recommendations which are in the process of being implemented along with local partners. These include (CI and WWF, 2008):

- Establishment of an inter-ministerial task force on climate change;
- A review of Madagascar's NAPA to incorporate feedback from the workshop;
- The development of a rural development policy in the areas most vulnerable to climate change; and
- The disbursement of methods of information-education-sensitization on the impacts of climate change.

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Madagascar Vision 2030	Economic Ministry	Published in 1995 (?)	Multi-sectoral	This document describes an overall development strategy for the country, and also touches upon the challenge of addressing climate change. It entails various statements on adaptation to climate change, including the importance of foreseeing environmental risks associated with climate change as well as developing legal, communication and education tools to reduce vulnerability.
2.	First National Communication to the UNFCCC ¹⁰⁷	Ministry of the Environment, Water and Forests	Submitted in 2004	Multi-sectoral.	This document reviews Madagascar's current climate situation, describes projected impacts, discusses the country's greenhouse gas emissions profile, and identifies its key vulnerabilities by sector. It also reviews how Madagascar will address these challenges through an action plan on climate change.
3.	National Adaptation Program of Action ¹⁰⁸	Ministry of the Environment, Water and Forests	Submitted in 2006	Multi-sectoral	The country's NAPA discusses the projected impacts of climate change on Madagascar and highlights key vulnerabilities by sector. The document then lists a number of priority adaptation actions and ranks

¹⁰⁷ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=4158#beg

¹⁰⁸ UNFCCC, <http://unfccc.int/resource/docs/napa/mdg01f.pdf>

Name of Policy Action	Government Division Responsible	Status	Sector(s) of Focus	Summary description
				them according to importance.
4. Second National Communication to the UNFCCC ¹⁰⁹	Ministry of the Environment, Water and Forests	Submitted in 2010	Multi-sectoral	This document reviews Madagascar's greenhouse gas emission profile as well as its vulnerability to climate change including projected impacts. It makes a number of recommendations as to the country's priority adaptation actions.

C. Current Adaptation Action

The current level of adaptation programming in Madagascar is moderate when compared to others in southern Africa. This programming includes both country-specific projects as well as regional programs. For example, the Norwegian Agency for Development Cooperation (NORAD) is funding a suite of programs through the World Wildlife Fund Madagascar office that focus on coastal zone management, ecosystem conservation, biodiversity and marine management. A diversity of other multilateral and bilateral organizations also are supporting adaptation efforts in the country.

Prominent sectors being addressed through multiple projects are agriculture, disaster risk management, enhancing climate information services, and building the capacity of government to facilitate adaptation to climate change. Current actions include capacity building, knowledge communication, community based adaptation, and research initiatives.

Table 2: Current Adaptation Projects and Programs active in Madagascar

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1. Vulnerability and Adaptation to Climate Change : Agricultural Systems in Madagascar ¹¹⁰	This project will allow the University of Antananarivo to facilitate a dialogue between decision-makers and researchers at the national, regional and local level; to produce spatial information on the factors affecting	DFID and IDRC through the CCAA program	Climate Change Adaptation Unit; DEPI; UNEP; Nairobi Kenya	Capacity building; Knowledge communication; Assessment	2007 – 2010	Agriculture	

¹⁰⁹ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=MDG/COM/2%20E#beg

¹¹⁰ IDRC,

http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Climate_Change_and_Adaptation_in_Africa/Pages/ProjectDetails.aspx?ProjectNumber=104143

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	vulnerability to climate change on the whole island of Madagascar; to better understand existing and possible adaptation strategies; to explore various intervention strategies under different scenarios; and to reinforce national capacity in analysis of climate change vulnerability and adaptation.						
2. Mangrove conservation in western Madagascar ¹¹¹	The project objective is to conduct a credible vulnerability assessment of mangroves in the Tsiribihina and Manambolo areas to provide solid baseline data for future conservation and sustainable management in the context of climate change.	NORAD	WWF	Assessment	2009 – 2010	Coastal zone management	Western Madagascar: Tsiribihina and Manambolo
3. Adaptation in the Diana Region ¹¹²	The Diana Region provides successfully implemented climate change adaptation models that can be scaled up for high-value conservation areas throughout Madagascar. In particular the project will aim to develop the capacity of Diana regional actors, adaptation approaches are developed and implemented in conservation and natural resource management, and adaptation is integrated into the regional development plan.	NORAD	WWF	Capacity building; Policy formation and integration	2009 – 2012	Ecosystem conservation	Diana region
4. Climate Change Adaptation Capacity ¹¹³	Provide support to WWF and its conservation partners in developing in-country capacity for climate change analysis and adaptation. Specific objectives include: awareness of	NORAD	WWF	Capacity building; Knowledge communicatio	2009 – 2012	Biodiversity	

¹¹¹ WWF, http://wwf.panda.org/who_we_are/wwf_offices/madagascar/?uProjectID=MG0933

¹¹² WWF, http://www.wwf.mg/ourwork/climatechange/ccprojects/adaptation_in_diana_region/

¹¹³ WWF, http://www.wwf.mg/ourwork/climatechange/ccprojects/climate_change_adaptation_capacity/

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	climate change impacts on biodiversity and livelihoods is increased within the Malagasy conservation community, decision-makers and targeted local communities.			n			
5. Integrating Climate Change into Coastal and Marine Conservation ¹¹⁴	The project goal is to improve the understanding of the vulnerability of Madagascar's marine biodiversity to climate change, and to support the integration of climate change considerations into marine protected area network planning, thereby contributing to the protection of Madagascar's globally important marine biodiversity from the impacts of climate change. The project objectives are the following: i) a robust climate change vulnerability assessment of Madagascar's marine biodiversity is completed; ii) a program of capacity building on climate change and its impacts in the country and the results of the vulnerability assessment is implemented.	NORAD	WWF	Assessment; Policy formation and integration; Capacity building;	2009 – ?	Marine management; Biodiversity	Coastal zones
Participation in Regional and Global Actions							
6. "ACCLIMATE" (adaptation au changement climatique) ¹¹⁵	This project aims to promote regional cooperation between the Indian Ocean Commission (COI) countries on climate change adaptation. This objective consists of reinforcing the COI's capacities in the area of climate change adaptation in the short and long term through the development of projects and policies. Several activities are	European Union, Fonds Français pour l'Environnement Mondial, French Ministry of Foreign and	Indian Ocean Commission	Capacity building; Policy formulation and integration	2008 – 2011	Climate information services; Government; Disaster risk management	Regional: Comoros, Madagascar, Mauritius, Réunion (France), Seychelles

¹¹⁴ WWF, http://www.wwf.mg/ourwork/climatechange/ccprojects/integrating_climate_change_into_coastal_and_marine_conservation/

¹¹⁵ IOC, <http://www.coi-ioc.org/index.php?id=158> and ACCLIMATE, <http://www.acclimate-oi.net/en>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	implemented, including: capacity building for climate change observation and for regional vulnerability analyses; the identification of priority axes for regional alert systems and risks prevention plans; demonstrative actions; elaboration of a regional adaptation action plan and policy; and improving the conditions for national and regional knowledge sharing.	European Affairs Budget: € 3.645 million					
<i>In Madagascar: Further information required.</i>							
7.	Enhancing the Disaster Risk Reduction Capacity in Agriculture and Rural Development ¹¹⁶	Global Facility for Disaster Reduction and Recovery Budget: US\$50,000	Agriculture and Rural Development & Sustainable Agriculture Systems, Knowledge and Information	Capacity building	2008 – 2010 (closed)	Agriculture; Disaster risk management	<i>African:</i> Burkina Faso, Comoros, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Niger, Rwanda, Senegal, Seychelles
<i>In Madagascar: Further information required.</i>							
8.	Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ¹¹⁷	BMZ Budget: US\$91,241	IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF	Capacity building; Community based adaptation; Policy formation and integration	2008 – 2011	Rural areas; Agriculture; Government	<i>African:</i> Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia,

¹¹⁶ GFDRR, http://gfdrr.org/gfdrr/ca_projects/detail/1228

¹¹⁷ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
	adaptation strategies.”						South Africa, Tanzania, Zambia and Zimbabwe	
<i>In Madagascar:</i> Further information required.								
9.	Preparedness for Climate Change ¹¹⁸	The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.	Red Cross/Red Crescent Climate Centre	National Red Cross/Red Crescent Societies	Capacity building; Policy formation and integration	Phase 1: 2006 – 2009 Phase 2: ongoing	Disaster risk management	<i>Global:</i> 39 countries <i>South African participants in Phase 1:</i> Madagascar, Malawi, Mauritius, Seychelles, Zimbabwe
<i>In Madagascar:</i> By the conclusion of the first phase of activity, the national Red Cross/ Red Crescent Society in Madagascar was developing climate change resilient plans and programs. ¹¹⁹								
10.	Making the Best of Climate: Adapting agriculture to climate variability ¹²⁰	This project will enhance adoption of climate risk management strategies in semi-arid tropics of East and Central Africa. Anticipated results include vulnerability of agricultural systems to impacts of climate variability quantified and mapped; farm-level response options to reduce the impacts of climate variability developed and evaluated; prototype climate information products to support adaptive decision making developed	World Bank <i>Budget:</i> US\$433,240	ICRISAT	Capacity building; Research; Community based adaptation	2009 – 2011	Agriculture; Climate information services	<i>African:</i> Ethiopia, Kenya, Madagascar
<i>In Madagascar:</i> Further information required.								

¹¹⁸ IFRC, <http://www.climatecentre.org/site/preparedness-for-climate-change-programme>

¹¹⁹ IFRC, <http://www.climatecentre.org/downloads/File/programs/Final%20PFCC%20General%20Assembly%20Document%20with%20renewed%20table.pdf>

¹²⁰ ASARECA, http://asareca.org/researchdir/PROGRAMME_COUNTRYD2C0.HTM

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	and tested; capacity of target stakeholders for applying climate information in agricultural decision making enhanced; availability and use of information on climate risk management enhanced.						
11. Southern Africa Regional Climate Change Program ¹²¹	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region's voice in international platforms, and enhance its ability to access necessary finance for climate change adaptation.	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	<i>African:</i> Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
<i>In Madagascar: Further information required.</i>							
12. Regional Initiative for Smallholder Agriculture Adaptation to Climate Change in the Indian Ocean Islands ¹²²	The objective is to support the adaptation of small-scaled productive systems to climate changes in the islands of the Indian Ocean to improve incomes and living conditions of family scaled farmers. It entails four main components: knowledge sharing, information and awareness, improvement of operational skills and support to small-scale farms.	IFAD Budget: US\$0.75 million	Indian Ocean Commission	Capacity building; Community based adaptation; Knowledge communication	2010 – 2013	Agriculture	<i>Regional:</i> Comoros, Madagascar, Mauritius, Seychelles, Reunion Island
<i>In Madagascar: Further information required.</i>							

¹²¹ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

¹²² COI, http://www.coi-ioc.org/fileadmin/multimedia_francais/activites/downloads/R%E9sum%E9%20projet%20Agro%E9cologie%20English%20version.pdf

D. Proposed Adaptation Action

Through its NAPA, Madagascar identified 15 projects for implementation, as presented in Table 3. Funding for these projects has not yet been received from the Least Developed Countries Fund. However, Madagascar is currently developing a project with UNEP, “Promoting Climate Resilience in the Rice Sector,” that is expected to be funded by the Adaptation Fund.

Table 3: Proposed Adaptation Projects and Programs in Madagascar

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)	
Projects proposed in Madagascar’s NAPA					
1.	Rehabilitation and/or construction of protective dams and sea walls	The objective of this project is the creation of infrastructure such as dams and sea walls that permit the population to access water and irrigation for agricultural production.	Field implementation	Agriculture; Freshwater supply; Coastal zone management	Boeny, Alaotra Mangoro
Notes:					
2.	The creation and revitalization of water management organizations	The purpose of this project is to empower stakeholders in the sustainable management of water resources	Capacity building; Policy formation and integration	Freshwater supply	
Notes:					
3.	Support for the intensification of crop and livestock production, especially through the acquisition of agricultural equipment and the creation of income generating activities in various regional branches, as well as support for the vaccination of cattle.	The objective of this project is to increase agricultural production (crops, livestock) and to improve income and social welfare.	Community based adaptation; Capacity building	Agriculture	
Notes:					
4.	The establishment of anti-erosion, soil restoration, and dune stabilization measures.	The objective of the project is to encourage participation of various stakeholders around the effectiveness of techniques concerning land and water management practices, and the normalized use of watersheds.	Capacity building; Community based adaptation	Ecosystem restoration	Boeny, Alaotra Mangoro, Manabe, Bongolava, and Matsiatra Ambony
Notes:					
5.	The implementation of a strengthened decentralized	The objective of this project is to put in place for each reach a meteorological service to predict and	Capacity building	Climate information services	Boeny, Alaotra Mangoro, Manabe,

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)	
	weather service.				
6.	The establishment of infrastructure such as dams, spurs, etc. as the sea level rises.	communicate weather forecasts to the population.	Notes:		
		Field implementation	Coastal zone management	Coastal areas including Manabe and Atsinanana	
		Notes:			
7.	Rehabilitation of degraded areas by reshaping the coast, laying windbreaks, planting of mangroves, and placing rocks on the seashore.	The objective of this project is the sustainable management of coastal and marine environments in the country.	Field implementation	Coastal zone management	Coastal areas including Manabe and Atsinanana
		Notes:			
8.	The reforestation of rural areas with adapted/appropriate species.	The objective of this project entails an increase in forest surface cover with species adapted to climatic changes in each region as well as local needs.	Field implementation	Forestry	
		Notes:			
9.	Promoting the transfer of forest management responsibilities to local communities.	The objectives of this project are the management and conservation of forests through local committees, the reduction of areas affected by forest fires, and the reduction in the number of illegal loggers.	Capacity building	Forestry; Fire management	Matsiatra Ambony, SAVA, and Atsinanana
		Notes:			
10.	Rehabilitation of communication networks and telecommunications to promote trade and marketing.	Improved communications of meteorological predictions so that the population may adapt their planting and harvesting seasons, as well as improve trade and marketing capacities.	Knowledge communication	Climate information services; Agriculture	Boeny, Alaotra Mangoro, Manabe, and Bongolava
		Notes:			
11.	Development of information, education and communication through appropriate media.	An increase in the level of knowledge of the rural population through the development of information, education, and communication.	Knowledge communication	Civil society	Rural areas
		Notes:			
12.	Information, education and communication of the population regarding the causes of disease and preventative measures, the importance of visiting health centers, the construction of latrines, nutrition and avoidance in particular of malaria.	The objective of this project is to improve public awareness and encourage behavior change to protect health.	Capacity building; Field implementation	Human health	
		Notes:			

Name		Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
13.	The reinforcement and consolidation of the capacity of basic health services through decentralization of health personnel, the enhancement of equipment, and improvement of epidemiological surveillance.	The objective of this project is that basic health clinics are ready to address epidemics that may be caused by climate change.	Capacity building	Human health	
Notes:					
14.	Improving staffing capacities in the health sector in order to fight against certain disease vectors	The ultimate objective of this project is to ensure that the population is in good health, and that medicine is available to the entire population.	Capacity building	Human health	
Notes:					
15.	Development, communication and implementation of standards in design and construction covering all major infrastructures in order to ensure that they resist extreme weather events	The objective of this project is to ensure that all infrastructure is constructed according to norms that will allow them to withstand anticipated impacts of climate change, and that silos and community granaries are available.	Capacity building	multi-sectoral	
Notes:					
Other proposed projects					
16.	Promoting Climate Resilience in the Rice Sector ¹²³	The overall objective of the project is to initiate the transformation of the rice sub-sector to make it more resilient to current climate variability as well as expected climate change and associated hazards. This overall objective will be achieved namely by pursuing the following secondary objectives: <ul style="list-style-type: none"> • Strengthening the scientific and technical capacities of Malagasy authorities to understand, analyze and manage climate risks to the rice sub-sector, as well as to determine further adaptation options for the sector. • Implementing and disseminating a series of changes to the rice production practices, from input to harvest management, including measures designed to restore and maintain ecological services around rice ecosystems 	Capacity building	Agriculture	Madagascar
Notes: This project was endorsed by the Board of the Adaptation Fund at its September 2010 meeting. <i>Proposed budget:</i> US\$4.505 million <i>Proposed implementing agency:</i> UNEP					

¹²³ Adaptation Fund, http://www.adaptation-fund.org/sites/default/files/AF_Rice%20Project%20Madagascar_03082010.pdf

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
	<ul style="list-style-type: none"> Identifying and addressing the key policy barriers, gaps or maladaptations in order to create the conditions for up-scaling adaptation in the rice subsector. 			

E. Assessment

A moderate number of current adaptation projects are occurring in Madagascar, several of which respond to the priority adaptation needs identified in the country’s National Communications and NAPA, as well as by other stakeholders. This includes projects that focus on integrated coastal zone management; improving the resilience of the agricultural sector to the impacts of climate change; promotion of farming practices that enhance soil and water conservation; integration climate change adaptation into community, national, and regional planning; conservation of mangroves in Western Madagascar; and ensuring various stakeholders within Madagascar understand and are aware of the potential impacts of climate change upon the country through education and awareness raising exercises. At present it appears that none of the priority adaptation projects identified through Madagascar’s NAPA have been funded and/or implemented.

Current adaptation actions in the country miss certain specific adaptation needs identified through the NAPA. While a number of the NAPA projects focus significantly on the creation of infrastructure—dams, protective sea walls, enhanced building design, etc.—that will improve the country’s resilience to climate change, very few of the ongoing adaptation actions in Madagascar explicitly support this type of field level implementation activity. Additional gaps include reforestation and forest management, public health initiatives, and gender.

A majority of the adaptation actions being implemented at this stage are focused on assessment, capacity building, policy formation/integration, and education and awareness generation. A smaller number of projects contain community based adaptation initiatives. Although capacity building and research are important, there may be a need for future actions to include concrete and specific actions to demonstrably enhance resilience to climate change, including investments in infrastructure, improved natural resource management, and the adoption of farming techniques that conserve water and improve soil quality.

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5.0 Malawi

AfDB	African Development Bank
ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
C4D	Canadian Coalition on Climate Change and Development
CCAA	Climate Change Adaptation in Africa
CGIAR	Consultative Group on International Agricultural Research
DEFRA	Department for Environment, Food, and Rural Affairs (United Kingdom)
DFID	Department for International Development (United Kingdom)
EC	European Commission
FANPRAN	Food, Agriculture and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organization
FOEN	Swiss Office for the Environment
HIV/AIDS	Acquired immune deficiency syndrome
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
LDCF	Least Developed Country Fund
MGDS	Malawi Development and Growth Strategy
MMNRE	Ministry of Mines Natural Resources and Environment
MNREA	Ministry of Natural Resources and Environmental Affairs
NAPA	National Adaptation Programme of Action
NCAP	Norwegian Climate Action Partnership
PIK	Potsdam Institute for Climate Impact Research
QWeCI	Qualifying weather and climate impacts on health in development countries project
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Program
UNEP	United Nations Environment Program



UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
USDS	United States Department of State
ZALF	Leibniz-Centre for Agricultural Landscape Research

One of the least developed countries in the world and one of the most densely populated countries in Africa, Malawi is a landlocked country in southeastern Africa that borders on Mozambique, Tanzania and Zambia (MMNRE, 2006). The country is split north to south by the Great Rift Valley, and is home to Lake Malawi—the third largest lake in Africa—which comprises 20 per cent of the country’s area (USDS, 2010). The topography of the country is varied, with the area surrounding the Great Rift Valley reaching elevations of 3,000 meters (McSweeney et al, 2008).

Malawi is highly dependent on its natural resources base, including soils, water, fisheries, and forests (MMNRE, 2006). Approximately 90 per cent of Malawi’s population of 13.1 million (MMNRE, 2006) is dependent on rain-fed subsistence farming for their livelihoods; it is estimated that 60 per cent of the population experiences food insecurity on a year-round basis (MMNRE, 2006). The agricultural sector comprises 63.7 per cent of the country’s Gross Domestic Product (USDS, 2010). As firewood makes up 90 per cent of the country’s energy supply, Malawi has one of the highest rates of deforestation in Africa (MNREA, 2002). Deforestation has contributed to the degradation of lands and soil erosion. Siltation of the Shire River, the tributary linking Lake Malawi to the Indian Ocean, has compromised the country’s electricity supply, as hydropower generators within the river supply 98 per cent of the country’s electricity (MMNRE, 2006). Female and children headed households are common due to the country’s HIV/AIDS epidemic (MMNRE, 2006).

A. Adaptation Needs and Priorities

Malawi’s present climate is characterized by a warm wet season from November to April (during which 95 per cent of the country’s annual precipitation falls), a cool dry winter from May to August, and a hot and dry season from September to October (UNDP, 2009). It currently experiences considerable fluctuations in year to year rainfall variability, resulting in difficulties in pinpointing long-term historical trends (McSweeney et al, 2008). However, based on recent community-level interviews with smallholder farmers, there is evidence to suggest that the climate in Malawi is changing. For example, there has been a marked change in the growing season and the crops grown over the past several decades (ActionAid, 2006; Oxfam, 2009). The country currently experiences a number of climate hazards which may

intensify over the coming years, including heavy rainfall, floods, seasonal droughts, cold spells, strong winds, thunderstorms, landslides, hailstorms, mudslides and heat waves (MMNRE, 2006). In recent years, repeated floods and droughts have compromised the country's food and water security, including impacts on health and energy supply (MMNRE, 2006).

Anticipating the future impacts of climate change in Malawi is difficult as climate models have not been adequately downscaled for the country. In addition, Malawi is influenced by two regional climate zones—southern and eastern Africa—further compounding climate projections (UNDP, 2009). Nonetheless, evidence from regional climate models suggest that Malawi will not experience extreme changes in annual levels of precipitation; rather it will experience changes in rainfall patterns, including further shifts in seasons, decreases in rainfall during dry seasons and increases during the wet season (UNDP, 2009; McSweeney et al, 2008). Regional climate models predict that temperatures will increase by 1.1 to 3°C by the 2060s and by 1.5 to 5°C by the 2090s (McSweeney et al, 2008). Malawi may also experience a “substantial increase” in the frequency of days and nights that are considered hot (McSweeney et al, 2008).

As discussed in the country's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), Malawi's vulnerability to climate changes will be determined by socioeconomic, demographic and climate factors including the degree to which it economy has diversified away from a dependence on agriculture, inadequate health facilities, and poverty (MNREA, 2002). At present, it is expected that Malawi will experience the potential impact of climate change in the following areas (MMNRE, 2006):

- *Agriculture:* Malawi relies on rain-fed agriculture, and current droughts have caused poor crop yields or complete crop failure. Flooding has also contributed to compromised food production;
- *Human health:* Climate change is anticipated to affect infant malnutrition and ailments associated with malaria, cholera and diarrhea linked to droughts and floods;
- *Energy:* Malawi's electricity primarily comes from hydroelectricity generated along the Shire river, and this river flow has been adversely affected by present droughts and floods as well as siltation;
- *Fisheries:* Droughts and floods are already adversely affecting the fisheries sector, and have been responsible for the declining and/or drying up of water bodies, causing low fish production and loss of biodiversity;
- *Wildlife:* Increase drought is anticipated to adversely affect animal reproduction systems and migratory habits;
- *Freshwater:* Increased droughts and floods are already presenting disrupting water quality and quantity;
- *Forestry:* Extended droughts, leading to land degradation and a loss of soil fertility, and forest fires are expected to be the main impacts of climate change on the forestry sector; and

- *Gender:* The NAPA highlights that women bear the overwhelming burden of activities impacted by climate change, including collection of water, firewood, and ensuring daily access to food.

Malawi’s National Adaptation Programme of Action (NAPA) identifies a number of priority adaptation activities within the aforementioned areas by evaluating their technical feasibility, economic impact, effects on vulnerable groups, cost, level of stakeholder participation, and other cross-cutting issues (MMNRE, 2006). These priority adaptation actions are presented in Table 3. Addition studies note the need for diversification in crop varieties that are suited to future climate conditions; improved land use practices; reforestation; enhanced local government capacity; improved sectoral coordination; enhanced climate data and climate modeling; establishment of risk management and safety procedures; and strengthened policy frameworks (ActionAid, 2006).

The NAPA also discusses various barriers that inhibit the implementation of these adaptation actions, including extreme poverty, poor infrastructure, limited credit opportunities, food insecurity, existence of HIV/AIDS orphans, poor health conditions and limited analytical capability.

B. National Level Policies and Strategic Documents

Malawi has prepared a NAPA and National Communication for submission to the UNFCCC which summarize the country’s vulnerability to climate change and adaptation priorities. As noted in Table 1, it has also developed a Development and Growth Strategy which considers how adaptation to climate change links with its broader development priorities.

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action	Government Division Responsible	Status	Sector(s) of Focus	Summary description
1. National Communication to the UNFCCC ¹²⁴	Ministry of Natural Resources and Environmental Affairs	Submitted in 2002	Multi-sectoral	Malawi’s National Communication provides an overview of the country’s greenhouse gas emissions profile and mitigation options, as well as key vulnerabilities to climate change and the measures that would allow the country to effectively adapt.
2. National Adaptation Programme of Action ¹²⁵	Ministry of Mines, Natural Resources and Environment	March 2006	Multi-sectoral	This document provides an overview of Malawi’s current climate conditions, the anticipated effects of climate change on the country, key

¹²⁴ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=MWI/COM/1%20B#beg

¹²⁵ UNFCCC, <http://unfccc.int/resource/docs/napa/mwi01.pdf>

Name of Policy Action	Government Division Responsible	Status	Sector(s) of Focus	Summary description
				impacts by sector and identifies priority adaptation actions.
3.	Malawi Development and Growth Strategy 2006-2011 (MGDS)	2006, revised 2009	Multi-sectoral	This document represents the government's medium-term strategy to attain the country's <i>Vision 2020</i> . The main goal of the MGDS is to generate sustainable economic growth to attain poverty reduction. The priority areas identified in the strategy are expected to accelerate the achievement of the Millennium Development Goals. The first version of the strategy did not place great emphasis on climate change. However, the revised version places climate change within the list of national development priorities and addresses the climate risks that will affect development.

C. Current Adaptation Action

A high number of adaptation projects are currently being implemented in Malawi relative to its southern African neighbors and, perhaps, relative to its size and population. Malawi benefits from participation in a number of regional adaptation initiatives, including: the Denmark-funded “Climate Change Adaptation and Development Initiative;” the Japan-UNDP Africa Adaptation program; and the partnership between International Development Research Centre (IDRC) and the UK Department for International Development (DFID) in the Climate Change Adaptation in Africa program (CCAA). Moreover, Malawi has had one of its NAPA priority adaptation projects, “Climate Adaptation for Rural Livelihoods and Agriculture,” funded by the Least Developed Country Fund (LDCF). Additional funders include the European Commission, IDRC, the International Red Cross and Red Crescent, and the governments of Germany, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States.

A majority of actions in Malawi focus on the agriculture sector, such as helping smallholder farmers understand and anticipate climate risks, crop diversification initiatives, capacity building, food security, water use, etc. A number of projects also seek to improve the capacity of government to prepare for and support adaptation to climate change. A minority of projects in the country focus specifically on freshwater resources, disaster risk management and the needs of civil society. The major of activities undertaken as part of these projects focus on research, assessment, capacity building and policy formation and integration; only a small number of projects include community based adaptation and field implementation components.

Table 2: Current Adaptation Projects and Programs active in Malawi

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1. Climate Adaptation for Rural Livelihoods and Agriculture ¹²⁶	This project is addressing vulnerability to climate change in the subsistence agriculture sector by: (i) making investments aimed at improving agricultural practices, land management, and natural systems as well as rural livelihoods through targeted adaptation interventions in crop diversification, cropping sequences, conservation tillage, food storage and irrigation, and efficient water use; and (ii) the creation of an enabling environment for climate risk management, including activities in policy development and implementation, institutional coordination, and generation of knowledge on climate risk management.	LDCF Budget: Total US\$27.505 million	AfDB; Environmental Affairs Department in Ministry of Mines, Natural Resources and Environment; Department of Irrigation in Ministry of Irrigation and Water Development	Community based adaptation; Capacity building; Policy formation and integration	2008 – 2013	Agriculture	Rural
2. Legume Diversification in Tobacco Systems: Climate risk and market opportunities ¹²⁷	The capacity of the National Smallholder Farmers' Association of Malawi (NASFAM) to use climate risk analyses to evaluate and target legume diversification strategies in tobacco producing systems in Malawi enhanced.	IDRC – Research in Tobacco Control Budget: US\$295,731	CGIAR; International Crop Research Institute for the Semi-Arid Tropics	Research; Capacity building	2009 – ?	Agriculture	
3. Malawi Climate Change Program ¹²⁸	General support for Malawi's efforts to respond to climate change (note: presumably includes actions towards adaptation efforts)	DFID Budget: GBP 990, 000			2009 – 2011		
4. Kulera Biodiversity and Mt. Mulanje Mountain	This project helps farmers in Malawi become more resilient to the effects of climate change	USAID ¹³⁰		Community based	2010 – ?	Agriculture; Biodiversity	Mt. Mulanje

¹²⁶ GEF, <http://www.thegef.org/gef/node/2153>

¹²⁷ AidData, <http://www.aiddata.org/project/show/37732258> and ICRISAT, <http://www.icrisat.org/what-we-do/agro-ecosystems/aes-adaption-table.htm>

¹²⁸ DFID, <http://projects.dfid.gov.uk/project.aspx?Project=200819>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Biodiversity Increases Livelihood Security project ¹²⁹	by providing higher-quality farm materials, such as seeds that are high-yielding, disease-resistant, and drought-tolerant.	Budget: US\$0.5 million		adaptation			
5. Enhancing the Resilience of Lake Chilwa Basin Communities to Climate Change ¹³¹	The WorldFish Center is working with communities in the Lake Chilwa Basin (Malawi) to help meet the challenges of climate change. Through participatory rural appraisals, researchers are engaged in project design using thematic working groups to solicit the views of community stakeholders including farmers, fishers, fish traders and others. They assess stakeholders' natural resource and livelihood priorities, and the constraints and opportunities stakeholders face in adapting to climate change.	Government of Norway	CGIAR; Worldfish Center	Research	2010 – 2015	Freshwater supply	Lake Chilwa basin
Participation in Regional and Global Projects							
6. Preparedness for Climate Change ¹³²	The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.	Red Cross/Red Crescent Climate Centre	National Red Cross/Red Crescent Societies	Capacity building; Policy formation and integration	Phase 1: 2006 – 2009 Phase 2: ongoing	Disaster risk management	<i>Global:</i> 39 countries <i>South African participants in Phase 1:</i> Madagascar, Malawi, Mauritius, Seychelles, Zimbabwe

¹³⁰ The U.S. has also contributed \$8.5 million to the regional climate change program 'ClimateDev Africa', a joint initiative of USAID, the African Union, African Development Bank and United Nations Economic Commission for Africa <http://www.state.gov/g/oes/rls/rpts/faststart/merge/151403.htm>. There is little information, however, regarding which countries have received funding under this initiative.

¹²⁹ USDS, <http://www.state.gov/documents/organization/164589.pdf>

¹³¹ CGIAR, <http://ongoing-research.cgiar.org/factsheets/addressing-climate-change-by-building-social-and-ecological-resilience-in-the-lake-chilwa-basin/>

¹³² IFRC, <http://www.climatecentre.org/site/preparedness-for-climate-change-programme>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
		<i>In Malawi:</i> A series of workshops took place to raise awareness on changing climatic risks and discussions around adaptation options for projected conditions. Through a film exercise, farmers identified duck rearing, diversification of crops, flood warnings with whistles, and food storage as adaptation strategies to cope with climate change. ¹³³					
7.	Advancing Capacity for Climate Change Adaptation (ACCCA) ¹³⁴	IDRC; DEFRA; Swiss Federal Office for the Environment; NCAP; European Commission	UNITAR	Assessment; Capacity building; Policy formation and integration	2007 – 2010	Multi-sectoral	Global: 17 countries in Asia and Africa ¹³⁵ including Malawi and South Africa
		<i>In Malawi:</i> “Audio-visual Tools for Community-Based Adaptation: Bridging the Meteorological Service and the Red Cross' Work.” ¹³⁶ Activities in Malawi focused on disaster management and health through improving audio-visual tools for community based adaptation.					
8.	Integrating Climate Change Risks and Opportunities into National Development Processes and United Nations Country Programming ¹³⁷	Spain	UNDP	Policy formation and integration	2008 – 2010 (closed)	Government	Global: Colombia, Cape Verde, El Salvador, Malawi and Nicaragua
		Budget: US\$1.2 million					
		<i>In Malawi:</i> The activities in Malawi focused on one UN document and 2 government documents: 1) UNDAF, 2) the Malawi Growth and Development Strategy, and 3) the					

¹³³ Climate Centre,

<http://www.climatecentre.org/downloads/File/programs/Final%20PFCC%20General%20Assembly%20Document%20with%20renewed%20table.pdf>

¹³⁴ ACCCA, <http://www.acccaproject.org/accca/>

¹³⁵ *African countries include:* Burkina Faso, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mali, Niger, Nigeria, Tanzania, Tunisia and South Africa. *Asian countries include:* Bangladesh, India, Mongolia, Nepal and the Philippines.

¹³⁶ ACCCA, <http://www.acccaproject.org/evolution/modules/knowledgebox/external2/view.php?id=294&kbid=5> and UN CC: Learn, <http://www.unclearn.org/sites/www.unclearn.org/files/inventory/UNITAR43.pdf>

¹³⁷ <http://www.adaptationlearning.net/project/integrating-climate-change-risks-and-opportunities-national-development-processes-and-unite-2> and UNDP, http://www.undp.org/climatechange/integrating_cc_risks.shtml

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
		Agriculture Sector-wide Approach.					
9.	Climate Change Adaptation and Development Initiative (CC-DARE) ¹³⁸	Danish Ministry of Foreign Affairs	UNEP and UNDP	Capacity building; Knowledge communication; Field implementation	2008 – 2011	Multi-sectoral	African: Benin, Ghana, Ethiopia, Malawi, Mozambique, Rwanda, Senegal, Seychelles, Tanzania, Togo, Uganda
		<p><i>In Malawi:</i> The following four projects are being implemented:</p> <ul style="list-style-type: none"> • Project 1: integrating climate change adaptation and mitigation in the agriculture and natural resource curriculum in Malawi; • Project 2: strengthening the management of natural resources in the impoverished Blantyre North area and enhancing the communities' resilience to climate change adaptation; • Project 3: streamlining of climate change, adaptation and environment into national science and technology policy; • Project 4: mainstreaming climate change into the district. 					
10.	Community Based Adaptation to Climate Change in Africa ¹³⁹	DFID and IDRC through the CCAA program	African Centre for Technology Studies	Capacity building; Field implementation; Community based adaptation; Research	2008 – 2011	Multi-sectoral	African: Kenya, Malawi, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe
		<p><i>In Malawi:</i> Further information required.</p>					

¹³⁸ CC-DARE, <http://www.ccdare.org/>

¹³⁹ ACTS, http://www.acts.or.ke/index.php?option=com_content&view=article&id=60&Itemid=53 and IDRC, http://www.idrc.ca/cp/ev-83067-201_104898-1-IDRC_ADM_INFO.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	<p>Technologies to Enhance Capacity;”</p> <ul style="list-style-type: none"> • Develop a tried and tested methodology for setting baselines, monitoring and evaluating changes in climate adaptation capacity; • Enhance particularly vulnerable communities’ capacity to adapt in eight African countries; • Develop the capacity of relevant stakeholders to mainstream climate change adaptation into plans and activities through knowledge exchanges and information provision; • Strengthen existing networks to enhance understanding of the climate adaptation needs of vulnerable communities; and • Enlarge the body of knowledge and information on vulnerability and adaptation. 						
11.	Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ¹⁴⁰	<p>BMZ</p> <p>Budget: US\$91,241</p>	<p>IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF</p>	<p>Capacity building; Community based adaptation; Policy formation and integration</p>	2008 – 2011	<p>Rural areas; Agriculture; Government</p>	<p>African: Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and</p>

¹⁴⁰ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
							Zimbabwe	
<i>In Malawi: Further information required.</i>								
12.	Groundwater in sub-Saharan Africa: Implications for food security and livelihoods ¹⁴¹	The project aims to enhance the role of groundwater in providing improved food security and livelihoods in the countries targeted by AGRA. The specific objectives include: assessing groundwater availability and sustainability, including the impacts associated with its use and role in adapting to climate change; identifying opportunities and constraints in using groundwater, and provide advice to investors in groundwater interventions; and developing a groundwater strategy for the region.	Alliance for a Green Revolution in Africa (AGRA)	International Water Management Institute	Research; Policy formation and integration	2009 – 2011	Freshwater supply	<i>African:</i> Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Tanzania, Uganda, Zambia
<i>In Malawi: Further information required.</i>								
13.	Linking African Researchers with Adaptation Policy Spaces ¹⁴²	This project will help build the capacity of researchers to influence policy. In particular, researchers will investigate the complexity of adaptation policy processes in different countries and identify policy spaces.	DFID and IDRC through the CCAA program	IDRC, Institute of Development Studies	Research; Policy formation and integration; Capacity building	2009 – 2011	Civil society	<i>Regional:</i> Kenya, Tanzania <i>Plus:</i> Malawi,
<i>In Malawi: Further information required.</i>								
14.	Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa (or Africa Adaptation Program – AAP) ¹⁴³	Under this program, UNDP will assist 20 African countries in implementing integrated and comprehensive adaptation actions and resilience plans. The projects will ensure that national development processes incorporate climate change risks and opportunities to	Japan International Cooperation Agency <i>Budget:</i>	UNDP	Capacity building; Policy formation and integration; Knowledge	2008 – 2011	Government	<i>African:</i> 20 African countries ¹⁴⁴ including: Lesotho, Malawi,

¹⁴¹ IWMI, <http://gw-africa.iwmi.org/>

¹⁴² AfricaAdapt, <http://www.africa-adapt.net/aa/ProjectOverview.aspx?PID=3ESdwbjcwM%3D>

¹⁴³ ALM, <http://www.adaptationlearning.net/program/africa-adaptation-programme> and UNDP-APP, <http://www.undp-aap.org/>

¹⁴⁴ These countries are Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome et Principe, Senegal, Tanzania and Tunisia.

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	secure development gains under a changing climate. UNDP will help countries establish an enabling environment and develop the capacity required to design, finance, implement, and monitor long-term and cost-effective adaptation policies and plans.	US\$92 million		communication			Mauritius, Mozambique, Namibia
<i>In Malawi:</i> The project is aimed at building capacity for integrated and comprehensive approaches to climate change adaptation in Malawi. It is focused on strengthening: (1) adaptive long-term planning capacities (2) institutional and human resource capacities, (3) policies and measures, (4) A sustainable financing strategy (5) knowledge management activities.							
15.	Urban-Rural Interdependence and the Impact of Climate Change in Malawi and Tanzania ¹⁴⁵	DFID and IDRC through the CCAA program	University of Dar es Salaam	Research; Capacity building	2009 – 2012	Agriculture; Urban area; Rural area	African: Malawi, Tanzania
<i>In Malawi:</i> Further information required.							
16.	Strengthening Local Agricultural Innovation Systems in Less Favourable and High-Potential Areas of Tanzania and Malawi ¹⁴⁶	DFID and IDRC through the CCAA program	Institute of Resource Assessment	Research; Capacity building	2007 – 2011	Agriculture	African: Malawi, Tanzania
<i>In Malawi:</i> Further information required.							

¹⁴⁵ IDRC, http://www.idrc.org/en/ev-83053-201_105836-1-IDRC_ADM_INFO.html

¹⁴⁶ IDRC, http://www.idrc.org/ccaa/ev-127586-201_104141-1-IDRC_ADM_INFO.html

Name		Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
17.	Zambezi River Basin Initiative ¹⁴⁷	In recognition of increasing flood events within the Zambezi River Basin, this project aims to reduce the vulnerability of communities within the basin to extreme weather events and climate change, including the impact of flooding. Activities include developing community hazard maps, training staff in community disaster preparedness, implementing community based early warning systems, and training in adaptation techniques.	International Foundation of Red Cross and Red Crescent Societies	National Red Cross and Red Crescent societies	Capacity building; Community based adaptation	2009 – 2013	Disaster risk management	<i>Regional:</i> Botswana, Malawi, Mozambique, Namibia, Zambia Zimbabwe
<i>In Malawi:</i> Further information required.								
18.	Southern Africa Regional Climate Change Program ¹⁴⁸	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region's voice in international platforms, and enhance its ability to access necessary finance for climate change adaptation.	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	<i>African:</i> Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
<i>In Malawi:</i> Further information required.								
19.	Enhancing Adaptive Capacity to Climate Change Impacts through well-managed	The project goal is to contribute to improving food security and well-being of sub-Saharan rural households trapped in a	BMZ	International Center for Living Aquatic	Assessment; Research	2010 – 2013	Freshwater fisheries	<i>Regional:</i> Malawi, Mozambique,

¹⁴⁷ ICP, <http://www.icp-confluence-sadc.org/projects/zambezi-river-basin-initiative-zrbi>

¹⁴⁸ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Water Use for Aquaculture integrated with small-scaled Irrigation in the Chinyanja Triangle in Africa ¹⁴⁹	cycle of poverty and vulnerability exacerbated by climatic vagaries and climate change impacts, through well-managed water use for aquaculture integrated with small-scale irrigation. The project will enhance the benefits of integrating aquaculture and small-scale irrigation by reducing conflicts over water use and improve capacity for adapting to drought and flood events that are expected to be increasingly frequent in the face of climate change.		Resources Management (WorldFish Center), International Water Management Institute				Zimbabwe
In Malawi: Further information required.							

D. Proposed Adaptation Action

Malawi's NAPA lists five priority adaptation projects as summarized in Table 3. These projects focus on capacity building and community based adaptation initiatives in the areas of agriculture, forestry, freshwater supply, electricity production, disaster risk management, climate information services and freshwater fisheries.

Table 3: Proposed Adaptation Projects and Programs in Malawi's NAPA

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
1. Improving community resilience to climate change through the development of sustainable rural livelihoods	The main objective of this project is to develop and promote user-friendly sustainable livelihood strategies to target communities in areas that are vulnerable to climate change, such as the Shire Valley in southern Malawi.	Community based adaptation	Agriculture	Shire Valley, and other vulnerable areas
Notes: Funded through the LDCF.				
2. Restoring forests in the Shire River Basin to reduce siltation	Objectives are to reduce siltation and enhance water flows through the reforestation of the Upper, Middle,	Community based adaptation	Forestry; Freshwater supply; Energy	Shire River Valleys

¹⁴⁹ CGIAR, <http://ongoing-research.cgiar.org/factsheets/enhancing-adaptive-capacity-to-climate-change-impacts-through-well-managed-water-use-for-aquaculture-integrated-with-small-scale-irrigation-in-the-chinyanja-triangle-in-africa/> and FARA, http://www.infosysplus.org/db/db_index.php/door/upcome/main_unit/project/dataset_id/1215/URL_NAME/fara

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)	
	and the associated water flow problems				
3.	Improving agricultural production under erratic rains and changing climate conditions	and Lower Shire Valley's catchments by adopting co-management strategies at the community level.	Notes:		
		The main objective is to improve agricultural productivity in areas characterized by erratic rainfall so as to improve the living standards and sustainable livelihoods of vulnerable rural communities.	Capacity building; Community based adaptation	Agriculture	Rural communities
			Notes:		
4.	Improving Malawi's preparedness to cope with droughts and floods	The objective of this project is to enhance the country's preparedness in swiftly responding to emergencies caused by floods and/or droughts so as to reduce the negative impacts on vulnerable communities.	Capacity building	Disaster risk management	
			Notes:		
5.	Improving climate monitoring to enhance Malawi's early warning capability and decision making and sustainable utilization of Lake Malawi and lakeshore areas resources	The main objective is to establish a climate monitoring and early warning system on Lake Malawi and lakeshore areas for the timely provision of information for pre-disaster preparedness to rural fishing and farming communities as well as short and long-term adaptation livelihood skills to riparian communities.	Capacity building; Field implementation	Climate information service; Disaster risk management; Freshwater fisheries	Lake Malawi and lakeshore areas
			Notes:		

E. Assessment

Overall, the many adaptation projects currently being implemented in Malawi appear to be responding to its adaptation priority needs as identified through the country's NAPA and other sources. The focus of current actions on agriculture and governance is consistent with the adaptation needs profile of the country, given that its dependence on the agricultural sector is a key element of its vulnerability to climate change. The number of projects in these sectors suggests the need for coordination of action to establish lessons-learned and ensure future investments are targeted to areas where there is the greatest need. However, the specific focus of the current actions appears to be mainly on capacity building, research and policy initiatives, with a small number involved in on-the-ground community-based adaptation efforts. The latter types of projects are identified in the NAPA as being important priorities.

Despite the significant number of adaptation activities currently underway in Malawi, certain gaps remain. As mentioned, the country is currently affected by a range of environmental challenges—deforestation, soil erosion, sedimentation in rivers, etc.—that further exacerbate the country's vulnerability to climate change and compromise its agricultural productivity. However there are few projects that

focus on these issues. In addition, it is notable that Malawi explicitly identifies the impacts of climate change on women as a concern in its NAPA; however, none of its current adaptation projects have addressing gender issues as one of their explicit objectives. In addition, there is a need for improved weather forecasting and climate modeling in the country in order for Malawi to properly anticipate the impacts of climate change; although there are a few current initiatives that touch on this need there likely is room for expansion. Additional gaps include projects focused on health, forestry and other issues that play a role in the success of adaptation in the country.

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6.0 Mauritius

ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
AFB	Adaptation Fund Board
BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
CIA	Central Intelligence Agency (United States)
COI	Indian Ocean Commission
DFID	Department for International Development (United Kingdom)
GCCA	Global Climate Change Alliance
GDP	Gross Domestic Product
GEF	Global Environment Facility
FANPRAN	Food, Agriculture, and Natural Resources Policy Analysis Network
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IOM	International Organization for Migration
LDCs	Least Developed Countries
PIK	Potsdam Institute for Climate Impact Research
RMMS	Republic of Mauritius Meteorological Service
ROM	Republic of Mauritius
SIDA	Swedish International Development Cooperation Agency
SIDS	Small island developing states
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
ZALF	Leibniz-Centre for Agricultural Landscape Research

The Republic of Mauritius is comprised of a group of islands of volcanic origin (St. Brandon Island, Rodrigues Island, the Agalega Islands and the island of Mauritius) located off the southeast coast of Africa, east of Madagascar (ROM, 1999). The country has a population of nearly 1.3 million people (McSweeney et al, 2009; USDS, 2010), of whom 42 per cent live in urban areas (CIA, 2010). Mauritius has one of



the most competitive economies in Africa, and per capita incomes are one of the highest in the continent (USDS, 2010). The major sectors in the country are tourism, textiles, sugar and financial services (USDS, 2010); approximately 22 per cent of the labor force is employed by the trade, restaurants, and hotels industry (CIA, 2010). Sugar production is the main agricultural activity in the country, with additional crops including tea, tobacco, vegetables, and fruits (ROM, 1999; USDS, 2010). In 2009, agriculture contributed 4.5 per cent of the country's Gross Domestic Product, with the tourism sector accounting for 8.7 per cent (USDS, 2010).

As a small island developing state (SIDS), Mauritius is considered to be vulnerable to the impacts of climate change. Mauritius' vulnerability, like many SIDS, is a function of its physical size and geographic location, proneness to natural disasters, reliance on imports, and low adaptive capacity (RMMS, 2009).

A. Adaptation Needs and Priorities

The climate of Mauritius is characterized by two seasons: a warm and wet summer, and a cooler, drier winter (McSweeney et al, 2009). During the wet and warm period, Mauritius is prone to tropical cyclones and hurricanes. The country's Meteorological Service notes that Mauritius has observed some changes to its climate in recent decades. On many of the country's islands, average temperatures during the period of 1998 to 2008 were 0.74 to 1.1°C warmer than during the 1951 to 1960 period (RMMS, 2009). Mauritius has also been experiencing a decrease in precipitation over the past century, as well as a shortening of the rainy season, leading to pressure to meet water demands from the agricultural, tourism, industrial and domestic sectors (RMMS, 2009). In addition, the incidence of intense tropical cyclones has been on the rise over the last quarter of the 20th century (RMMS, 2009).

The country's Meteorological Services projects that future climate change will bring about the following impacts for the country: increased more frequent heat waves; hotter summer months; an increase in heavy precipitation events; a rise in the number of intense tropical cyclones; and acidification of oceans (RMMS, 2009). Another study projects increased precipitation over the northern islands and decreased in the southern islands (McSweeney et al, 2009). However, given the uncertainty in future changes in tropical cyclones, there is uncertainty regarding the future volume of wet season rainfall (McSweeney et al, 2009). Given these projections, the Meteorological Services' assessment foresees that the capacity of ecosystems to adapt may be exceeded; fisheries, aquaculture, and agricultural production will be negatively impacted by rising temperatures, leading to compromised food security; coastal zones may undergo increased erosion and flooding; and human health may be negatively impacted including a rise in infectious diseases (RMMS, 2009).

Mauritius' Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) identifies the key socioeconomic sectors likely to be impacted by climate change in the country as being: coastal resources, agriculture, freshwater

resources, fisheries, human health and well-being, land use change and forestry, and biodiversity (ROM, 1999). It anticipates that climate change will cause the following changes in the agriculture sector: the productivity zone of certain crops will shift from lowlands to regions of higher altitudes; sugar cane cultivation will be more profitable in humid zones; the duration of certain crops will shorten and yields will decrease; cropping calendars may shift; pastures in low-lying drier areas may support fewer animals; and livestock will be under higher stress (ROM, 1999). The National Communication also provides a list of potential adaptation activities by sector (ROM, 1999):

- *Coastal zones*: engage in integrated coastal zone management strategies that integrate adaptation considerations, investigate costs and advantages of different options for the hard protection of coasts, and establish marine parks and wetland preserves;
- *Agriculture*: experiment with drought tolerant and wind resistant varieties of sugar cane, diversify agricultural products, and study the length of growing seasons and optimal harvesting times;
- *Fisheries*: gather data to assess stocks and sustainable yields, increase food production from aquaculture, and collect data on ocean circulation changes relating to temperature;
- *Forestry*: preserve and conserve remaining forests, initiate tree-planting programs, and ban cutting of mangroves;
- *Freshwater resources*: encourage use of ‘gray water’ for secondary household uses, construct household back-up of rain catchment tanks, put limitations on the use of water for crop irrigation, and establish efficient water resources management.

Given the changing distribution of rainfall and a tendency towards heavy rainfall events, the need for Mauritius to increase its rainfall storage capacity has also been identified (RMMS, 2009). So too has the need for increased capacity to undertake risk assessments and research activities regarding the impact of climate change on human health (Commonwealth Secretariat, 2009).

B. National Level Policies and Strategic Documents

Mauritius was the first country to ratify the UNFCCC, reflecting its early awareness and commitment to addressing climate change. In 1991, it established a multi-sectoral National Climate Change Committee involving a variety of institutions and organizations, including various ministries, representatives from the private sector, and non-governmental organizations (ROM, 1999). The mandate of this body is to monitor developments on the science of climate change and its possible impacts on key sectors of the economy. In addition to this measure, the country has prepared its Initial National Communication to the UNFCCC, which was released in 1999 (ROM, 1999).

As well, through the Hyogo Framework of Action, Mauritius is addressing disaster risk management through a variety of mechanisms, including a comprehensive early warning system, that also support adaptation to climate change (RMMS, 2010). Mauritius has also

integrated a review of the potential impacts of climate change into the Environment Impact Assessments it requires to be conducted prior to undertaking major construction/development projects (RMMS, 2010).

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Initial National Communication to the UNFCCC ¹⁵⁰	Ministry of Environment, Human Resource Development, and Employment	Released in 1999	Coastal resources, agriculture, freshwater supply, marine fisheries, human health and well-being, land use change and forestry, and biodiversity	This document provides an overview of Mauritius' national circumstances and greenhouse gas mitigation profile, as well as key areas of vulnerability to climate change and potential actions to address climate change within the country.

C. Current Adaptation Action

When compared to its southern African neighbors, a moderate level of adaptation programming is currently being funded in Mauritius. The majority of these projects are part of multi-country initiatives, including Mauritius' participation in the "Global Climate Change Alliance" funded by the European Commission, the Africa Adaptation Program funded by the Government of Japan, and the Development Agency of France's 'ACCLIMATE' program. Nationally focused projects in Mauritius include the recently initiated "Adapting Coastal Zone Management to Address the Impacts of Climate Change" project funded by the Adaptation Fund. It focuses on integrated coastal zone management for climate adaptation, and incorporates capacity building, awareness raising, policy formation and the piloting of specific adaptation measures along Mauritius' coastline.

Collectively, the sectors most commonly addressed through current climate change adaptation projects in Mauritius are governance, disaster risk management, climate information services and agriculture. Projects with a strong focus on freshwater resources, fisheries and forestry have not been identified. The main activities being implemented through these projects are capacity building, knowledge communication, and policy formation and integration. A limited number of projects support community based adaptation.

¹⁵⁰ UNFCCC, <http://unfccc.int/resource/docs/natc/maunc1/index.html>

Table 2: Current Adaptation Projects and Programs active in Mauritius

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1.	Sensitization on Environment Protection with Emphasis on Climate Change ¹⁵¹	Environment Care Association is spreading awareness of climate change through talks and booklet distribution to schools, women's groups, and youth organizations. The overall goal of the project is to sensitive the population to care about the environment and instill a sense of environmental stewardship.	GEF Small Grants Fund Budget: US\$26,045	Environment Care Association	Knowledge communication	2007 – 2009	Civil society Mauritius
2.	The Other Migrants: Reducing Migration Pressure from Gradual Environmental Change – Environment and Sustainable Development in the Republic of Mauritius ¹⁵²	This project is intended as an investigation into the interrelationship between environmental degradation and population movements in Mauritius. The project aims to mitigate the effects of climate change and environmental degradation non-migration through awareness raising and capacity building of national institutions.		IOM	Research; Knowledge communication; Capacity building	2010 – 2011	Migration
3.	Adapting Coastal Zone Management to Address the Impacts of Climate Change ¹⁵³	The objective of this project is to ensure that future development in coastal areas is sustainable in the face of climate change by (a) integrating climate change risks into coastal zone management planning, (b) enhancing the capacity of public and private sectors in Mauritius to develop and implementation adaptive approaches to coastal zone management, and piloting specific adaptation measures at	Adaptation Fund Budget: US\$9,240,00	UNDP	Policy formation and integration; Capacity building; Field implementation; Knowledge communication	2010 – 2016	Coastal zone management Coastal areas

¹⁵¹ UNDP, http://sgp.undp.org/web/projects/11569/sensitisation_on_environment_protection_with_emphasis_on_climate_change.html

¹⁵² IOM, http://www.iom.int/jahia/webdav/shared/shared/mainsite/events/docs/inception_proj_summary_en.pdf

¹⁵³ Adaptation Fund, http://adaptation-fund.org/system/files/AFB.PPRC_1.6%20Technical%20Review%20of%20Project%20Concept%20AFB_MIE_Coastal_2010_2_Mauritius.pdf

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
	demonstration sites.							
Participation in Regional and Global Actions								
4.	Global Climate Change Alliance ¹⁵⁴	The Global Climate Change Alliance seeks to deepen the policy dialogue between the European Union and developing countries on climate change; and to increase support to target countries to implement priority adaptation and mitigation measures, and integration climate change into their development strategies. The program's five priority areas for funding are: improving the knowledge base of developing countries to the effects of climate change; promoting disaster risk reduction; mainstreaming climate change into poverty reduction development strategies; reducing emissions from deforestation and degradation; and enhancing participation in the Clean Development Mechanism.	European Commission, Czech Republic, Sweden, 10th European Development Fund Budget: € 140 million	National Governments	Policy formation and implementation; Knowledge communication	2008 – ongoing	Disaster risk management; Government	17 developing countries and the Pacific Region, ¹⁵⁵ including: Mauritius, Mozambique and Seychelles
			<p><i>In Mauritius:</i> The GCCA is supporting sustainable development, climate change mitigation and adaptation measures in Mauritius, including the mainstreaming of climate change. The funds provided through this program will complement ongoing budget support as well as other donors' contributions to similar activities.¹⁵⁶</p> <ul style="list-style-type: none"> • Budget: € 3 million (€ 2.8 million as general budget support and € 0.2 million for technical assistance) • Duration: 2010 – 2015 					
5.	Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ¹⁵⁷	"Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups, and factors influencing initial state of vulnerability.	BMZ Budget: US\$91,241	IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF	Capacity building; Community based adaptation; Policy	2008 – 2011	Rural areas; Agriculture; Government	<i>African:</i> Angola, Botswana, Lesotho, Madagascar, Malawi,

¹⁵⁴ GCCA, http://www.gcca.eu/pages/1_2-Home.html

¹⁵⁵ These countries are Bangladesh, Belize, Cambodia Ethiopia, Gambia, Guyana, Jamaica, Malawi, Maldives, Mali, Mauritius, Mozambique, Nepal, Pacific region, Rwanda, Senegal, Seychelles, Sierra Leone, Solomon Islands, Tanzania and Vanuatu.

¹⁵⁶ GCCA, http://www.gcca.eu/cgi-bin/datadirs.pl?&lg=2&id_datadir_family=1&extlink=8&sw=detail&id_datadir_sheet=12

¹⁵⁷ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.”			formation and integration			Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
In Mauritius: Further information required.							
6.	Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa (or Africa Adaptation Program – AAP) ¹⁵⁸	Japan International Cooperation Agency Budget: US\$92 million	UNDP	Capacity building; Policy formation and integration; Knowledge communication	2008 – 2011	Government	African: 20 African countries ¹⁵⁹ including: Lesotho, Malawi, Mauritius, Mozambique, Namibia
		<p>In Mauritius: The objective of the AAP in Mauritius is to mainstream climate change adaptation into the institutional framework and into core development policy, strategies and plans of the Republic. Expected outputs of the project are:</p> <ul style="list-style-type: none"> • The introduction of dynamic, long-term planning tools/mechanisms to manage the inherent uncertainties of climate change. • Strengthened leadership capacities and institutional frameworks to manage climate change risks and opportunities in an integrated manner at the local and national levels. • Implementation of climate-resilient policies and measures in priority sectors. • Expansion of financing options at the local, national, sub-regional and regional levels to meet national adaptation costs.¹⁶⁰ 					

¹⁵⁸ ALM, <http://www.adaptationlearning.net/program/africa-adaptation-programme> and UNDP-APP, <http://www.undp-aap.org/>

¹⁵⁹ These countries are Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome et Principe, Senegal, Tanzania and Tunisia.

¹⁶⁰ ALM, <http://www.adaptationlearning.net/project/supporting-integrated-and-comprehensive-approaches-climate-change-adaptation-africa-%E2%80%93-republ>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
7. "ACCLIMATE" (adaptation au changement climatique) ¹⁶¹	This project aims to promote regional cooperation between the Indian Ocean Commission (COI) countries on climate change adaptation. This objective consists of reinforcing the COI's capacities in the area of climate change adaptation in the short and long term through the development of projects and policies. Several activities are implemented, including: capacity building for climate change observation and for regional vulnerability analyses; the identification of priority axes for regional alert systems and risks prevention plans; demonstrative actions; elaboration of a regional adaptation action plan and policy; and improving the conditions for national and regional knowledge sharing.	European Union, Fonds Français pour l'Environnement Mondial, French Ministry of Foreign and European Affairs Budget: € 3.645 million	Indian Ocean Commission	Capacity building; Policy formulation and integration	2008 – 2011	Climate information services; Government; Disaster risk management	<i>Regional:</i> Comoros, Madagascar, Mauritius, Réunion (France), Seychelles
<i>In Mauritius:</i> Further information required.							
8. Preparedness for Climate Change ¹⁶²	The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.	Red Cross/Red Crescent Climate Centre	National Red Cross/Red Crescent Societies	Capacity building; Policy formation and integration	Phase 1: 2006 – 2009 Phase 2: ongoing	Disaster risk management	<i>Global:</i> 39 countries <i>South African participants in Phase 1:</i> Madagascar, Malawi, Mauritius, Seychelles, Zimbabwe
<i>In Mauritius:</i> The Mauritius Red Crescent Society undertook a number of capacity building activities, including awareness raising, education, communication, and planning activities. ¹⁶³							

¹⁶¹ IOC, <http://www.coi-ioc.org/index.php?id=158> and ACCLIMATE, <http://www.acclimate-oi.net/en>

¹⁶² IFRC, <http://www.climatecentre.org/site/preparedness-for-climate-change-programme>

¹⁶³ Further information is available here: http://www.climatecentre.org/downloads/File/programs/FINAL_Seychelles.pdf

Name		Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
9.	Five-City Network to Pioneer Climate Change Adaptation in sub-Saharan Africa ¹⁶⁴	Local governments and coastal cities in southern Africa face a serious threat associated with climate change. This project aims to design a framework for managing increased risk from climate change, and is anticipated to lay the groundwork for a local climate change adaptation strategy and action plan in the five urban areas in the participating countries: Cape Town (South Africa); Dar es Salaam (Tanzania); Maputo (Mozambique); Windhoek (Namibia); and Port Louis (Mauritius).	DFID and IDRC through the CCAA program	International Council for Local Environmental Initiatives	Capacity building; Policy formation and integration)	2009 – 2012	Urban area	<i>Regional:</i> Mauritius, Mozambique, Namibia, South Africa and Tanzania
<i>In Mauritius:</i> Further information required.								
10.	Southern Africa Regional Climate Change Program ¹⁶⁵	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region's voice in international platforms, and enhance its ability to access necessary finance for climate change adaptation.	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	<i>African:</i> Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
<i>In Mauritius:</i> Further information required.								
11.	Regional Initiative for Smallholder Agriculture	The objective is to support the adaptation of small-scaled productive systems to climate	IFAD	Indian Ocean Commission	Capacity building;	2010 – 2013	Agriculture	<i>Regional:</i> Comoros,

¹⁶⁴ IDRC, http://www.idrc.ca/EN/Regions/Eastern_and_Southern_Africa/Pages/ProjectDetails.aspx?ProjectNumber=105868

¹⁶⁵ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Adaptation to Climate Change in the Indian Ocean Islands ¹⁶⁶	changes in the islands of the Indian Ocean to improve incomes and living conditions of family scaled farmers. It entails four main components: knowledge sharing, information and awareness, improvement of operational skills and support to small-scale farms.	Budget: US\$0.75 million		Community based adaptation; Knowledge communication			Madagascar, Mauritius, Seychelles, Reunion Island
<i>In Mauritius: Further information required.</i>							

D. Proposed Adaptation Action

No emerging projects in Mauritius have been identified.

E. Assessment

Given the anticipated impacts of climate change in Mauritius, there is a need for attention to adaptation in the following areas: coastal zones, disaster risk management, agriculture, tourism, climate information services, fisheries, forestry and freshwater resources, as well as the establishment of appropriate governance and policy structures. Current adaptation activities being funded in Mauritius address adaptation in some of these key areas, namely governance, disaster risk management, agriculture and climate information services. For example, through its participation in the Indian Ocean Commission’s “ACCLIMATE” program, Mauritius is expected to enhance its capacity to perform vulnerability assessments, monitor the weather, and reduce climate related risk. Disaster risk management needs is also being addressed in part through the Red Cross/ Red Crescent Societies’ “Preparedness for Climate Change” program. As well, both the Africa Adaptation Program and the Global Climate Change Alliance programs are helping governments understand and integrate climate change adaptation considerations into policies and programs. In order to maximize impact, it will be important to ensure that projects with a similar focus are coordinated and any lessons learned are shared.

Given the danger of sea level rise and the threats posed by climate change to coastal regions, various sources point to the need for Mauritius to address these risks through integrated coastal zone management activities and, if necessary, appropriate infrastructure in coastal areas. At present, only the (large) project funded by the Adaptation Fund is currently focused on coastal zone management issues, including piloting of specific adaptation measures along Mauritius’ coastline. Agriculture is another area in which existing support could be

¹⁶⁶ COI, http://www.coi-ioc.org/fileadmin/multimedia_francais/activites/downloads/R%E9sum%E9%20projet%20Agro%E9cologie%20English%20version.pdf



expanded. Current activities in this sector are focused on adaptation in smallholder farming communities and assessing future risks in the sector. There may be a need for future efforts to address the need for diversified crop varieties that are suited to future climate conditions. Areas in which gaps in action appear to be present are fisheries, forestry and freshwater resources. As well, none of Mauritius' current projects specifically address gender and human health concerns.

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7.0 Mozambique

ACCESA	Integrating Vulnerability and Adaptation to Climate Change into Sustainable Development Policy Planning and Implementation in Eastern and Southern Africa
ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
CCAA	Climate Change Adaptation in Africa program
CC-DARE	Climate Change Adaptation and Development Initiative
CIF	Climate Investment Fund
DFID	Department for International Development (United Kingdom)
EC	European Commission
FANRPAN	Food, Agriculture, and Natural Resource Policy Analysis Network
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit / German Agency for Technical Cooperation
ICLEI	International Council on Local Environmental Initiatives
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
LDCF	Least Developed Country Fund
MDG	Millennium Development Goals
MICOA	Ministry for the Coordination of Environmental Affairs
NAPA	National Adaptation Programme of Action
PIK	Potsdam Institute for Climate Impact Research
PPCR	Pilot Program for Climate Resilience
SCCF	Special Climate Change Fund
SIDA	Swedish International Development Agency
SSN	South South North
UNDP	United Nations Development Program
UNEP	United Nations Environment Program



USAID	United States Agency for International Development
USDS	United States Department of State
ZALF	Leibniz-Centre for Agricultural Landscape Research

Located on the southeastern coast of Africa, Mozambique's 2,700 kilometer coastline is the third longest in Africa. It is characterized by sandy beaches, dunes, coral reefs, bays, mangroves and sea grass beds (MICOA, 2003). Approximately 60 per cent of Mozambique's population lives along its coast, which is also home to critical ecosystems and species of economic importance (MICOA, 2007). The majority of coastal zones are below sea level, further exacerbating vulnerability to climate impacts (GIZ, 2006). Around 70 per cent of the remainder of Mozambique is covered by savannah and secondary forest, and approximately 45 per cent of the country is arable (MICOA, 2003).

The country's 16 year civil war ended in 1992, but its long-term effects on development are still evident (GIZ, 2006). Mozambique is one of the poorest countries in the world, and is also one of the most affected by natural disasters, including drought and floods. These extreme weather events are often associated with the El Nino Southern Oscillation's El Niño and El Niña phases (GIZ, 2006; MICOA, 2003; USDS, 2010). Agriculture, livestock and fisheries are the most important sectors of the economy; approximately 80 per cent of the country's workforce relies on agriculture for their livelihoods (MICOA, 2007). Small scale agriculture constitutes 97 per cent of agricultural activities in the country, and occupies 96 per cent of the cultivated land area (MICOA, 2007). In addition, fisheries, tourism and sport within coastal areas provide livelihoods for over 60 per cent of the people residing within 50 km of the country's coastal zone (MICOA, 2007).

A. Adaptation Needs and Priorities

Mozambique's predominant climate is humid tropical, and undergoes two seasons: a cool and dry season from April to September, and a hot and humid climate between October and March (MICOA, 2007). Rainfall mainly occurs within the warmest season, from November to April, with the majority of rain falling between December and February (MICOA, 2003; McSweeney et al, 2009). During this wet season, Mozambique is highly prone to hurricanes and cyclones (McSweeney et al, 2009). Mozambique's inter-annual rainfall patterns are variable, and influenced by the Indian Ocean's sea surface temperatures (McSweeney et al, 2009). Northern Mozambique's climate is influenced by the equatorial low pressure zone and experiences a northeast monsoon in the warm season, whereas the climate in the south is influenced by the subtropical anti-cyclonic zone (MICOA, 2003).

Looking back over past decades, changes in Mozambique's climate have been observed. The country's mean annual temperature increased by 0.6°C between 1960 and 2006, and the proportion of rain falling in heavy events has increased by 2.6 per cent per decade since mid-century (McSweeney et al, 2009). Mozambique is experiencing increased frequency and severity of droughts in the interior of the country and floods in coastal regions (MICOA, 2007). Droughts and changes in precipitation, air temperature and atmospheric humidity have all been affecting the country's agricultural production (MICOA, 2007).

Looking forward, Mozambique's mean annual temperature is expected to rise by 1 to 2.8°C by the 2060s, and 1.4 to 4.6°C by the end of the 21st century (McSweeney et al, 2008). Projections of rainfall patterns do not indicate substantial changes, although models commonly indicate that there will be an increase in the proportion of rainfall that falls in heavy events (McSweeney et al, 2008). Accurate projections of future climate changes in Mozambique are made difficult the unpredictable nature of El Niño and El Niña events.

Given these projections, Mozambique anticipates it experience increased frequency of floods, droughts, and tropical cyclones, with human health, agriculture and food security, biodiversity, freshwater, coastal zones, and infrastructure being the most vulnerable areas to climate change (MICOA, 2003). To enable adaptation within its coastal zones, Mozambique's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) identifies the need for: enhanced monitoring of the country's coastal areas; development of a data center; strengthening of institutional and legal frameworks governing coastal areas; and enhancement of integrated coastal zone management. In the agriculture sector, the National Communication discusses a number of adaptation options including changing cultivation periods, changing the geographic location of production activities, sustainable natural resource management, diversification of crop varieties, and promotion of technologies that reduce vulnerability to drought (MICOA, 2003). The document also identifies as adaptation measures within the water sector the need to develop integrated water master plans for each river basin, public awareness campaigns in water conservation, and the creation of flood forecasting and warning systems.

A further list of priority adaptation actions have been communicated through Mozambique's National Adaptation Programme of Action (NAPA) as summarized in Table 3. These actions include:

- *Strengthening of early warning systems:* There is a need for improved communication of early warning information so that communities may be alerted of extreme weather events in a timely manner. These efforts would include improving the accuracy of meteorological readings at existing stations, as well as the creation of more stations.
- *Strengthening capacities of agricultural producers to cope with climate change:* Adaptation within the smallholder agriculture community is also seen as a priority for Mozambique. Activities within this area would include building infrastructure to collect rainwater and establishing small scale irrigation systems, as well as disseminating drought-tolerant crops.

- *Reduction of climate change impacts in coastal zones:* Coastal zones are identified as a key vulnerability for the country, and Mozambique has noted the need to: identify rehabilitation techniques for dunes and mangroves; map eroded land; and disseminate coastal zone management practices to communities.
- *Management of water resources under climate change:* Finally, Mozambique’s NAPA identifies the need to improve forecasting systems to anticipate the impacts of droughts and floods on water bodies, including improving monitoring systems and improving technical capacity.

Finally, as part of its preparations for participation in the “Pilot Program on Climate Resilience,” Mozambique identified a number of additional adaptation priorities: improving the capacity to monitor and evaluate climate hazards and the ability to respond; improve methodologies of climate data management and dissemination; improving institutional coordination among different Ministries in addressing climate change; and mainstreaming climate change issues into development plans (CIF, 2009).

B. National Level Policies and Strategic Documents

Mozambique has prepared both a National Communication and a NAPA. Each outlines its key areas of vulnerability to climate change and proposed adaptation options.

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	First National Communication to the UNFCCC ¹⁶⁷	Ministry for the Coordination of Environmental Affairs	Submitted in 2003	Multi-sectoral	This document provides an overview of Mozambique’s national circumstances, provides details of the country’s mitigation profile by sector, and describes the key areas of vulnerability of the country to climate change, including potential adaptation options in key sectors.
2.	National Adaptation Programme of Action ¹⁶⁸	Ministry of for the Coordination of Environmental Affairs	Submitted in 2007	Freshwater supply; agriculture; coastal zone management; disaster risk reduction	This document summarizes the main characteristics of Mozambique’s current climate, identifies the likely impacts of climate change in the country, and identifies key proposed adaptation activities.

¹⁶⁷ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&piref=5552#beg

¹⁶⁸ UNFCCC, <http://unfccc.int/resource/docs/napa/moz01.pdf>



C. Current Adaptation Action

There are a very high number of discrete adaptation projects and program underway in Mozambique, including nationally focused projects as well as its participation in programs involving multiple developing countries. Several current projects have been developed specifically to meet Mozambique's needs. A number of these national adaptation projects are directed towards improving the country's disaster risk management capacities. Coastal zone management needs are being addressed in part through the project "Adaptation in the Coastal Zones of Mozambique" funded through the Least Developed Countries Fund (LDCF). Other sectors of focus for national adaptation projects are forestry, freshwater and the general needs of rural areas. Most of these projects aim to build capacity and support the formation adaptation policies. A few also support community based adaptation efforts.

Ongoing multi-country projects being implemented in Mozambique include a number of prominent African regional programs, like the Government of Denmark's "Climate Change Adaptation and Development Initiative" (CC-DARE), which funds short-term initiatives that address key national gaps on climate change adaptation; and the Africa Adaptation Program financed by Japan, which aims to support the integration of climate change adaptation into government policies and plans. Mozambique is also a participant in several adaptation projects that involve countries from around the global. These include: the European Commission's "Global Climate Change Alliance," which is focused on integrating climate change into national policy frameworks, raising public awareness, and improving adaptation strategies within Mozambique's agriculture and land use fields; and the global "Pilot Program for Climate Resilience" funded by the Climate Investment Fund, which aims to pilot and demonstrate ways that climate risk and resilience can be mainstreamed within core development planning processes. By priority sector area, the greatest number of multi-country projects target agriculture, governance, disaster risk management, coastal zone management, urban areas and enhancing the capacity of civil society to be engaged in adaptation action. A smaller number of projects focus on adaptation needs related to fisheries, climate information services, fire management and gender. The large majority of these multi-country projects emphasize capacity building, research and policy formation and integration activities; fewer projects support community based adaptation and implementation of pilot projects.

Mozambique is receiving funding for adaptation projects from a number of different sources. Funders of two or more projects in the country include the Climate Change Adaptation in Africa (CCAA) program developed by the United Kingdom's Department for International Development (DFID) and the International Development Research Centre (IDRC) and the governments of Denmark, Finland, the Netherlands, Norway, the United Kingdom and, in particular, Germany.

Table 2: Current Adaptation Projects and Programs active in Mozambique

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
National Action								
1.	Disaster Risk Management and Effective Early Warning ¹⁶⁹	The expected outcome of this project is that the early warning flood system operated by local people protects against the impact of climate change.	BMZ	Instituto Nacional de Gestão de Calamidades within the Ministry for State Administration	Capacity building	2007 – 2012	Disaster risk management	Mozambique
2.	Sustainable Use and Management of Forests in Mozambique	Although the country has the highest forest cover in southern Africa, the resource is threatened by fires and illegal felling. Forests are important in both adapting to and mitigation climate change, and are strongly linked to other rural development and land use planning issues. This project provides support to local communities in the province of Zambezia to improve sustainable resource use.	Finland		Capacity building	2009 – 2014	Forestry	Zambezia province, Mozambique
3.	Coping with Drought and Climate Change ¹⁷⁰	The purpose of this project is to develop and pilot a range of coping mechanisms for reducing the vulnerability of farmers and pastoralists to future climate shocks. The project is allowing Mozambique to test a range of drought adaptation measures, such as diversifying livestock and crops, assuring access to water and land, and developing an early warning system.	SCCF Budget: US\$1,889,840	UNEP	Capacity building	2009 – ?	Agriculture; Disaster risk management; Freshwater supply	Mozambique

¹⁶⁹ GIZ, <http://www.gtz.de/en/aktuell/21071.htm>

¹⁷⁰ ALM, <http://www.adaptationlearning.net/projects/mozambique-coping-drought-and-climate-change>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
4. Integrating Adaptation to Climate Change within Disaster Risk Management Systems in the Búzi River Catchment Area ¹⁷¹	The Programme for Rural Development is preparing the Buzi district for storms and floods by establishing preparedness committees and early warning systems and promoting risk reduction policy.	Government of Germany	UNDP	Capacity building; Policy formation and integration	2009 – ?	Disaster risk management	Buzi district, Mozambique ACRONYMS
5. Adaptation in the Coastal Zones of Mozambique ¹⁷²	The objectives of this project are to develop capacity of communities living in coastal zones to manage climate change risks.	LDCF Budget: US\$13,390,000	UNDP	Capacity building	2010 – 2015	Coastal zone management	Coastal zones of Mozambique
6. General support for climate change adaptation	USAID is providing the Government of Mozambique to help communities adapt to climate change impacts.	USAID Budget: US\$1.5 million	Government of Mozambique	Capacity building; Community based adaptation	2010 – ?	Multi-sectoral	Mozambique
7. Environment Mainstreaming and Adaptation to Climate Change ¹⁷³	The joint program will reduce the risks of climate change to poverty reduction efforts in areas of Mozambique at risk from climate change (arid and semi-arid areas, river basins and coastal areas) through the mainstreaming of environment in central and local level plans and programs, and improving the adaptive capacity of the communities and other stakeholders through enhancing their coping mechanisms and diversifying their livelihoods options.	Spain MDG Achievement Fund Budget: US\$7,554,200	UNDP	Capacity building; Policy formation and integration; Community based adaptation	2010 – ?	Rural areas	Mozambique

¹⁷¹ UNDP, http://www.unep.org/roa/amcen/docs/AMCEN_Events/climate-change/UNEPAfricaStocktaking.pdf

¹⁷² GEF, <http://www.gefonline.org/projectDetailsSQL.cfm?projID=4276>

¹⁷³ ALM, <http://www.adaptationlearning.net/project/environment-mainstreaming-and-adaptation-climate-change>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Participation in Regional and Global Actions							
8.	Integrating Vulnerability and Adaptation to Climate Change into Sustainable Development Policy Planning and Implementation in Eastern and Southern Africa ¹⁷⁴	To promote the mainstreaming or integration of vulnerability and adaptation to climate change into sustainable development plans and planning processes drawing upon lessons learned through the implementation of pilot projects in Kenya, Mozambique and Rwanda.	GEF, Netherlands, Norway Budget: US\$2.355 million	UNEP, International Institute for Sustainable Development	Policy formation and integration; Capacity building; Community-based adaptation	2005 – 2010 (closed) Agriculture; Fire management; Energy	<i>Regional:</i> Kenya, Mozambique, Rwanda
		<p><i>In Mozambique:</i> “Community-based Fire Management in Central Mozambique.” This project focused on community based fire management activities, which sought to reduce vulnerability to uncontrolled wildfires in Sofala Province and to promote the integration of climate change impacts in district and national policies.</p> <ul style="list-style-type: none"> • <i>Implementing agency:</i> AMBERO-IP 					
9.	Resilience and the African Smallholder: Enhancing the capacities of communities to adapt to climate change ¹⁷⁵	This project aims to enhance the ability of households, communities and relevant institutions to respond to changing circumstances with a view to reducing future threats to food security and environmental integrity. It will work with farmers to identify improved farming technologies, and translate the results into action plans at the appropriate institutional level whether local or national. Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups and factors influencing initial state of	DFID and IDRC through the CCAA program Budget: CND 1,319,800	University of Zimbabwe; International Food Policy Research Institute	Community based adaptation; Policy formation and integration	2007 – 2011 Agriculture	<i>African:</i> Ghana, Mali, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe
		<i>In Mozambique:</i> Further information required.					

¹⁷⁴ IISD, <http://www.iisd.org/climate/vulnerability/adaptation.asp>

¹⁷⁵ IDRC, http://web.idrc.ca/en/ev-118881-201_104140-1-IDRC_ADM_INFO.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.						
10. Global Climate Change Alliance ¹⁷⁶	The Global Climate Change Alliance seeks to deepen the policy dialogue between the European Union and developing countries on climate change; and to increase support to target countries to implement priority adaptation and mitigation measures, and integration climate change into their development strategies. The program's five priority areas for funding are: improving the knowledge base of developing countries to the effects of climate change; promoting disaster risk reduction; mainstreaming climate change into poverty reduction development strategies; reducing emissions from deforestation and degradation; and enhancing participation in the Clean Development Mechanism.	European Commission, Czech Republic, Sweden, 10th European Development Fund Budget: € 140 million	National Governments	Policy formation and implementation; Knowledge communication	2008 – ongoing	Disaster risk management; Government	17 developing countries and the Pacific Region, ¹⁷⁷ including: Mauritius, Mozambique and Seychelles
		<p><i>In Mozambique:</i> The GCCA is focused on building capacity and integrating climate change into national policy frameworks, raising public awareness, as well as improving adaptation strategies within the agriculture and land use fields. The program has a special focus on assisting the most vulnerable communities in Mozambique.¹⁷⁸</p> <ul style="list-style-type: none"> • Budget: Euros 10.2 million • Duration: 2011 – 2015 					
11. Supporting the Vulnerable: Increasing the adaptive capacity of agro-pastoralists to climate change in West and Southern Africa using a	The purpose of this project is to co-generate methods, information and solutions between local communities, local and international scientists, policy makers and other actors involved in climate change and adaptation	BMZ	International Livestock Research Institute	Research; Community based adaptation	2008 – 2011	Agriculture; Pastoralism	African: Mali, Mozambique
		<i>In Mozambique:</i> Further information required.					

¹⁷⁶ GCCA, http://www.gcca.eu/pages/1_2-Home.html

¹⁷⁷ These countries are Bangladesh, Belize, Cambodia Ethiopia, Gambia, Guyana, Jamaica, Malawi, Maldives, Mali, Mauritius, Mozambique, Nepal, Pacific region, Rwanda, Senegal, Seychelles, Sierra Leone, Solomon Islands, Tanzania and Vanuatu.

¹⁷⁸ GCCA, http://www.gcca.eu/cgi-bin/datadirs.pl?lg=2&id_datadir_family=1&extlink=8&sw=detail&id_datadir_sheet=18

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
transdisciplinary research approach ¹⁷⁹	programs for coping mechanisms and adapting strategies to climate change and variability in West and Southern Africa, and more particularly in Mali and Mozambique.						
12. Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ¹⁸⁰	“Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups, and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.”	BMZ Budget: US\$91,241	IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF	Capacity building; Community based adaptation; Policy formation and integration	2008 – 2011	Rural areas; Agriculture; Government	<i>African:</i> Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
<i>In Mozambique: Further information required.</i>							
13. Climate Change Adaptation and Development Initiative (CC-DARE) ¹⁸¹	The joint UNEP–UNDP program provides demand-driven, flexible and rapid financial and technical support to 15 sub-Saharan countries. The emphasis of CC-DARE support is on short-term (3–6 months) initiatives that contribute to addressing key gaps for national climate change adaptation. The support is made available to improve the ability of sub-Saharan African countries to remove barriers and create opportunities for	Danish Ministry of Foreign Affairs	UNEP and UNDP	Capacity building; Knowledge communication; Field implementation	2008 – 2011	Multi-sectoral	<i>African:</i> Benin, Ghana, Ethiopia, Malawi, Mozambique, Rwanda, Senegal, Seychelles, Tanzania, Togo, Uganda

¹⁷⁹ CIGAR, <http://ongoing-research.cgiar.org/factsheets/supporting-the-vulnerable-increasing-the-adaptive-capacity-of-agro-pastoralists-to-climatic-change-in-west-and-southern-africa-using-a-transdisciplinary-research-approach-2/>

¹⁸⁰ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

¹⁸¹ CC-DARE, <http://www.ccdare.org/>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	integrating climate change adaptation into national development planning and decision-making frameworks. The three main types of activities undertaken through the program are country-level activities, regional training courses, and national and regional workshops to communicate project results and share experiences and lessons learned.	In Mozambique: Further information required.					
14.	Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa (or Africa Adaptation Program –AAP) ¹⁸²	Japan International Cooperation Agency Budget: US\$92 million	UNDP	Capacity building; Policy formation and integration; Knowledge communication	2008 – 2011	Government	African: 20 African countries ¹⁸³ including: Lesotho, Malawi, Mauritius, Mozambique, Namibia
		In Mozambique: Further information required.					
15.	Economics of Adaptation to Climate Change ¹⁸⁴	Netherlands, Switzerland and the United Kingdom	World Bank	Research; Policy formation and integration	2008 – 2010	Multi-sectoral	Global: Bangladesh, Bolivia, Ethiopia, Ghana, Mozambique, Samoa and Viet Nam

¹⁸² ALM, <http://www.adaptationlearning.net/program/africa-adaptation-programme> and UNDP-APP, <http://www.undp-aap.org/>

¹⁸³ These countries are: Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome et Principe, Senegal, Tanzania and Tunisia.

¹⁸⁴ World Bank, <http://climatechange.worldbank.org/content/economics-adaptation-climate-change-study-homepage>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	evaluate and assess the risks posed by climate change and to better design strategies to adapt to climate change.	<i>In Mozambique:</i> Further information required.					
16. Pilot Program for Climate Resilience (PPCR) ¹⁸⁵	PPCR aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation in a way that is consistent with poverty reduction and sustainable development goals. In this way, the PPCR provides incentives for scaled-up action and initiates transformational change. The pilot programs and projects implemented under the PPCR are country-led and build on NAPAs and other relevant country studies and strategies.	World Bank's Strategic Climate Fund <i>Budget:</i> US\$971.75 million pledged as of February 2011	World Bank	Policy formation and integration	2008 – ongoing	Multi-sectoral	Bolivia, Cambodia, Mozambique, Nepal, Niger, Tajikistan, Yemen, Zambia <i>Regional Programs:</i> Caribbean and Pacific (includes Papua New Guinea, Samoa, Tonga)
		<i>In Mozambique:</i> The main purpose of PPCR in Mozambique would be to fill knowledge gaps in ongoing climate change dialogue for key affected sectors, and finance investments for improved climate resilience, including infrastructure, capacity building, and improved institutional coordination. ¹⁸⁶					
17. Cities and Climate Change Initiative (CCCI) ¹⁸⁷	The first phase of this project was designed to promote policy dialogue, develop tools and implement pilot activities in the cities of Sorsogon (Philippines), Esmeraldas	Government of Norway	UN-HABITAT, UNEP, National Governments	Knowledge communication; Capacity building;	2008 – ongoing	Urban areas	<i>Global:</i> 17 countries, ¹⁸⁸ including: Kenya,

¹⁸⁵ CIF, <http://www.climatefundsupdate.org/listing/pilot-program-for-climate-resilience>

¹⁸⁶ Further information available here: http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/MozambiqueAcceptanceTemplate_F.pdf

¹⁸⁷ UN-HABITAT, http://www.fukuoka.unhabitat.org/programmes/ccci/index_en.html and http://www.fukuoka.unhabitat.org/programmes/ccci/pdf/CCCI_Asia-Pacific_Flyer.pdf

¹⁸⁸ These countries are: Burkina Faso, Ecuador, Fiji, Indonesia, Kenya, Mongolia, Mozambique, Namibia, Nepal, Papua New Guinea, the Philippine, Rwanda, Samoa, Senegal, Sri Lanka, Uganda and Vanuatu.

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	(Ecuador), Maputo (Mozambique) and Kampala (Uganda). The project aims at advising and supporting cities and towns prone to the different impacts of climate change by offering innovative approaches and solutions for national and local development planning. In 2010, efforts were initiated to up-scale lessons from this initiative by launching CCCI-Asia/Pacific with UN-HABITAT partners in China, Fiji, Indonesia, Mongolia, Nepal, Papua New Guinea, Samoa, Sri Lanka, Vanuatu and Viet Nam. The project was also upscaled in Africa.			Assessment			Rwanda, Uganda
		In Mozambique: Further information required.					
18.	Groundwater in sub-Saharan Africa: Implications for food security and livelihoods ¹⁸⁹	Alliance for a Green Revolution in Africa (AGRA)	International Water Management Institute	Research; Policy formation and integration	2009 – 2011	Freshwater supply	African: Burkina Faso, Ethiopia, Ghana, Kenya, Malawi , Mali, Mozambique , Niger, Nigeria, Rwanda, Tanzania, Uganda, Zambia
		In Mozambique: Further information required.					
19.	Five-City Network to Pioneer Climate Change Adaptation in sub-Saharan Africa ¹⁹⁰	DFID and IDRC through the CCAA program	International Council for Local Environmental Initiatives	Capacity building; Policy formation and	2009 – 2012	Urban area	Regional: Mauritius, Mozambique, Namibia, South Africa

¹⁸⁹ IWMI, <http://gw-africa.iwmi.org/>

¹⁹⁰ IDRC, http://www.idrc.ca/EN/Regions/Eastern_and_Southern_Africa/Pages/ProjectDetails.aspx?ProjectNumber=105868

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	anticipated to lay the groundwork for a local climate change adaptation strategy and action plan in the five urban areas in the participating countries: Cape Town (South Africa); Dar es Salaam (Tanzania); Maputo (Mozambique); Windhoek (Namibia); and Port Louis (Mauritius).			integration)			and Tanzania
		In Mozambique: Further information required.					
20.	Zambezi River Basin Initiative ¹⁹¹	International Foundation of Red Cross and Red Crescent Societies	National Red Cross and Red Crescent societies	Capacity building; Community based adaptation	2009 – 2013	Disaster risk management	Regional: Botswana, Malawi, Mozambique, Namibia, Zambia Zimbabwe
		In Mozambique: Further information required.					
21.	Southern Africa Regional Climate Change Program ¹⁹²	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	African: Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania,

¹⁹¹ ICP, <http://www.icp-confluence-sadc.org/projects/zambezi-river-basin-initiative-zrbi>

¹⁹² Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
							Zambia, Zimbabwe
In Mozambique: Further information required.							
22.	Enhancing Adaptive Capacity to Climate Change Impacts through well-managed Water Use for Aquaculture integrated with small-scaled Irrigation in the Chinyanja Triangle in Africa ¹⁹³	BMZ	International Center for Living Aquatic Resources Management (WorldFish Center), International Water Management Institute	Assessment; Research	2010 – 2013	Freshwater fisheries	Regional: Malawi, Mozambique, Zimbabwe
In Mozambique: Further information required.							
23.	Strengthening the Role of Civil Society in Water Governance in African Cities: Durban, Maputo, Nairobi ¹⁹⁴	DFID and IDRC through the CCAA program	York University (Canada)	Research; Capacity building	2010 – 2013	Freshwater supply; Civil society; Urban areas	African: Kenya, Mozambique, South Africa
In Mozambique: Further information required.							

¹⁹³ CGIAR, <http://ongoing-research.cgiar.org/factsheets/enhancing-adaptive-capacity-to-climate-change-impacts-through-well-managed-water-use-for-aquaculture-integrated-with-small-scale-irrigation-in-the-chinyanja-triangle-in-africa/> and FARA, http://www.infosysplus.org/db/db_index.php/door/upcome/main_unit/project/dataset_id/1215/URL_NAME/fara

¹⁹⁴ IDRC, http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Climate_Change_and_Adaptation_in_Africa/Pages/ProjectDetails.aspx?ProjectNumber=106002

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
24. Adaptation Learning Programme (ALP) ¹⁹⁵	<p>The overarching goal of ALP is to increase the capacity of vulnerable households in sub-Saharan Africa to adapt to climate variability and change with a particular focus on gender equality and diversity. The program:</p> <ul style="list-style-type: none"> • Develops and applies innovative approaches to community-based adaptation (CBA) to generate best practice models; • Empowers local communities and civil society organizations to have a voice in decision-making on adaptation; • Promotes best practice models for CBA among adaptation practitioners; and • Influences national, regional and international adaptation policies and plans. 	<p>DFID, The Ministry of Foreign Affairs of Denmark and the Ministry of Foreign Affairs of Finland</p> <p>Budget: £5,000,000</p>	CARE International	Capacity building; Community-based adaptation; Policy formation and integration	2010 – 2014	Rural areas; Civil society; Gender	African: Ghana, Kenya, Mozambique and Niger
<p><i>In Mozambique: Further information required.</i></p>							

D. Proposed Adaptation Action

As presented in Table 3, Mozambique has proposed four key adaptation actions through its NAPA, corresponding to the priority areas of early warning system strengthening, adaptation to climate change in the freshwater and agriculture sectors, and adaptation in the coastal zones of Mozambique. One of these projects, “Adaptation in the Coastal Zones of Mozambique,” has received from the LDCF. As discussed in the notes section, the country’s other NAPA priority projects are at least being partially addressed through ongoing activities.

In addition, Mozambique is noted as being a planned participant in the proposed project “Community Adaptation to Climate Change in the Limpopo Basin,” which would bring together Botswana, Mozambique, South Africa and Zimbabwe. Funding for this project has been requested from the Special Climate Change Fund.

¹⁹⁵ CARE, <http://www.careclimatechange.org/files/adaptation/ALP.pdf>, DFID, <http://projects.dfid.gov.uk/project.aspx?Project=200658> and CARE, <http://www.careclimatechange.org/adaptation-initiatives/alp>

Table 3: Proposed Adaptation Projects and Programs in Mozambique

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
Projects Identified in Mozambique's NAPA				
1. Strengthening of an Early Warning System	The objective is to improve inter-sector coordination for the use and dissemination of warnings. Activities would include training technicians in relevant sectors; the identification, mapping and evaluation of risks of different groups; train local bodies in data collection and analysis; create education tools to raise awareness; etc.	Capacity building; Knowledge communication	Disaster risk management; Climate information services	Mozambique
		Notes: A number of ongoing projects are helping to advance these objectives, including the BMZ funded “Disaster Risk Management and Effective Early Warning” and “Integrating Adaptation to Climate Change within Disaster Risk Management Systems in the Búzi River Catchment Area” project, as well as the Pilot Program for Climate Resilience.		
2. Strengthening capacities of agricultural producers to cope with climate change	Activities of this project would include building infrastructure to collect rainwater, drilling water boreholes, creating small scale irrigation systems, encouraging applied research, disseminating drought-tolerant crops, etc.	Field implementation; Knowledge communication; Capacity building	Agriculture; Freshwater supply	Rural areas of Mozambique
		Notes: The objectives of this project are being supported through the GEF funded “Coping with Drought and Climate Change” project, among others.		
3. Reduction of climate change impacts in coastal zones	This project will aim to decrease erosion of coastal zones due to natural forces, estimated to cause 90 per cent of the degradation of Mozambique's coastline. Activities would include identifying and mapping eroded land and coastal vegetation; identifying rehabilitation techniques for dunes and mangroves; and developing strategic actions to disseminate good practices to coastal communities.	Research; Knowledge communication; Capacity building	Coastal zone management	Coastal areas of Mozambique
		Notes: The objectives of this project are being addressed through the LDCF funded “Adaptation in the Coastal Zones of Mozambique” project.		
4. Management of water resources under climate change	The objective of the project is to improve the level of control and evaluation capacity of river water flows in order to reduce the impacts of droughts and floods within hydrological basins. Activities would include monitoring systems of river water levels for greater precision in drought and flood forecasting; and build technical capacity of personnel to collect and process hydrological data.	Research; Capacity building	Freshwater supply	Mozambique
		Notes: The water sector is the focus of a number of going projects in Mozambique.		

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
Other Planned Adaptation Projects				
5.	Community Adaptation to Climate Change in the Limpopo Basin ¹⁹⁶			Botswana, Mozambique, South Africa and Zimbabwe
		Notes: Project submitted for funding from the Special Climate Change Fund. Proposed funding from the SCCF: US\$4.45 million. Proposed co-financing: US\$12.0 million.		

E. Assessment

Through its NAPA and other documents, Mozambique has identified adaptation within coastal zones, and the agriculture and water sectors as being priorities. It has also highlighted the need to improve early warning and risk reduction measures, expand climate hazard monitoring, strengthen institutional coordination among different Ministries in addressing climate change; and facilitate mainstreaming of climate change issues into development plans. These priority adaptation needs are being addressed to some extent through current adaptation projects focused on governance, disaster risk management and agriculture. Mozambique’s NAPA priority related to coastal zones is also being directly addressed through implementation of the LDCF financed project “Adaptation in the Coastal Zones of Mozambique.” The number of adaptation projects currently being implemented in Mozambique in some of its priority sectors suggests that it will be important to ensure that they are sharing good practices and coordinating as appropriate in order to minimize overlap and maximize lessons learned.

Mozambique is also engaged in the implementation of adaptation projects that meet needs in other areas, such as urban areas and the particular needs of women in a changing climate. Yet, Mozambique’s National Communication identifies the following sectors as also being vulnerable to the effects of climate change: human health, biodiversity and ecosystems, and infrastructure (MICOA, 2003). There are currently no apparent adaptation projects that explicitly touch upon these sectors, and it may be important to diversify into these areas in the future. In addition, a thorough consideration of the likely regional impacts of climate change in Mozambique is not evident within the country’s NAPA or National Communication, and it is important to ensure that these specific effects are considered when identifying further adaptation options.

¹⁹⁶ GEF, http://www.thegef.org/gef/sites/thegef.org/files/publication/adaptation-actions_0.pdf



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Ministry for the Coordination of Environmental Affairs [MICOA] (2007). National Adaptation Programme of Action for Mozambique. Accessed in April 2011 from: <http://unfccc.int/resource/docs/napa/moz01.pdf>

United States Department of State [USDS] (2010). Background Note: Mozambique. Accessed in April 2011 from: <http://www.state.gov/r/pa/ei/bgn/7035.htm>

8.0 Namibia

ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
DFID	Department for International Development (United Kingdom)
GDP	Gross Domestic Product
GEF	Global Environment Facility
FANPRAN	Food, Agriculture, and Natural Resources Policy Analysis Network
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
MET	Ministry of Environment and Tourism
MAWF	Ministry of Agriculture, Water and Forestry
NGO	non-governmental organization
PIK	Potsdam Institute for Climate Impact Research
SIDA	Swedish International Development Agency
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	US Agency for International Development
ZALF	Leibniz-Centre for Agricultural Landscape Research

Namibia is a country located on the southwestern coast of Africa, It is land characterized as semi-desert with a high plateau, and is home to a large part of the Namib Desert. Like many other countries in the area, Namibia's economy is dependent on rain-fed agriculture; over 70 per cent of the population derives their livelihoods from farming activities (Reid *et al*, 2007). It is estimated that up to 30 per cent of Namibia's Gross Domestic Product (GDP) is dependent on natural resources and the environment.

A. Adaptation Needs and Priorities

The mean annual temperature in Namibia has been increasing at approximately three times the global average rate recorded in the 20th century (Reid *et al*, 2007). Relative to mean temperatures between 1961 and 1990, the country is projected to experience temperature rises by 2100 of between 2 to 3°C based upon use of the B1 emissions scenario, and 4.5 to 6°C based on use of the A1 emissions scenario. Temperature increases are projected to be less in the western areas of Namibia that are nearer to the ocean (MET, 2002). Projections of

future rainfall patterns are more uncertain, with models indicating ranges from small increases of less than 30 mm per year to severe declines in annual rainfall (MET, 2009). It is anticipated that rainfall patterns will correlate closely with projected temperature changes.

Namibia's Proposed Climate Change Strategy and Action Plan notes that future climate change impacts will cause greater rainfall variability, shortening of the rainy season, a possible increase in evapotranspiration and sea level rise. (MET, 2009). An increase in drought and aridity is also expected, with attendant impacts upon agriculture, forestry, fisheries resources, water resources, ecosystems and food security. Climate change is also expected to increase the occurrence of certain vector-borne diseases (e.g. malaria) as well as the population's vulnerability to water- and food-borne diseases that spread person to person (e.g. cholera). Frequent and intense rainfalls, rising sea levels, and drought may also affect infrastructure, including water, wastewater, and sewerage treatment systems as well as houses, buildings, roads, railways, dams and water pipes (MET 2009).

Namibia is particularly vulnerable to climate change given its geographic location, variable climate and socioeconomic factors that include its dependence on rain fed agriculture (MET, 2009). Research suggests that, over the next 20 years, Namibia's economy could lose up to six per cent of its GDP annually due to the impact of climate change on its natural resources (Reid *et al*, 2007). Namibia's vulnerabilities to climate change have been identified in through its Initial National Communication to the UNFCCC, National Adaptation Vulnerability Assessment, and the Proposed Climate Change Strategy and Action Plan. These documents high concerns relevant to the following sectors:

- *Agriculture*. Smallholder agriculture and pastoralism, practiced by over two-thirds of the population, are considered to be particularly vulnerable to the projected impacts of climate change in Namibia as agricultural output in Namibia already extremely sensitive to climatic conditions. Even under best-case climate change scenarios, subsistence farming in Namibia is expected to experience declining productivity, with approximately a quarter of the population required to find new livelihoods (Reid *et al*, 2007). Under future climate conditions, ranching will also become more difficult as climate change is expected to impact the productivity of grassland, savanna and shrub-based ecosystems (Reid *et al*, 2007). As the export of livestock products makes up a substantial portion of the country's annual GDP, this decline could have implications for the national economy.
- *Tourism*. Climate sensitive biodiversity is also seen as being particularly at risk, with consequent impacts on the ecotourism sector. A considerable contributor to the Namibian economy, approximately 75 per cent of Namibia's tourism sector is nature-based (Reid *et al*, 2007).

- *Freshwater resources.* Namibia currently experiences a net water deficit as it has no perennial rivers and less than one per cent of annual rainfall is retained as groundwater. Should Namibia experience a decrease in rainfall and an increase in evapotranspiration, the impact on the country's water supply and dependent sectors would be extreme.

To reduce its vulnerability to the impacts of climate change, Namibia has recommended a number of actions through its various policy documents, including the National Communication, Adaptation and Vulnerability Assessment, and Proposed Climate Change Strategy and Action Plan. These include the following measures, by key socioeconomic area:

- *Policy, planning and research:* Integrate available information on the vulnerability to climate change and adaptation options into existing economic, social and natural and environmental resource policies, and into the National Development Agenda; establish a consultative planning process to develop a strategic framework to address climate change issues within existing policies and legislation; and undertake further research on Namibia's socioeconomic and ecosystem vulnerability to climate change, as well as available measures to adapt to these changes.
- *Agriculture:* Improve information dissemination around the effects of climate change, as well as improved forecasting and the establishment of early warning systems, to encourage adaptation in the farming sector; development of climate resilient cropping/agriculture/production systems; development of climate resilient crop varieties/cultivars; diversification of agriculture and livelihoods; and development of climate resilient livestock breeds.
- *Forestry, biodiversity, and ecosystems:* Conservation, utilization and sustainable development of biological resources; and maintenance of ecosystems to ensure environmental sustainability.
- *Coastal zone, fisheries and aquaculture:* Conservation, utilization and sustainable development of the coastal zone and its resources; develop climate change infrastructure risk assessment guidelines and methodology; improve drainage and sanitation facilities in rural and urban areas; adaptation to floods; adaptation against future sea level rise; and conservation, utilization and sustainable development of fisheries and aquaculture
- *Sustainable freshwater resources:* Conservation and management of watershed/catchment areas; promote integrated development and management of water resources; promote conservation and sustainable utilization of water resources; improve transboundary cooperation regarding water resources; support institutional and human capacity building in water resources management and use; and improve efficiency and conservation in the use of water resources, including implementation of water demand management policies and integrated water resources management.
- *Housing and settlements:* Improve infrastructure spatial planning and development in urban and rural areas; improve formal and informal settlement patterns and housing; and climate-proof existing and future housing and other infrastructure.

- *Human health and well-being*: Assessment of the impacts of climate change on human health and well-being; expansion of health facilities and networks to remote areas; improve the capture, management, storage and dissemination of health information; improve access to sanitation and water; increase human resources capacity and improve efficiency; and support action plans against HIV/AIDS.

To address gaps in Namibia's adaptation identified through this assessment, it was recommended that the following actions be taken: (a) targeted, pro-poor disaster insurance schemes should be developed for the rural poor in Namibia as part of a broader rural development policy and strategy; (b) pricing mechanisms of water, land and electricity should be introduced that reflect the scarcity of the goods and the importance of conservation; (c) capacity should be enhanced to access, interpret, translate, and communicate climate change science to policymakers and the general public in the country; (d) access to weather data should be improved and the number of weather stations increased; and (e) vulnerability mapping should be enhanced in order to enhance disaster preparedness (MET, 2008).

The 2008 Assessment also noted some of the key barriers to adaptation to climate change in Namibia, namely: insufficient awareness, political and institutional barriers, sociocultural barriers and financial barriers. Additional research corroborates the need for Namibia to ensure its policies and activities take the impacts of climate change into consideration (Reid *et al*, 2007).

B. National Level Policies and Strategic Documents

As part of activities leading to the submission of Namibia's Second National Communication to the UNFCCC, the Ministry of Environment and Tourism is undertaking research and consultations to develop a national climate change policy and strategy and accompanying action plan (MET 2009). This process is being funded by the Government of Japan's "Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa," or Africa Adaptation regional program being implemented in Namibia by the United Nations Development Programme (UNDP).

Studies conducted during this process include: a vulnerability and adaptation assessment (with UNDP support); research on farming systems needs to enable adequate adaptation to climate change; a study examining adaptation to climate change through the project "Improvement of Traditional Crops and Livestock Farming in Namibia;" and the Proposed Climate Change Strategy and Action Plan in 2009.¹⁹⁷ The latter outlines Namibia's approach to addressing mitigation, adaptation, and tackling cross-cutting issues. The Ministry of

¹⁹⁷ Based on current research, this proposed document has yet to be formally adopted as the country's national climate change strategy.

Environment and Tourism also conducted three regional consultative workshops in July 2010 to gather public inputs for a draft national climate change policy.¹⁹⁸

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Initial National Communication to the UNFCCC ¹⁹⁹	Ministry of Environment and Tourism	Submitted in 2002	Multi-sectoral	Provides an overview of the climate and economy of Namibia; outlines anticipated impacts of climate change and emissions profile of the country along with needs and priorities to address them.
2.	Namibian Biodiversity Strategy and Action Plan	Ministry of the Environment	Released in 2002	Multi-sectoral	One of the ten priorities of the action plan is to “raise awareness and strengthen capacity to adapt to climate change.” In particular, the plan commits to synthesize relevant regional and national information from other sources, commission analyses of the biodiversity impacts of climate change in Namibia, design and implement an awareness program, integrate climate change monitoring and research needs in the planning of environmental observatories, focus research and management planning on climate change impacts on vulnerable species and areas, and to make results and recommendations regularly available to stakeholders.
3.	Adaptation and Vulnerability Assessment	Ministry of Environment and Tourism (with assistance from UNDP)	March 2008	Freshwater supply; Agriculture	Focuses on impacts of climate change in the water and agriculture sectors as well as socioeconomic impacts. This study is part of an overall effort to develop a national climate change policy and strategy and associated action plan.
4.	Proposed Climate Change Strategy and Action Plan ²⁰⁰	Ministry of Environment and Tourism (with assistance from the UNDP)	Produced in 2009; remains a working document	Multi-sectoral	As noted in the document, the National Climate change Strategy and Action Plan is “part of the background activities of Namibia under the second national communication to develop a national climate change policy and strategy and accompanying action plan” (MET 2009). The adaptation section outlines activities in the following areas: food security and sustainable resource base, sustainable water resources, human health and well-being, and infrastructure.
5.	National Development Plan ²⁰¹	National Planning Commission	2009 – 2011	Multi-sectoral	The document outlines an intention to modernize meteorological services in Namibia and to set up a Climate Change Unit to support the National Climate

¹⁹⁸ Source: <http://www.met.gov.na/SiteCollectionDocuments/Hon%20Minister%20speech%20at%20the%20National%20Climate%20Change.pdf>

¹⁹⁹ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&piref=3455#beg

²⁰⁰ Accessible here: <http://www.met.gov.na/Documents/NAMIBIA-Proposed%20Climate%20Change%20Strategy%20and%20Action%20Plan%20%2813.pdf>

²⁰¹ Accessible here: http://www.npc.gov.na/docs/NDP3_Executive_Summary.pdf

Name of Policy Action	Government Division Responsible	Status	Sector(s) of Focus	Summary description
				Change Committee. The document also outlines a commitment to ensure environmental sustainability by strengthening the management of natural resources and biodiversity, to develop and implement a National Strategy on Climate Change, and to mainstream climate change adaptation and mitigation into national policies. Related goals include the implementation of Community-Based Natural Resource Management and integrated sustainable land management.

C. Current Adaptation Action

When compared to other southern African countries, a moderate amount of adaptation programming is currently occurring in Namibia. Most of this action is being directed towards supporting adaptation in the areas of agriculture, governance and, to a lesser extent, urban areas. Projects are also being capacity related to disaster risk management, climate information services, sustainable land management and biodiversity. The actions being implemented through these projects primarily include capacity building, knowledge communication and policy development; some projects are supporting community based adaptation. Financing for these projects is most commonly being provided by the Global Environment Facility (GEF) and the governments of Germany, Japan and Norway.

Table 2: Current Adaptation Projects and Programs active in Namibia

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1.	Country Pilot Partnership for Integrated Sustainable Land Management Namibia: Adaptation to climate change through the improvement of traditional crops and livestock farming (CPPISLM) ²⁰²	The project objective is to develop and pilot a range of coping mechanisms for reducing the vulnerability of farmers and pastoralists to climate change and climate variability.	GEF Trust Fund (Strategic Priority for Adaptation) Budget: US\$6,795,806	UNDP, Ministry of Agriculture, Water and Forestry, Ministry of Lands and Resettlement, Ministry of Regional and	Capacity building	2008 – 2011	Agriculture; Biodiversity Namibia

²⁰² ALM, <http://www.adaptationlearning.net/project/cpp-namibia-adapting-climate-change-through-improvement-traditional-crops-and-livestock-farm>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
			Local Government and Housing and Rural Development, and the National Planning Commission					
2.	Adjusting Community Agricultural Practices to Reduce Climate Change Risk in Omusati Region ²⁰³	Project objectives include both providing the community with practical tools for adaptation and increasing community awareness about climate change risks. The project seeks to integrate all community groups, including younger members, into activities. Lessons learned from project implementation will be shared regionally, nationally and globally, to encourage adaptive solutions at all levels.	Japan, GEF Budget: US\$135,000	UNDP, Onkani community; Ministry of Agriculture, Water and Forestry; Desert Research Foundation of Namibia; Namibia National Farmers Union; Ongushu cooperative	Capacity building; Community based adaptation	2009 – 2011	Agriculture	Omusati Region
Participation in Regional and Global Actions								
3.	Capacity Development for Policy Makers: Addressing climate change in key sectors ²⁰⁴	The project is a targeted capacity development initiative that supports two goals: to increase national capacity to coordinate ministerial views for more effective participation in the UNFCCC process and to	United Nations Foundation; Switzerland; Finland;	UNDP	Capacity building; Policy formation and integration;	2008 – 2010	Government	Global: 19 countries, ²⁰⁵ including Namibia

²⁰³ ALM, <http://www.adaptationlearning.net/project/adjusting-community-agricultural-practices-reduce-climate-change-risk-omusati-region>

²⁰⁴ UNDP, <http://www.undp.org/climatechange/capacity-development.html>

²⁰⁵ These countries are: Algeria, Bangladesh, Colombia, Costa Rica, Dominican Republic, Ecuador, Gambia, Honduras, Liberia, Namibia, Nepal, Nicaragua, Niger, Paraguay, Peru, St. Lucia, Togo, Turkmenistan, and Uruguay.

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	assess investment and financial flows to address climate change for selected key sectors. As a result of this project, both the technical understanding of key climate change issues and their economic and policy implications within the context of the UNFCCC will be enhanced.	Spain; and Norway Budget: US\$6,953,413		Knowledge communication			
							<i>In Namibia:</i> A work plan for an Investment and Financial Flows (IFF) assessment for the key sectors of energy (mitigation) and land-use change (adaptation) has been undertaken in Namibia. Leading up to the development of the work plan, two Inter-Ministerial training sessions took place in 2008 and 2009. The first workshop aimed to (a) raise awareness for policymakers on strategic climate change issues and national priorities, (b) develop capacity of negotiators on the building blocks of the Bali Action Plan, and (c) build the capacity of technical experts on conducting assessments of investment and financial flows to address climate change. The second workshop brought together policymakers to discuss investment and financial flows to address climate change in key sectors, trained participants in how to conduct an I&FF assessment using UNDP methodology, reviewed the a national work plan for undertaking I&FF assessment, and established institutional arrangements and next steps for the work plan.
4.	Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa (or Africa Adaptation Program – AAP) ²⁰⁶	Japan International Cooperation Agency Budget: US\$92 million	UNDP	Capacity building; Policy formation and integration; Knowledge communication	2008 – 2011	Government	<i>African:</i> 20 African countries ²⁰⁷ including: Lesotho, Malawi, Mauritius, Mozambique, Namibia
							<i>In Namibia:</i> The goal of this project is to ensure that Namibia has the institutional, individual and systemic capacity to address climate change risks and opportunities through a national approach to adaptation. In particular, Namibia's project is focused on strengthening: (1)

²⁰⁶ ALM, <http://www.adaptationlearning.net/program/africa-adaptation-programme> and UNDP-APP, <http://www.undp-aap.org/>

²⁰⁷ These countries are: Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome et Principe, Senegal, Tanzania and Tunisia.

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
		adaptive long-term planning capacities (2) institutional and human resource capacities, (3) policies and measures, (4) A sustainable financing strategy (5) knowledge management activities. The project was initiated in Namibia in 2009.					
5.	Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ²⁰⁸	BMZ Budget: US\$91,241	IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF	Capacity building; Community based adaptation; Policy formation and integration	2008 – 2011	Rural areas; Agriculture; Government	African: Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
<i>In Namibia: Further information required.</i>							
6.	Cities and Climate Change Initiative (CCCI) ²⁰⁹	Government of Norway	UN-HABITAT, UNEP, National Governments	Knowledge communication; Capacity building; Assessment	2008 – ongoing	Urban areas	Global: 17 countries, ²¹⁰ including: Mozambique and Namibia
<i>In Namibia: Further information required.</i>							

²⁰⁸ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

²⁰⁹ UN-HABITAT, http://www.fukuoka.unhabitat.org/programmes/ccci/index_en.html and http://www.fukuoka.unhabitat.org/programmes/ccci/pdf/CCCI_Asia-Pacific_Flyer.pdf

²¹⁰ These countries are: Burkina Faso, Ecuador, Fiji, Indonesia, Kenya, Mongolia, Mozambique, Namibia, Nepal, Papua New Guinea, the Philippine, Rwanda, Samoa, Senegal, Sri Lanka, Uganda and Vanuatu.

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	In 2010, efforts were initiated to up-scale lessons from this initiative by launching CCCI-Asia/Pacific with UN-HABITAT partners in China, Fiji, Indonesia, Mongolia, Nepal, Papua New Guinea, Samoa, Sri Lanka, Vanuatu and Viet Nam. The project was also upscaled in Africa.						
7.	Community-based Adaptation (CBA) Programme ²¹¹	GEF (Strategic Priority on Adaptation), co-financing Budget: US\$6.7 million	UNDP	Knowledge communication; Capacity building; Community-based adaptation	2009 – 2011	Multi-sectoral	<i>Global:</i> Bangladesh, Bolivia, Guatemala, Jamaica, Kazakhstan, Morocco, Namibia, Niger, Samoa, Viet Nam
				<i>In Namibia:</i> The CBA program’s work in Namibia is being co-financed by the Government of Japan. Two projects are underway: ²¹² 1. “Ecosystem and Livelihood Resilience through Sustainable Agriculture.” The focus of the project is to increase community-level capacity cope/adapt to climate change through implementation of sustainable agricultural practices at four farming communities in the arid Onkani region and the surrounding communities of Onakapya, Ondjungulume and Onkaankaa. 2. “Harnessing coping strategies via a holistic approach for community adaptation to climate change.” The project pilots the implementation of six coping strategies to climate change vulnerability that can be duplicated on a large scale in subsistence agricultural communities.			
8.	Regional Science Service	The objective is to develop a program that will	Germany		Research;	2009 – 2012	Ecosystem <i>Regional:</i>

²¹¹ UNDP, http://www.undp-adaptation.org/projects/websites/index.php?option=com_content&task=view&id=203

²¹² UNDP, http://www.undp-adaptation.org/projects/websites/index.php?option=com_content&task=view&id=257&sub=1

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Centre for Adaptation to Climate Change and Sustainable Land Management in Southern Africa ²¹³	conduct problem-oriented research in the area of adaptation to climate change and sustainable land management and provide evidence-based advice for all decision-makers and stakeholders. Research will be geared towards filling current regional or local gaps in integrated knowledge. The research will aim to: integrate research on land- and resource management; link science and theory to practice and decision-making; compile, analyze and disseminate best practices.	Federal Ministry of Education and Research		Capacity building; Knowledge communication		conservation	Angola, Botswana, Namibia, South Africa, Zambia
<i>In Namibia:</i> Further information required.							
9. Five-City Network to Pioneer Climate Change Adaptation in sub-Saharan Africa ²¹⁴	Local governments and coastal cities in southern Africa face a serious threat associated with climate change. This project aims to design a framework for managing increased risk from climate change, and is anticipated to lay the groundwork for a local climate change adaptation strategy and action plan in the five urban areas in the participating countries: Cape Town (South Africa); Dar es Salaam (Tanzania); Maputo (Mozambique); Windhoek (Namibia); and Port Louis (Mauritius).	DFID and IDRC through the CCAA program	International Council for Local Environmental Initiatives	Capacity building; Policy formation and integration)	2009 – 2012	Urban area	<i>Regional:</i> Mauritius, Mozambique, Namibia, South Africa and Tanzania
<i>In Namibia:</i> Further information required.							
10. Zambezi River Basin Initiative ²¹⁵	In recognition of increasing flood events within the Zambezi River Basin, this project aims to reduce the vulnerability of communities within the basin to extreme weather events and climate change, including	International Foundation of Red Cross and Red Crescent	National Red Cross and Red Crescent societies	Capacity building; Community based adaptation	2009 – 2013	Disaster risk management	<i>Regional:</i> Botswana, Malawi, Mozambique, Namibia,

²¹³ SASSCAL, <http://www.sasscal.org/>

²¹⁴ IDRC, http://www.idrc.ca/EN/Regions/Eastern_and_Southern_Africa/Pages/ProjectDetails.aspx?ProjectNumber=105868

²¹⁵ ICP, <http://www.icp-confluence-sadc.org/projects/zambezi-river-basin-initiative-zrbi>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	the impact of flooding. Activities include developing community hazard maps, training staff in community disaster preparedness, implementing community based early warning systems, and training in adaptation techniques.	Societies					Zambia Zimbabwe
<i>In Namibia: Further information required.</i>							
11.	Southern Africa Regional Climate Change Program ²¹⁶	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	African: Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
<i>In Namibia: Further information required.</i>							

D. Proposed Adaptation Action

No planned adaptation projects have been identified at present.

E. Assessment

Namibia has made progress in implementing a moderate number of projects that address key adaptation priorities. There is considerable evidence that Namibia is integrating climate change adaptation considerations into its national development policies and strategies and, as

²¹⁶ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en



discussed above, the country is currently undertaking research and consultations to develop a national Climate Change Strategy and Action Plan with assistance from the UNDP and Government of Japan.

The majority of current adaptation projects in Namibia focus on adaptation in the agriculture sector, including crop production, livestock rearing and food security. Certain projects are also addressing the need to further mainstream climate change adaptation into policy frameworks. While these areas have been identified as important sectors for adaptation action, some gaps in current programming may exist. Looking strictly at the number of discrete adaptation projects underway in the country, needs related to biodiversity and the potential impact of climate change on Namibia's tourism sector do not appear to be addressed. Nor do the identified vulnerabilities of the freshwater resource, infrastructure, coastal zones, fisheries and human health sectors. The potential impacts of climate change by gender also do not appear to have been given dedicated attention through existing programming. Namibia's various documents assessing vulnerability to climate change identify a range of possible adaptation actions, and the country could make a concerted effort to identify the most important adaptation priorities in order to ensure scarce resources are allocated effectively.

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9.0 Seychelles

CC-DARE	Climate Change Adaptation and Development Initiative
COI	Indian Ocean Commission
EC	European Commission
DFID	Department for International Development (United Kingdom)
GDP	Gross Domestic Product
GEF	Global Environment Facility
GOS	Government of Seychelles
FAO	Food and Agriculture Organization
IFAD	International Fund for Agriculture and Development
IFRC	International Federation of Red Cross and Red Crescent Societies
IUCN	International Union for the Conservation of Nature
MPF	Mangroves for the Future
SIDA	Swedish International Development Agency
SNCCC	Seychelles National Climate Change Committee
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USDS	United States Department of State

Seychelles is an archipelagic country of over 115 islands located off the east coast of continental Africa in the Indian Ocean, northeast of Madagascar, with a total surface area of 455.3 square kilometers (USDS, 2010). A majority of the country's islands are formed from coral, with forty being granitic (SNCCC, 2009). Seychelles is rich in biodiversity and 45 per cent of the country's land area is protected—one of the largest protected areas in the world in relation to surface area (GOS, 2000). Most of its islands are surrounded by fragile coastal ecosystems.

More than 90 per cent of its population of around 84,600 people and nearly all of its economic activities are concentrated in the narrow coastal zone of Mahe island (SNCCC, 2009). Seychelles has the second highest Gross Domestic Product (GDP) per capita in Africa, and its



Human Development Index is ranked the highest on the continent (SNCCC, 2009). The country's adult population has attained a 92 per cent literacy rate, with school aged children reaching 98 per cent (SNCCC, 2009; USDS, 2010).

While primarily an agrarian country at the time of its independence in 1976, the economy of the Seychelles is now dependent on tourism; the services sector (transport, communications, commerce and tourism) has contributed close to 70 per cent of GDP. In recent years this dependence has made the country susceptible to external shocks (USDS, 2010). Fisheries are the country's second largest economic sector (SNCCC, 2009). The country's domestic food production averages 60 per cent of local consumption, with 40 per cent imported (GOS, 2000). The country further relies on imported petroleum products to meet its energy needs, with fuel imports costing the equivalent of 22 per cent of GDP in 2005 (SNCCC, 2009).

A. Adaptation Needs and Priorities

The mean average temperature of the archipelago is 26.9°C with a humidity of 80 per cent (GOS, 2000). Although precipitation levels vary across the country's islands, most experience a dry season from May to October, (GOS, 2000). Recent accounts indicate that the country's climate may have begun to change over the past few decades. The country warmed by 0.25°C between 1972 and 1997, and its annual rains increased between 1972 and 2006 (SNCCC, 2009). From 2002 to 2006, there are five cases in which sea levels exceeded the average by 10 centimeters—an increase that caused significant damage to infrastructure when accompanied by storm events (SNCCC, 2009).

As a small island nation with highly populated low-lying coastal areas, Seychelles is particularly vulnerable to the impacts of climate change (SNCCC, 2009). Climate projections to date have focused on the island of Mahe, where the majority of the country's population is based. While recent assessments make use of both global and regional circulation models in anticipating the effects of climate change, the Seychelles' recent National Climate Change Strategy notes uncertainty associated with current climate scenarios given the country's very small geographic size (SNCCC, 2009). Projections reveal uncertainty around the magnitude of future changes in precipitation on the island, with model results ranging from -8.6 per cent to +9.3 per cent by 2050 (SNCCC, 2009). It is generally anticipated that the dry season will be drier while the rainy season will be wetter under future climate conditions.

Annual sea level rise is anticipated to be within the range of 0.4 to 0.6 meters during the 2070 to 2100 period, a change that would not allow Seychelles' coral reefs to fully recover; it is anticipated that the health of the country's coral reefs will decline over the next 40 years (SNCCC, 2009). Given Seychelles' economic dependence on tourism, any future climatic changes that impact the country's biodiversity, coastline, coral reefs, fisheries and other tourist attractions may significantly impact its development. A 2007 study of six major tourism

sites in Seychelles found that the country's tourism sector is "extremely vulnerable" to external economic and environmental disasters, but that an aggressive approach to conservation may help to mitigate some of these impacts (Payet, 2007).

The Seychelles' Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) outlines many of the Seychelles' key vulnerabilities to climate change, including impacts on natural habitats and biodiversity, coastal zones, agriculture, freshwater resources and fisheries (GOS, 2000). Priority adaptation needs identified in the National Communication include the following (GOS, 2000):

- Monitor, survey and collect data on climate change and potential sea level rise;
- Formulate comprehensive integrated coastal zone management strategies to address potential sea level;
- Improve public awareness and political understanding around the effects of climate change;
- Increase participation in bilateral, regional and global research and assessments that are monitoring and mapping climate impacts;
- Develop information systems on construction technologies and land-use planning tools; and
- Introduce coastal adaptation technologies and conduct regular assessments on these technologies.

The National Communication also mentions some of the barriers to adaptation in Seychelles, including the country's dependence on a narrow range of resources, dependence on international trade, high coastal population density, overuse of resources, and limited institutional capacities (GOS, 2000).

The country's recent National Climate Change Strategy identifies the Seychelles' main needs in order to implement adaptation as being: (1) development of capacity at the tertiary level, especially in the mainstreaming of climate change, research and monitoring, and capacity building; (2) the development of a policy framework to enable stakeholders to tackle climate change issues; and (3) develop capacity within the government to manage the change through appropriate institutional channels (SNCCC, 2009). The Strategy also outlines a number of strategic objectives and planned adaptation activities, as outlined in Table 3.

In addition, based on the findings of a recently completed adaptation project, the Red Cross Climate Centre has identified the following needs to move adaptation along within the country: address risk reduction and improve surveillance of climate impacts; build capacity; establish community pilot projects to address the impacts of coastal erosion and flooding; and develop innovative financing mechanisms to enable community participation in risk reduction efforts (IFRC, 2010).

B. National Level Policies and Strategic Documents

Seychelles has produced a number of policies and reports that address adaptation needs, priorities and planned actions. The country prepared an Initial National Communication under the UNFCCC that was released in 2000, and is in the process of developing its second National Communication (SNCCC, 2009). In addition, the Seychelles has in place a ten-year Environmental Management Plan (2000-2010) that addresses how the country’s environment will be managed across thirteen thematic areas; climate change is integrated into the plan as a cross-cutting theme. Finally, the government has recently released a National Climate Change Strategy which lays out the policy actions that the government could carry out to address climate change—in relation to both mitigation and adaptation.

In addition to the policies discussed above, the government has organizational frameworks in place to coordinate climate change internally. In 1992 the government established the Seychelles National Climate Change Committee to provide broader coordination of the development and implementation of national climate policies (SNCCC, 2009). As well, the Seychelles Meteorological Services established a climate center in 1998, which has contributed to a number of studies and understanding of historical meteorological data (SNCCC, 2009).

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Seychelles Initial National Communication to the UNFCCC ²¹⁷	Ministry of Environment and Transport	Submitted in 2000	Multi-sectoral	This document provides a review of the country’s national circumstances, identifies greenhouse gas sources and sinks, discusses the technologies and measures for greenhouse gas mitigation, presents vulnerability and adaptation options, and discusses the country’s capacity building needs and priorities.
2.	Seychelles National Climate Change Strategy	The Seychelles National Climate Change Committee	Released 2009	Multi-sectoral	This document provides a broad overview of the adaptation challenge in Seychelles, including a review of the country’s current climate and the anticipated effects of climate change by sector. It then discusses the measures that will allow Seychelles to adapt to climate change through a consideration of five overarching objectives.
3.	Second Environmental Management Plan of the Seychelles (2000 – 2010)	Government of the Seychelles		Multi-sectoral	The Environment Management Plan is a 10 year strategic document that outlines the country’s environmental objectives across 13 thematic areas. The vision is for the Management Plan to “serve as a flexible yet robust vehicle for continued improvement of proactive environmental management excellence.” In the document, climate change is viewed as a cross-cutting theme that must be integrated across all program areas.

²¹⁷ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=2737#beg

C. Current Adaptation Action

Less than 10 discrete adaptation projects have been identified as being underway in Seychelles, which is a low number compared to other country in the region, but high relative to the size of its population. These initiatives include one nationally focused project, “Ecosystem-based Adaptation to Climate Change in Seychelles,” that was recently approved by the Adaptation Fund and will be implemented by the United Nations Development Programme (UNDP). Outside of this project, Seychelles participates in several joint projects involving countries from Africa, Asia and Latin America. This includes participation in the Danish-funded program “Climate Change Adaptation and Development Initiative;” the “ACCLIMATE” project being implemented by the Indian Ocean Commission (COI) that facilitates regional cooperation amongst COI countries; and the “Mangroves for the Future” program promoting investment in coastal ecosystem conservation.

A number of the current projects underway in Seychelles have a focus on disaster risk management, followed by improving governance capacity, coastal zone management, freshwater resources, agriculture and strengthening climate information services. The activities being implemented within these projects generally include research, capacity building, knowledge communication and supporting policy development and integration. Fewer projects include community based adaptation and field implementation components.

Table 2: Current Adaptation Projects and Programs active in Seychelles

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1. Ecosystem-based Adaptation to Climate Change in Seychelles ²¹⁸	This projects looks at water scarcity and coastal flooding. The project will concentrate on the coastal zones and hinterlands the main granitic islands. The main objective of the project is to include ecosystem-based adaptation into the country’s risk management system in water supplies. This will include the introduction of technology for ecosystem restoration and strengthen ecosystems to climate change resilience.	Adaptation Fund Budget: US\$6,455,750	UNDP	Capacity building; Field implementation	2011 – 2018	Freshwater supply; Coastal zone management; Ecosystem restoration	Mahé, Praslin, La Digue and Silhouette

²¹⁸ Adaptation Fund, http://adaptation-fund.org/sites/default/files/AFB.PPRC_.5.13%20Proposal%20for%20Seychelles_1.pdf

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
Participation in Regional and Global Projects								
2.	“ACCLIMATE” (adaptation au changement climatique) ²¹⁹	This project aims to promote regional cooperation between the Indian Ocean Commission (IOC) countries on climate change adaptation. This objective consists of reinforcing the IOC’s capacities in the area of climate change adaptation in the short and long term through the development of projects and policies. Several activities are implemented, including: capacity building for climate change observation and for regional vulnerability analyses; the identification of priority axes for regional alert systems and risks prevention plans; demonstrative actions; elaboration of a regional adaptation action plan and policy; and improving the conditions for national and regional knowledge sharing.	European Union, Fonds Français pour l’Environnement Mondial, French Ministry of Foreign and European Affairs Budget: € 3.645 million	Indian Ocean Commission	Capacity building: Policy formulation and integration	2008 – 2011	Climate information services; Government; Disaster risk management	<i>Regional:</i> Comoros, Madagascar, Mauritius, Réunion (France), Seychelles
<i>In Seychelles:</i> Further information required.								
3.	Enhancing the Disaster Risk Reduction Capacity in Agriculture and Rural Development ²²⁰	Preparation of 10 capacity building modules on pre- and post-disaster risk management and mainstreaming of disaster risk reduction in agriculture and rural development, with a focus on climate change adaptation.	Global Facility for Disaster Reduction and Recovery Budget: US\$50,000	Agriculture and Rural Development & Sustainable Agriculture Systems, Knowledge and Information	Capacity building	2008 – 2010 (closed)	Agriculture; Disaster risk management	<i>African:</i> Burkina Faso, Comoros, DRC, Eritrea, Ethiopia, Kenya, Madagascar, Niger, Rwanda, Senegal, Seychelles
<i>In Seychelles:</i> Further information required.								

²¹⁹ IOC, <http://www.coi-ioc.org/index.php?id=158> and ACCLIMATE, <http://www.acclimate-oi.net/en>

²²⁰ GFDRR, http://gfdrr.org/gfdrr/ca_projects/detail/1228

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
4. Climate Change Adaptation and Development Initiative (CC-DARE) ²²¹	The joint UNEP–UNDP program provides demand-driven, flexible and rapid financial and technical support to 15 sub-Saharan countries. The emphasis of CC-DARE support is on short-term (3–6 months) initiatives that contribute to addressing key gaps for national climate change adaptation. The support is made available to improve the ability of sub-Saharan African countries to remove barriers and create opportunities for integrating climate change adaptation into national development planning and decision-making frameworks. The three main types of activities undertaken through the program are country-level activities, regional training courses, and national and regional workshops to communicate project results and share experiences and lessons learned.	Danish Ministry of Foreign Affairs	UNEP and UNDP	Capacity building; Knowledge communication; Field implementation	2008 – 2011	Multi-sectoral	African: Benin, Ghana, Ethiopia, Malawi, Mozambique, Rwanda, Senegal, Seychelles, Tanzania, Togo, Uganda
							<i>In the Seychelles:</i> Consultative meetings were held in the Seychelles in May 2009 to scope out project options. One activity included a school rainwater harvesting project, whereby water tanks were installed in schools to harvest rainwater from school roofs for domestic uses (other than drinking). This project also incorporated an educational angle. ²²²
5. Global Climate Change Alliance ²²³	The Global Climate Change Alliance seeks to deepen the policy dialogue between the European Union and developing countries on climate change; and to increase support to target countries to implement priority adaptation and mitigation measures, and integration climate change into their development strategies. The program’s five priority areas for funding are: improving the knowledge base of developing countries to	European Commission, Czech Republic, Sweden, 10th European Development Fund <i>Budget:</i>	National Governments	Policy formation and implementation; Knowledge communication	2008 – ongoing	Disaster risk management; Government	17 developing countries and the Pacific Region, ²²⁴ including: Mauritius, Mozambique and Seychelles

²²¹ CC-DARE, <http://www.ccdare.org/>

²²² CC-DARE, <http://www.ccdare.org/Portals/131/outputs/Seychelles/final%20report%20cc%20dare.pdf>

²²³ GCCA, http://www.gcca.eu/pages/1_2-Home.html

²²⁴ These countries are: Bangladesh, Belize, Cambodia Ethiopia, Gambia, Guyana, Jamaica, Malawi, Maldives, Mali, Mauritius, Mozambique, Nepal, Pacific region, Rwanda, Senegal, Seychelles, Sierra Leone, Solomon Islands, Tanzania and Vanuatu.

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	the effects of climate change; promoting disaster risk reduction; mainstreaming climate change into poverty reduction development strategies; reducing emissions from deforestation and degradation; and enhancing participation in the Clean Development Mechanism.	€ 140 million					
		<p><i>In Seychelles:</i> The program is supporting the development of a National Climate Change Strategy for the country, coordinating with other donors. The project in this country will run from 2010-2013 and focus on sustainable development, energy and the clean development mechanism.²²⁵</p> <ul style="list-style-type: none"> • Budget: Euros 2.0 million • Duration: 2010 – 2013 					
6.	Mangroves for the Future (MFF) ²²⁶	<p>2007 – 2009: Australia, Germany, Norway, Sweden, UNDP, UNEP</p> <p>2010 to now: Norway and Sweden</p>	<p>National governments with CARE International, FAO, IUCN, UNDP, UNEP and Wetlands</p> <p>International with NGOs and CBOs</p>	<p>Research; Knowledge communication; Policy formation and implementation</p>	2006 – present	Coastal zone management	<p>Global; Asia region: India, Indonesia, Maldives, Pakistan, Seychelles, Sri Lanka, Thailand, Viet Nam</p>
		<p><i>In Seychelles:</i> This program supported a number of activities in the Seychelles, including integrated coastal zone management, as well as support for a Seychelles National Strategy and Plan of Action on coastal zone management.</p>					
7.	Preparedness for Climate Change ²²⁷	Red Cross/Red Crescent Climate Centre	National Red Cross/Red Crescent Societies	Capacity building; Policy formation and integration	<p>Phase 1: 2006 – 2009</p> <p>Phase 2: ongoing</p>	Disaster risk management	<p>Global: 39 countries</p> <p>South African participants in</p>

²²⁵ GCCA, http://www.gcca.eu/cgi-bin/datadirs.pl?&lg=2&id_datadir_family=1&extlink=8&sw=detail&id_datadir_sheet=15

²²⁶ MFF, <http://www.mangrovesforthefuture.org/> and <http://www.mangrovesforthefuture.org/Assets/documents/IUCN-MFF-Brochure-Web.pdf>

²²⁷ IFRC, <http://www.climatecentre.org/site/preparedness-for-climate-change-programme>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.						Phase 1: Madagascar, Malawi, Mauritius, Seychelles, Zimbabwe
		<i>In Seychelles:</i> The Seychelles Red Crescent Society undertook a number of capacity building activities, including awareness raising, education, communication, and planning activities. ²²⁸					
8.	Southern Africa Regional Climate Change Program ²²⁹	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	<i>African:</i> Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
		<i>In Seychelles:</i> Further information required.					
9.	Regional Initiative for Smallholder Agriculture Adaptation to Climate	IFAD	Indian Ocean Commission	Capacity building; Community	2010 – 2013	Agriculture	<i>Regional:</i> Comoros, Madagascar,
		Budget:					

²²⁸ Further information is available here: http://www.climatecentre.org/downloads/File/programs/FINAL_Seychelles.pdf

²²⁹ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Change in the Indian Ocean Islands ²³⁰	improve incomes and living conditions of family scaled farmers. It entails four main components: knowledge sharing, information and awareness, improvement of operational skills and support to small-scale farms.	US\$0.75 million		based adaptation; Knowledge communication			Mauritius, Seychelles, Reunion Island
<i>In Seychelles:</i> Further information required.							

D. Proposed Adaptation Action

Through the Seychelles National Climate Change Strategy, the country has identified a number of key objectives that will help the archipelago adapt to climate change, along with several policy options under each of these objectives. While the Strategy notes that the implementation of these actions will require assistance from international funders, the document provides a good indication of the planned adaptation projects and programs that Seychelles would like to undertake.

In addition, Seychelles is identified as have submitted the project “Adaptation of the Water Sector to Climate Change” to the Special Climate Change Fund for funding in the amount of US\$4.7 million. Co-financing for this project is estimated to be US\$8.0 million (GEF, 2010).

Table 3: Proposed Adaptation Projects and Programs in Seychelles’ National Climate Change Strategy

Objective	Examples of possible adaptation actions	Priority Sector(s)
1. To advance understanding of climate change, its impact, and appropriate responses.	Adaptation options mentioned in the Strategy include research and monitoring; the development of higher resolution models to understand the impacts of climate change on small islands; closing of research gaps in key sectors, including health, coastal areas, agriculture and marine fisheries; establishment of a national research council; and capacity building of existing institutions.	Multi-sectoral
2. To put in place measures to adapt, build resilience, and minimize vulnerability to the impacts of climate change.	Creation of inter-sectoral task force to coordinate effective implementation of actions, and identify key stakeholders and synergies. In addition, the Strategy mentions the following adaptation options: identify priorities for adaptation in critical sectors; assess and improve ongoing management activities and contribution to adaptation; and implementation of adaptation activities including adaptation at the community level, alternative coastal design, nationwide rainwater harvesting, evaluation of new	Multi-sectoral

²³⁰ COI, http://www.coi-ioc.org/fileadmin/multimedia_francais/activites/downloads/R%E9sum%E9%20projet%20Agro%E9cologie%20English%20version.pdf

Objective	Examples of possible adaptation actions	Priority Sector(s)
	plant varieties, etc.	
3. To mainstream climate change considerations into national policies, strategies, and plans.	Activities under this objective would address addressing institutional learning needs, including the identification and review of main institutions involved in responding to climate change and raising awareness of the likely impact of climate change; incorporating climate risk assessment and response into government; and the incorporation of climate risk assessment into the private sector, including the adoption of guidelines and codes.	Government
4. To build capacity and social empowerment at all levels to adequately respond to climate change.	Activities falling under this objective would address the following: developing climate change education and curriculum within the country; implementing climate change awareness at all levels, including within government and the private sector, and integrating climate change into all sectoral policies and strategies, etc.	Civil society

E. Assessment

The Government of Seychelles has made a concerted effort to identify and address the country’s adaptation challenges, and it is evident that there is a considerable level of engagement within the country on this subject area through the Second National Communication process, the National Climate Change Strategy, and the Environment Management Plan. By its own admission, however, there is still room to further mainstream climate change adaptation considerations into key institutional/sectoral goals and to improve inter-ministerial coordination.

As well, the various adaptation projects currently being implemented generally respond to priority adaptation needs as identified by the Government of Seychelles and key stakeholders. These priority adaptation activities include the need to expand climate research and monitoring capacities, improve climate modeling capacity, enhance coastal zone management, build public awareness, further mainstreaming adaptation and strengthen disaster risk management. For example, the “ACCLIMATE” program being implemented by the IOC responds to this priority need by facilitating regional cooperation and knowledge sharing around meteorology and policy formation; coastal zone management is being addressed through the “Mangroves for the Future” project; policy formation and implementation is being advanced through European Commission and Government of Denmark programs; and risk reduction has been addressed through the “Preparedness for Climate Change” project. Expanded activity in these areas may be appropriate in the future, particularly with respect to coastal zone management, as well as greater attention to issues related to marine management, agriculture and freshwater resources.



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10.0 South Africa

ACCCA	Advancing Capacity for Climate Change Adaptation program
ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
BMU	Federal Environment Ministry (Germany)
CCAA	Climate Change Adaptation in Africa program
CGIAR	Consultative Group on International Agricultural Research
DEA	South Africa Department of Environmental Affairs
DEAT	South Africa Department of Environmental Affairs and Tourism
DEFRA	Department of Environment, Food, and Rural Affairs (United Kingdom)
DFID	Department for International Development (United Kingdom)
FANPRAN	Food, Agriculture, and Natural Resources Policy Analysis Network
GDP	Gross Domestic Product
GEF	Global Environment Facility
GSA	Government of South Africa
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit / German Agency for Technical Cooperation
ICLEI	International Centre for Local Environmental Initiatives
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
NCAP	Netherlands Climate Assistance Program
NCCRP	National Climate Change Response Strategy
PIK	Potsdam Institute for Climate Impact Research
SIDA	Swedish International Development Agency
SCCF	Special Climate Change Fund
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
USAID	US Agency for International Development
USDS	United States Department of State

WRI World Resource Institution
ZALF Leibniz-Centre for Agricultural Landscape Research

Located at the tip of the continent of Africa, extending from the Atlantic Ocean in the west to the Indian Ocean in the east, South Africa is the dominant country of southern Africa in terms of its size, population and economy. South Africa is a middle-income developing country and boasts the continent's largest economy based on a strong manufacturing sector and many natural resources (DEAT, 2003; USDS, 2010). Around 7 per cent of South Africa's Gross Domestic Product (GDP) is generated by the agricultural and mining industries, 73 per cent by the services sector, and 20 per cent industry (USDS, 2010). Despite its economic strength, economic inequality persists; 25 per cent of the population is unemployed and 47 per cent live below the lower bound poverty line (Madzwamuse, 2010). Approximately 50 per cent of South Africa's nearly 50 million people reside in the country's urban areas (DEAT, 2003; USDS, 2010).

Geographically, the country is comprised of three main regions: a large central plateau covered mainly by grasslands; a continuous escarpment of mountain ranges that surround the plateau on the west, south and east; and a narrow strip of low-lying land along the coast (Benhin et al, 2006). The country is located within a drought belt and is the fifth most water scarce country in sub-Saharan Africa (USAID, 2008). Approximately 50 per cent of the country's water supplies are currently being used by the agriculture sector (Benhin, 2006; DEAT, 2004). Even without climate change, it is predicated that South Africa will use up much of its surface water resources (DEAT, 2009).

A. Adaptation Needs and Priorities

South Africa's climate varies from desert to semi-desert in the drier northwestern region to sub-humid and wet along the eastern coast; approximately 50 per cent of the country is arid or semi-arid (Benhin, 2006; DEAT, 2004). On average, the country receives only 464 millimeters of rain annually compared to the global average of 851 millimeters, and 65 per cent of the country receives less than 500 millimeters (DEAT, 2003). Rainfall in the country is highly variable spatially as well as within and between years, although the majority falls within the summer months of November to March; the southwest of the country receives a winter rainfall from June to August (Benhin, 2006). There is evidence that South Africa has grown warmer over the past several decades, with average annual temperatures increasing by 0.13°C per decade between 1960 and 2003 (Benhin, 2006).

The anticipated effects of climate change in the country include rising temperatures as well as changing intensity and seasonality of rainfall (DEAT, 2009). The country's Initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) presents the results of a number of downscaled climate models for the country, noting that within the next 50 years South

Africa may experience: a continental warming of between 1 and 3°C; reductions in annual average precipitation of between 5 and 10 per cent; increases in summer rains in the northeast and southwest, and an increase in winter rains in the northeast; and an prolongation of summer season characteristics (DEAT, 2003). The magnitude, timing and distribution of severe storms that produce floods may also increase (DEAT, 2009).

Given the country's current state of water scarcity, many studies note that the agriculture and water sectors are particularly vulnerable to climate change. Given that South Africa produces more than half of the southern African region's maize yields, climate change impacts within the country have broader regional implications (Benhin et al, 2006). Other studies have identified energy, mining, health, biodiversity, and rangelands as being vulnerable sectors (Madzwamuse, 2010). Collectively, there are estimates that climate change could cost South Africa 1.5 per cent of its GDP each year by 2050 (DEAT, 2009).

Both South Africa's National Climate Change Response Strategy (NCCRS) as well as the country's National Communication list possible climate change impacts and adaptation options by the following socioeconomic sectors (DEAT, 2003; DEAT, 2004):

- *Human health:* Impacts on human health include a possible spread of water-borne diseases as well as an increase in the occurrence of strokes, dehydration and bilharzia. Adaptation options include the integration of climate change into prevention and monitoring programs for disease prevention, the extension of treatment facilities, and the improvement of monitoring and forecasting systems to warn of disease outbreaks.
- *Freshwater resources:* South Africa's National Communication notes that climate change may already be impacting water availability in the country, including changes in the season distribution and intensity of precipitation. Increased temperatures are expected to lead to higher rates of evapotranspiration, and desertification may intensify. Adaptation options identified through the NCCRS include improvement of water resources management, including water demand management and conservation measures, and contingency planning for extreme events such as droughts and floods. Additional measures include drought relief measures, improved water infrastructure, and public awareness measures.
- *Rangelands:* Rangelands currently occupy over 70 per cent of South Africa's territory and climate models indicate that acidification of rangelands will take place over the medium- to long-term, with implications for pastoralists (DEAT, 2003). Adaptation options include enhanced monitoring and forecasting systems to predict fire hazard and droughts, breed switching, and preventative measures to guard against livestock disease outbreaks.
- *Agriculture:* Certain climate models foresee that South Africa's maize production will decrease by 10 to 20 per cent by 2050, whereas food production in the country would need to increase by 3 per cent annually in order to meet projected demand (DEAT, 2003).

Adaptation options in the agricultural sector include: changes in agricultural management practices such as planting dates and row spacing; water conservation measures; and diversification of crops planted.

South Africa's NCCRS also identifies a number of overarching adaptation actions that should be given high priority for the country. These include accelerating the process of education, training and awareness raising around climate change and its impacts; the extension of health protection and promotion measures; accelerated water resources management and contingency planning; adaptation agricultural, rangeland, and forestry practices; developing a protection plan for priority plant, animal, and marine biodiversity; and setting a timeframe for action with specific milestones and responsibilities (DEAT, 2004).

B. National Level Policies and Strategic Documents

South Africa has developed a number of policies and reports that address the country's adaptation priorities. These reports include an Initial National Communication under the UNFCCC, the National Climate Change Response Strategy, and a National Strategy for Sustainable Development. Regional and city governments within the country have also prepared climate change adaptation reports and policy documents, including the city of Cape Town.

In addition, the South African government, through its Department of Environmental Affairs (DEA), is in the process of developing a National Climate Change Response Policy (NCCRP), which will serve as the country's comprehensive adaptation strategy. It is expected to build on the National Climate Change Response Strategy of 2004. Consultations with a few environmental experts and civil society organizations took place in March 2009, and the official strategy was expected to be released towards the end of 2010 (WRI 2010).

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
National Reports and Policies					
1.	Initial National Communication under the UNFCCC ²³¹	Department of Environmental Affairs and Tourism	Submitted in 2003	Multi-sectoral	South Africa's national communication provides an overview of the country's national circumstances, presents its emissions profile, provides a vulnerability assessment of key sectors, and outlines adaptation options.
2.	Climate Change Response Strategy	Department of Environmental Affairs and Tourism is the lead	Released in 2004	Multi-sectoral	The objective of this strategy is to support the policies and principles laid out in the Government White Paper on Integrated

²³¹ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=3996#beg

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
		department, although cross-sectoral nature of challenge noted.			Pollution and Waste Management. It lays out a number of strategies objectives, principles and proposals to deal with climate change in South Africa, including measures for adaptation as well as education, research, and international concerns. This document notes that the health sector, maize production, plant and animal biodiversity, water resources and rangelands are areas of highest vulnerability to climate change and those which should be targeted for adaptation measures, with the mining and energy sectors also particularly vulnerable.
3.	South Africa's National Strategy for Sustainable Development ²³²	Department of Environmental Affairs and Tourism	Published in 2005	Multi-sectoral	Mentions the importance of addressing the impacts of climate change.
Local/Regional Reports and Policies					
4.	Framework for Adaptation to Climate Change in the City of Cape Town ²³³	City of Cape Town Environmental Planning Department (prepared by University of Cape Town researchers)	Released in August 2006	Multi-sectoral	This document presents an overarching framework for a city-wide consolidated and coordinated approach to reducing vulnerability to climate impacts. The ultimate goal is to develop a City Adaptation Plan of Action for the City of Cape Town. The study outlines some of the anticipated effects of climate change on the city as well as potential adaptation measures in key sectors.
5.	eThekweni Municipality Integrated Development Plan ²³⁴ (city of Durban)	City of Durban	Implemented 2006; effective 2006-2011	Multi-sectoral	This overall development/strategy document identifies the impacts of climate change on the municipality, and calls for the establishment of a municipal pollution reduction and climate protection program.
6.	Climate Change Strategy and Action Plan for the Western Cape ²³⁵	Department of Environmental Affairs and Development Planning, Western Cape	Released in 2007	Multi-sectoral	Sets out a longer term strategy to improve understandings of the impacts of climate change, as well as planning and adaptation measures. Includes both mitigation and adaptation.

²³² GOSA, <http://www.environment.gov.za/HotIssues/2008/nfsd/nfsd.html>

²³³ GOSA, [http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Framework for Adaptation to Climate Change %28FAC4T%29_08_2006_38200713832_465.pdf](http://www.capetown.gov.za/en/EnvironmentalResourceManagement/publications/Documents/Framework%20for%20Adaptation%20to%20Climate%20Change%20-%2008%202006%2038200713832%20465.pdf)

²³⁴ GOSA, <http://www.durban.gov.za/durban/government/policy/idp/idp/idp2011/idp1>

²³⁵ GOSA, http://www.capegateway.gov.za/Text/2007/10/climate_change_strategy_final_draft_june2007.pdf

C. Current Adaptation Action

A moderate number of adaptation projects financed by international donors are currently being implemented in South Africa. Additional projects, such as those financed by the government of South Africa, as well as those in which adaptation considerations have been integrated into the design of projects in various sectors, have not been captured by this review. Of the discrete adaptation projects identified as being underway in the country, most are also being implemented in other (mostly African) developing countries; less than half of the identified projects are occurring solely within South Africa. These country-specific projects are addressing issues in a variety of sectors, including agriculture, freshwater resources, urban areas, human health, tourism, climate information services, and disaster risk management. They include the project “Reducing Disaster from Wildfire Hazards Associated with Climate Change” financed by the Special Climate Change Fund (SCCF).

South Africa is participating in a shared adaptation projects that focus on a narrower range of sectors, namely: urban issues, agriculture, freshwater resources and building governance capacity. This includes involvement in the projects “Community Based Adaptation to Climate Change in Africa,” “Five-City Network to Pioneer Climate Change Adaptation in sub-Saharan Africa,” and the “Southern Africa Regional Climate Change Program.” The types of activities being undertaken in these multi-country projects, as well as those only underway in South Africa, generally are research, capacity building, knowledge communication and supporting policy formation and integration. Only a small number of projects contain components that support implementation of “on-the-ground” adaptation measures.

Although South Africa is receiving funding from a number of different sources, several of its projects are financed through the Climate Change Adaptation in Africa (CCAA) program of the United Kingdom Department for International Development and the International Development Research Centre (IDRC), and by the government of Germany.

Table 2: Current Adaptation Projects and Programs active in South Africa

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1. Building the Capacity of Urban Project Teams in Participatory Action in Research ²³⁶	Climate change threatens to increase the stress on communities that are ill-prepared to face the impacts of this phenomenon, including in urban areas. This project will	DFID and IDRC through the CCAA program	IDRC	Capacity building; Knowledge communicatio	2008 – 2010	Urban areas	Urban areas

²³⁶ IDRC, http://web.idrc.ca/en/ev-113692-201_106241-1-IDRC_ADM_INFO.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	strengthen the knowledge and skills of urban project teams in participatory action research, as well as ways of adapting them to the urban context.			n; Research			
2.	Adaptation by Small Scale Rooibos Tea Farmers in Wypperthal and Suid Bokkeveld areas of Western and Northern Cape ²³⁷	SouthSouthNorth Budget: US\$50,000	UNEP	Assessment; Capacity building	2008 – ?	Agriculture	Western and Northern Cape
3.	Managing Climate Risk to Agriculture and Water Resources in South Africa ²³⁸	DFID and IDRC through the CCAA program Budget: CND 1,086,900	DFID	Research; Knowledge communication	2009 – 2011	Agriculture; Freshwater supply; Climate information services	South Africa
4.	Climate Change Support Program ²³⁹	BMU	DEA	Assessment	2009-2012	Tourism; Human health	South Africa

²³⁷ Adaptation Atlas, <http://www.adaptationatlas.org/activityDetail.cfm?id=2564>

²³⁸ ALM, <http://www.adaptationlearning.net/project/managing-climate-risk-agriculture-and-water-resources-south-africa> and IDRC, http://web.idrc.ca/en/ev-113692-201_104150-1-IDRC_ADM_INFO.html

²³⁹ GIZ, <http://www.gtz.de/en/weltweit/afrika/suedafrika/32091.htm>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
5. Reducing Disaster from Wildfire Hazards Associated with Climate Change ²⁴⁰	To develop and implement integrated disaster risk management strategies to address climate change -induced fire hazards and risks. Expected outputs: (1) early warning and hazard risk information system put in place to deal with the additional fire hazard risks associated with climate change; (2) paradigm shift from reactive firefighting to integrated fire management system to cope with climate change-induced fire hazards and capacity built at local level; (3) innovative risk reduction interventions implemented; and (4) good practices on adaptive management of fire risks disseminated at national and regional levels.	Special Climate Change Fund Budget: US\$35,336,400	UNDP	Policy formation and integration; Capacity building	2011 – 2014	Disaster risk management; Fire management	Western Cape, Eastern Cape, and Freetown province
Participation in Regional and Global Actions							
6. Food and Water Security under Global Change: Developing adaptive capacity with a focus on rural Africa ²⁴¹	This project aims to understand the impacts of global change on agriculture and water resources at the global, national, and river basin levels; to assess the effects of global change on water and food security in vulnerable rural areas of Africa, particularly rural Ethiopia and South Africa; and to identify adaptation measures that reduce the impacts of global change on these communities.	German Government through the Advisory Service on Agricultural Research for Development	International Food Policy Research Institute	Assessment	2007 – 2009 (closed)	Agriculture; Freshwater supply	African: Ethiopia, South Africa
		<i>In South Africa: To be determined</i>					
7. Advancing Capacity for Climate Change Adaptation (ACCCA) ²⁴²	The rationale for this project is that countries lack scientific knowledge and understanding of climate risks, and that this is an	IDRC; DEFRA; Swiss Federal Office for the	UNITAR	Assessment; Capacity building;	2007 – 2010	Multi-sectoral	Global: 17 countries in Asia and

²⁴⁰ ALM, <http://www.adaptationlearning.net/project/reducing-disaster-risks-wildfire-hazards-associated-climate-change>

²⁴¹ IFPRI, <http://www.ifpri.org/book-1043/ourwork/program/food-and-water-security-under-global-change> and <http://ongoing-research.cgiar.org/factsheets/food-and-water-security-under-global-change-developing-adaptive-capacity-with-a-focus-on-rural-africa/>

²⁴² ACCCA, <http://www.acccaproject.org/accca/>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
	impediment to addressing climate variability. Activities include the following: identify and prioritize climate risks; assess available knowledge about risks and adaptation opportunities; develop, test, and disseminate risk communication materials that are designed to assist adaptation decisions; and identify critical knowledge gaps that impede effective adaptation decisions.	Environment; NCAP; European Commission		Policy formation and integration			Africa ²⁴³ including Malawi and South Africa	
		<p><i>In South Africa: “Climate Change Adaptation Options in Informal Communities in Durban, South Africa.”²⁴⁴ A vulnerability assessment is being conducted of the Amaoti community which will recommend appropriate adaptation strategies aimed at reducing the community’s vulnerability to climate change</i></p> <ul style="list-style-type: none"> • <i>Implementing agency: Golder Associates Africa; UNITAR</i> • <i>Duration: 2008 – 2010</i> 						
8.	Community Based Adaptation to Climate Change in Africa ²⁴⁵	DFID and IDRC through the CCAA program Budget: CND 1,398,500	African Centre for Technology Studies	Capacity building; Field implementation; Community based adaptation; Research	2008 – 2011	Multi-sectoral	African: Kenya, Malawi, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe	
		South Africa: Further information required.						
9.	Strategies for Adapting to Climate Change in Rural Sub-	“Promote adaptation among vulnerable populations through developing	BMZ	IFPRI (lead); ASARECA;	Capacity building;	2008 – 2011	Rural areas; Agriculture;	African: Angola,

²⁴³ African countries include: Burkina Faso, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mali, Niger, Nigeria, Tanzania, Tunisia and South Africa. Asian countries include: Bangladesh, India, Mongolia, Nepal and the Philippines.

²⁴⁴ ACCCA, http://www.acccaproject.org/accca/files/ACCCA_Brochure_19pilotactions.pdf

²⁴⁵ ACTS, http://www.acts.or.ke/index.php?option=com_content&view=article&id=60&Itemid=53 and IDRC, http://www.idrc.ca/cp/ev-83067-201_104898-1-IDRC_ADM_INFO.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Saharan Africa: Targeting the most vulnerable ²⁴⁶	comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups, and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.”	Budget: US\$91,241	FANRPAN; PIK; ZALF	Community based adaptation; Policy formation and integration		Government	Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
<i>In South Africa: Further information required.</i>							
10. Five-City Network to Pioneer Climate Change Adaptation in sub-Saharan Africa ²⁴⁷	Local governments and coastal cities in southern Africa face a serious threat associated with climate change. This project aims to design a framework for managing increased risk from climate change, and is anticipated to lay the groundwork for a local climate change adaptation strategy and action plan in the five urban areas in the participating countries: Cape Town (South Africa); Dar es Salaam (Tanzania); Maputo (Mozambique); Windhoek (Namibia); and Port Louis (Mauritius).	DFID and IDRC through the CCAA program	International Council for Local Environmental Initiatives	Capacity building; Policy formation and integration)	2009 – 2012	Urban area	<i>Regional:</i> Mauritius, Mozambique, Namibia, South Africa and Tanzania
<i>In South Africa: Further information required.</i>							
11. Regional Science Service Centre for Adaptation to Climate Change and Sustainable Land	The objective is to develop a program that will conduct problem-oriented research in the area of adaptation to climate change and sustainable land management and provide	Germany Federal Ministry of Education		Research; Capacity building; Knowledge	2009 – 2012	Ecosystem conservation	<i>Regional:</i> Angola, Botswana, Namibia,

²⁴⁶ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

²⁴⁷ IDRC, http://www.idrc.ca/EN/Regions/Eastern_and_Southern_Africa/Pages/ProjectDetails.aspx?ProjectNumber=105868

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Management in Southern Africa ²⁴⁸	evidence-based advice for all decision-makers and stakeholders. Research will be geared towards filling current regional or local gaps in integrated knowledge. The research will aim to: integrate research on land- and resource management; link science and theory to practice and decision-making; compile, analyze and disseminate best practices.	and Research		communication			South Africa, Zambia
<i>In South Africa: Further information required.</i>							
12. Strengthening the Role of Civil Society in Water Governance in African Cities: Durban, Maputo, Nairobi ²⁴⁹	This project aims to increase the capacity of civil society to influence water sector governance in the context of climate change adaptation. Researchers will identify stakeholders' vulnerability to and perception of climate change and examine how civil society institutions adjust programs to cope with climate change.	DFID and IDRC through the CCAA program	York University (Canada)	Research; Capacity building	2010 – 2013	Freshwater supply; Civil society; Urban areas	African: Kenya, Mozambique, South Africa
<i>In South Africa: Further information required.</i>							
13. Southern Africa Regional Climate Change Program ²⁵⁰	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region's voice in international platforms, and enhance its ability to access necessary finance for climate change adaptation.	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	African: Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa,

²⁴⁸ SASSCAL, <http://www.sasscal.org/>

²⁴⁹ IDRC,

http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Climate_Change_and_Adaptation_in_Africa/Pages/ProjectDetails.aspx?ProjectNumber=106002

²⁵⁰ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
							Swaziland, Tanzania, Zambia, Zimbabwe
<i>In South Africa: Further information required.</i>							

D. Proposed Adaptation Action

South Africa, along with nine other African countries, is proposed to be involved in the project “Microeconomic Costing of Discrete Adaptation Options in the Agriculture Sector: A Sub-National Level Analysis of the Welfare Gains of Dynamic Adaptation.” Funding for this project has been requested from the SCCF. A second project, “Community Adaptation to Climate Change in the Limpopo Basin,” has also been submitted to the SCCF. Countries expected to participate in this project are Botswana, Mozambique, South Africa and Zimbabwe. Otherwise, it appears that South Africa has not proposed a suite of adaptation actions for the country. However, this information may be forthcoming in the National Climate Change Response Policy.

Table 3: Proposed Adaptation Projects and Programs in South Africa

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
1. Microeconomic Costing of Discrete Adaptation Options in the Agriculture Sector: A Sub-National Level Analysis of the Welfare Gains of Dynamic Adaptation ²⁵¹		Research	Agriculture	Burkina Faso, Cameroon, Egypt, Ethiopia, Ghana, Kenya, Niger, Senegal, South Africa, Zambia
Notes: Proposal submitted for funding to the SCCF. Budget: Proposed to from the SCCF: US\$2.0 million; proposed co-financing: to be determined.				
2. Community Adaptation to Climate Change in the Limpopo Basin ²⁵²				Botswana, Mozambique, South Africa and Zimbabwe
Notes: Project submitted for funding from the SCCF. Budget: Proposed funding from the SCCF: US\$4.45 million; proposed co-financing: US\$12.0 million.				

²⁵¹ GEF, http://www.thegef.org/gef/sites/thegef.org/files/publication/adaptation-actions_0.pdf

²⁵² GEF, http://www.thegef.org/gef/sites/thegef.org/files/publication/adaptation-actions_0.pdf

E. Assessment

South Africa identified several adaptation options in its National Communication to the UNFCCC, but did not prioritize these actions according to level of urgency/importance. It is therefore difficult to assess South Africa's progress in acting on priority adaptation actions. Nonetheless, South Africa has made progress in addressing some of its various adaptation needs at the policy level and through implementation of a number of adaptation projects and programs. In addition, there is evidence that South Africa is undertaking comprehensive consultation and outreach leading to the establishment of a national climate change adaptation strategy, and various municipalities and regions are also integrating climate change adaptation into their policy frameworks.

Ongoing projects in South Africa target a number of the areas identified as priority adaptation actions, including the freshwater and agriculture sectors identified as being particularly vulnerable to climate change. However much of this work is currently focused on research, policy formation and capacity building. Although these are important endeavors, it is possible that particularly vulnerable communities and sectors have not yet realized the benefits of on-the-ground activities through community based adaptation measures.

In addition, certain key gaps remain based on the range of adaptation options identified in the National Communication:

- *Freshwater resources:* Greater emphasis could be made on drought relief measures, improved water infrastructure, communications around water efficiency, planning across river basins, and development of short term contingency plans.
- *Rangelands:* Progress has been made in monitoring/forecasting fire hazard and drought, but gaps remain in investigating breeds with higher heat tolerance, guarding against disease outbreaks and disaster management.
- *Agriculture:* Various projects address vulnerability in the agriculture sector but few seem to be building capacity to adapt farming practices through techniques such as row spacing, planting density and seed banks. (It is possible, however, that these actions are being undertaken as part of other development focused initiatives).

Other sectors in which greater adaptation programming may be appropriate include human health, understanding the different implications of climate change for men and women, tourism, coastal zone management and disaster risk management.

The World Resources Institute also notes in a recent report that although South Africa has a strong policy framework compared to many other African countries, adaptation planning in South Africa has been hindered by insufficient coordination and social capacities (WRI 2010). In particular, integrating climate projections into development policy in South Africa could be improved in provincial and local level authorities. There is also a need to ensure that agrarian provinces, such as the Northern Cape and Limpopo, understand and incorporate climate protections in policy formation and economic development efforts. Enhanced public information campaigns would also address



the gap of communicating the effects of climate change to civil society; current efforts lack a strategy to share information with key stakeholders (WRI, 2010).

References:

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Department of Environmental Affairs and Tourism [DEAT] (2004). *National Climate Change Response Strategy for South Africa*. Accessed April 2011 from: http://unfccc.int/files/meetings/seminar/application/pdf/sem_sup3_south_africa.pdf

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United States Department of State [USDS] (2010). Background Note: South Africa. Accessed April 2011 from: <http://www.state.gov/r/pa/ei/bgn/2898.htm>

World Resources Institute (2010). Moving Forward on Climate Adaptation in South Africa. Accessed April 2011 from: <http://www.wri.org/stories/2009/09/moving-forward-climate-adaptation-south-africa>

11.0 Swaziland

GEF	Global Environment Facility
DFID	Department for International Development (United Kingdom)
MPWT	Ministry of Public Works and Transport
MTEC	Ministry of Tourism, Environment, and Communications
SIDA	Swedish International Development Agency
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USDS	United States Department of State

The Kingdom is Swaziland, covering an area of around 17,000 square kilometers, is surrounded by the country of South Africa. The country has a population of approximately 1.2 million people, with a temperate to tropical climate (USDS, 2010). Although Swaziland is considered a lower middle income country, approximately 70 per cent of its population lives in poverty (USDS, 2010).

A. Adaptation Needs and Priorities

Swaziland's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), submitted in May 2002, focuses on the potential impact of climate change on three key priority sectors: forestry, water resources and agriculture. The document notes that the main climatic changes impacting these sectors will be increased temperatures and changing rainfall patterns (MPWT, 2002). It is anticipated that Swaziland could experience a reduction in stream flows under all available climate scenarios. As such, given that 96 per cent of water use in the country is for irrigation, efficient use of irrigation water is identified as a key adaptation priority. Climate models also suggest that total crop yields could decline for a range of crop varieties.

As a result of these anticipated climatic changes, the National Communication discusses the following adaptation options by priority sector (MPWT, 2002):

- *Forestry sector:* Adaptation options discussed include minimizing threats to forestry outside of climate change, including expansion of settlements, fires, communal grazing and ranching. Key adaptation needs were also discussed, including better policy guidance to

preserve forests in light of climate change and other perceived threats, as well as further research to better understand existing forest resources and vulnerabilities.

- *Hydrology and water resources*: The National Communication identifies a need for better water resources planning, development, operation and management through the development of policies and strategies to conserve water. Specific adaptation measures include:
 - Modification of existing infrastructure;
 - Conservation and improved efficiency (e.g., low-flow toilets);
 - Technological change in household, agricultural, industrial and energy water use systems;
 - Improved land use management to ensure runoff not compromised; and
 - Promoting regional partnerships for better water management.
- *Agricultural sector*: Adaptation strategies discussed for this priority sector are:
 - Change in the country's growing season, as late planting is projected to lead to a decline in yield (especially for maize);
 - Crop switching to more pest and heat resistant crop varieties;
 - Strategies to ensure greater food security, including food aid, as well as to mitigate the effects of a decline in employment in the agricultural sector; and
 - Economic diversification given the dependence of the Swaziland economy on agriculture.

B. National Level Policies and Strategic Documents

Swaziland's national policies and reports that touch upon adaptation to climate change include the National Communication to the UNFCCC and the country's *Disaster Management Bill*, *National Disaster Management Plan* and *Environment Action Plan*. Swaziland's Environmental Action Plan of 2001 notes the importance of undertaking vulnerability assessments around climate change, the preparation of adaptation options, and the creation of a national plan for adaptation (MTEC 2001). There was no available evidence that these activities have been undertaken.

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Disaster Management Bill and National Disaster Management Plan	National Disaster Task Force	Released in 2000	Multi-sectoral	This is a multi-sectoral plan that acknowledges risks arising from climate change, water resource management practices, agriculture/land use planning, health and education. It is implemented by the National Disaster Task Force.
2.	Swaziland Environment Action Plan ²⁵³	Swaziland Environment Authority (now the responsibility of the Ministry of Tourism, Environment and Communications)	Created in 2001	Multi-sectoral	The Swaziland Environment Action Plan provides a framework for the management of the environment in a sound a sustainable manner. It consists of both an action plan and a Policy and Strategy Framework. The preparation of national plans for mitigation and adaptation are noted as priorities for the country, as well as vulnerability assessments the identification of adaptation options.
3.	First National Communication to the UNFCCC ²⁵⁴	Ministry of Public Works and Transit	Submitted in May 2002	Multi-sectoral	The National Communication discusses Swaziland's national circumstances, emissions inventory, vulnerability to climate change, adaptation options, and policy framework.

C. Current Adaptation Action

A very low number of adaptation projects appear to be ongoing in Swaziland. These projects involve capacity building, awareness raising, research, and policy formation and integration in the areas of freshwater resources, crop agriculture, disaster risk reduction and governance capacity. The international organizations financing this work are the Special Climate Change Fund (SCCF), the Swedish International Development Agency (SIDA), United Kingdom Department for International Development (DFID) and the United Nations Development Programme (UNDP).

Table 2: Current Adaptation Projects and Programs active in Swaziland

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1.	Strengthening National and Local Resilience to Disaster	This project attempts to improve livelihood and food security by enhancing the capacity	UNDP	Government of Swaziland,	Capacity building;	2008 – 2010	Disaster risk management

²⁵³ Swaziland Environment Authority, www.environment.gov.sz/files/seap.pdf

²⁵⁴ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=3427#beg

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
Risks in Swaziland ²⁵⁵	of Swaziland to respond to a number of disaster risks, including those generated by climate change and also extending to the effects of HIV/AIDS, economic shocks, and erosion of household assets. The project aims to create a planning and implementation strategy that reduces vulnerabilities and manages risks, and to strengthen national and local resilience to disaster risks.		UNDP	Policy formation and integration			
2. Adapting National and Transboundary Water Resource Management in Swaziland to Manage Expected Climate Change ²⁵⁶	The objectives of the project are: <ul style="list-style-type: none"> • Promoting informed and inclusive national dialogue around water needs vulnerability to climate change and water allocation in Swaziland; • Integrating climate risk management into the implementation of national policies and relevant to integrated water resource management; and • Informed negotiations on trans-boundary water resources management. 	SCCF; UNDP; Government of Swaziland Budget: US\$7.77 million	UNDP, Swaziland Department of Water Affairs (Ministry of Natural Resources and Energy)	Capacity building; Policy formation and integration; Knowledge communication	2011 – 2014	Freshwater supply	
Participation in Regional and Global Actions							
3. Southern Africa Regional Climate Change Program ²⁵⁷	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for transboundary responses to climate change, strengthen the region's voice in international	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	African: Angola, Botswana, DRC, Lesotho, Madagascar, Malawi,

²⁵⁵ ISN, <http://www.isn.ethz.ch/isn/Current-Affairs/ISN-Insights/ObjectDetail/?ots736=69f57a17-24d2-527c-4f3b-b63b07201ca1&lng=en&ots627=fce62fe0-528d-4884-9cdf-283c282cf0b2&id=115011>

²⁵⁶ ALM, <http://www.adaptationlearning.net/program/adapting-national-and-transboundary-water-resource-management-swaziland-manage-expected-clim>

²⁵⁷ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	platforms, and enhance its ability to access necessary finance for climate change adaptation.						Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
<i>In Swaziland: Further information required.</i>							

D. Proposed Adaptation Action

In the National Communication, Swaziland identified various adaptation priorities in the freshwater, forestry and agriculture sectors. It is not clear which projects the government proposes to undertake and/or which measures require funding.

E. Assessment

Swaziland engagement on the issue of climate change adaptation appears to be limited. Little progress appears to have been made with respect to the development of a policy framework for adaptation, and few adaptation projects are underway. These projects do, however, address some key adaptation priorities discussed in the country's National Communication. These include country-specific projects, one in the water sector the appears to focus on land use management, water use conservation, and regional partnerships for better water management; and another that aims to mitigate the effects of future climate change related natural disasters. However, there is no evidence of adaptation programming within the forestry sector, which was also identified as a key priority area for adaptation. In addition, there is no national level strategy on adaptation despite it having been mentioned as a key priority in the government's Environmental Action Plan.

Future adaptation programming in Swaziland may focus on addressing these gaps in the area of forestry and governance. It could also address additional needs in the freshwater sector, including modification of existing infrastructure and technological change. Gender considerations, which are not the focus of any current adaptation project or proposed strategy, and could be addressed as appropriate. As well, there appears to be very little downscaled climate change information for the area of Swaziland, and available studies predicting the



future impacts of climate change in the country are now outdated. An up-to-date assessment of future impacts and key vulnerabilities is needed to better identify and address key gaps in adaptation action.

References:

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Ministry of Tourism, Environment, and Communications [MTEC] (2001). Swaziland Environment Action Plan. Accessed in April 2011 from: <http://www.environment.gov.sz/files/seap.pdf>

United States Department of State [USDS] (2010). Background Note: Swaziland. Accessed in April 2011 from: <http://www.state.gov/r/pa/ei/bgn/2841.htm>

12.0 Zambia

ASARECA	Association for Strengthening Agriculture Research in Eastern and Central Africa
BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
CCAA	Climate Change Adaptation in Africa program
CEEPA	Centre for Environmental Economics and Policy in Africa
CGIAR	Consultative Group on International Agriculture Research
DFID	Department for International Development (United Kingdom)
GEF	Global Environment Facility
GWP	Global Water Partnership
FANPRAN	Food, Agriculture, and Natural Resources Policy Analysis Network
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
IFRC	International Federation of Red Cross and Red Crescent Societies
LDCF	Least Developed Country Fund
NAPA	National Adaptation Programme of Action
MTENR	Ministry of Tourism, Environment and Natural Resources
PPCR	Pilot Program on Climate Resilience
PIK	Potsdam Institute for Climate Impact Research
SIDA	Swedish International Development Cooperation Agency
SEI	Stockholm Environment Institute
SCCF	Special Climate Change Fund
UNDP	United Nations Development Programme
UNITAR	United Nations Institute for Training and Research
ZALF	Leibniz-Centre for Agricultural Landscape Research

Zambia is a landlocked country in southern Africa that shares its borders with a number of countries: Angola, Botswana, the Democratic Republic of Congo, Malawi, Mozambique, Namibia, Tanzania and Zimbabwe. Of the country's 9.8 million inhabitants, nearly 40 per cent live in urban areas, making it one of the most urbanized in sub-Saharan Africa (MTENR, 2007; MTENR, 2002). Zambia holds 40 per cent of southern Africa's water resources (CEEPA, 2006; MTENR, 2007; MTENR, 2002). This includes the marshy wetlands of northern Zambia that are the source for the Zambezi River, the fourth largest river in Africa, the river basin of which extends into six sub-Saharan African countries (IFRC, 2009).

Around 12 per cent of Zambia's land is arable, with major crops including maize, sorghum, millet, rice, wheat, cassava and groundnuts (CEEPA, 2006). Approximately 67 per cent of Zambia's population depends on rain-fed agriculture for their livelihoods, and growth in this sector is stagnant (CEEPA, 2006; MTENR, 2007; MTENR, 2002). Environmental issues being faced by the country include air pollution in mining towns, water pollution, substandard sanitation, wildlife depletion, land degradation and biodiversity loss (MTENR, 2007).

A. Adaptation Needs and Priorities

Zambia's climate is sub-tropic and comprised of three distinct seasons: a hot and dry season between mid-August and November, a cool dry season from May to mid-August, and a rainy season from November to April (MTENR, 2007). Rainfall in the country is impacted by the Inter-Tropical Convergence zone, and therefore varies considerably from year to year (McSweeney et al, 2009). Rainfall patterns also vary across the country, leading to the formation of three agro-ecological regions (MTENR, 2007). Region I is a low rainfall area in the country's southern and western provinces that is at high risk of droughts. Region II experiences medium rainfall and 87 per cent of the land in this region is arable. Region III experiences the highest annual rainfall in the country, and only 50 per cent of the land is cultivatable due to highly leached soil (MTENR, 2007).

The country's National Adaptation Programme of Action (NAPA) notes that drought conditions in Zambia have been on the rise over the past few decades, with the drought of 1991/92 being the most severe. In addition, the country has experienced an increased frequency of floods, and farmers in its eastern and southern provinces have noted a general shortening of the growing season (CEEPA, 2006; MTENR, 2007). Recent analysis indicates that the average rate of hot days per year increased by 43 per cent between 1960 and 2003, while the number of cold days declined by 22 per cent (McSweeney et al, 2009).

As the process of global climate change proceeds, Zambia is anticipated to experience an increase in temperature within the range of 1.2 to 3.4°C by the 2060s, and 1.6 to 5.5°C by the 2090s, with all projections pointing to a substantial increase in the number of hot days and

nights (McSweeney et al, 2009). Zambia's NAPA uses a Global Circulation Model to anticipate the potential impacts of climate change on the country. With respect to precipitation, it is projected that the country will experience differentiated impacts by region. While Region I will only experience a marginal increase in rainfall, Regions II and III can anticipate heavier annual precipitation under future climate conditions (MTENR, 2007). Depending on the impacts of climate change in these different zones, certain crop yields may increase while others could decrease. Historically, increased precipitation has been associated with increased farm revenues (CEEPA, 2006; MTENR, 2002).

Zambia's NAPA lists the anticipated impacts of climate change by sector (MTENR, 2007):

- *Agriculture and food security*: The most groups suggested as being most vulnerable to the impacts of climate change are those that depend upon rain-fed agriculture for their livelihoods. The main threats to this sector include excessive precipitation, erosion, increased frequency of droughts, shortening of the growing season, and flash floods.
- *Human health*: Increased incidence of droughts and crop failures may cause malnutrition, and increased prevalence of cholera and malaria may also occur.
- *Natural resources, wildlife, and forestry*: Droughts are anticipated to negatively affect wildlife habitat and the ability of forest resources to generate, and the potential for greater scarcity of water could undermine wildlife health.
- *Water and energy*: Groundwater resources are anticipated to be negatively impacted by drought, and drying of rivers could occur.

Given these anticipated impacts, the NAPA lists a number of high priority adaptation actions for the country, as listed in Table 3. The list prioritizes actions such as the strengthening of early warning systems, economic diversification, adaptation to drought, the management of critical habitats, promotion of forest regeneration, and adaptive land use practices (MTENR, 2007). Specifically within the agriculture sector, priority adaptation needs for the country include: addressing vulnerability in the agriculture sector through the development of new crop varieties that mature faster and are heat resistant; diversified crops that withstand drought and higher temperatures, and land use rotation between crop and livestock to improve soil quality (CEEPA, 2006). There is also a need to improve human health by reducing vulnerability of drought and floods (MTENR, 2007). Zambia's NAPA also discusses some of the barriers that may prohibit the implementation of adaptation actions, including lack of financial resources, lack of clear policy frameworks, inadequate capacity at various levels, underdeveloped public awareness of the issue, and lack of private sector involvement.

B. National Level Policies and Strategic Documents

The government of Zambia has established a Climate Change Facilitation Unit within the Ministry of Tourism, Environment and Natural Resources that is in the process of developing a National Climate Change Response Strategy in collaboration with the United Nations Development Programme (UNDP) (METNR and UNDP, 2010). A wide range of stakeholders in Zambia are being involved in the development of this policy. The strategy is anticipated to build on and reinforce the priority adaptation actions identified through the country's NAPA, and to include a national institutional and implementation framework covering mainstreaming, mitigation, adaptation, research, capacity building and awareness raising, including priority actions for various sectors of the economy (METNR and UNDP, 2010).

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action	Government Division Responsible	Status	Sector(s) of Focus	Summary description
1. Initial National Communication under the UNFCCC ²⁵⁸	Ministry of Tourism, Environment and Natural Resources	Submitted in 2002	Multi-sectoral	This document provides an overview of Zambia's national circumstances including its greenhouse gas emissions profile, vulnerability to adaptation, systematic observations and research capacity, and outlines the way the country may address climate change.
2. National Adaptation Programme of Action ²⁵⁹	Ministry of Tourism, Environment and Natural Resources	Submitted in 2007	Multi-sectoral	This document provides an overview of Zambia's national circumstances including current climate conditions, assesses the country's vulnerabilities to climate change, provides an overview of climate projections, and outlines priority adaptation projects.
3. National Climate Change Response Strategy	Ministry of Tourism, Environment and Natural Resources	In development	Multi-sectoral	This policy is anticipated to comprise a national institutional and implementation framework covering mitigation, adaptation, research, capacity building, and awareness raising.
4. National Development Plan 2011 – 2015 ²⁶⁰	Ministry of Finance and National Planning	Released in 2011	Multi-sectoral	Among its objectives, strategies and programs, the government seeks to strengthen policy and legal framework surrounding environmental management within various sectors, including agriculture, health, education, energy, water, land and infrastructure, to appropriately adapt to climate change. Also, the Zambian government aims to support disaster risk management in priority sectors including the development of design

²⁵⁸ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&piref=4496#beg

²⁵⁹ UNFCCC, <http://unfccc.int/resource/docs/napa/zmb01.pdf>

²⁶⁰ World Bank, http://siteresources.worldbank.org/INTZAMBIA/Resources/SNDP_Final_Draft_20_01_2011.pdf

Name of Policy Action	Government Division Responsible	Status	Sector(s) of Focus	Summary description
				standards and codes of practice for infrastructure adapted to climate change resilience.

C. Current Adaptation Action

When compared to other countries in southern Africa, a moderate number of discrete adaptation projects and programs are currently being implemented in Zambia. The majority of these projects emphasize capacity building, research, awareness raising and policy formation and integration in the agriculture, water sectors and governance sectors. Some work is also occurring in the areas of disaster risk management, enhancing climate information services, rural landscapes and ecosystem conservation.

Prominent current adaptation actions include the project “Adaptation to the Effects of Drought and Climate Change in Agro-ecological Zone I and II in Zambia” financed through the Least Developed Country Fund (LDCF); it is a project concept identified in the country’s NAPA. The country is also participating in the “Pilot Program for Climate Resilience” funded by the Strategic Climate Fund and “Groundwater in sub-Saharan Africa: Implications for food security and livelihoods” funded by the Alliance for a Green Revolution in Africa. The greatest number of adaptation projects in Zambia are being financed by the “Climate Change Adaptation in Africa” (CCAA) program established by United Kingdom Department for International Development (DFID) and the International Development Research Centre (IDRC), and by the Government of Germany.

Table 2: Current Adaptation Projects and Programs active in Zambia

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1. Lyambai Vulnerability and Adaptation Project ²⁶¹	This project is focused on four pilot action villages near the eastern margin of the floodplain in the Upper Zambezi Valley in western Zambia. The project will assess increasing climate related vulnerability and identify possible adaptation strategies, develop strategies and plans for the	SEI; UNITAR	Zambezi Valley Development Initiative	Assessment; Capacity building Field implementation	2007 - ?	Rural areas	Western Zambia

²⁶¹ ZVDI, <http://www.zvdi.org/projdoc1.pdf>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	adaptation of existing practices, and help to create positive change.						
2. Adaptation to the Effects of Drought and Climate Change in Agro-ecological Zone I and II in Zambia ²⁶²	The objective of this project is to develop adaptive capacity of subsistence farmers and rural communities to withstand climate change in Agro-ecological Regions I and II in Zambia.	LDCF Budget: US\$13.699 million	UNDP	Capacity building; Community based adaptation	2010 – 2013	Agriculture; Disaster risk management	Agro-ecological regions I and II
Participation in Regional and Global Projects							
3. Building Adaptive Capacity to Cope with Increasing Vulnerability due to Climate Change ²⁶³	To enhance the educational, research and extension competencies to develop strategies that help rural communities adapt to climate variability and change.	DFID and IDRC through the CCAA program	ICRISAT	Knowledge communication Research; Capacity building	2007 – 2010	Agriculture	Regional: Zambia, Zimbabwe
<i>In Zambia: Further information required.</i>							
4. Resilience and the African Smallholder: Enhancing the capacities of communities to adapt to climate change ²⁶⁴	This project aims to enhance the ability of households, communities and relevant institutions to respond to changing circumstances with a view to reducing future threats to food security and environmental integrity. It will work with farmers to identify improved farming technologies, and translate the results into action plans at the appropriate institutional level whether local or national. Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts	DFID and IDRC through the CCAA program Budget: CND 1,319,800	University of Zimbabwe; International Food Policy Research Institute	Community based adaptation; Policy formation and integration	2007 – 2011	Agriculture	African: Ghana, Mali, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe
<i>In Zambia: Further information required.</i>							

²⁶² ALM, <http://www.adaptationlearning.net/project/adaptation-effects-drought-and-climate-change-agro-ecological-zone-1-and-2-zambia> and UNDP, http://www.undp.org.zm/index.php?option=com_content&view=article&id=15:adaptation-to-the-effects-of-drought-and-climate-change&catid=4:environment-and-natural-resources&Itemid=6 and GEF, <http://www.gefonline.org/projectDetailsSQL.cfm?projID=3689>

²⁶³ ICRISAT, <http://www.icrisat.org/what-we-do/agro-ecosystems/aes-adaption-table.htm>

²⁶⁴ IDRC, http://web.idrc.ca/en/ev-118881-201_104140-1-IDRC_ADM_INFO.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	across disaggregated systems, groups and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.						
5. Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ²⁶⁵	“Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups, and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.”	BMZ Budget: US\$91,241	IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF	Capacity building; Community based adaptation; Policy formation and integration	2008 – 2011	Rural areas; Agriculture; Government	African: Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
<i>In Zambia: Further information required.</i>							
6. Community Based Adaptation to Climate Change in Africa ²⁶⁶	The project involves identifying ways of communicating climate information to poor and vulnerable communities and from communities to other stakeholders. Capacity building and support is being given to NGOs and communities through training to facilitate integration of climate change into their plans and activities. The project will generate	DFID and IDRC through the CCAA program Budget: CND 1,398,500	African Centre for Technology Studies	Capacity building; Field implementation; Community based adaptation; Research	2008 – 2011	Multi-sectoral	African: Kenya, Malawi, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe

²⁶⁵ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

²⁶⁶ ACTS, http://www.acts.or.ke/index.php?option=com_content&view=article&id=60&Itemid=53 and IDRC, http://www.idrc.ca/cp/ev-83067-201_104898-1-IDRC_ADM_INFO.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	information on community-based climate change adaptation, and disseminate the information to inform other stakeholders including researchers, NGOs, national and international policy and decision makers, among others.	<i>In Zambia:</i> Further information required.					
7. Pilot Program for Climate Resilience (PPCR) ²⁶⁷	PPCR aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation in a way that is consistent with poverty reduction and sustainable development goals. In this way, the PPCR provides incentives for scaled-up action and initiates transformational change. The pilot programs and projects implemented under the PPCR are country-led and build on NAPAs and other relevant country studies and strategies.	World Bank's Strategic Climate Fund <i>Budget:</i> US\$971.75 million pledged as of February 2011	World Bank	Policy formation and integration	2008 – ongoing	Multi-sectoral	Bolivia, Cambodia, Mozambique, Nepal, Niger, Tajikistan, Yemen, Zambia <i>Regional Programs:</i> Caribbean and Pacific (includes Papua New Guinea, Samoa, Tonga)
		<i>In Zambia:</i> Zambia's participation in the PPCR will focus on mainstreaming climate change issues into national development programs and strategies. Specific objectives include the development of climate data collection and information management systems; building capacity in line ministries, civil society and the private sector; developing research methodologies for crop and livestock production and harvesting/storage systems; etc. It is proposed that Zambia will share lessons learned through the PPCR through COMESA and SADC. ²⁶⁸					

²⁶⁷ CIF, <http://www.climatefundsupdate.org/listing/pilot-program-for-climate-resilience>

²⁶⁸ Further details concerning Zambia's participation in the PPCR can be found here:

http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Zambia_AcceptanceTemplate1_F.pdf

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
8. Groundwater in sub-Saharan Africa: Implications for food security and livelihoods ²⁶⁹	The project aims to enhance the role of groundwater in providing improved food security and livelihoods in the countries targeted by AGRA. The specific objectives include: assessing groundwater availability and sustainability, including the impacts associated with its use and role in adapting to climate change; identifying opportunities and constraints in using groundwater, and provide advice to investors in groundwater interventions; and developing a groundwater strategy for the region.	Alliance for a Green Revolution in Africa (AGRA)	International Water Management Institute	Research; Policy formation and integration	2009 – 2011	Freshwater supply	<i>African:</i> Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Tanzania, Uganda, Zambia
<i>In Zambia:</i> Further information required.							
9. Regional Science Service Centre for Adaptation to Climate Change and Sustainable Land Management in Southern Africa ²⁷⁰	The objective is to develop a program that will conduct problem-oriented research in the area of adaptation to climate change and sustainable land management and provide evidence-based advice for all decision-makers and stakeholders. Research will be geared towards filling current regional or local gaps in integrated knowledge. The research will aim to: integrate research on land- and resource management; link science and theory to practice and decision-making; compile, analyze and disseminate best practices.	Germany Federal Ministry of Education and Research		Research; Capacity building; Knowledge communication	2009 – 2012	Ecosystem conservation	<i>Regional:</i> Angola, Botswana, Namibia, South Africa, Zambia
<i>In Zambia:</i> Further information required.							
10. Zambezi River Basin Initiative ²⁷¹	In recognition of increasing flood events within the Zambezi River Basin, this project aims to reduce the vulnerability of communities within the basin to extreme weather events and climate change, including	International Foundation of Red Cross and Red Crescent	National Red Cross and Red Crescent societies	Capacity building; Community based adaptation	2009 – 2013	Disaster risk management	<i>Regional:</i> Botswana, Malawi, Mozambique, Namibia,

²⁶⁹ IWMI, <http://gw-africa.iwmi.org/>

²⁷⁰ SASSCAL, <http://www.sasscal.org/>

²⁷¹ ICP, <http://www.icp-confluence-sadc.org/projects/zambezi-river-basin-initiative-zrbi>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	the impact of flooding. Activities include developing community hazard maps, training staff in community disaster preparedness, implementing community based early warning systems, and training in adaptation techniques.	Societies					Zambia Zimbabwe
In Zambia: Further information required.							
11.	Southern Africa Regional Climate Change Program ²⁷²	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	African: Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
In Zambia: Further information required.							

D. Proposed Adaptation Action

Through its NAPA, Zambia has identified a number of potential projects in the areas of agriculture, human health, disaster risk management, freshwater, gender, biodiversity and energy. As well, Zambia is one of 10 African countries proposed to participate in the project “Microeconomic Costing of Discrete Adaptation Options in the Agriculture Sector: A Sub-National Level Analysis of the Welfare Gains of Dynamic Adaptation.” Funding for this project has been requested from the Special Climate Change Fund.

²⁷² Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Table 3: Proposed Adaptation Projects and Programs in Zambia

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
Projects identified in Zambia's NAPA				
1. Strengthening of early warning systems to improve services to preparedness and adaptation to climate change in all the sectors (agriculture, health, Natural resources and energy)	The objectives of this project are to develop the use of compatible standards and systems, encompassing relevant data and stations; adopt and disseminate modern technology for data collection, transmission and assessment; to strengthen systematic observations of meteorological and hydrological services; as well as capacity building, education and public awareness.	Capacity building; Research	Disaster risk management	
Notes:				
2. Promotion of alternative sources of livelihoods	Objective: To initiate alternative livelihood sources for communities in and around protected areas Activities: Promotion of Income-Generating Activities and other alternative livelihood sources; setting up micro credit facilities targeting women beneficiaries; and establishment of household woodlots for firewood/poles/timbers	Community based adaptation	Ecosystem conservation	
Notes:				
3. Adaptation of the effects of drought in the context of climate change in agro-ecological region I of Zambia	To reduce the vulnerability of those depending on rainfed agriculture practices to anticipated rainfall shortages in the face of climate change including variability.	Community based adaptation	Agriculture	Agro-ecological zones I and II
Notes: This project has received funding from the LDCF.				
4. Management of critical habitats	The objective of this project is to manage critical habitats in National Parks. Activities include data collection to establish critical habitats in National Parks, to sink boreholes for watering points for animals in the parks, dredge watercourses and lagoons of sand to increase volume of available water to animals, and construct/improve tracks to act as firebreaks in parks.	Field implementation	Biodiversity	National Parks
Notes:				
5. Promote natural regeneration of indigenous forests	The objective of the project is to promote regeneration of indigenous forests. Activities include promotion of natural regeneration of indigenous woodlands, prevention of wild fires by building fire barriers, and promotion of alternative sources of energy.	Community based adaptation	Forestry; Energy	
Notes:				
6. Adaptation of land use practices (crops, fish and livestock) in light of climate change	The object of this project is to (a) enhance awareness and training among stakeholders, and enhance improved food security, (b) generate income and business opportunities in all agricultural	Knowledge communication; Capacity building	Agriculture	

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)	
	sectors, and (c) identify species best suitable for aquaculture under changing climatic conditions due to global warming.	Notes:			
7.	Maintenance and provision of water infrastructure to communities to reduce Human wildlife conflict	The objective of this project is to provide access to potable water for communities living in and around protected areas. Activities include sinking boreholes and repairing existing water infrastructures in communities around parks as well as eradication of invasive alien species.	Community based adaptation	Human health	
	Notes:				
8.	Capacity building for improved environmental health in rural areas	The objective of this project is to improve the health, water and food security of rural populations, including climate proofing sanitation in urban areas. This is meant to prevent outbreaks of water-borne diseases in urban shanty compounds by flood-proofing sanitation facilities.	Capacity building	Human Health; Freshwater supply	
	Notes:				
Additional Proposed Projects					
9.	Microeconomic Costing of Discrete Adaptation Options in the Agriculture Sector: A Sub-National Level Analysis of the Welfare Gains of Dynamic Adaptation ²⁷³		Research	Agriculture	Burkina Faso, Cameroon, Egypt, Ethiopia, Ghana, Kenya, Niger, Senegal, South Africa, Zambia
	Notes: proposal submitted for funding to the SCCF Budget: Proposed to from the SCCF: US\$2.0 million; proposed co-financing: to be determined.				

E. Assessment

A moderate number of adaptation projects are active in Zambia, and there is considerable evidence of a high level of engagement within the government on the integration of climate change into its national policies, as demonstrated in its National Development Plan 2011-2015. The country is also currently preparing a National Climate Change Response Strategy.

²⁷³ GEF, http://www.thegef.org/gef/sites/thegef.org/files/publication/adaptation-actions_0.pdf



While only one of the priority adaptation actions identified in the country's NAPA is currently being funded, the project "Adaptation to the Effects of Drought and Climate Change in Agro-ecological Zone I and II," there is evidence that many of the country's most acute climate vulnerabilities are being addressed through current project activities. Adaptation within the agriculture and water sectors were noted as important by the Government of Zambia and other stakeholders, and several current project activities focus on these high priority areas. This includes work to promote adaptation on the ground through community based adaptation efforts, capacity building with local populations and governments to develop adaptation strategies, as well as further research into the potential impacts of climate change on these vulnerable sectors.

Although Zambia is making progress with respect to addressing some of its adaptation needs and priorities, others noted within the country's NAPA are not currently being addressed. These include areas such as the development the promotion of alternative sources of livelihoods, managing critical habitats, promoting regeneration of indigenous forests, and capacity building for improved environmental health. As well, future efforts may also look more at the gender-based implications of climate change, human health concerns and urban issues (reflecting Zambia's status as one of the most urbanized countries in sub-Saharan Africa). The diversification of future adaptation activities into these high priority areas would help to fill these gaps.

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Ministry of Tourism, Environment and Natural Resources [MTENR] and the United Nations Development Programme [UNDP] (2010). National Climate Change Response Strategy, Zambia: Briefing Note. Accessed in April 2011 from: http://nccrs-zambia.com/docs/briefing_note_june2010.pdf

13.0 Zimbabwe

BMZ	Bundesministeriums für Umwelt, Naturschutz und Reaktorischerheit/ Ministry for Economic Cooperation and Development (Germany)
CCAA	Climate Change Adaptation in Africa program
DFID	Department for International Development (United Kingdom)
GDP	Gross Domestic Product
GEF	Global Environment Facility
GSDRC	Governance and Social Development Resource Centre
ICRAF	World Agroforestry Centre
ICPAC	IGAD Climate Prediction and Applications Centre
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
MMET	Ministry of Mines, Environment and Tourism
SADC	Southern Africa Development Community
SCCF	Special Climate Change Fund
SIDA	Swedish International Development Cooperation Agency
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USDS	United States Department of State

The landlocked country of Zimbabwe is home to over 11 million people (USDS, 2010). The country has experienced political and economic crisis over the past several years, which has placed achievement of many development goals on hold. Zimbabwe is one of the only countries in the world whose Human Development Index is lower today than it was in 1970. Approximately 62 per cent of the country currently experiences income poverty (UNDP, 2010; USDS, 2010), with Gross Domestic Product (GDP) per capita being approximately USD 350 (USDS, 2010) Despite this, Zimbabwe has one of Africa's highest literacy rates at over 90 per cent (USDS, 2010).

Agriculture contributes to 19 per cent of the country's GDP, with industry (mostly mining) contributing 25 per cent (USDS, 2010). Approximately 80 per cent of Zimbabweans depend upon agriculture for their livelihoods (Madzwamuse, 2010). Once described as the “breadbasket” of Africa, Zimbabwe was at one time a food exporting nation. In recent years, though, Zimbabwe's crop production has largely declined, contributing to its slide towards food insecurity—a result of land reform, mismanagement and weather conditions (ICRAF and UNEP, 2006). The political and economic situation in the country has also encouraged migration within and from Zimbabwe, leaving agricultural activities to the elderly and very young who may not have the capacity to optimize land use and reducing capacity in the fields of health, environment and water—further increasing the country's vulnerability to climate change (Madzwamuse, 2010).

A. Adaptation Needs and Priorities

Zimbabwe experienced warming of 1°C over the last several decades of the 20th century (MMET, 1998), and there is evidence that it has begun to experience more hot days and fewer cold days (UNEP, 2010). As well, over the past decade, the amount of rainfall the country receives has deviated from the multi-decadal mean on a more regular basis (UNEP, 2010). In the latter part of the 20th century, runoff in the country decreased by 20 to 30 per cent (MMET, 1998). A recent workshop held in Zimbabwe's Munyawiri area indicates that smallholder farmers are increasingly concerned about unfamiliar climate dynamics, including uncertainty around planting, loss of crops and damage to infrastructure (Zvigadza et al, 2010). The same workshop revealed a general lack of access to weather trends and climate data, and 80 per cent of respondents noticed that seasonal rains are starting later and ending prematurely (Zvigadza et al, 2010).

Over the remainder of this century, climate change is anticipated to cause increased temperatures, more frequent droughts, decreases in precipitation, seasonal shifts in rainfall, localized floods, varying river flow, and wildfires in Zimbabwe (Eriksen et al, 2008). A rainfall-runoff simulation for the country has estimated that rainfall in the country could be 15 to 19 per cent lower in 2075 and that evapotranspiration rates could increase by 7.5 to 13 per cent (MMET, 1998). The drought-prone areas of Zimbabwe are likely more vulnerable to climate change than comparatively more humid areas (Eriksen et al, 2008). Research into the economic impacts of climate change on Zimbabwean agriculture indicates that smallholder farms in Zimbabwe are highly vulnerable to the impacts of climate change, particularly by rising temperatures and lower rainfall (Man and Nhemachena, 2006; Gwimbi, 2009). These results are particularly acute for farms without irrigation systems. Marginally productive areas may shift to non-agricultural use land in the future (MMET, 1998). There is also a potential for a decrease in the length of growing season, and reductions in annual rainfalls due to the late start and early end of the rainy seasons (MMET, 1998).

Zimbabwe's National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) provides an overview of adaption priorities for the country, including: enhancing capacity for climate research; capacity building for industry decision-

makers; and the timely updating and dissemination of climate data. Adaptation in the agriculture sector is also identified as a key priority. Actions that could be taken to reduce vulnerability in this sector have been identified by researchers as including: providing farmers with up-to-date information about rainfall forecasts in order to influence planting dates; improving smallholder farmers’ access to capacity building, training and credit (Man and Nhemachena, 2006); raising awareness to climate change; improving water availability and irrigation systems; off-season cash crop planting; improved land management and forest conservation; integrated crop production; and community based weather monitoring activities (Zvigadza *et al*, 2010).

B. National Level Policies and Strategic Documents

Zimbabwe completed its Initial National Communication for the UNFCCC in 1998, and is currently in the process of preparing a second National Communication (Madzwamuse, 2010). At the moment, however, there is no overarching national framework for the implementation of provisions contained in the National Communication (Madzwamuse, 2010). In 1995 the country created a National Climate Change Committee under the Ministry of Mines, Environment and Tourism, with a role to coordinate and review all national climate change positions (Madzwamuse, 2010).

Table 1: Key Government Policies and Reports reflecting Adaptation Needs, Priorities and Planned Actions

Name of Policy Action		Government Division Responsible	Status	Sector(s) of Focus	Summary description
1.	Zimbabwe's Initial National Communication on Climate Change ²⁷⁴	Ministry of Mines, Environment and Tourism	Released in 1998	Multi-sectoral	This document provides an overview of Zimbabwe’s national circumstances, including: its greenhouse gas inventory; existing policies, programs and measures; the anticipated impacts of climate change in the country; existing research capacity; and possible climate change projects.

C. Current Adaptation Action

A relatively low number of adaptation projects are currently being implemented in Zimbabwe relative to its southern African neighbors. The vast majority of these projects are also being implemented concurrently in other developing countries. The sole significant adaptation project being implemented only in Zimbabwe has been identified as “Coping with Drought and Climate Change,” which is co-financed by the Special Climate Change Fund (SCCF). A variety of activities are being implemented as part of this project at both the policy and field levels. Otherwise, Zimbabwe is participating in: the “Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa” program being implemented by the International Food Policy Research Institute that involves enhanced research to estimate the impacts of climate

²⁷⁴ UNFCCC, http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=2251#beg

change and the development of tools to implement adaptation strategies; the “Preparedness for Climate Change” led by the Red Cross/Red Crescent Climate Centre, and the “Southern Africa Regional Climate Change Program” that aims to enhance coordination and capacities to adapt to climate change in southern Africa.

Collectively, the current adaptation projects in Zimbabwe are addressing needs in the areas of agriculture and disaster risk management most commonly. Other areas receiving attention are fisheries, capacity of government and strengthening climate information services. Most of the projects emphasize the completion of research, the building of capacity and the sharing of knowledge. Fewer involve field level implementation of concrete measures to reduce vulnerability to the impacts of climate change (e.g., improving farmers’ access to credit). Although funding is received from several sources, multiple projects are being financed by each of: the Climate Change Adaptation in Africa (CCAA) established by the United Kingdom’s Department for International Development (DFID) and the International Development Research Centre (IDRC); the Red Cross/Red Crescent; and the Government of Germany.

In addition to the projects described in Table 2, Zimbabwe is also home to the Southern Africa Development Community’s Regional Early Warning Unit, the Regional Remote Sensing Project, the Drought Monitoring Centre and the Famine Early warning System Project (ICRAF and UNEP, 2006). These units monitor changes in weather and provide alerts to member countries to prepare for possible droughts or flooding (ICRAF and UNEP, 2006).

Table 2: Current Adaptation Projects and Programs active in Zimbabwe

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
National Action							
1. Coping with Drought and Climate Change ²⁷⁵	This project seeks to develop and pilot a range of coping mechanisms for reducing the vulnerability of small-holder farmers and pastoralists in rural Zimbabwe to future climate shocks. Activities under this project include: natural resource management; optimizing livestock production in semi-arid regions; cassava production in southeast Zimbabwe; captive breeding of crocodiles as	SCCF, UNDP, Government of Zimbabwe, ICPAC, CAMPFIRE, Chiredzi RDC Budget: US\$1,	UNDP	Capacity building; Research; Community based adaptation; Field implementation;	2007 – 2012	Agriculture	Rural areas

²⁷⁵ ALM, <http://www.adaptationlearning.net/experience/managing-climate-risk-agriculture-and-water-resources-0>

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)	
	an adaptation strategy; and optimizing crop mix and soil moisture management.	938,000						
Participation in Regional and Global Actions								
2.	Building Adaptive Capacity to Cope with Increasing Vulnerability due to Climate Change ²⁷⁶	To enhance the educational, research and extension competencies to develop strategies that help rural communities adapt to climate variability and change.	DFID and IDRC through the CCAA program	ICRISAT	Knowledge communication Research; Capacity building	2007 – 2010	Agriculture	Regional: Zambia, Zimbabwe
<i>In Zimbabwe: Further information required.</i>								
3.	Resilience and the African Smallholder: Enhancing the capacities of communities to adapt to climate change ²⁷⁷	This project aims to enhance the ability of households, communities and relevant institutions to respond to changing circumstances with a view to reducing future threats to food security and environmental integrity. It will work with farmers to identify improved farming technologies, and translate the results into action plans at the appropriate institutional level whether local or national. Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.	DFID and IDRC through the CCAA program Budget: CND 1,319,800	University of Zimbabwe; International Food Policy Research Institute	Community based adaptation; Policy formation and integration	2007 – 2011	Agriculture	African: Ghana, Mali, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe
<i>In Zimbabwe: Further information required.</i>								

²⁷⁶ ICRISAT, <http://www.icrisat.org/what-we-do/agro-ecosystems/aes-adaption-table.htm>

²⁷⁷ IDRC, http://web.idrc.ca/en/ev-118881-201_104140-1-IDRC_ADM_INFO.html

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
4. Community Based Adaptation to Climate Change in Africa ²⁷⁸	The project involves identifying ways of communicating climate information to poor and vulnerable communities and from communities to other stakeholders. Capacity building and support is being given to NGOs and communities through training to facilitate integration of climate change into their plans and activities. The project will generate information on community-based climate change adaptation, and disseminate the information to inform other stakeholders including researchers, NGOs, national and international policy and decision makers, among others.	DFID and IDRC through the CCAA program Budget: CND 1,398,500	African Centre for Technology Studies	Capacity building; Field implementation; Community based adaptation; Research	2008 – 2011	Multi-sectoral	African: Kenya, Malawi, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe
<i>In Zimbabwe: Further information required.</i>							
5. Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable ²⁷⁹	“Promote adaptation among vulnerable populations through developing comprehensive systems for assessing global changes and the changes of these impacts across disaggregated systems, groups, and factors influencing initial state of vulnerability. Provide regional organizations, policy-makers and farmers in sub-Saharan Africa with tools to identify and implement appropriate adaptation strategies.”	BMZ Budget: US\$91,241	IFPRI (lead); ASARECA; FANRPAN; PIK; ZALF	Capacity building; Community based adaptation; Policy formation and integration	2008 – 2011	Rural areas; Agriculture; Government	African: Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe
<i>In Zimbabwe: Further information required.</i>							

²⁷⁸ ACTS, http://www.acts.or.ke/index.php?option=com_content&view=article&id=60&Itemid=53 and IDRC, http://www.idrc.ca/cp/ev-83067-201_104898-1-IDRC_ADM_INFO.html

²⁷⁹ FANRPAN, <http://www.fanrpan.org/themes/eachproject/?project=2> and http://www.fanrpan.org/documents/d00539/BMZ_Climate_Change_Adaptation_Jun2008.pdf

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
6. Preparedness for Climate Change ²⁸⁰	The aim of this program was for the Red Cross and Red Crescent National Societies in countries particularly vulnerable to climate change to gain a better understanding of climate change and its impacts to identify country-specific adaptation measures in line with risks. Activities could include organizing a workshop on risks, assessment of risks through preparation of a background document, capacity building programs, and developing climate change resilient plans.	Red Cross/Red Crescent Climate Centre	National Red Cross/Red Crescent Societies	Capacity building; Policy formation and integration	Phase 1: 2006 – 2009 Phase 2: ongoing	Disaster risk management	<i>Global:</i> 39 countries <i>South African participants in Phase 1:</i> Madagascar, Malawi, Mauritius, Seychelles, Zimbabwe
<i>In Zimbabwe:</i> During the first phase of the project, a workshop on climate change was organized with Red Cross/Red Crescent staff members. ²⁸¹							
7. Zambezi River Basin Initiative ²⁸²	In recognition of increasing flood events within the Zambezi River Basin, this project aims to reduce the vulnerability of communities within the basin to extreme weather events and climate change, including the impact of flooding. Activities include developing community hazard maps, training staff in community disaster preparedness, implementing community based early warning systems, and training in adaptation techniques.	International Foundation of Red Cross and Red Crescent Societies	National Red Cross and Red Crescent societies	Capacity building; Community based adaptation	2009 – 2013	Disaster risk management	<i>Regional:</i> Botswana, Malawi, Mozambique, Namibia, Zambia Zimbabwe
<i>In Zimbabwe:</i> Further information required.							
8. Southern Africa Regional Climate Change Program ²⁸³	The program aims to synthesize relevant climate change science, develop strategic research and strengthen the science-policy-governance-finance dialogue. The program will aim to build an evidence base for	DFID, SIDA	OneWorld Sustainable Investments	Policy formation and integration; Research	2009 – 2014	Government; Climate information services	<i>African:</i> Angola, Botswana, DRC, Lesotho, Madagascar,

²⁸⁰ IFRC, <http://www.climatecentre.org/site/preparedness-for-climate-change-programme>

²⁸¹ IFRC, <http://www.climatecentre.org/downloads/File/programs/Final%20PFCC%20General%20Assembly%20Document%20with%20renewed%20table.pdf>

²⁸² ICP, <http://www.icp-confluence-sadc.org/projects/zambezi-river-basin-initiative-zrbi>

²⁸³ Southern Africa Regional Climate Change Program, http://www.rccp.org.za/index.php?option=com_content&view=article&id=68&Itemid=61&lang=en

Name	Objectives	Funder(s)	Implementing Agency(s)	Type of project	Duration	Priority Sector(s)	Geographic focus (if any)
	transboundary responses to climate change, strengthen the region's voice in international platforms, and enhance its ability to access necessary finance for climate change adaptation.						Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
<i>In Zimbabwe: Further information required.</i>							
9.	Enhancing Adaptive Capacity to Climate Change Impacts through well-managed Water Use for Aquaculture integrated with small-scaled Irrigation in the Chinyanja Triangle in Africa ²⁸⁴	BMZ	International Center for Living Aquatic Resources Management (WorldFish Center), International Water Management Institute	Assessment; Research	2010 – 2013	Freshwater fisheries	<i>Regional:</i> Malawi, Mozambique, Zimbabwe
<i>In Zimbabwe: Further information required.</i>							

²⁸⁴ CGIAR, <http://ongoing-research.cgiar.org/factsheets/enhancing-adaptive-capacity-to-climate-change-impacts-through-well-managed-water-use-for-aquaculture-integrated-with-small-scale-irrigation-in-the-chinyanja-triangle-in-africa/> and FARA, http://www.infosysplus.org/db/db_index.php/door/upcome/main_unit/project/dataset_id/1215/URL_NAME/fara

D. Proposed Adaptation Action

Zimbabwe is identified as a planned participant in the project, “Community Adaptation to Climate Change in the Limpopo Basin,” that has been submitted to the SCCF. Countries expected to participate in this project are Botswana, Mozambique, South Africa and Zimbabwe.

Table 3: Proposed Adaptation Projects and Programs in Zimbabwe

Name	Objectives	Type of project	Priority Sector(s)	Geographic focus (if any)
1. Community Adaptation to Climate Change in the Limpopo Basin ²⁸⁵				Botswana, Mozambique, South Africa and Zimbabwe
<p>Notes: Project submitted for funding from the SCCF. <i>Budget:</i> Proposed funding from the SCCF: US\$4.45 million; proposed co-financing: US\$12.0 million.</p>				

E. Assessment

Through the limited number of adaptation projects currently being implemented in Zimbabwe, the country is beginning to address some of its key adaptation needs, particularly in the agriculture sector. Improving resilience in this sector is noted as a key adaptation priority for the country, including enhancing farmer’s access to climate forecasts, water availability and irrigation, and integrated crop production. Many of these priorities are being addressed through the current adaptation activities in Zimbabwe, including the “Coping with Drought and Climate Change” project, the projects being funded through the CCAA, as well as the regional project “Strategies for Adapting to Climate Change in Rural Sub-Saharan Africa: Targeting the most vulnerable.”

While current actions are responding to adaptation priorities, there is also a need for more projects that focus on enhancing climate research capacity, capacity building for national decision-makers, improved land management, forest conservation, the gender dimensions of climate change impacts, and the availability of freshwater supplies, and improving human health. In addition, a report prepared by researchers at the Heinrich Boll Foundation points to a need to harmonize uncoordinated legislation and policy frameworks in order to facilitate adaptation in Zimbabwe, including mainstreaming into the national economic development framework. The study also notes a need to ensure policies facilitate adaptation at the community level, and that adaptation priorities are communicated to these groups .

²⁸⁵ GEF, http://www.thegef.org/gef/sites/thegef.org/files/publication/adaptation-actions_0.pdf

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