POLICY RESEARCH WORKING PAPER 4711

Mainstreaming Climate Adaptation into Development Assistance in Mozambique:

Institutional Barriers and Opportunities

Diana Sietz
Maria Boschütz
Richard JT Klein
Alexander Lotsch

The World Bank
Development Research Group
Sustainable Rural and Urban Development Team
September 2008

Policy Research Working Paper 4711

Abstract

Based on a literature review and expert interviews, this paper analyzes the most important climate impacts on development goals and explores relevant institutions in the context of mainstreaming climate adaptation into development assistance in Mozambique. Climate variability and change can significantly hinder progress toward attaining the Millennium Development Goals and poverty aggravates the country's climate vulnerability. Because Mozambique is one of the major recipients of official development assistance in the world, there is a clear interest in ensuring that the risks of climate impacts are incorporated into the country's development investments. A screening of donor activities at the sub-national level shows that a high share of development assistance is invested in climate-sensitive sectors, partly in areas that are particularly exposed to droughts, floods, and cyclones. The authors find that Mozambique has a supportive legislative environment and donors have a high awareness of climate risks. However, limited individual, organizational, networking, and financial capacity constrain mainstreaming initiatives. Given strong limitations at the national level, bilateral and multilateral donors can play a key role in fostering institutional capacity in Mozambique.

This paper—a product of the Sustainable Rural and Urban Development Team, Development Research Group—is part of a larger effort in the department to study the implications of climate change. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at alotsch@worldbank.org.

Mainstreaming climate adaptation into development assistance in Mozambique: Institutional barriers and opportunities

Diana Sietz[1], Maria Boschütz[2], Richard JT Klein[3] and Alexander Lotsch[4]

Keywords: Climate adaptation, Mainstreaming, Development goals, Official Development Assistance, Africa, Mozambique

Acknowledgement

The research for this paper was funded by Bank-Netherlands Partnership Program (BNPP). We would like to express our gratitude and appreciation for the contribution to the international and national experts, who participated in the interviews, provided background information, shared documentation and offered logistical support in Mozambique. Special thanks goes to the staff members of the World Bank, the Mozambican Red Cross and the Deutsche Gesellschaft für Technische Zusammenarbeit.

[1] Centro Internacional de la Papa, Lima, Peru. Corresponding author (email: d.sietz@cgiar.org).
[2] Potsdam Institute for Climate Impact Research, Potsdam, Germany.
[3] Stockholm Environment Institute, Stockholm, Sweden.
[4] The World Bank Group, Washington DC, USA.

1 Introduction

Climate change is likely to alter the water cycle over southern Africa and, by extension, affect water availability and the frequency and severity of extreme events such as droughts, floods, and cyclones. Climate models generally show decreasing rainfall for southeastern Africa (IPCC, 2007b; Hudson and Jones, 2002; Tadross et al., 2005), which is likely to result in a decline in available surface water and decrease in river runoff (De Wit and Stankiewicz, 2006; Arnell, 2004). Mozambique is at the downstream of several major river basins in southern Africa - Zambezi, Ruvuma and Limpopo – all of which are projected to have diminishing runoff of 25-40% (Arnell, 1999), and especially the dry season (June-August) is projected to get drier across Mozambique in the future (IPCC, 2007b). At the same time cyclone activity in the Indian Ocean is expected to increase as a result of increased sea surface temperatures (Lal, 2001; McDonald et al., 2005), which tend to result in widespread flooding in the region. As a result of changing temperature and precipitation patterns, Mozambique ranks high in the climate change index based on annual and seasonal indicators of temperature and precipitation (Baettig et al., 2007).

In light of these scenarios, climate change poses a major challenge to development in Mozambique and is further evidenced by recent climate-related disasters. The ten most serious disasters have occurred during the past two decades; four of these since 2000 (EM-DAT, 2007). Mozambique's vulnerability to climate extremes is exacerbated by extreme poverty and in the current Poverty Reduction Strategy Paper (PRSP), Mozambique has recognized the need to adapt to climate variability and change in order to reduce people's vulnerability (GoM, 2006a).

Mozambique is one of the major recipients of official development assistance (ODA) in the world (OECD, World Bank)[5] and strongly depends on donor investments. As the linkages between climate impacts and development are becoming increasingly apparent, donors seek to better integrate policies and measures addressing climate impacts into decision-making. This mainstreaming process aims at reducing climate vulnerability and ensuring long-term sustainability of investments (Klein, 2002; Huq et al., 2003; Agrawala, 2005). This paper provides an analytical framework (section 2) and rationale (section 3) for mainstreaming climate adaptation into ODA activities in Mozambique. It evaluates current ODA activities and climate-sensitive donor investments to support adaptation to climate impacts and reduce climate vulnerability (section 4), discusses institutional barriers to mainstream adaptation into development initiatives and identifies opportunities available to relevant actors to overcome these barriers (section 5).

2 Analytical framework

Decision-making on climate adaptation in the context of development assistance requires knowledge of climate impacts on development goals and ongoing adaptation activities within the donor community. This section outlines the analytical framework used to identify and analyze the barriers and opportunities for mainstreaming of climate adaptation.

[5] OECD/World Bank: Mozambique ODA statistics. Accessible at: www.oecd.org

At the core of the analysis is the concept of climate vulnerability, which refers to "the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes" (IPCC 2007a). More specifically, climate vulnerability is considered a function of exposure, sensitivity and adaptive capacity (IPCC 2007a, Füssel and Klein 2006), where *exposure* defines the nature and extent to which climate affects development activities (including its spatial manifestation), *sensitivity* describes the degree to which development goals are adversely impacted or benefit from climate effects; and *adaptive capacity* refers to the ability to adjust to climate impacts, manage damages or explore potential benefits.

This paper analyzes the key determinants of climate vulnerability in Mozambique by taking the perspective of extreme poverty eradication and hunger as an example. It starts from the viewpoint of social vulnerability, which considers both environmental and social changes as determinants of vulnerability to environmental risks (Adger 1999, Adger et al. 2003). This concept links individual and collective vulnerability with public policies describing a socially constructed phenomenon which is shaped by the specific institutional setting. The concept of social vulnerability therefore not only allows assessing natural, social and economic factors that determine climate vulnerability, but also the institutional context in which climate vulnerability develop.

Effectively performing institutions are at the core of reducing vulnerability and an important element in advancing a country's development. Broadly defined, institutions are structures of social order to organize human interactions at all scales (Ostrom 2005). Institutions are set up with a social purpose to enforce rules governing cooperative human behaviour. The term institution includes behavior patterns, which are important to a society as well as particular formal organizations of government and public service. Institutions targeting adaptation to climate impacts need to be able to anticipate and prepare for climate risks. This includes for example observing current climate variability, accessing and allocating resources and assessing potential measures to adapt. Thereby a country's approach is embedded in its historical development, social order and institutional conditions. Institutional changes consistent with the broader political, social and economic conditions help create appropriate internal dynamics for transformation (OECD 2000, UNDP/GEF 2000). Otherwise it can distort national policies and institutions, undermine local capacity or fragment management processes.

The question that arises is what constitutes the capacity of institutions to perform climate specific functions, solve problems of climate impacts and manage adaptation to adverse climate impacts? In this paper, capacity is understood as the ability of people, organizations and society to successfully manage their climate concerns. Based on this, capacity extends over the individual experience, knowledge and technical skills and depends on the organizational environment in which people apply their skills (Fukuda-Parr et al., 2002; OECD, 2006a). The broader enabling environment of institutional frameworks, power structures and the legal environment shape the functioning of organizations. The enabling environment also reflects the societal context in which mainstreaming processes take place and can create opportunities for organizations and people to engage in actions. This level of capacity also includes the ability to influence mainstream policy-making.

In this sense, functional institutions that foster adaptation to climate impacts and integrate adaptation with development assistance in Mozambique rely on individual climate specific skills, awareness of climate issues and engagement in climate adaptation. An organizational environment between Mozambican and international organizations that promotes cooperative processes, designates clear mandates for organizations and generates the necessary climate data and information is required to fully integrate and operationalize the individual skills. Considering the cross-scale interactions between the institutions which operate in the Mozambican climate-development context, a broader societal context which positively influences the behavior of organizations and individuals towards climate issues, harmonizes climate policy with other policy domains and provides a positive attitude towards climate adaptation is essential to address problems of climate impacts and manage adaptation to adverse climate consequences in the country.

Importantly, institutional capacity for improved mainstreaming of climate adaptation require more than climate specific skills, *e.g.*, climate vulnerability assessment, climate policies, adaptation technologies. It also extends to broader climate-relevant skills, *e.g.*, good governance, conflict management, information and communication skills.

Recognizing that institutional determinants for mainstreaming climate adaptation operate at various scales, this paper performs the institutional analysis in Mozambique at all three levels of institutional capacity: the individual, organizational and enabling environment. The most important characteristics of these three levels are characterized in more detail below.

Individual

- Sufficient staff and experts for climate vulnerability assessment, development of climate adaptation strategies, design and implementation of climate adaptation policies
- Reasonable level of climate-specific skills
- Individual attitudes, knowledge, behavior and awareness of climate impacts
- Ability to develop of individual skills and learning through appearing opportunities

Organizational

- Specific mandate on climate issues
- Focal points on climate issues within an organization
- Provision of climate data and information systems
- Organizational structures, processes, resources and management abilities

Enabling environment

- Societal support for climate adaptation
- Level of commitment and cooperation on climate adaptation
- Leadership of an organization on climate issues
- Allocation of responsibilities within the mainstreaming processes of climate adaptation
- Underlying public sector strategies for climate policy integration
- Creation of opportunities to enable efficient use and development of skills and resources
- Political accountability, independence and transparency in decision-making processes

Following this framework, expert interviews were used to characterize the nexus between climate and development, and to identify barriers and opportunities of mainstreaming of climate adaptation in Mozambique. Specifically, relevant experts in Mozambique and Europe were identified by chain referral sampling (Meuser and Nagel, 1997). While chain referral sampling allows efficiently entering the climate-related development community, it bears the potential that experts primarily refer to colleagues of their own community, which may follow the same opinion. To avoid a narrow perspective, 31 expert interviews were held at 24 institutions. Institutions included ministries, institutes and research institutions at national level and

international organizations, donor agencies, ministries and research institutions at international level. Expert consultations held as semi-structured interviews considered three domains: (a) climate vulnerability of development goals and sectors, (b) integration of climate adaptation into development assistance and (c) potential barriers to and opportunities for mainstreaming climate adaptation into development assistance.

3 The climate-poverty nexus in Mozambique

Mozambique was one of the 189 nations that adopted the Millennium Declaration in September 2000 and committed itself to an ambitious development agenda to achieve the Millennium Development Goals (MDGs) by 2015. Recent studies by bilateral and multilateral development agencies as well as NGOs have shown that climate impacts threaten to reverse human progress and make the MDGs unattainable (Chigwada, 2004; ODI, 2004; Sperling, 2003; Simms and Reid, 2005; Magrath, 2006).

A 2005 review showed that Mozambique is unlikely to attain the MDGs within the given timeframe (Table 1) and that progress has been slow in the areas of hunger eradication, extension of primary education, gender equality, HIV/AIDS reversal, and environmental sustainability (GoM, 2005a). In particular the overarching goal of reducing extreme poverty and hunger is undermined as climate impacts reduce people's livelihood assets (*i.e.*, health, water, and infrastructure) and impinge on food production. Climate change is expected to exacerbate livelihood conditions, *e.g.*, through food insecurity, increasing prevalence of vector-borne diseases, especially malaria, and deepening existing gender inequality.

Millennium Development Goal	Will target be met?	Supportive environment
MDG 1: Extreme Poverty and Hunger		
- Eradicate extreme poverty	Potentially	Strong
- Eradicate hunger	Unlikely	Fair
MDG 2: Universal primary education	Unlikely	Fair
MDG 3: Gender Equality	Unlikely	Weak but improving
MDG 4: Child Mortality	Potentially	Fair
MDG 5: Maternal Health	Potentially	Fair
MDG 6: HIV/AIDS, Malaria and other Diseases		
- Halt and begin to reverse spread of HIV/AIDS	Unlikely	Fair
- Halt and begin to reverse incidence of Malaria and other diseases	Potentially	Weak but improving
MDG 7: Environmental Sustainability		
- Integrate sustainability principles into country policies and programmes, reverse loss of environmental resources	Unlikely	Weak but improving
- Halve proportion of people without access to safe drinking water and sanitation	Unlikely	Weak but improving
- Significant improvement of lives of slum dwellers	No data	Weak but improving
MDG 8: Global Partnership		
- Develop further an open, rule based, predictable, non-discriminatory trading and financial system	Potentially	n/a
- Address the special needs of LDCs	No data	n/a
- Deal comprehensively with debt problem trough national and international measures in order to make debt sustainable in the long run	n/a	Fair
- In cooperation with developing countries develop and implement decent and productive strategies for work for youth	No data	n/a
- In cooperation with pharmaceutical companies provide access to affordable essential drugs in developing countries	No data	n/a
- In cooperation with private sector make available to benefits of new technologies, especially information and communication	n/a	Weak but improving

Table 1: Progress towards the MDGs in Mozambique (Source: GoM, 2005a).

Furthermore, recent climate events such as the floods of 2000 and 2007 have undone years of development efforts and the adverse impacts of climate change may further slow Mozambique's development. The recovery costs following recent climate extremes (Table 2) provide an indication of the magnitude of the annually occurring damages. In Mozambique annual growth was estimated at only 2% after the devastating floods in 2000, having severely declined from 8% beforehand (Washington et al., 2004).

Province	Rural Poverty	Recovery costs (thousand USD)								
		Droughts			Floods			Cyclones		
		2002/3	2003/4	2004/5	2002/3	2003/4	2004/5	2002/3	2003/4	2004/5
Cabo Delgado	64.8	2,324	113	50	231	2,385	76	589	589	82
Gaza	61.0	2,222	8	208	903	2,757	707	419	1,548	373
Inhambane	84.7	8,199	182	27	894	329	866	1,504	75	8
Manica	32.0	1,715	248	73	233	1,303	145	0	85	80
Maputo	83.0	4,523	9,095	285	576	4,873	281	380	60	312
Nampula	58.7	4,032	117	438	529	1,166	94	4,998	2,836	738
Niassa	49.7	1,587	93	35	448	0	0	0	0	0
Sofala	40.8	1,185	970	250	191	806	1,028	434	1,300	709
Tete	57.8	2,276	2,081	2,191	90	83	3,160	0	0	0
Zambézia	45.0	4,695	521	819	987	844	1,786	666	442	1,019
Total	55.2	32,756	13,428	4,376	5,082	14,546	8,143	8,991	6,935	3,321

Table 2: Recovery costs following climate impacts between 2002 and 2004. (Source: GoM, 2004).

Little progress has been made in relation to MDG 1 (Eradication of extreme poverty and hunger), which targets primarily the 86% of the Mozambican population living in rural areas (INE, 2005). Current climate impacts felt by the poor largely arise through inter-annual climate variability (e.g. seasonal droughts) and extreme events (severe seasonal flooding and cyclones). The poor are particularly vulnerable due to variety of factors, including the exposure of their livelihood assets, the lack of access to services, poor infrastructure, limited capacity to cope with adverse events, and prevalence of climate-related diseases. These are frequently exacerbated by food insecurity and gender-specific stress factors (Table 3). Some of the key climate-related factors that were identified through expert interviews include:

High degree of exposure of the rural poor: The livelihoods of the poor largely depend on agricultural activities, including farming in areas prone to drought, floods, and cyclones. This exposes their physical assets such as shelter, livestock, and crops to direct damages due adverse events, and tends to increase poverty in the long-term due to the loss of productive assets. Many of Mozambique smallholder farmers are among the poorest and practice farming in downstream areas of the Mozambique river basins that frequently experience flooding and upland areas affected by seasonal drought

Limited access to water, economic opportunities and infrastructure: The isolation of rural communities with a lack of economic opportunities and social infrastructure poses a major challenge to poverty reduction in face of adverse climate impacts (Wiles et al., 2005; Chigwada, 2004).

Limited capacity to adapt: The capacity of the poor to adapt to seasonal climate variations and respond to extreme events is frequently limited due to a variety of factors, including limited

means to invest in more climate-resilient farming practices such as water harvesting and drought-tolerant varieties.

Health: Various infectious diseases in Africa are linked to climate (Githeko et al., 2000; WHO, 2004; Thomson et al., 2006). Diseases bear potential to affect household labor and are expected to further increase with climate change. Generally, poor health and sanitation conditions worsened by insufficient water availability act as both driver and consequence of poverty (Malaney et al., 2004).

Gender: The time diverted to household tasks reduces the available time of already climate constrained female-headed households to follow an income generating activity and participate in decision-making (Denton, 2004). Future climate conditions are likely to affect current gender inequalities (Lambrou and Piana, 2005).

Food Security: Food insecurity caused by climate-related agricultural production loss is particularly prevalent in the South of Mozambique (SETSAN, 2005a, b, c) and transport infrastructure significantly hampers effective food distribution in times of disasters.

As a result of the combination of the high exposure to climate events, the high sensitivity and the low adaptation level, climate events have already severely affected poor rural communities. While climate is not directly addressed in the Millennium Development Goals, the examples above show the difficulties to attain MDG 1 given current climate variability. Moreover, climate change is posing further challenges to livelihoods and future development progress may be impeded by the increasing frequency and intensity of climate extremes.

MDG 1	Impacts of climate variability and change	Currently exposed areas[6]	Affected social groups
Eradicate extreme poverty and hunger	Current climate variability • Straining food security due to reduction or failure of agricultural production • Reducing people's livelihood assets, including housing, education centers, health provision, sanitation supply and road infrastructure as well as the access to water • Tying up work force due to climate-related diseases • Reducing income opportunities Future climate change • Straining food insecurity as a result of high flood and erosion risks for the majority of agricultural areas • Destroying maladjusted infrastructure, *e.g.,* housing, roads, education and health centers • Impeding economic development due to destroyed productive assets and diseases • Posing a potential disincentive for investments in high risk areas	High drought exposure: Main areas of Maputo and Gaza and parts of Cabo Delgado, Inhambane, Manica, Nampula, Sofala and Tete High flood exposure: River valleys and coastal zones: Inhambane, Gaza, Maputo, Sofala, Tete, Zambézia High cyclone exposure: Coastal zones: Inhambane, Nampula, Sofala, Zambézia High exposure to food insecurity: Gaza, Inhambane, Niassa, Sofala, Tete and major parts of the remaining provinces	• Remote rural communities • Smallholders • Women and girls more severely affected

Table 3: Climate-Impact Matrix for MDG 1 "Eradication of extreme poverty and hunger" (Sources: Expert interviews and literature review).

4 Climate adaptation in development assistance

Official development assistance constitutes 24% of the Mozambican gross national income (OECD/World Bank)[7] and acts therefore as an important development driver. The five main

[6] Current climate exposure as extracted from SETSAN (2005c).

donor agencies and bilateral partners are the World Bank, the European Union, the United States, Denmark and the United Kingdom which account for about 50% of the average 2003-2004 gross ODA. In the following sub-sections, climate threats are analyzed at sub-national level and three projects are shown as examples to illustrate how climate vulnerability of affected communities is incorporated in project design.

4.1 Climate-sensitive development activities

Inputs and activities of the five main donors focus on all major development sectors, including agriculture, water, health, environment, energy and education. Since sectoral evaluations would not capture all climate risks, six donor agencies have screened their portfolios to assess the potential climate risks on their activities in various countries (Agrawala, 2005; Burton and van Aalst, 1999, 2004a, b; DFID, 2004; Eriksen and Næss, 2003; Kasparek, 2003; Klein, 2001; Robledo et al., 2006).

For this paper, a sub-national analysis of climate-sensitive ODA activities by the five main donors was performed based on the project objectives provided in the ODAmoz and EU DbIS databases (ODAmoz, 2007; DbIS, 2007). Where project descriptions did not yield sufficient details, the OECD's Development Assistance Committee's sector was used to estimate the overall project objective. All projects ongoing in 2006 were covered. The criteria to select climate-sensitive ODA projects are based on two dimensions: (i) deliverables in terms of physical infrastructure sensitive to floods or cyclones, *i.e.,* transport, irrigation, health and sanitation infrastructure and flood protection, and (ii) targeted management effectiveness which may be affected by climate impacts considering the agricultural sector, food security and malnutrition, water supply, sanitation and irrigation management, rural incomes and development as well as natural resource management. If not all objectives of a selected project were climate-sensitive and no breakdown of the budget by objective was available, the total budget committed to this project was included in the analysis. Annual budget estimates were calculated as the average of the total project budget for one year. As a result, the average climate-sensitive ODA budget of the five main donors amounts to about USD 248 million in 2006, which constitutes 44% of their average 2003-2004 gross ODA.

Since climate impacts show distinct geographic patterns, the portfolio analysis was further refined by spatially disaggregating climate-sensitive development activities to the sub-national level. To do this, project budgets were attributed to the highest administrative unit indicated in the project description or based on the targeted sectors, *e.g.,* coastal zone management. Investments committed at national scale were evenly distributed among the 10 provinces. This may overestimate funding for the province with the lowest number of districts, the Maputo province. However, as Maputo province includes the capital city with the highest density of roads, water and sanitation infrastructure, it is assumed that ODA projects are likely to invest a high proportion of the budget into Maputo province.

The three provinces receiving most climate-sensitive ODA investments are Zambézia, Sofala and Maputo (Figure 1). Taking into account the exposure to current climate, the risk of ODA deliverables being adversely affected by droughts, floods and cyclones becomes evident. An

[7] OECD/World Bank: Mozambique ODA statistics. Accessible at: www.oecd.org

overview of climate-sensitive ODA investments, their exposure to current climate impacts and recent recovery costs are provided in Table 4.

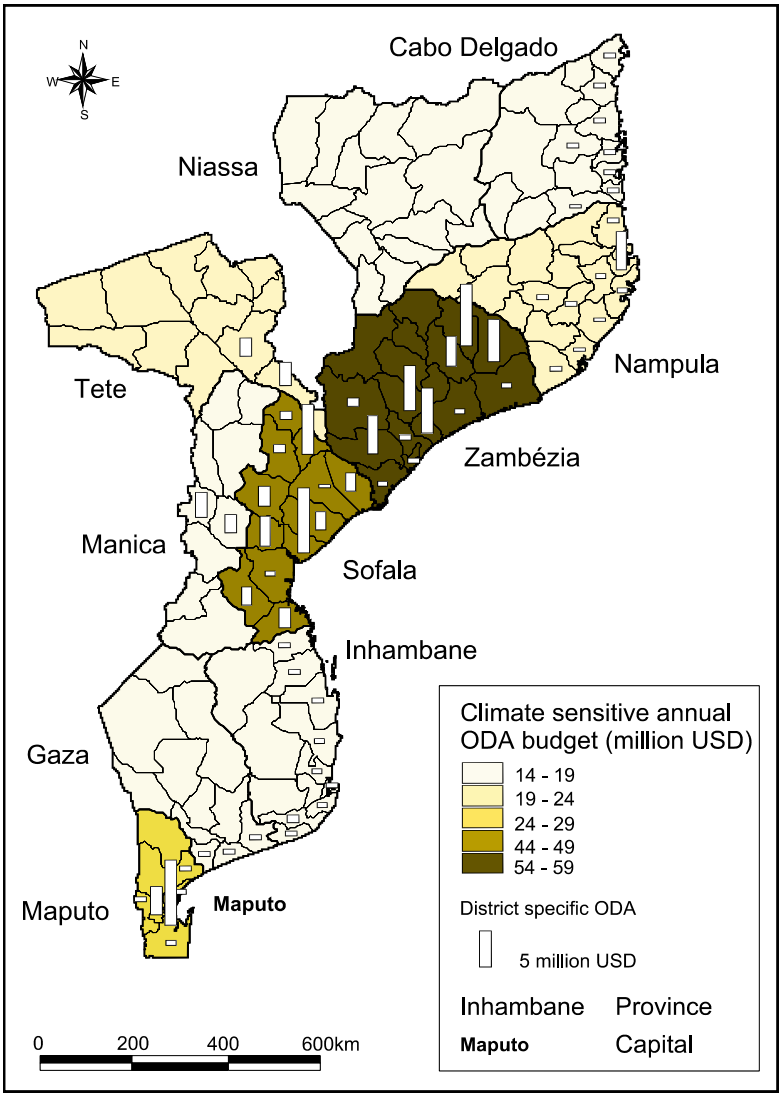

Figure 1: Spatial distribution of climate-sensitive ODA investments supported by the five main donors in 2006. (Data source: ODAmoz, 2007; DbIS, 2007).

The European Commission, the main donor in Zambézia, committed major investments in road infrastructure in this province. The Caia bridge and Namacurra road constructions are taking place in districts highly exposed to cyclone impacts with some of them additionally exposed to floods. The World Bank Railways and Ports project is implemented in Maputo, Nampula and Sofala where the majority of districts are similarly highly exposed to cyclones or floods. Even though ODA projects in some sectors, *e.g.,* agriculture and infrastructure, are sometimes designed taking current climate risks into account, the tremendous climate damages in the early 2000s demonstrate the insufficient adaptation to such extreme events. In total, 61% of the recovery costs following recent climate impacts were recorded in Maputo, Nampula, Inhambane and Sofala

(Table 4). In addition, the exposure to current climate impacts points out that ODA activities are particularly vulnerable in the Zambézia and Maputo provinces, which underlines the need for well-adapted ODA investments.

Provinces	Climate-sensitive ODA (million USD)	Proportion (%) of districts highly exposed to			Recovery costs (million USD)
		Droughts	Floods	Cyclones	
Zambézia	55.878	0	19	69	11.779
Sofala	46.809	25	67	50	6.873
Maputo	27.062	75	63	0	20.385
Nampula	20.021	17	0	78	14.948
Tete	19.255	50	17	0	9.881
Manica	18.837	44	22	0	3.882
Inhambane	15.950	21	7	100	12.084
Cabo Delgado	15.163	13	0	0	6.439
Gaza	14.398	73	64	0	9.145
Niassa	14.118	0	0	0	2.163
Total	247.491	27	22	35	97.578

Table 4: Average annual climate-sensitive ODA by the five main donors in 2006, exposure to current climate impacts (*cf.*, sect. 3.2; SETSAN, 2005c) and recovery costs following climate impacts in 2002-2004 (GoM, 2004).

Future climate change - hardly ever integrated into development projects - will even increase yet existing challenges to ODA investments. The projected higher rainfall intensity and related flood risk in the central and southern parts of Mozambique require more sophisticated flood adaptation.

In summary, the major climate-sensitive development investments in regions highly exposed to severe climate impacts strengthen the rationale for mainstreaming climate adaptation. Adaptation projects that seek to reduce climate vulnerability of affected communities and strengthen the development context in a climate robust way, *i.e.*, ensure long-term sustainability of development interventions facing their climate vulnerability, are a necessary prerequisite for sound development progress. ODA projects that explicitly address climate vulnerability, related disaster risk management and institutional capacity in their objectives are further analyzed below.

4.2 Current adaptation to climate variability and change

Given Mozambique's exposure to extreme climate events, donors have targeted both short- and long-term interventions in climate-sensitive development areas. Vulnerability reduction in the short-term are addressed for instance through early warning systems for floods and droughts, whereas long-term vulnerability reduction includes improved disaster management, building of climate resistant infrastructure and advancing information dissemination and communication. Table 5 summarizes all relevant information gained in the expert interviews and review of ODA projects.

Adaptation Interventions		Relevant ODA projects
Short-term vulnerability reduction	Long-term vulnerability reduction	
Early warning and forecasting - Forecast extreme events and impacts - Implement early warning systems on floods and cyclones	Vulnerability and disaster management - Develop national disaster management plan - Establish local disaster risk management (DRM) as part of the National Risk Management Policy - Provision of technical assistance to integrate DRM into district planning - Develop national early warning system - Formulate a Joint Integrated Water Resources Management Strategy for the Pungwe Basin - Promote drought preparedness and mitigation policies - Enhance food security and capacity to adapt to drought - Limit land degradation - Enhance resilience of ecosystems to climate change - Manage emergency stocks - Risk mapping - Provide training on disaster management Adaptive infrastructure and technologies - Build cyclone resistant settlements and infrastructure - Improve water related infrastructure - Promote farming techniques and technologies for adapting to climate impacts Information management and communication - Establish a Disaster Information and Communication Centre - Provide predictive capacity to evaluate vulnerability to climate change - Manage and disseminate data and information - Provide training on GIS software and use of remote sensing Promote international cooperation - Assist developing countries to prepare, formulate, implement and evaluate their climate change policy Promote research - Research on climate risks, health sector, regional development planning and disaster management	- Capacity Building for Disaster Management - Capacity Building for Vulnerability Reduction Project - Capacity Building in Geoinformation for Sustainable Development at CIG/UCM in Beira - Coping with drought and climate change - Disaster Risk Management along the Rio Búzi - Drought mitigation plan - Installation of CIG for Geoinformation for Sustainable Development at the Catholic University UCM in Beira - Joint Pungwe Project - Market led Smallholder Development in the Zambezi Valley - Netherlands Climate Assistance Program

Table 5: Current adaptation interventions and related ODA projects targeting MDG 1 "Eradicating extreme poverty and hunger" (Sources: Expert interviews and review of ODA projects).

The broad range of adaptation measures shown in Table 5 are important steps to improve basic livelihood conditions and address many of the climate impacts captured in the Climate-Impact Matrix (*cf.*, Table 3). For example, building of adaptive infrastructure for cyclones contributes to reduce the loss of livelihood assets. Early warning and forecasting systems help to reduce flood and erosion risks and improve drought preparedness. Early information is also essential to forecast climate driven malaria epidemics (Githeko and Ndegwa, 2001; Thomson et al., 2006).

Since the individual adaptation projects listed in Table 5 were not designed within a single comprehensive climate adaptation framework, each of them only captures specific aspects of climate vulnerability in a distinct region. Three ongoing projects were reviewed in more detailed in light of their effects on reducing vulnerability in the short- and long-term. They address climate vulnerability resulting from droughts, floods and cyclones in the areas of sustainable land management, food security, water management and disaster risk management.

Market-led Smallholder Development in the Zambezi Valley (World Bank)

The smallholder development project funded by the World Bank and the Global Environment Facility

(GEF) seeks to limit land degradation and improve the ecosystem's resilience towards climate change in five districts of the Central Zambezi Valley. It aims at promoting sustainable rural livelihoods by increasing smallholder's income. The five targeted districts are situated across the highly climate exposed provinces Zambézia, Tete and Sofala. In terms of climate adaptation, the project seeks to increase the regional predictive capacity and enhance sustainable land management in order to decrease pressure on the ecosystems. The project sees climate variability, including droughts and floods, as a risk to the achievement of its objectives (World Bank, 2006b). Based on scenarios for future climate change projected by the IPCC (2001), the project recognizes the associated risks of food shortage, land degradation and water and sanitation supply services mainly affecting the rural poor.

Notably, the project focuses on strengthening Mozambique's National Adaptation Programme of Action (NAPA) and builds national institutional capacity to assess inter-linkages of hydrology, land cover and land use changes. It also supports a national database on climate, land use and hydrology to improve collaboration between national institutions, *e.g.*, INAM, CENACARTA (National Centre for Cartography and Remote Sensing), DNA and ARA (National and Regional Water Authority) (World Bank, 2006b). As the available data and information on land use in the Central Zambezi Valley is insufficient, the Smallholder Development project purchases satellite imagery to determine land cover and deforestation rates. These images will be made available as open source information according to a senior scientist at the World Bank, which is expected to stimulate the integration in larger data and decision support networks. Overall, the project is a good example on how to integrate adaptation to current climate variability and future change into agriculture, namely sustainable land management.

Drought Mitigation Plan (EC)

The Drought Mitigation Plan is born out of an increased cooperation between the Government of Mozambique and the European Commission in the areas of food security and agriculture. Funding is provided to improve water management for agriculture and livestock production in Gaza and Inhambane. While both provinces receive comparatively little climate-sensitive ODA (*cf.*, Figure 1), they are both medium-highly exposed to droughts and related food insecurity. The project starts from the point that improved adaptation is needed to the recurring droughts in the South of the country including increasing irrigation efficiency, rehabilitating and developing water infrastructure and on-farm water management (FAO, 2006). Therefore, the Drought Mitigation Plan will identify further investment needs to build or rehabilitate water supply infrastructure providing flood regulation during the wet season and with this help stabilize base flow during the dry season.

Synchronistic support for water infrastructure and institutional capacity building is a crucial factor for assuring benefits from development investments. Consequently, the provision of technical assistance and training for climate adaptation is highlighted (FAO, 2006). Although the project well incorporates current climate conditions into its design, reference to future climate change is missing. This could well serve as an entry point for upgrading the design and implementation of project objectives.

Disaster Risk Management along the Rio Búzi (GTZ PRODER)

GTZ PRODER supports the district development program, in which it places particular emphasis on disaster risk management in the Búzi district (Sofala province), which is highly exposed to floods and cyclones. Being part of the pilot phase of the Climate Protection Programme for Developing Countries (CaPP) initiated by the GTZ, the Búzi project has disaster prevention and preparedness components aiming at decreasing climate vulnerability. Measures include construction of new housing facilities on higher grounds away from flood prone areas, cyclone resistant rehabilitation of damaged infrastructure and implementation of early warning systems for floods and cyclones.

Current climate variability informs the design of risk management and adaptation measures. The threat of more frequent extreme events caused by future climate change is also well integrated. Regional forecasting and early warning as provided by the Southern African Regional Climate Outlook Forum (SARCOF) help to ensure development progress. Although no information is included on the temporal distribution of rainfall over the wet season, *e.g.*, on-set and duration of rainfall, the probabilistic rainfall information serves as rough orientation for agricultural production potential. Finally, a concept was developed to integrate disaster risk management into the district planning process. This project is a good example on how to integrate a long-term perspective to vulnerability reduction. Drawing on the successful Búzi example, disaster risk management was also implemented in the districts of Caia, Chemba (both Sofala) and Govuro (Inhambane). Concern was however expressed by a GTZ representative that personal resources, organizational capacity and available financial means largely restrict the extension to other areas.

Several lessons learnt from these three examples can be formulated. Forecasts and early warnings are vital to prepare for emergencies and reduce climate vulnerability. In addition, open source information bears a high potential to strengthen the national data network and decision support system. Success of climate adaptation interventions is influenced by the changing dynamics of climate vulnerability and there are several opportunities to evaluate and monitor adaptation interventions. Indicators for the success of the Zambézi Smallholder project could include for example the productivity of the natural and technological resources, the total agricultural production and market accessibility. Another option to assess the Búzi project would be to consider improvements in disaster risk management at local scale and changes in district area planning. Changes of recovery costs could further indicate advances in disaster risk management at regional level.

To further seize potentials of development assistance to bridge remaining gaps, the status of adaptation initiatives could be explored at various levels, *e.g.*, national, governmental and non-governmental. For example, coastal zone development has a great potential to contribute to vulnerability reduction in face of more severe future cyclone activity and flooding. Enhancing the resilience of natural ecosystems, *e.g.*, mangroves and coral reefs, may offer a way to progress development in coastal zones. For this, specific adaptation components as for example the coastal development initiatives by the World Bank and Denmark could help to meet the full adaptation potential.

Long-term adaptation in agriculture is crucial to shift out of climate-sensitive practices. Agricultural production can be designed as flood resistant under current climate, but may not be efficiently maintained with aggravating future rainfall intensity or cyclone activities. Entry points may be developed based on the traditional agricultural production system, which involves for example cultivating crops at different distance to rivers. In this traditional system, a cultivated low-lying area in vicinity to a river provides suitable water access during droughts, while flood protection is achieved in up hill areas. Agricultural research could provide further strategic adaptation options through transferring the agricultural system to less water demanding crops and livestock in drought prone areas.

In addition to direct climate effects on agricultural production, climate-related diseases or out-migration can reduce the available labor force in a given area. Hence, interventions to transfer rural poor out of the predominant agricultural sector into skilled off-farm labor are important to sustain livelihoods in the term (Jayne et al., 2003). To support this long-term goal, climate robust incentives to agriculture could generate rural purchasing power, which may stimulate growth in

the secondary and tertiary sectors (Heltberg and Tarp, 2002). The concept of strengthening the smallholder sector through both diversification of the agricultural production system by, *e.g.*, diversifying cultivated crops or installing irrigation systems, and considering off-farm alternatives, *e.g.*, processing of agricultural products, is commonly applied in development assistance – regardless of specific reference to climate impacts. Adverse climate impacts as shown in section 3.2, however, have already aggravated smallholder livelihood conditions and challenged development progress above all in areas with limited livelihood alternatives. Given the expected increase of adverse climate impacts as a result of future climate change development assistance faces additional development challenges. Adaptation challenges could thereby arise from both climate impacts on the project deliverables as discussed in section 4.1 as well as impacts on the climate vulnerability of affected communities.

In summary, besides a strong rationale for mainstreaming climate adaptation into development assistance adaptation efforts are currently limited to stand-alone projects. The majority of ODA investments do not take into account current or future climate risks and climate robust development is generally not ensured. Also, adaptation measures now being integrated in development processes can have positive long-term effects on future climate vulnerability. This momentum is essential to prevent aggravating development conditions due to climate change. As a number of development projects have the potential to integrate climate adaptation into their design, the following section outlines reasons why mainstreaming is constrained and how it can be promoted.

5 Mainstreaming climate adaptation into development assistance

The above analysis presented some important insights into how climate impacts the deliverables of ODA projects and how some of the donors and technical agencies have started to address specific climate vulnerabilities in project design. At the same time, barriers still exist to further apply important lessons learnt more broadly. This section first presents some key institutional barriers to incorporating climate adaptation more systematically and then proceeds with opportunities to enhance mainstreaming into development assistance in Mozambique.

5.1 Institutional barriers to mainstreaming

The structured interviews with international and national experts addressed all three levels of institutional capacity: individual, organizational and enabling environment. The management of disaster risks frequently revealed some important barriers and is analyzed in more detail below.

The level of perception was evaluated according to the number of experts relating to a specific barrier as being important. A barrier received the highest perception level (+++) if more than two third of the experts highlighted it as main barrier, while the medium perception level (++) was given if between one and two third of the experts underscored a barrier. Less than one third of expert notions resulted in the low perception level (+). Table 6 summarizes the perceived barriers according to experts at donor and national institutions. The barriers are not entirely climate specific, but also extend to development barriers. In the following text, specific circumstances and causes of the barriers are explored.

Perceived barriers to mainstreaming	Institutions	
	Donors	National
Individual		
Lack of human resources within relevant institutions	+	++
Organisational		
Insufficient data and information availability	++	+++
Weak data and information management	++	++
Inadequate data and information dissemination	++	++
Erosion of institutional memory	+	+++
Enabling environment		
Lack of inter-institutional coordination and communication	+++	+++
Gaps and overlaps in mandates of institutions	+++	+
Short-term development goals are given a higher priority	++	++
Scarce sources of adaptation funding	+	+++
Lack of communication with and participation of local communities	+	++
Example: Disaster risk management		
Absence of a coordinated strategy for disaster risk management	+++	++
Predominant culture of emergency response	++	+++
Lacking transparency in planning and implementing processes	++	+
Lack of disaster management at local and district level	++	+

Table 6: Main barriers to mainstreaming adaptation into development assistance perceived by donor and national experts. (Level of perception: +++ high, ++ medium, + low).

Individual level

Addressing climate vulnerability requires human resources with appropriate levels of climate-specific skills and capacity to network and cooperate on climate issues. These resources and skills are important for assessing climate vulnerability, formulating strategies and development targets. The majority of national experts highlighted the shortage of human resources as an important barrier to strengthen institutional capacity for climate adaptation. This echoes the limited availability of skilled personal, with only a few thousand Mozambicans holding a university degree (Stasavage, 1999). Limited incentives in the national public sector were frequently mentioned by the experts as contributing to the shortage of skilled staff in climate-relevant institutions such as INAM or the National and Regional Water Authority ARA.

Organizational level

The success of mainstreaming efforts depends on the capacity of responsible organizations to plan and implement respective measures. This capacity is affected by the continuity of institutional processes. Institutional memory and inter-institutional coordination are important factors in allowing adaptive measures to be adopted both in project design and approval as well as in having a broad-based policy dialogue on climate-related vulnerabilities, including the drafting and approval of key documents such as the National Communication to the UNFCCC, the National Adaptation Programme of Action (NAPA), the National Capacity Self Assessment (NCSA) and the National Strategy for Sustainable Development. The release of adaptation funds such us under the UNFCCC Least Developed Countries Fund (LDC Fund) is contingent on these core documents and requires government processes to be streamlined.

The availability and proper management of climate data and information is paramount for planning and implementing adaptation measures (*e.g.*, Dilley, 2000; Hulme et al., 2005). However, data collection and information management is limited in Mozambique which represents a main barrier to mainstreaming. The national climate data network requires

substantial rehabilitation, partly due to damages done during the civil war, and limited means to collect and process data results in data inconsistencies and inadequate coverage. Equally important is the timely provision of climate information for planning purposes and to respond to seasonal extreme weather events. Mozambique, similar to many other countries in Sub-Saharan Africa, has limited capacity to provide such services due lack of reliable, long-term data and well-trained scientists (UNFCCC, 2006a; Washington et al., 2006). As a result, decision makers have adopted development interventions without directly considering climate impacts (IRI, 2006).

Mozambique avails of several seasonal forecasting systems and early warning systems, both at the regional and national level, including the Southern African Regional Climate Outlook Forum (SARCOF), the national food insecurity monitoring by SETSAN and Famine Early Warning System network (FEWS NET), and the early warning system for floods and cyclones by the GTZ in Sofala. While improvements have been made in how the seasonal climate information is generated and disseminated, an important barrier in limited capacity by the end-users to effectively to reduce climate vulnerability on the basis of this information. In agriculture, for instance, effective use of climate forecasts by farmers at local level requires access to productive means such as credits, fertilizers, seeds and machinery as well as the ownership of landholdings (O´Brien et al., 2000; Vogel, 2000). In addition, linkages between responses to climate forecasts from farmers, the marketing sector and the non-agricultural sector in Mozambique suggest that seasonal climate forecasts can be particularly beneficial when focused on the marketing sector (Arndt et al., 2003). Based on empirical evidence in Zimbabwe, Patt and Gwata (2002) list credibility and scale constraints as important limits of forecasts to inform the public and private sector on climate risks. Trust and effective use of seasonal forecasts by farmers in Mozambique is limited to some extent due to intrinsic uncertainties in forecasting.

Enabling environment

Inter-agency coordination and communication is an important factor for effective climate mainstreaming. Overlapping mandates of government entities tend to create conflicts and slow responses to climate-related climate stresses and natural disasters. Communication is a major challenge in particular in areas vulnerable to natural disasters and climate-relevant ministries and national institutions require clear focal points (INGC, 2006).

In addition to the constrained ability of institutions to network, limited government effectiveness and vested interests influence governmental procedures in Mozambique (Kaufmann et al., 2007). Lack of transparency impinges on budgetary processes, regulations and policy implementation and represents an impediment to decision making and fiscal planning for adaptation. Acemoglu et al. (2001) argue that in many developing countries, like Mozambique, inefficient policies and institutions favor suboptimal governance conditions. Kaufmann and Kraay (2003) find a negative feedback from per capita incomes to quality of governance which is attributed to captured states. That is, improving governance conditions for advancing climate mainstreaming depends on the broad institutional setting, *e.g.*, political accountable, transparent and independent institutions, which are jointly being addressed by donor and the Mozambican government.

Another fundamental condition for institutions to perform their functions is to possess sufficient financial resources. Expert interviews support the notion that limited financial resources represent a major barrier, though this is primarily noted by the national experts and less by the donors. However, distinction needs to be made between the actual existing means for climate adaptation

and access to these resources. Access to existing financial resources for adaptation is a complex and lengthy process for all African countries and for this reason an increasing individual and organizational capacity to prepare projects proposals is necessary in order to better access the existing financial resources (UNFCCC, 2006a).

Regarding the importance of climate impacts for achieving development goals that have largely been neglected in the development debate, the barriers presented above are major hindrances to achieving climate informed development progress. Based on these barriers, the following section discusses opportunities to overcome them.

5.2 Institutional opportunities for mainstreaming

As shown in the previous section, each of the three levels of institutional capacity shows different barriers to mainstreaming climate adaptation into development assistance. Specific opportunities identified through expert consultations and literature review are presented in this section. Planning and implementing climate adaptation for development assistance is shaped by bilateral and multilateral donors, but also depends on national development planning. Opportunities focus therefore on donors and the Government of Mozambique. While some barriers can be addressed by either the donors or the Government of Mozambique, certain opportunities can be seized in partnership. The options for mainstreaming climate adaptation are presented in an actor-oriented way to facilitate recognizing specific opportunities and collaborative actions.

(i) Individual level

Bilateral and multilateral donors

Donor initiatives have helped increase the number of well-trained staff at two important national institutions: INAM and the Eduardo Mondlane University. These two institutions play a key role in advancing climate adaptation since they collect and disseminate climate data and process necessary information on climate vulnerability and potential adaptation measures. INAM profited from funding supplied by Finland in collaboration with the EU (UNFCCC, 2006b), which supported the national weather service system between 2002 and 2006. During the project, local scientists, meteorologists and maintenance people at INAM were trained and can now better manage the national weather service system and produce sound reports on meteorological data and information. In the education sector, USAID, the University of Port Elizabeth, the University of Washington and the Seattle Partnership Project on Interdisciplinary Marine Studies established two Sub-Saharan Africa Coastal Initiative Groups, which provides opportunities for academics from the Eduardo Mondlane University in Maputo to participate in research on climate impacts on coastal zones at the University of Port Elizabeth. These two examples show that investments in education and training are an important vehicle and investment to build technical skills, networks and human resources that are fundamental for climate adaptation.

Government of Mozambique

The Government of Mozambique has created basic individual capacity for assessing national climate vulnerability and formulating adaptation strategies. This basic capacity could further be strengthened. The stabile economic growth at national level together with improved access to climate adaptation funds at international level would allow allocating resources to train staff in

ministries and national agencies and hire new skilled staff for planning and implementing national adaptation strategies. Specific resources could also be allocated to improving climate specific institutional cooperation and coordination procedures.

Partnership between GoM and donors

In a joint initiative, the Board for International Food and Agriculture Development (IFAD), USAID and African stakeholders corresponded to the human resource gaps which are particularly prevalent in the agricultural sector by supporting educational training on development of agriculture and agribusiness (Skelton et al. 2003). Based on the capacity needs within the sector, the team designed specific programs for training activities. This included for example the design of training interventions for scientist at the National Agricultural Research Institute (IIAM) to address the frequently expressed barrier of insufficient number of scientists with strong capability to formulate and carry out agricultural research relevant to climate impacts in Mozambique. With agriculture being the one of most vulnerable sectors, such individual capacity building can play an important role in climate adaptation.

(ii) Organizational level

Bilateral and multilateral donors

Organizational capacity on managing climate risks was greatly strengthened at regional level by the GTZ/PRODER project on disaster risk management in Búzi, Sofala and Inhambane (Bollin et al., 2005). A central initiative in preventing and preparing for climate disasters was the creation of local committees for disaster risk management. These organizational structures are responsible for data collection and dissemination, early warning, transport and evacuation measures. This provides an example for successful mainstreaming and implementing disaster management, which could be transferred to other mainstreaming issues. The local level structuring is accompanied by a close collaboration with INAM and ARA at national level. Being the two most important Mozambican institutions, which manage data and information on droughts, floods and cyclones, the improved coordination and communication could also benefit data and information management for other climate and development concerns.

Government of Mozambique

To improve institutional coordination and the integration of cross-cutting issues such as food security, environment and natural disasters into development planning, strengthening environmental units in all relevant sector institutions can improve the network for awareness raising and organizational capacity building. Specialists within the environmental units, which would be able to identify the sector specific climate impacts and develop appropriate adaptation strategies, are crucial to strengthen the capacity to effectively address climate risks within the respective sectors. This will also support the mandate of INGC (the coordinating body for disaster risk management) and SETSAN (the body responsible for coordinating the implementation of the National Food Security and Nutrition Strategy) to reduce the vulnerability of the poor.

Given scarce resources for adaptation measures, enhancing synergies between activities to implement the other Rio Conventions would be a beneficial action to increase the effectiveness of existing resources as combating desertification and biodiversity management contribute to climate adaptation. The NCSA process constitutes a key opportunity for creating synergies by considering common and cross-cutting issues among the Rio Conventions and links to other socio-economic issues (UNFCCC, 2005). MICOA has undertaken valuable efforts to coordinate the work among the Rio Conventions (MICOA, 2005). Even though MICOA is not a ministry with broad mandate as Sperling (2003) suggested as a pre-requisite, the implementation of activities to strengthen the synergies among the Rio Conventions is greatly enhanced since all three national focal points are based at MICOA. According to MICOA representatives, more efficient communication and personal coordination is already facilitated.

Partnership between GoM and donors

Reliable statistical information is fundamental for informed development interventions. Population data for example were a key to design the relief actions when Mozambique faced the devastating floods in 2000. The National Statistical Development Strategy (NSDS) represents the framework for coordinating all national surveys and statistics together with all international assistance for statistics. Being fully integrated in this framework, the available climate data and information, though limited, would facilitate the planning and implementing of adaptation to climate impacts.

The full potential of an even perfect data collection system can merely contribute to reduce climate vulnerability if data are efficiently used. Pilot projects on adaptation and lessons from the flood management in 2000 provide good experience on how to integrate existing climate data and information. For example, the GTZ project on Disaster Risk Management in Búzi (Bollin et al., 2005) and the Netherlands Climate Assistance Program (Van Drunen et al., 2006) provided valuable insights on how to integrate scientific knowledge and climate information in decision-making processes. In another viable effort to overcome shortcomings for climate adaptation, which became apparent during the 2000 floods, INGC, the Eduardo Mondlane University and FEWS NET compiled basic data on climate risks and livelihood conditions and assessed potential impacts of and responses to scenarios for floods, cyclones and droughts (INGC et al., 2003). The resulting Limpopo Atlas provides a comprehensive source of information for disaster preparedness at the scale of a complete river basin, and can serve as a model for similar data information and dissemination efforts.

(iii) Enabling environment

Bilateral and multilateral donors

A number of donors are taking the initiative to mainstream adaptation into their operations (*cf.*, sect. 4.2), including the OECD (2006b) and the European Commission (EC, 2004) by raising the policy profile of climate change, capacity building at the level of enabling environment and research on climate impacts, vulnerability and adaptation. The World Bank is developing a systematic approach to screening of public investments for climate impacts to identify climate

risks to an intended project and propose potential adaptation measures. The screening tool will serve to prioritize public investments for climate proofing (World Bank, 2006a).

Coordination for climate change adaptation is only effective if it avoid gaps and duplications (Frantz and Komich, 2003; Killick et al., 2005). The Country Analytical Work (CAW)[8] platform provides experience on policy dialogue, country strategies and operational aspects and the database ODAmoz enables tracking donors' and United Nations agencies' projects and programs. To increase awareness on adaptation measures, a new category for adaptation could be created under the targeted sectors following an earlier effort by OECD/DAC to identify projects in support of the Rio Conventions (so-called "Rio Markers").

Mozambique is a participant of the 2005 Paris Declaration on Aid Effectiveness, which provides impetus for budget support. Nonetheless project-type support is playing a key role in Mozambique today (GoM, 2006b). While project type assistance offers little benefits beyond the targeted community and mainstreaming adaptation efforts are rather short-lived (Killick et al., 2005), lessons learnt from concrete adaptation projects can provide important insights, raise awareness and inform decision-making on integrating climate risks at a more strategic, national level. Coordination on adaptation implementation may be undertaken under the Development Partners Group (DPG) in a working group at a technical level. Thereby, the identification of common strategic and operational adaptation interventions could benefit from insights presented in section 4.2.

Budget support provides a number of opportunities for advancing environmental considerations by offering the prospect for increased funding through the budget, strengthening budgetary processes within MICOA and increasing ownership over environmental spending plans (ODI, 2006).

Assistance under the Global Environmental Facility to develop National Adaptation Programmes of Action is a key funding vehicle for adaptation (Adger et al., 2003). Besides funding for preparing its NAPA under the LDC Fund, Mozambique has received further funding under the Strategic Priority on Adaptation and the SCCF. Improving coherence and identifying synergies between international initiatives would be an important step without necessarily developing new instruments (Dodds et al., 2002). Regional cooperation such as through the New Partnership for Africa's Development (NEPAD) and the Southern African Development Community (SADC) would also lend support to implement adaptation measures above all at cross-national level, *e.g.*, transport infrastructure, water supply and electricity generation. Initiatives at national and regional level imply specifically good prospects to assist developing country partners such as Mozambique when they are embedded in complementary action within the broader global environment (Bryceson, 2004; Jones, 2002; Metz et al., 2002).

Government of Mozambique

Stabile political conditions in Mozambique have created a suitable environment for considering newly emerging policy issues (Kaufmann et al., 2007). Mozambique has made considerable progress in integrating climate concerns in national development planning as demonstrated in

[8] Accessible at: www.countryanalyticwork.net

PARPA II, the current 5-Year Plan and Agenda 2025 (GoM, 2006a, 2005b, 2003). At the same time, it performed worst out of 53 countries subject to PRSP progress reports on the implementation of environmental measures (Bojö et al., 2004). Mozambique environmental assessment legislation is conducive for the mainstreaming of climate adaptation, though implementation capacity has been identified as a limiting factor (CIDA, 2004). International support for actual implementing adaptation measures remains important.

One way to advance the implementation of climate adaptation would include considerations for ensuring the integration of climate risks across all climate-sensitive sectors, e.g., agriculture, water and sanitation, health and infrastructure, in Mozambique's "External Aid and Cooperation Policy". In addition, a clear aid policy statement from the Government of Mozambique, indicating preferences for receiving aid in form of programmatic, project and technical assistance would help to set priorities to climate informed development (GoM, 2006b; Killick et al., 2005).

Finally, resources are available under the GEF to commence with the second National Communication to the UNFCCC. It is important to assess climate vulnerability and adaptation options for those sectors not included in the first National Communication, *e.g.*, health, education and fisheries, and these resources can help in restoring institutional memory, which will become important for the implementation of the NAPA (MICOA, 2003).

Partnership between GoM and donors

Being participants of the Paris Declaration on Aid Effectiveness provides a sound platform for the Government of Mozambique and donors to address challenges in the public sector performance. Improving the effectiveness and transparency in public institutions helps achieve long-term sustainable development in face of climate vulnerability. The parallel mainstreaming efforts at project and strategic level is a further important area of collaboration between the Government of Mozambique and the donors to implement short-term and plan long-term adaptation activities.

Stronger coordination between project mainstreaming under the DPG and budget mainstreaming under the Programme Aid Partnership (PAP) is an important mechanism to improve conditions for planning and project implementation to inform and complement each other. For example, experiences from existing projects that incorporate climate adaptation (*cf.*, sect. 4.2) could be widely shared among donors and the Government of Mozambique and assist the further development of vulnerability indicators under PAP's monitoring framework (Batley et al., 2006).

Another opportunity for enhancing the coordination and policy dialogue on mainstreaming adaptation is strengthening the current environment specific Sector Working Group (SWG). Broadening its current focus would offer an opportunity, given that environmental governance has been quite narrowly defined and is still strongly associated exclusively with MICOA's activities. Moreover, the environment SWG if integrated more strongly with other regular SWGs on agriculture, roads, natural disasters and food security could provide opportunities for mainstreaming climate adaptation.

Regarding the strengthening of Mozambican institutions to implement increased budget support efficiently, the Government of Mozambique together with bilateral and multilateral donors has adopted the sector-wide approach (SWA) in agriculture, health and education to increase the

institutional capacity of MICOA. Such an approach could well be extended to the environment sector.

NGOs and the civil society are often instrumental in ensuring that environment is on the national policy agenda and are already actively undertaking important adaptation activities (ODI, 2006). For example, the Mozambican Red Cross, supported by the Red Cross/Red Crescent Climate Centre, contributes to disaster preparedness at the national and local level. In addition, CARE International is currently in the process of developing an initiative to mainstream climate change adaptation into its development activities in Mozambique. Involving this expertise in planning and implementing of adaptation measures would foster significant long-term prospects of adaptation to climate impacts.

6 Conclusions and Policy Implications

Mainstreaming of climate adaptation into development assistance is still in its early stage in Mozambique. Integrating adaptation measures across all sectors and institutional levels is however important to safeguard existing and future development progress in light of the current high climate variability, the projected increase of extreme weather events and the development progress already being impacted by climate. Poverty and hunger reduction is particularly at risk due to both direct climate impacts of droughts, floods and cyclones as well as indirect impacts arising from climate-related health conditions and gender inequality.

Mozambique receives substantial development assistance in climate-sensitive sectors and regions that are exposed to climate risks. Thus, climate-informed investments are essential to enhance livelihood opportunities and reduce poverty. An analysis of ODA investments showed that major investments are made in climate-sensitive provinces highly exposed to droughts, floods and cyclones, and major recovery costs in the early 2000s demonstrated that current adaptation to climate impacts is insufficient. Apart from a few stand-alone projects in the agricultural and infrastructural sectors, current climate risks have not yet been systematically integrated into the design of ODA projects. This strengthens the need for mainstreaming adaptation to climate impacts.

Three projects analyzed in more detail provide insights into how adaptation can be incorporated in project planning and implementation. Land management, sound information on climate and early warning and forecasting systems play an important role at all levels. Each of the projects however covers only specific aspects of climate vulnerability and is limited to a distinct region, since these initiatives were designed as individual projects. Nevertheless, they are indicative of the type of action that is needed.

Although the legislative environment in Mozambique is conducive to mainstreaming climate adaptation, barriers exist both at the level of individuals, organizations and the enabling environment. The barriers to mainstreaming identified through expert interviews encompass constraints specific to climate adaptation and development progress, including the availability of human resources, data availability and management, organizational structures and networking as well as financial resources. Bilateral and multilateral donors are well positioned to play a catalytic

role in mainstreaming climate adaptation into development assistance and take advantage of the numerous opportunities to initiate action at governmental as well as donor level.

One important area of action lies in improving organizational capacity and the enabling environment. Continued budget support for the environment, with the aim of strengthening MICOA as an institution, would increase its leverage and convening power to coordinate other ministries that are instrumental in mainstreaming adaptation such as agriculture, energy or health. Another area of assistance is support of the Sector Working Group on environment. Joint meetings with other relevant working groups whose performance and deliverables are affected by climate impacts including agriculture, roads and health could encourage the cross-sectoral dialogue and ensure the consideration of climate mainstreaming in the relevant budgetary planning and implementation processes.

Another key area for mainstreaming climate adaptation is in education and training. Programme Aid Partners can play a key role in stimulating explicit consideration of climate change adaptation as a cross cutting issue. Climate adaptation specific indicators derived from the existing adaptation intervention could to be used in the joint reviews of PAP, and help to operationalize mainstreaming climate adaptation. Improved climate data collection and management as well as the national early warning and forecasting systems are further areas where donors can actively assist the Government of Mozambique in improving the foundations of climate informed development.

Finally, at the partnership level, bilateral and multilateral donors are in a unique position to support climate mainstreaming in development planning and implementation. A systematic approach to screen public investments for climate impacts at sub-national level and identify the existing capital stock to receive priority in the face of climate change are fundamental next steps to define targeted adaptation interventions. Such action provides valuable insights to be adopted by the Development Partner Group and associated sectoral working groups. Further actions include the broad engagement of stakeholders such as NGOs and the civil society in supporting adaptation projects in the country and promoting comprehensive capacity building programs.

References

Acemoglu, D., Johnson, S. and Robinson, J. (2001) The colonial origins of comparative development: An empirical investigation. American Economic Review 91(5): 1369-1401.

Adger, WN., Huq, H., Brown, K., Conway, D. and Hulme, M. (2003) Adaptation to climate change in the developing world. Progress in Development Studies 3(3): 179-195.

Adger, N. (1999) Social Vulnerability to Climate Change and Extremes in Coastal Vietnam. World Development 27 (2): 249-269.

Agrawala, S. (2005) (ed.) Bridge over troubled waters: Linking climate change and development. OECD, Paris.

Arndt, C., Bacou, M. and Cruz, A. (2003) Climate forecasts in Mozambique: An economic perspective. In: Coping with climate variability. The use of seasonal climate forecasts in Southern Africa. O´Brien, KL. and Vogel, C. (eds.), Aldershot, Ashgate, pp. 129-152.

Arnell, NW. (1999) Climate change and global water resources. Global Environmental Change 9: S31–S50.

Arnell, NW. (2004) Climate change and global water resources: SRES emissions and socio-economic scenarios. Global Environmental Change 14: 31-52.

Baettig, MB, Wild, M. and Omboden, DM. (2007) A climate change index: Where climate change may by most prominent in the 21st century. Geophys. Res. Lett., 34, L01705, doi:10.1029/2006GL028159.

Barnett, T., Zwiers, F., Hegerl, G., Allen, M., Crowley, T., Gillett, N., Hasselmann, K., Jones, P., Santer, B., Schnur, R., Stott, P., Taylor, K. and Tett, S. (2005) Detecting and attributing external influences on the climate system: A review of recent advances, Journal of Climate 18: 1291–1314.

Batley, R., Bjørnestad, L. and Cumbi, A. (2006) Joint Evaluation of General Budget Support, 1994-2004 – Mozambique Country Report, International Development Department. The World Bank, DC.

Bojö, J., Green, K., Kishore, S., Pilapitiya, S., Chandra Reddy, R. (2004) Environment in Poverty Reduction Strategies and Poverty Reduction Support Credits. The World Bank Environment Department. Paper no. 102. The World Bank, Washington DC.

Bollin, C., Lamade, N. and Ferguson, J., (2005) Disaster Risk Management along the Rio Búzi. Case Study on the Background, Concept and Implementation of Disaster Risk, Management in the Context of the GTZ-Programme for Rural Development (PRODER). German Gesellschaft für Technische Zusammenarbeit, Governance and Democracy Division. 26 pp.

Bryceson, D. (2004) Agrarian Vista or Vortex: African rural livelihood policies. Review of African Political Economy 31(102): 617-629.

Burton, I. and van Aalst, M. (1999) Come Hell or High Water: Integrating Climate Change Vulnerability and Adaptation into Bank Work. World Bank, Washington, DC, USA, 60 pp.

Burton, I. and van Aalst, M. (2004a) Vulnerability and adaptation in Bank work: progress and prospects. In: An Adaptation Mosaic: A Sample of the Emerging World Bank Work in Climate Change Adaptation. World Bank, Washington, DC, USA, pp. 41–52.

Burton, I. and van Aalst, M. (2004b) Look Before You Leap: A Risk Management Approach for Incorporating Climate Change Adaptation in World Bank Operations. Final Draft, February 2004. World Bank, Washington, DC, USA, 55 pp.

Chigwada, J. (2004) Adverse Impacts of Climate Change and Development Challenges: Integrating Adaptation in Policy and Development in Mozambique, Capacity Strengthening in the Least Developed Countries for Adaptation to Climate Change (CLACC), 47 pp.

CIDA (2004) A Direct Budget Support Pilot for Poverty Reduction in Mozambique. Project Approval Documentation. Canadian International Development Agency.

DbIS (2007) The European Union's Projects Database in Mozambique (DbIS), Accessible at: www.delmoz.cec.eu.int/euextra/rpt_mdg.asp, Last accessed 15 January 2007.

De Wit, M. and Stankiewicz, J. (2006) Changes in surface water supply across Africa with predicted climate change. Science 311: 1917-1921.

Denton, F. (2004) Gender and climate change: Giving the "latecomer" a head start. IDS Bull 35(3): 42-49.

Dercon, S. (2004) Growth and shocks: Evidence from rural Ethiopia. Journal of Development Economics 74(2): 309-329.
DFID (2004) Poverty and Climate Change: Key Sheets 1-13. DFID. Accessible at www.dfid.gov.uk
Dilley, M. (2000) Reducing vulnerability to climate variability in Southern Africa: The growing role of climate information. Climatic Change 45: 63–73.
Dodds, SEH., Bradnee Chambers, W., Neumann, K., Kanie, N. and Green, J. (2002) International sustainable development governance. The question of reform: Key issues and proposals. UNU/IAS Report, Tokyo, submitted to the World Summit on Sustainable Development 2002, 49pp.
EC (2004) EU Strategy on Climate Change in the Context of Development Cooperation: Action Plan 2004-208. DGE, European Commission, Brussels.
EM-DAT (2007) The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, Accessible at: www.em-dat.net, Last accessed 15 January 2007.
Eriksen, S. and Næss, LO. (2003) Pro-Poor Climate Adaptation: Norwegian Development Cooperation and Climate Change Adaptation—An Assessment of Issues, Strategies and Potential Entry Points. CICERO Report 2003:2, Centre for International Climate and Environmental Research Oslo, University of Oslo, Norway, viii+75 pp
FAO (2006) Missão de formulação para apoio da CE ao plano de Redução dos efeitos da seca em Gaza e Inhambane. Esboço final. FAO, 88pp.
Frantz, F. and Komich, C. (2003) A Donor Coordination Assessment for USAID/Mozambique. 24pp
Fukuda-Parr, S., Lopes, C. and Malik, K. (2002) Overview. Institutional innovations for capacity development. In: Capacity for Development: New Solutions to Old Problems. UNDP Earthscan, London, pp. 1-21.
Füssel, H-M. and Klein, RJT. (2006) Climate change vulnerability assessments: an evolution of conceptual thinking. Climatic Change 75(3): 301-329.
Githeko, AK. and Ndegwa W. (2001) Predicting malaria epidemics using climate data in Kenyan highlands: A tool for decision makers. Global Change and Human Health 2: 54-63.
Githeko, AK., Lindsay, SW., Confalonieri, UE. and Patz, JA. (2000) Climate change and vector-borne diseases: a regional analysis, WHO Bulletin, 78, 1136-1147.
Government of Mozambique (2003) Visão e Estratégias da Nação. Versão para Debate Público, (Agenda 2025) Comité de Conselheiros, Maputo, Moçambique, 168 pp.
Government of Mozambique (2004) Plano de Contingência 2004/2005. Maputo.
Government of Mozambique (2005a) Report on the Millennium Development Goals, Maputo.
Government of Mozambique (2005b) Plano Quinquenal do Governo 2005-2009. (Five-years Plan of the Mozambican Government), Maputo.
Government of Mozambique (2006a) Plano de Acção para a Redução da Pobreza Absoluta 2006-2009. PARPA II (Second Poverty Reduction Strategy Paper). República de Moçambique, Maputo.
Government of Mozambique (2006b) Joint Review of the Government's implementation of the poverty reduction strategy (PARPA) and of the performance of PAPs. Government of Mozambique (GoM), Programme Aid Partners (PAPs), 25pp. Accessible at: www.pap.org.mz
Heltberg, R. and Tarp, F. (2002) Agricultural supply response and poverty in Mozambique. Food Policy 27: 103-124.
Hudson, DA. and Jones, RG. (2002) Regional climate model simulations of present-day and future climates of Southern Africa. Hadley Centre technical note 39, 40pp.
Hulme, M., Doherty, R., Ngara, T., New, M. and Lister, D. (2005) Global warming and African climate change: A re-assessment. In: Climate Change in Africa, Low, P. S. (ed.), Cambridge University Press, pp. 29–40.
Hulme, M., Doherty, R., Ngara, T., New, M. and Lister, D. (2001) African climate change: 1900-2100. Clim. Res. 17: 145-168.
Huq, S., Rahman, A., Konate, M., Sokona, Y. and Reid, H. (2003) Mainstreaming Adaptation to Climate Change in Least Developed Countries (LDCs). International Institute for Environment and Development, London, UK, 40 pp.

INE (2005) Inquérito Integrado à Força de Trabalho (IFTRAB 2004/05). Accessible at: www.ine.gov.mz/inqueritos_dir/iftrab/ftrab/pop_contap
INGC (2006) Plano director de prevenção e mitigação das calamidades naturais. Instituto Nacional de Gestão de Calamidades, 37pp.
INGC, UEM and FEWS NET MIND (2003) Atlas for disaster preparedness and response in the Limpopo Basin. Cape Town, South Africa, 99pp.
IPCC (2007a) Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp.
IPCC (2007b) Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.
IPCC (2001) Climate Change 2001: Impacts, Adaptation, and Vulnerability. Contribution of the Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. [McCarthy, JJ., Canziani, OF., Leary. NA., Dokken, DJ. and White, KS. (eds.)], Cambridge University Press, 1042pp.
IRI (2006) A Gap Analysis for the Implementation of the Global Climate Observing System Program in Africa, IRI, Draft April 2006, 45pp.
Jayne, TS., Takashi, Y., Weber, MT., Tschirley, D., Benfica, R. Chapoto, A. and Zulu, Ballard (2003) Smallholder income and land distribution in Africa: implications for poverty reduction strategies. Food Policy 28: 253-275.
Jones, T. (2002) Policy coherence, global environmental governance, and poverty reduction. Int. Environ. Agreements: Politics Law Econ. 2: 389 - 401.
Kasparek, M. (2003) Anpassung an den Klimawandel: Ergebnisse eines Screenings der deutschen TZ-Projekte. Deutsche Gesellschaft für Technische Zusammenarbeit, Eschborn, Germany, 17 pp + annexes. (Adaptation to Climate Change: Results of a Screening of German Technical Co-operation Projects, In German.)
Kaufmann D., Kraay, A. and Mastruzzi, M. (2007) Governance Matters VI: Governance Indicators for 1996-2006. World Bank Policy Research Working Paper 4280, 93pp.
Kaufmann, D. and Kray, A. (2003) Governance and growth: Causality which way? -- Evidence from the World, in brief. World Bank, 8pp.
Killick, T., Castel-Branco, CN. and Gerster, R. (2005), Perfect Partners? The performance of Programme Aid Partners in Mozambique, 2004. A report to the Programme Aid Partners and Government of Mozambique, 66pp. Accessible at www.pap.org.mz
Klein, RJT. (2001) Adaptation to Climate Change in German Official Development Assistance - An Inventory of Activities and Opportunities, with a Special Focus on Africa. Deutsche Gesellschaft für Technische Zusammenarbeit, Eschborn, Germany, 42 pp.
Klein, RJT. (2002) Climate Change, Adaptive Capacity and Sustainable Development. Expert Meeting on Adaptation to Climate Change and Sustainable Development, Organisation for Economic Co-operation and Development, Paris, France, 13–14 March 2002, 8 pp.
Lal, M. (2001) Tropical cyclones in a warmer world. Current Science 80(9): 1103-1104.
Lambrou, Y. and Piana, G. (2005) Gender: The missing component in the response to climate change. FAO, 42pp.
Magrath, J. (2006) (ed.) Africa Up in Smoke - COP12 Update. Fourth report from the Working Group on Climate Change and Development. London 16pp.
Malaney, P., Spielman, A. and Sachs, J. (2004) The malaria gap. American Journal of Tropical Medicine and Hygiene 71(2): 141-146.
Manson, SJ., Waylen, PR., Mimmack, GM., Rajaratnam, B. and Harrson, JM. (1999) Changes in extreme rainfall events in South Africa. Clim. Change 41: 249-257.

McDonald, RE., Bleaken, DG. Cresswell, DR., Pope, VD. and Senior, CA. (2005) Tropical storms: representation and diagnosis in climate models and the impacts of climate change. Climate Dynamics 25(1): 19-36.
Metz, B., Berk, M., den Elzen, M., de Vries, B. and van Vuuren, D. (2002) Towards an equitable global climate change regime: compatibility with Article 2 of the Climate Change Convention and the link with sustainable development. Climate Policy 2: 211 - 230.
Meuser, M. and Nagel, U. (1997) Das Experteninterview – Wissenschaftssoziologische Voraussetzungen und methodische Durchführung. In: Handbuch qualitative Forschungsmethoden in der Erziehungswissenschaft. Friebertshäuser, B. and Prengel, A. (eds.), Weinheim, München, Juventa, pp. 481-491.
MICOA (2003) Initial National Communication to the UNFCCC. MICOA, Maputo, 116pp.
MICOA (2005) As três convenções do Rio e os respetivos protocolos. MICOA, Maputo, 49pp.
MICOA (2006) National Adaptation Programme of Action. MICOA, Draft, June 2006, 46pp.
New, M., Hewitson, B., Stephenson, DB., Tsiga, A., Kruger, A., Manhique, A., Gomez, B., Coelho, CAS., Masisi, DN., Kululanga, E., Mbambalala, E., Adesina, E., Saleh, H., Kanyanga, J., Adosi, J., Bulane, L., Fortunata, L., Mdoka, ML. and Lajoie, R. (2006) Evidence of trends in daily climate extremes over southern and west Africa, Journal of Geophysical Research, 111, D14102, Doi:10.1029/2005JD006289.
O´Brien, KL., Synga, L., Naess, LO., Kingamkono, R. and Hochobeb, B. (2000) Is information enough? User resonses to seasonal climate forecasts in Southern Africa. CICERO Report 2000 (3), Oslo, Norway.
ODAmoz (2007) Official Development Assistance to Mozambique Database. Accessible at: www.odamoz.org.mz, Last accessed 15 January 2007.
ODI (2004) Food security options in Mozambique: one country, two worlds? Country Food Security Options Paper 3, Forum for Food Security in Southern Africa. Accessible at www.odi.org.uk/food-security-forum
ODI (2006) Addressing Environmental Objectives in the Context of Budget Support, Overseas Development Institute, London, 39pp.
OECD (2006a) The Challenge of Capacity Development. Working towards good practice. DAC Guidelines and Reference Series, OECD, 46pp.
OECD (2006b) Declaration on integrating climate change adaptation into development. OECD Headquarters, Paris.
OECD (2000) Donor support for institutional capacity development in environment. Development Assistance Committee OECD, Paris, 192pp.
OECD/World Bank Mozambique ODA statistics. Accessible at www.oecd.org
Ostrom, E. (2005) Understanding institutional diversity. Princeton University Press, 376 pp.
PAP (2006) Joint Review of the Programme Aid Partnership. Aide-Mémoire, Final version April 13, 2006, 24pp.
Patt, A. and Gwata, C. (2002) Effective seasonal climate forecast applications: Examining constraints for subsistence farmers in Zimbabwe. Global Environ. Change 12: 185-195.
Richard, Y., Fauchereau, N., Poccard, I., Rouault, M. and Trzaska, S. (2001). 20th century droughts in southern Africa: Spatial and temporal variability, teleconnections with oceanic and atmospheric conditions. International Journal of Climatology 21: 873–885.
Robledo, C. et al. (2006) Understanding Linkages between Development Cooperation in Natural Resource Management and Vulnerability to Climate Change and Climate Variability. Swiss Agency for Development and Co-operation, Berne, Switzerland, in prep.
SETSAN (2005a) Relatório da Monitoria da Segurança Alimentar e Nutricional em Moçambique. Secretariádo Técnico de Segurança Alimentar e Nutricional, 49pp.
SETSAN (2005b) Evaluation Study of the Implementation of the Drought and Mitigation Action Plan for Maputo, Gaza and Inhambane Provinces. SETSAN, 101pp.
SETSAN (2005c) Relatório de análise da vulnerabilidade crónica à seguranca alimentar. SETSAN, 52pp.

Simms, A. and Reid, H. (2005) Africa - Up in smoke? The second report from the Working Group on Climate Change and Development. London, 40pp

Skelton, A., Fraser, P., Freire, M. and Laos, AG. (2003) Mozambique. Human capacity building assessment. Agricultural sector. Joint USAID and BIFAD Assessment, 29pp.

Sperling, F. (2003) (ed.) Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation. Inter-Agency report by AfDB, ADB, DFID-UK, BMZ-Germany, DGIS- Netherlands, OECD, UNDP, UNEP, World Bank, 43pp.

Stasavage, D. (1999) Causes and consequences of corruption: Mozambique in transition. Journal of Commonwealth and Comparative Politics 37(3): 65-97.

Tadross, M., Jack, C. and Hewitson, B. (2005) On RCM-based projections of change in southern African summer climate, Geophys. Res. Lett. ,32, L23713, Doi:10.1029/2005GL024460.

Thomson, MC., Doblas-Reyes, FJ., Mason, SJ., Hagedorn, R., Connor, SJ., Phindela, T., Morse, AP. and Palmer, TN. (2006) Malaria early warnings based on seasonal climate forecasts from multi-model ensembles. Nature 439: 576-579.

UNDAF (2001) United Nations Development Assistance Framework 2002 - 2006. 47pp.

UNDP/GEF (2000) Capacity development initiative. Country capacity development needs and priorities: A synthesis. United Nations Development Programme. Global Environment Facility, Washington DC, 2pp.

UNFCCC (2005) Synergy among multilateral environmental agreements in the context of national adaptation programmes of action. Document FCCC/TP/2005/3.

UNFCCC (2006a) Background paper for the African workshop on adaptation implementation of Decision 1/CP.10 of the UNFCCC Convention. Accra, Ghana, 21-23 September 2006. 54pp.

UNFCCC (2006b) Information on activities relating to the preparation of national communications from Parties not included in Annex I to the Convention. UNFCCC, 23pp. Accesible at: http://unfccc.int/resource/docs/2006/sbi/eng/misc14.pdf

Van Drunen, MA., Lasage, R. and Dorlands, C. (2006) (eds.) Climate Change in Developing Countries. CABI Publishing, Wallingford, UK, 272pp.

Vogel, CH. (2000) Usable Sience: An assessment of long-term seasonal forecasts amongst farmers in rural areas of South Africa. South African Geographic Journal 82: 107-116.

Washington, R., Harrison, M., Conway, D., Black, E., Challinor, A., Grimes, D., Jones, R., Morse, A., Kay, G. and Todd, M. (2006) African Climate Change: Taking the Shorter Route. Bulletin of the American Meteorological Society 87(10): 1355–1366.

Washington, R., Harrison, M., Conway, D., Black, E., Challinor, A., Grimes, D., Jones, R., Morse, A., Kay, G. and Todd, M. (2004) African Climate Report. A report commissioned by the UK Government to review African climate science, policy and options for action, 45pp.

WHO (2004) Using Climate to Predict Infectious Disease Outbreaks: A Review. Communicable Diseases Surveillance and Response. Protection of the Human Environment. Roll Back Malaria, World Health Organization, Geneva, 55pp.

Wiles, P., Selvester, K. and Fidalgo, L. (2005) Learning lessons from disaster recovery: The case of Mozambique. The World Bank, Disaster Risk Management Working Paper Series 12, 81 pp.

World Bank (2006a) Clean Energy and Development: Towards an Investment Framework. ESSD-VP/I-VP. April 5, 2006. World Bank, Washington, DC, USA, x+38 pp.

World Bank (2006b) Market-led smallholder development in the Zambezi valley. Project appraisal document, Environment, Rural and Social Development Unit, Country Department 2, Mozambique, Report 35466-MZ, 150pp.

Yohe, G. and Schlesinger, M. (2002) The economic geography of the impacts of climate change. Journal of Economic Geography 2(3): 311-41.