Republic of Mozambique Ministry for Coordination of Environmental Affairs

Maputo Municipal Council

CLIMATE CHANGE IMPACTS IN URBAN AREAS OF MOZAMBIQUE A PILOT INITIATIVE IN MAPUTO CITY

<u>Preliminary Assessment</u> and Proposed Implementation Strategy

(Draft for comments and discussion)

SUD-Net Cities and Climate Change Initiative (CCCI)

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Prepared by:	Mr. Paulo da Conceição Junior, UN-HABITAT Consultant	
	E-mail: pconceicaojr@gmail.com	
Coordinated and finalised by:	Mr. Mathias Spaliviero	
	UN-HABITAT Chief Technical Adviser for Mozambique	
	E-mail: spaliviero@teledata.mz	

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Acronyms and Abbreviations

AFD	Agence Française de Développement - French Agency for Development			
ANAMM	Associação Nacional dos Municípios de Moçambique			
BCPR	Bureau of Crisis Prevention and Recovery			
САР	Clean Air Partnership			
СВО	Community-Based Organisation			
СС	Climate Change			
CCAMUP	Climate Change Adaptation and Mitigation Urban Plan			
CCCI	Cities and Climate Change Initiative			
CIF	Climate Investment Fund			
СТА	Chief Technical Adviser			
DANIDA	Danish International Development Agency			
DNA	Direcção Nacional de Águas – National Directorate of Water Affairs			
DNDA	<i>Direcção Nacional de Desenvolvimento Autarquico</i> - National Directorate of Municipal Development			
DRR	Disaster Risk Reduction			
FAO	United Nations Food and Agriculture Organisation			
FEMA	<i>Fórum Económico para o Meio Ambiente</i> - Economic Forum for Environment			
FIPAG	<i>Fundo de Investimento do Património de Abastecimento de Água</i> - Water Supply Assets Investment Fund			
GRIP	Global Risk Identification Programme			
HRW	Hydraulic Research Wallingford			
ICLR	Institute for Catastrophic Loss Reduction			
IIED	International Institute for Environment and Development			
INAM	Instituto Nacional de Meteorologia - National Institute of Meteorology			
INE	Instituto Nacional de Estatística - National Institute of Statistics			
INGC	Instituto Nacional de Gestão de Calamidades - National Institute of Disaster Management			
INQUA	International Union for Quaternary Research			
IPCC	Inter-Governmental Panel on Climate Change			
JP	Joint Programme			
MAE	Ministério da Administração Estatal – Ministry of State Administration			
МСТ	Ministério da Ciência e Tecnologia – Ministry of Sciences and Technology			
MICOA	<i>Ministério para a Coordenação da Acção Ambiental -</i> Ministry for Coordination of Environmental Affairs			
MMC	Maputo Municipal Council			

МОРН	Ministério das Obras Públicas e Habitação - Ministry of Public Works and Housing
MSW	Municipal Solid Waste
NAPA	National Adaptation Plan of Action
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NPO	National Project Officer
ОНІ	Open House International
PARPA	Plano de Acção para a Reducção da Pobreza Absoluta - Absolute Poverty Reduction Action Plan
PEUMM	<i>Plano de Estrutura Urbana do Município de Maputo</i> - Urban Master Plan of Maputo Municipality
PPCR	Pilot Programme for Climate Resilience
PRO-MAPUTO	Programa de Desenvolvimento Municipal de Maputo - Maputo Municipal Development Program
RADIUS	Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters
SCP	Sustainable Consumption and Production
SDC	Swiss Agency for Development and Cooperation
SWOT	Strengths, Weaknesses, Opportunities and Threats
UEM	Universidade Eduardo Mondlane - Eduardo Mondlane University
TOR	Terms of Reference
UK	United Kingdom
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN-HABITAT	United Nations Human Settlements Programme
UNICEF	United Nations Children Fund
USA	United States of America
WB	World Bank
WMO	World Meteorological Organisation

Executive Summary

This preliminary assessment starts by highlighting that, at the global level, Climate Change (CC) related impacts will be more destructive in urban areas since there is a greater concentration of people, buildings and infrastructure. Cities located along the coastline, such as Maputo, are particularly vulnerable to extreme events such as floods, cyclones and sea level rise. Worst case scenarios can have huge costs implications in terms of recovery and reconstruction operations if no climate change adaptation and/or mitigation measures are in place. The urban poor, especially those living in unsafe slum areas, are the most at risk.

After providing an overview of the different dimensions of Maputo city's vulnerability to climate change, existing policies, strategies and plans addressing this phenomenon at country and municipal levels are reviewed and several gaps identified. These can be addressed by the Cities and Climate Change Initiative (CCCI) promoted by the United Nations Human Settlements Programme (UN-HABITAT), which includes Maputo as one of the four selected cities around the world for carrying out the pilot phase.

Then the study identifies the main steps to be followed for setting up a climate change adaptation strategy for Maputo city. Firstly, key stakeholders of the public (i.e. central Government and municipality), academic, private and civil society sectors need to participate actively to the process, and awareness has to be raised at all levels. For this purpose, and more in general for ensuring an effective management and implementation capacity with aim at addressing CC impacts in urban areas, a proper institutional set-up shall be established in which the Ministry for Coordination of Environmental Affairs (MICOA), the National Institute of Disaster Management (INGC) and the Maputo Municipal Council (MMC) will play major roles. This will help adopting proper communication mechanisms, which will ensure participatory approach during the various implementation stages.

Thereafter an in-depth assessment of climate change impacts should be undertaken in order to determine the adaptation-mitigation measures to be applied and prioritise interventions. Hence, CC methods and tools need to be developed as there is an apparent vacuum of this kind of instruments in Mozambique. Appropriate synergies and coordination mechanisms with ongoing or incoming initiatives shall be set up, and potential funding sources for securing follow-up investments identified. A snapshot of UN-HABITAT activities and experience developed in Mozambique is provided.

As final recommendations, it is proposed to strengthen MICOA's capacity to mainstream CC related aspects in urban areas, and to establish a CC/Disaster Risk Reduction Unit in the MMC. In particular, the latter should coordinate the preparation of a CC Adaptation and Mitigation Urban Plan (CCAMUP) for Maputo City, which will include the identification of priority demonstrative adaptation/mitigation interventions to be carried out in the short, medium and long term.

The study concludes by stressing the importance of setting up policy dialogue, knowledge management and dissemination mechanisms concerning CC-related issues in urban areas, as well as carrying out awareness-raising activities. An outline of the CCCI implementation strategy in Mozambique is proposed, as well as an estimated budget for executing the pilot phase.

1. Introduction

The aim of this preliminary assessment is to undertake an overview of climate change issues and challenges in Maputo, the capital city of Mozambique. The study highlights current policies and strategies addressing climate change at the national and local levels, and provides a general analysis of existing tools and studies, on-going and planned activities and initiatives (such as training and capacity building, mitigation and adaptation projects, etc.) and information events and networks occurring in Mozambique and in Maputo in particular for addressing such phenomenon.

This assessment was carried out within the framework of the Cities and Climate Change Initiative (CCCI) promoted by the United Nations Human Settlements Programme (UN-HABITAT) in coordination with the concerned Mozambican institutions at central and municipal levels. The main purpose of the initiative is to contribute to improving the resilience of cities against climate change impacts. Maputo has been selected as one of the four cities around the world where the pilot phase of the CCCI will be carried out (see Box 1 below).

Box 1: UN-HABITAT's Cities and Climate Change Initiative (CCCI)

The CCCI aims at assisting cities in Africa, in Asia and the Pacific and in Latin America and the Caribbean regions to respond adequately to climate change. It does so by bringing together local and national governments, academia, NGOs and international organisations with the objective of alerting cities to identify and apply appropriate adaptation and mitigation strategies by strengthening existing capacities and promoting partnerships. The key components of the CCCI are:

- Advocacy, policy dialogue and policy change;
- Tool development and tool application;
- Piloting climate change mitigation and adaptation measures;
- Knowledge management and dissemination, through, amongst others, the UN-HABITAT partner universities and the partnership with UN-HABITAT's Local Government Training Institutes Network.

Initially four cities will participate to the CCCI: Esmeraldas in Ecuador, Kampala in Uganda, Maputo in Mozambique and Sorsogon in the Philippines, while pulling in good practices from other cities around the world.

This preliminary assessment is the result of a literature review on climate change related issues, including data collection and analysis, existing legislation and strategies, scientific papers, recently implemented and planned initiatives and projects, as well as interviews with central and municipal government officials and professionals of the sector.

2. Some background

When focusing on climate change and related impacts in Southern African, recent studies strongly suggest a temperature increase in the coming decades, which could change the rainfall regime (Hulme, 1996). At continental level, the United Nations Environment Programme (UNEP, 2002) indicates a warming process of about 0.7 °C during the 20th century based on historical records (see Fig. 1), which is a similar trend observed globally. Studies carried out by the Intergovernmental Panel on Climate Change (IPCC, 1990, 1992, 2001 and 2007) confirm these trends.

Fiqure 1: Mean surface temperature over Africa in the XXth Century

Source: UNEP, 2002

Still according to Hulme (1996), if assuming a non-intervention attitude on future greenhouse gas emissions, the scenario derived through modelling yields a global warming with respect to the 1961-90 average of 1.7°C by the 2050s decade. The current generation of climate change models indicates that global average precipitation would increase in warmer climates by about 1 to 2 percent per degree of warming (IPCC, 2007). This is caused by the increase of evaporation which leads to an increase of precipitation. A warmer atmosphere as a result of global warming can hold more moisture before becoming saturated (Thow and de Blois, 2008).

While focusing on how the phenomenon will affect urban areas, it seems relevant to report the main findings of a research carried out by the International Institute for Environment and Development (IIED, 2007) which indicates that:

- 10 percent of the world population live in coastal areas that lie within just 10 metres above sea level;
- Nearly two-thirds of urban settlements with more than 5 million inhabitants are at least partially in the 0-10 metre zone;
- 21 percent of the urban populations of least developed nations are in the zone, versus only 11 percent in the developed countries.

One of the authors of the research, Gordon McGranahan, explains that "urban development in the coastal zone brings multiple risks. It exposes people to seaward hazards such as storms, flooding and cyclones, and it can damage sensitive ecosystems including those such as mangrove forests that protect the coastline. The Intergovernmental Panel on Climate Change's (IPCC, 2007) warned that sea levels could rise by tens of centimetres this century, making coastal populations more vulnerable to flooding and storm surges. It also predicted more intense tropical cyclones. "The IPCC is aware that there are high population densities in coastal areas, but it has not yet recognised the links to urbanisation, and the implications for adaptation to climate change", says co-author Deborah Balk. "It is too late to rely solely on a reduction in greenhouse gas emissions to mitigate climate change, although this is clearly an imperative", says McGranahan. "Migration away from the zone at risk will be necessary but costly and hard to implement, so coastal settlements will also need to be modified to protect residents".

3. Maputo city's vulnerability to climate change

Mozambique is an elongated country along the North-South direction and located in South-Eastern Africa. Its boundaries are constituted by the Indian Ocean in the East, and shared with South Africa, Swaziland, Zimbabwe, Zambia, Malawi and Tanzania inland (see map in Fig. 1).

Given its geographic location, the country is highly vulnerable to natural disasters, in particular those of hydro-meteorological origin (such as floods, drought and cyclones). Vulnerability is defined by the IPCC as "the degree to which a system is susceptible to, or unable to cope with adverse effects of climate change, including climate variability and extremes. In this respect vulnerability is seen as the function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity and its adaptive capacity" (IPCC, 2001).

During the last 25 years Mozambique suffered from an uninterrupted sequence of drought and floods which negatively affected the country's social and economic development. The most severe drought periods were recorded in 1981-1984, 1991-1992 and 1994-1995; while floods were observed in 1977-1978, 1985, 1988, 1999-2000 and more recently in 2007-2008. Floods are often exacerbated by cyclones. In particular, the amount of recorded during the 1999-2000 wet seasons were extraordinarily high and flooding had terrible consequences. Figure 1: Map of Mozambique

During the months of February to March 2000 a combination of torrential rains and tropical cyclones caused the most devastating floods in the history of Mozambique killing 700 people and producing damages worth 600 million dollars (McBean and Henstra, 2003; Kundzewicz et al, 2001).

Maputo is the capital city of Mozambique, and is located at the extreme South of the country. As shown in Fig. 1, and considering the arguments presented by the IIED (2007) reported above, the city is highly vulnerable to the effects of climate change since its facing the Indian Ocean and is the most densely populated urban area in Mozambique. Its population is about 1.1 million inhabitants according to the preliminary data of the 2007 official population census (INE, 2008). However, there is an interconnected metropolitan system including Maputo and Matola municipalities and Marracuene District, also called *Greater Maputo*, with a fluctuating population from 2 to 2.5 million inhabitants.

In general, African cities are experiencing a rapid population growth, producing a high demand for housing and infrastructures (UNFCCC, 2006). According to the official statistics and projections of the United Nations Department of Economic and Social Affairs (UNDESA, 2007), the urban population of Mozambique will be greater than average at Sub-Saharian Africa's level by the next decade. Similarly, the phenomenon of population's migration to cities is also taking place in Mozambique, especially in Maputo. Table 1 indicates how the population of the capital city is growing according to the data retrieved from the population census undertaken in 2007.

Municipal District	1997 Population Census	2007 Population Census (Preliminary Data)	Difference 1997:2007
Municipal District n. 1	154,284	108,353	-45,931
Municipal District n. 2	162,750	155,264	-7,486
Municipal District n. 3	210,551	224,181	+13,630
Municipal District n. 4	228,244	289,864	+61,620
Municipal District n. 5	211,008	293,716	+82,708
Municipal District n. 6 (Catembe)	15,853	19,605	+3,752
Municipal District n. 7 (Inhaca Island)	4,672	3,956	-716
Total	987,362	1,094,939	+107,577

Table 1: Distribution of Maputo's population by its 7 municipal districts

Source: National Institute for Statistics (Instituto Nacional de Estadísticas - INE, 2008)

The predicted sea-level rise related to global warming may again result in flooding of the lowest topographical areas of Maputo, which are the most populated. This prediction is also supported by the Mozambique National Adaptation Plan of Action to Climate Change (NAPA, 2007). An interesting study on the changes recorded in the Maputo Bay during the Holocene period was recently carried out, highlighting the effects of the sea level rise since 8,000 years BC, which could provide some useful baseline information on the expected changes of the bay in the future, taking into account the compounding effects of climate change (Mussa et al., 2003). Fig. 2 provides a satellite view of Maputo and Matola cities, and of the bay system.

Figure 2: Maputo city and its 7 Municipal Districts, Matola and the Maputo Bay seen from satellite

Source: Google Earth

The combined effect of high urban population's density (especially in the peri-urban slum areas of Maputo) with season-related factors (in which cool seasons are associated with dry events and warm seasons are associated with wet events – see climatic data for Maputo City in Fig. 4) can be worsened by climate change. Consequently, the risk of severe impact on urban poor will increase, especially considering their incapacity to improve their dwellings or move to safer areas. In general, the incidence of extreme events linked to climate change will have destructive consequences on cities, damaging their water, sewage, energy supply and transportation systems, as well as buildings, trees and public spaces. This can lead to illness and death.

Figure <u>3</u>: Average precipitation and temperature in Maputo City

<u>Source</u>: National Institute of Meteorology (*Instituto Nacional de Meteorologia – INAM*), data compiled based on normal values from 1971-2000 (see www.inam.gov.mz)

Vulnerability to floods has increased in peri-urban areas in Mozambique where during the last 3 decades a proliferation of unplanned human settlements has been observed, gradually expanding in topographically depressed and marshy areas with high flood risk (Spaliviero, 2006). The following is a remarkable testimony of a slum dweller living in one of the oldest and most degraded neighbourhood of Maputo: "Our houses are built in low areas. We have no shelter when the flood starts. The house owners do not help us to drain out water from our homes. People use buckets to remove water themselves. Once water has gone, the real disaster has just begun. That is diseases." – extracted from an interview with the residents of Mafalala Neighbourhood in Maputo (ActionAid, 2006).

Table 2 provides a synthetic analysis of the different sectors and areas of Maputo city vulnerable to climate change.

Sector or area	Climate change related-event	Impact or produced effect	
	Tropical cyclones	Damage to coastal infrastructure, dunes, beaches and other natural features	
		Increased erosion or damage to coastal infrastructure, dunes, beaches, and other natural features	
		Loss of coastal wetlands and other coastal habitats	
Coastal zone and ecosystems	Sea level rise and	Increased costs for maintenance and expansion of coastal erosion control (natural or man-made)	
	storm now	Saltwater intrusion into coastal aquifers	
		Increased risk of pollution from coastal hazardous waste sites	
		Reduced effectiveness of sea walls	
Transportation	Variations of	Increased road surface and bridges damage	
system	Temperature and heavy precipitation	Increased maintenance requirements for roadside/pavement	
	Heavy precipitation	Increased risk of flooding	
Wetlands and urban agriculture	Dry season	Crop failures, water scarcity, drying of water reservoirs and demand for water irrigation	
		Increased risk of habitat loss (mangroves), salt intrusion	
	Tropical cyclones	Housing and infrastructure damage	
		Housing and infrastructure damage	
Human	Heavy	Need for new or upgraded flood control and erosion control structures	
Settlements and	precipitation	Landslides, road washouts and flooding	
Infrastructure		Increased demands on storm water management systems and sewer overflows	
	Sea level rise	Reduced effectiveness of sea walls	
		Housing and infrastructure damage	
Health, food and	Heavy	Increase in vector-borne diseases (malaria, cholera, etc.)	
waste management	precipitation	Need for a new waste collection, management and treatment system	

<u>Table 2</u>: Sectors and areas of Maputo city vulnerable to extreme events related to climate change

The next Figures (4 to 7) provide detailed mapping examples concerning the impacts of climate change related events on some of the areas and infrastructure of Maputo city.

In particular, the map presented in Fig. 4 illustrates the current land use of the city, in which the areas subject to flooding where are highlighted in darker blue. It can be observed that these areas coincide with the coastal strip and with some old slum neighbourhoods distributed in the middle of the city, such as Mafalala, Luis Cabral, Chamanculo and Xipamanine.

Figure 4: Current land use map of Maputo city

Source: Adapted from the Maputo's Municipality Urban Master Plan (Plano de Estrutura Urbana do Município de Maputo - PEUMM), 2008

Figure5: View of the Julius Nyerere Avenue before and after the 2000 floods

The images presented in Figs. 5 and 6 illustrate the impact of an extreme event linked to climate change on infrastructure. Fig. 5 shows an aerial photo on 1982 where Julius Nyerere Avenue appears to be in good conditions and works as one of the main transportation axes to go out of Maputo City heading to the North direction. Fig. 6 shows the situation at present in which several erosion processes which took place during the extraordinary rain event of 2000 are highlighted (see points A, B, C and D).

Figure 6: Detailed mapping of roads interruptions and damages along Avenue Julius Nyerere, Maputo

Finally, Fig. 7 shows the current impacts of the sea level rise effect in the Marginal Avenue of the Maputo City, which has been recently rehabilitated. However no adequate sea protection barriers have been installed yet.

<u>Figure 7</u>: Points of the Marginal Avenue susceptible to be impacted by the erosion process linked to the sea level rise effect

4. Existing policies, strategies and plans related with climate change issues at country and municipal levels in Mozambique

Key national policies, strategies and plans as well as strategic plans and programmes for the city of Maputo were considered and analysed from the perspective of climate change impacts and urban development according to the following four criteria (see Tables 3 and 4):

- Main objective(s) and purpose;
- Strategic activities or main contents;
- Urban and climate change issues;
- Relevance to the SUD-Net CCCI.

Policy/strategy title	Main objective(s) and purpose	Strategic activities or main contents	Urban and climate change issues	Relevance to the SUD-Net CCCI
Agenda 2025 (Adopted in Nov. 2003)	 To improve socio- economic situation of Mozambique by 2025 	 Human capital Social capital Economic development Governance 	 It does not provide attention to CC impacts in urban areas However it places human settlements and sustainable urban development as one of the main priorities 	• The CCCI appears to fit well in the Agenda's strategic programme, and constitutes an opportunity to fulfil existing gaps concerning CC
Absolute Poverty Reduction Action Plan 2006-2009 Plano de Acção para a Redução da Pobreza Absoluta II (PARPA II) (Approved in 2006)	 To reduce the incidence of poverty from 54% in 2003 to 45% in 2009 This plan influences all donors support to Mozambique during 4 years 	To be developed through 3 main pillars: • Governance • Human capital • Economic Development	 It does not provide attention to CC impacts in urban areas Natural disasters and urban areas are treated as cross- cutting issues; however, urban development does not constitute a priority 	 Poverty, which can be seen also as a consequence of CC impacts in urban areas, is addressed from a general perspectives The CCCI in Maputo can play a strategic role in mainstreaming both urban development and CC issues into such crucial planning instrument
National Adaptation Plan of Action to Climate Change (NAPA) Programa de Acção Nacional para a Adaptação às Mudanças Climáticas (Approved in 2007)	 To identify the country's urgent needs through a participative assessment process The implementation of this plan should increase the national capacity to deal with climate change impacts 	 Strengthening of the warning system for natural disaster prevention Capacity building and awareness raising of agriculture producers to deal with climate change effects Reducing climate change impacts in the coastal areas Improving water resources management 	 It does not provide attention to CC impacts in urban areas 	 The CCCI in Maputo can be instrumental in stressing on the high vulnerability of coastal cities to CC effects More in general, the CCCI can raise awareness on sustainable urban development in general, especially considering the increasing negative impacts of CC in the future

<u>Table 3</u>: Key national policies, strategies and plans related with climate change and urban development

<u>Table 3</u> (cont.)

Policy/strategy title	Main objective(s) and purpose	Strategic activities or main contents	Urban and climate change issues	Relevance to the SUD-Net CCCI
Environmental Strategy for Sustainable Development of Mozambique Estratégia Ambiental para o Desenvolvimento Sustentável de Moçambique (Approved in 2007)	 Creation of a common vision for sustainable environmental management in Mozambique, which will contribute to poverty eradication based on principles of the Agenda 21 and NEPAD Establishment of stakeholders guidelines for implementing development programs, including NGOs, private sector, scientific and academic community, civil society and international partners 	 Capacity building for the implementation of strategies including the establishment of goals at national and local level to achieve integrated management and protection of natural resources and ecosystems Creation of institutions with technical capacity for urban planning, development of infrastructures, waste management, and water and sanitation services Strengthening the country's capacity to measure, reduce and evaluate environmental pollution including impact on health and climate change issues by providing technical and financial support Keeping the population growth within the limit of socio-economic goals and sustainable development objectives 	 It refers to urban environment but not in particular to climate change impacts in cities It includes a slum upgrading strategy in its urban environment chapter, which was supported by UN-HABITAT in 2004/2005 Climate change issues are discussed but mainly from an atmospheric pollution perspective, by specifying a range of actions to be implemented in order to fulfil the government UNFCCC compromises and terms 	 This strategy can be used as general framework for designing a municipal CC adaptation action plan for Maputo city The CCCI is an opportunity to build on the slum upgrading strategy supported by UN-HABITAT in the recent past, which is part of the urban environment chapter

<u>Table 3</u>	(cont.)
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Policy/strategy title	Main objective(s) and purpose	Strategic activities or main contents	Urban and climate change issues	Relevance to the SUD-Net CCCI
Master Plan for Prevention and Mitigation of Natural Disasters Plano Director para Prevenção e Mitigação das Calamidades Naturais (Approved in 2006)	 To complement the PARPA II and to fill in strategic gaps in the different governmental sectors related to risk management, vulnerability reduction, prevention and mitigation of natural disasters To recognise effective disaster management as a key component of both poverty reduction and sustainable development 	 Achieving a balanced use of water resources, in particular by storing the excess produced by flooding for using during the drought periods Ensuring a food and nutritional balance through application of improved cropping techniques, introduction of resistant species, seed provision and development of non agriculture activities with economic value Reinforce disaster emergency management by developing conditions for a prompt response, decentralised decision-making and early recovery capacity 	 Disaster risk mapping for planning & monitoring purposes Introduction of agricultural conservation techniques, and strengthening of local practices Application of local land use planning methodologies Emphasis on community self-esteem and confidence in its capacities 	 This Master Plan introduces several innovative concepts, such as maximising the use of local techniques and capacities while planning and identifying coping solutions In general, it does not focus on urban-related aspects and contemplates the impacts of CC in a partial manner The CCCI in Maputo can constitute a show case by actually implementing some of the innovative components presented by the Master Plan and, in the mean time, help mainstreaming urban and CC aspects into Government DRR policies
National Water Policy Política Nacional de Águas (Adopted in 2007)	 To guarantee sufficient water resources in quantity and quality for the present and future generations To focus on poverty reduction, peace promotion, well being and good practices, and to minimise the negative impacts of floods and drought 	 To improve access to water for human consumption in accordance with the MDGs To improve access to decent sanitation for preventing water- borne disease To promote the efficient use of water supply infrastructure To contribute to floods and drought vulnerability reduction To promote peace and regional integration 	 It stresses the need for improving drainage systems in urban areas, thus minimising the impacts provoked by flooding in infrastructure It promotes investment for facilitating access to drinking water, which is currently producing positive results in city centres, but not yet in peri-urban slum areas 	 This will be a fundamental policy instrument to use while identifying appropriate water and sanitation adaptation/coping strategies during the CCCI in Maputo

<u>Table 3</u> (cont.)

Policy/strategy title	Main objective(s) and purpose	Strategic activities or main contents	Urban and climate change issues	Relevance to the SUD-Net CCCI
National Water Resources Management Strategy Estratégia Nacional de Gestão de Recursos Hídricos (Approved in 2007)	• To develop effective and integrated management of water resources for contributing to sustainable socio- economic development	 To build human capacity for water resource management To develop infrastructure for water supply & sanitation services To develop a framework for integrated water management To support policies for ensuring a sustainable and diversified use of water resources 	 It explains how floods should be managed, without differentiating urban and rural areas CC –related issues are generally not mainstreamed in the strategy 	 The CCCI can represent an added-value for including an analysis of climate change impacts in water resources management for urban areas
National Energy Strategy <i>Estratégia Nacional de Energia</i> (Approved in 2000)	 It aims at increasing the number of users having access to energy sources, especially by promoting efficient use and environmental protection 	 To ensure low cost energy supply To increase the energy availability for the domestic sector To promote reforestation in order to increase the availability of biomass fuel To strengthen the capacity of stakeholders involved in energy supply for improving their performance and efficiency To promote development and use of renewable energy (solar, wind and bio-fuels) 	 It does not show how currently applied energy supply strategies have climate change implications and what mitigation strategies can be proposed for minimising related impacts in urban areas 	 The CCCI will be important for proposing adequate measures for mitigating CC-related impacts by applying energy saving and reforestation activities in urban and peri- urban areas
Territorial Planning Law and Policy <i>Política e Lei de</i> <i>Ordenamento</i> <i>Territorial</i> (Approved in 2007)	 These instruments create a legal and policy framework for territorial planning and sustainable urban development at the national level 	 To ensure people's right to access land and its resources To implement slum upgrading To value socio-economic and cultural activities To protect the ecological quality of soils and water resources, and develop a legal framework for their optimised used and access 	 These legal/policy tools do not specifically refer to the impacts of climate change 	 Relevant as a reference to urban issues.

Plan/programme title	Main objective(s) and purpose	Strategic activities or main contents	Climate change issues	Relevance to the SUD-Net CCCI
Maputo Municipal Development Programme (PRO-Maputo) Programa de Desenvolvimento Municipal de Maputo (Approved in 2006)	 To improve the life quality of citizens through a 3 phased development strategy framework for the period 2007-2016 Phase 1: to strengthen the Maputo Municipal Council (MMC) institutional and financial capacity for supporting the achievement of long-term service delivery goals, and for implementing selected priority investments 	 Governance: to ensure strategic, efficient and participative municipal management Municipal finances: to improve the revenue system and promote efficient expenditure Planning and improvement of services, such as urban and planning, infrastructure and solid waste management 	 Climate change is not a specifically addressed by the programme However some physical interventions that are carried out to improve road, drainage and coastline protection infrastructure contribute to the mitigation of climate change impacts 	• This is probably the most important on- going programme under implementation by the MMC with which the CCCI needs imperatively to coordinate, as it represents a clear source for follow-up investments after the pilot phase
Solid Waste Management Strategic Plan of Maputo City Estratégia de Gestão de Resíduos Sólidos Urbanos na Cidade de Maputo (September 2006)	 To implement and improve Municipal Solid Waste (MSW) collection and related economic aspects To adopts measures to fine polluters To develop a sustainable costs/benefits system 	 Phase 1: development of the institutional capacity for MSW collection Phase 2: Expansion of the MSW collection services to cover periurban areas Phase 3: Achievement of a sustainable MSW management system 	 Establishing a more efficient solid waste management system will surely contribute to mitigate the negative effects related to climate change, e.g. collecting waste will avoid the obstruction of drainage channels However CC related effects due to incorrect waste treatment are not contemplated 	 The CCCI will allow providing the MMC a more comprehensive strategy of solid waste management which contributes to the mitigation of CC effects

<u>Table 4</u>: Strategic plans and programmes at Maputo's municipal level which are relevant to the CCCI

<u>Table 4</u> :	(cont.)
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Plan/programme title	Main objective(s) and purpose	Strategic activities or main contents	Climate change issues	Relevance to the SUD-Net CCCI
Urban Master Plan of Maputo Municipality Plano de Estrutura Urbana do Municipio de Maputo (PEUMM) (approved in 2008)	 This is the main urban planning instrument of Maputo City, which: defines the spatial vision and strategic planning priorities of the city identifies priority areas for public investment establishes the municipal principles for addressing issues related to urban planning provides clear guidelines for private investments and/or initiatives establishes a simple data collection system which can be permanently updated 	 Slum upgrading Land requalification for installing the social/public services and equipments Land provision for urban expansion Reserve of green areas for guaranteeing ecological and environmental quality Establishment of minimum conditions for ensuring proper transit flow and mobility Promotion of social housing construction Promotion of urban agriculture development Promotion of urban diversification of activities and functions, avoiding the formation of periurban slum and spatial segregation of poor communities Reduction of social differentiation by providing infrastructure, services and equipments in slum areas 	 This planning instrument: identifies sensitive areas of Maputo city which are vulnerable to extreme events related with climate change provides guidelines for future urban development interventions also related with CC impacts 	 This plan will be a crucial reference tool for implementing the CCCI in Maputo Through this initiative the CC aspects of the plan will be strengthened
Sustainable Consumption and Production (SCP) for Maputo and Matola Cities Consumo e Produção Sustentável para as Cidades de Maputo e Matola (2007)	This SCP initiative is a follow up of the 10 Year Framework Programme on Sustainable Consumption and Production in Africa, which identifies key priorities concerning the thematic areas of: energy, water, urban development, and industrial development	 Water and sanitation Energy efficiency and sustainability Urban development and infrastructure 	 It does not address specifically potential climate change impacts in urban areas 	• Some of the assessment methodologies used in the SCP programme could be applied within the framework of the CCCI in Maputo

5. Setting up a climate change adaptation strategy for Maputo city

The capacity to adapt represents the ability of a society to reduce its vulnerability; thus strengthening the capacity to adapt should be aimed at the most vulnerable groups and territories. There is a general agreement on the need to move away from top-down implementation approach and centralised planning towards building capacity to adapt and resilience at the ground level. Achieving this goal requires enhancing the capacity of local actors in a specific area to mitigate the effects of climate change extreme events and to recover from their possible effects.

According to Rosenzweig and Solecki (2003) the key questions related to the need of climate adaptation are: which is the response capacity of urban areas to climate? What conditions make particular sites, people, and systems in urban areas more vulnerable than others? How can these sites, people, and systems be made less vulnerable?

Before engaging on designing a climate change adaptation strategy for the city of Maputo, it is important to begin by unfolding a systematic assessment of the possible impacts and examining not only how climate change is likely to affect the natural environment and physical infrastructure of an urban region, but also to trace possible economic impacts on municipal operations and on the city's economy, as well as the social impact on vulnerable population (Clean Air Partnership, 2007).

The most important steps to be undertaken for such **adaptation process** are described in Fig. 8.

Step 1: Awareness and engagement of stakeholders

The consultations and interviews carried out within the framework of this study with key people from the Ministry of Coordination for Environmental Affairs (*Ministério para a Coordenação da Acção Ambiental* - MICOA), the Maputo Municipal Council (MM), the National Institute of Disaster Management (*Instituto Nacional de Gestão de Calamidades* - INGC) and the National Institute of Meteorology (*Instituto Nacional de Meteorologia* – INAM) confirmed a strong level of engagement for addressing climate change, and are very much interested in the CCCI initiative.

However, a more comprehensive and consistent consultation process is needed in order to assess the degree of awareness at the different levels. In particular, a qualitative assessment based on the different CC-related initiatives in which UN-HABITAT is involved allows anticipating that vulnerable communities, such as the urban poor, show an extremely low level of awareness on the potential impacts of such phenomenon. This can be explained since these target groups have more immediate needs to satisfy on a daily basis, in order to ensure their subsistence.

Figure 8: The adaptation process

Source: Clean Air Partnership (2007). Cities Preparing for Climate Change - A Study of Six Urban Regions.

Step 2: Climate change impacts and assessment

As follow-up of the present study, additional data and further investigation are needed in order to identify and assess potential climate change impacts in Maputo city in a more accurate manner. For this purpose, in the context of the CCCI in Mozambique, the following actions need to be undertaken:

- Review and analysis of existing/historical climatic and hydrological data records, including hydro-morphologic dynamics of the Maputo Bay;
- Identification of potential threats and impacts in Maputo city according to different climate change scenarios;
- In-depth assessment studies of specific vulnerable urban areas of Maputo (e.g. coastal strip, flood-prone peri-urban slum, etc.) and sensitive sectors (water supply, drainage system, energy, transportation, building codes, green and wetland areas, solid waste management, health, etc.);
- Assessment of potential socio-economic and infrastructure costs of climate impacts at city level.

Importantly, the World Bank is currently carrying out a thoroughly study on the potential climate change impacts in Mozambique for the next 50 years, in coordination with INGC, which is about to be finalised. This is a key activity within the framework of the Pilot Programme for Climate Resilience (PPCR) under the Climate Investment Fund (CIF), which will represent an important starting point for undertaking the detailed assessment for Maputo city in the context of the CCCI. The PPCR will initially concern 8 countries, among which is Mozambique, and consists in about US\$500 million to be invested in undertaking CC adaptation measures, in terms of policy/strategy formulation, planning and investments. Overall the planned CIF corresponds to a budget of about US\$6,100 million to be used at the global level (for more information, please see: http://diplomacymonitor.com/stu/dma1.nsf/uh/cc684637B2E55C046C8525754F003E6716).

Step 3: Planning for adaptation action

The analysis of current policies, strategies and plans at the national level and of the strategic instruments at municipal level presented in Tables 3 and 4 shows that climate change issues are indeed acknowledged. However, these legal/policy/strategic instruments do not address climate change neither in an integrated and consistent manner (several gaps exist), nor with a clear focus on urban areas (where there is a higher population density, hence higher risk), especially those located in vulnerable areas such as along the coastline, which is the case of Maputo city. Consequently the CCCI in Mozambique will have a strategic importance in contributing to the preparation of adequate policy, strategic and planning tools based on the outcomes of both previous steps (i.e. engagement/awareness and detailed assessments), in order to provide a range of adaptive options for cities targeting policy and decision-makers. These tools need to be simple, understandable and applicable, as well as inscribed within an overall strategic framework for ensuring sustainable urban development in Mozambique.

Currently, innovative plans and strategies are under elaboration for adaptation and mitigation of CC-related impacts at country level, especially under INGC leadership, in which UN-HABITAT is providing an important technical assistance. However, these instruments are not yet fully adopted and systematically applied, and do not specifically focus on urban areas.

Step 4: <u>Taking adaptation action</u>

First of all, proper institutional mechanisms to guide the adaptation process need to be established at both the national and the municipal levels. MICOA is currently the focal point Ministry for coordinating climate change activities in Mozambique within central government; however its capacity needs urgently to be strengthened for such purpose. This could be done in partnership with other partners such as the World Bank and UNEP, among others. On the other hand, there is still no unit or department dealing with CC and related DRR issues at the level of Maputo municipality. Therefore the CCCI represents a fantastic opportunity for building an institutional set up within the municipality with proper linkages with the government/policy level.

In terms of existing policies, Table 3 highlights that there are several gaps to be filled in. It is highly desirable that the CCCI functions as a key demonstration and catalytic activity by producing a significant impact at both institutional and ground levels. The initiative can therefore serve as best practice and stimulate the formulation of an improved policy framework, which will allow to better addressing CC-related issues in the context of the on-going accelerated urbanisation process in Mozambique.

Finally, climate change adaptation needs to be incorporated and strengthen in on-going or planned programmes or initiatives. From this perspective, the implementation of demonstrative adaptation projects or interventions is essential as pilot climate change adaptation measures. The in-depth assessment exercise will help identifying which areas should be prioritised for that purpose. Of course establishing proper coordination and creating synergies with on-going programmes, especially those supported by UN-HABITAT, will be fundamental.

6. Identifying priority CC adaptation/mitigation measures and key stakeholders

After the consultations carried out at both municipal and central government levels a list of **key priority sectors** were identified, in which CC adaptation and mitigation measures could be tested in urbanised and, particularly, informal areas of Maputo municipality with a potential relevant impact in the short to medium term (see Table 5).

Key sectors	Type of mitigation and/or adaptation measures
Urban infrastructure and planning	 Improved drainage/storm water system Edification of coastline protection dikes Development and implementation of adaptation/mitigation urban plans
Housing and building codes	 Construction of environmentally sustainable social houses Development and application of building codes which confer resistance to natural disasters
Water, sanitation and health	 Sustainable use and supply of water resources Provision of basic services to the urban poor Health education and promotion
Urban environmental quality and green areas	 Improved solid waste management Support of urban agriculture development Protection of green areas and wetlands Installation of ecological water treatment systems

Table 5: Identified key sectors for applying CC adaptation and mitigation measures in Maputo city

Of course, Table 5 is the result of a preliminary assessment which will need to be re-visited after carrying out a more in-depth CC study focusing on Maputo city.

The following **stakeholders** were identified for carrying out the CCCI in Mozambique:

- At central government level:
 - The Ministry for Coordination of Environmental Affairs (MICOA), which is the focal point institution for coordinating matters related to climate change, with includes departments dealing with urban planning, environmental promotion and solid waste management, among other areas;
 - The Ministry of Public Works and Housing (*Ministério das Obras Públicas e Habitação* MOPH), especially concerning building codes, housing development strategies and water and sanitation interventions/investments;
 - The Ministry of State Administration (*Minstério da Administração Estatal* MAE), since it includes two unavoidable institutions for this initiative: (i) the National Disaster Management Institute (INGC); and (ii) the National Directorate for Municipal Development (*Direcção Nacional de Desenvolvimento Autárquico* – DNDA);
 - The Ministry of Science and Technology (Ministério da Ciência e Tecnologias MCT), especially while testing innovative and sustainable solutions/technologies for mitigating/adapting to CC-related impacts;
 - The National Institute of Meteorology (INAM), of course.
- At municipal level:
 - The Maputo Municipal Council (MMC) will obviously me the main focal point at city level by, among other functions: (i) developing CC adaptation urban plans; (ii) coordinating the planning and execution of pilot interventions; (iii) benefiting from training and capacity building programmes; and (iv) serving as intermediary to access the final beneficiaries;
 - The vulnerable population at the neighbourhood level, or slum dwellers, also organised in Community-Based Organisations (CBOs) or community associations.

> <u>The academic sector</u>:

The Eduardo Mondlane University (*Universidade Eduardo Mondlane* - UEM) in Maputo will be involved in the development and testing of CC adaptation/mitigation tools and methods, especially through:

- The Faculty of Architecture and Physical Planning;
- The Faculty of Engineering;
- The Faculty of Sciences.
- The civil society and the private sector

These are essential sectors where key stakeholders were not yet clearly identified, if not the Economic Forum for Environment (Fórum Económico para o Meio Ambiente – FEMA). These important sectors can respectively guarantee, on the one hand, CC awareness-raising and advocacy, and on the other hand, capital investments which could allow the implementation of pilot adaptation and/or mitigation interventions.

Table 6 presents a rapid Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis on climate change, which was conducted with only three key stakeholders, namely: MICOA, INGC and MMC.

STAKEHOLDER	STRENGTHS	WEAKNESSES
MICOA	 Government coordinating institution concerning CC and environmental issues Focal point institution for implementing of the UNFCCC 	 Lack of qualified human resources, policy and/or strategy for dealing with CC-related impacts in urban areas Poor enforcement/revision capacity of existing policies and strategies
INGC	 Pro-active and experienced management team Strong community involvement when implementing plans, strategies and interventions 	 Few interventions at urban level Lack of qualified human resources for dealing with CC-related impacts in urban areas
ММС	 Decentralised organisational structure set up through municipal elections New transparency governance policy Improved managerial/technical capacity for dealing with urban management/planning issues 	 No managerial/technical unit dealing with CC-related impacts at city level Lack of methods and tools to address CC-related impacts at city level
STAKEHOLDER	OPPORTUNITIES	THREATS
MICOA	 Solid legal, policy and strategic framework for dealing with CC (NAPA, Environmental Strategy for Sustainable Development, etc.) Good partnerships and integration of various on-going CC projects 	 Budget and technical capacity constraints Environmental coordination mandate is too broad, ending up in a weak attention on its policies from the other sectors
INGC	 Good financing and technical partnerships Wide, innovative and multi-disciplinary disaster risk reduction approach, with a decentralised vision 	 Budget constraints Limited human resources compared to the needs
ММС	 Excellent financing partnership with the World Bank, producing positive capital investments on urban infrastructure Increased sense of responsibility of service delivery for the urban poor Openness for bringing the CC urban dimension to the discussion table and for drafting a first CC Adaptation and Mitigation Master Urban Plan of Maputo city 	 Budget constraints Limited human resources compared to the needs

<u>Table 6</u>: Rapid SWOT stakeholders' analysis

It will be important that the CCCI in Mozambique also links with at least three working groups composed of government representatives and multi/bilateral partners, in order to create proper networks and synergies, and identify potential sources of funding:

- <u>The Working Group for Municipal Development</u>, currently co-chaired by the World Bank and Swiss Development Cooperation (SDC), which gathers representatives of MAE, MICOA, MOPH and of the National Association of Municipalities of Mozambique (*Associação Nacional dos Municípios de Moçambique* - ANAMM), and development partners concerned with urban and municipal issues. The group has recently coordinated the implementation of a comprehensive joint municipal study in several cities involving national and international experts and the academic sector. The study will serve as basis for establishing a coordinated municipal development programme in the near future.
- <u>The Working Group for Environment</u>, at present chaired by the French Agency for Development (Agence Française de Développement AFD) in coordination with MICOA, which deals with issues related to environmental sustainability including climate changes.
- <u>The Working Group for Disaster Risk Reduction</u>, chaired by INGC in partnership with the United Nations Development Programme (UNDP). This group was created recently and is still not fully functional, however it might be a strategic forum of discussion for identifying donors which could fund follow-up investments of the CCCI inception phase.

7. CC methods and tools and potential synergies with on-going initiatives

Most of the policies, strategies and plans presented and quickly analysed in Tables 3 and 4 of Section 4 include strategic recommendations and proposed lines of interventions which will contribute to the formulation and application of CC adaptation and mitigation measures. However, there is no adequate integration between these different instruments for addressing the phenomenon in a comprehensive and systematic manner, nor a specific focus on the urban dimension of the problem. Importantly, to the knowledge of these authors, no specific methods and tools were developed and have been adopted yet. Particularly, it appears that the negative effects of climate change and DRR in general are not yet in the agenda of the municipalities. These are major shortfalls which need to be addressed urgently. From this perspective, the CCCI in Mozambique can play an important role.

In the mean time, several initiatives including CC-related aspects have recently started or will commence soon. Among others, the following are of interest of the CCCI:

The UN Joint Programme (JP) for Disaster Risk Reduction (DRR) and Emergency Preparedness, which is lead by UNDP and counts with UN-HABITAT participation. This JP, which was established as part of the "Delivering as One" pilot initiative taking place in Mozambique, aims at: (i) mainstreaming disaster risk and vulnerability reduction in national development plans and programmes, including development of policy and norms; (ii) strengthening Government and Civil Society capacities for DRR at central, provincial and local levels; (iii) setting up a National Information System including Early Warning System, inter-sectoral information sharing and knowledge management for DRR. Several methods and tools are being developed under this JP, some of which could well fit the purpose of the CCCI.

- The UN Joint Programme for Environmental Mainstreaming and Adaptation to Climate Change, lead by FAO and includes UN-HABITAT as participating agency, has for goal to support the Government of Mozambique's efforts towards sustainable development through (i) mainstreaming of environment and climate change policies, and (ii) adaptation of human activities to climate change. The implementation of ground activities of this JP is taking place in Chicualacuala District, a remote and arid rural area of Gaza Province located 500 km North-West of Maputo. The CCCI will be able to take advantage especially of the policy and normative work undergoing in this JP.
- The Maputo Municipal Development Programme (PRO-MAPUTO), which is a 3-year initiative funded by the World Bank through a committed amount of about US\$40 million. This programme does not specifically address CC-related issues but is developing urban planning and physical interventions which will surely mitigate the effects of such phenomena. Furthermore, as mentioned already, it constitutes a potential source of funding of a follow-up investment phase of the CCCI in Maputo city, especially if the latter initiative is well implanted in the Municipal Council.
- The Pilot Programme for Climate Resilience (PPCR), to be funded by the World Bank (WB) in the next 2-3 years with an amount of US\$500 million. As reported above, as preliminary step, an in-depth assessment on the potential CC impacts in Mozambique for the next 50 years is under preparation. This programme is part of the WB recently approved Climate Investment Fund (CIF), which also constitutes a potential funding source for a follow-up investment of the CCCI.

8. A snapshot of UN-HABITAT activities, know-how and established partnerships in Mozambique

Since 2002 UN-HABITAT is implementing several projects in Mozambique (and even in the subregion with the GEF Limpopo project) dealing with DRR and vulnerability reduction issues, slum upgrading, policy-making and capacity building (see Table 7). Most of them will be, in a way or another, will be of interest of the starting CCCI in Mozambique.

Figure 9: housing low-cost solution for "living This UN agency started by promoting "living with floods" with floods" as sustainable alternative to massive resettlement. Different types of didactic and interactive awareness-raising materials were prepared, such as the colourful manual "Aprender a Viver com as Cheias" associated with a cards game (see Fig. 9), the "River Game" (see Fig. 10), as well as several posters and a short cartoon animation. These materials provide basic concepts of community-based disaster response, preparedness and mitigation, coping solutions, among others, and have already been tested and disseminated.

<u>Table 7</u>: UN-HABITAT (completed, closing, on-going and starting) projects in Mozambique

Project Title	Time frame	Budget (in US\$)	Donor(s)	Partners	Objectives/Main Activities		
Completed Projects							
Slum Upgrading and Vulnerability Reduction in Flood Prone Cities (Maputo, Chókwè, Tete and Quelimane)	Jun. 02 Sep. 04	495,000	Cities Alliance	MICOA, MAE, 4 concerned City Councils	To enhance local capacities for reducing vulnerability to floods through participatory planning, slum upgrading, and mitigation & preparedness techniques.		
Secure of Tenure and Policy Preparation	Jun. 02 Jun. 04	100,000	Govt. of Italy	МІСОА, МОРН	To assist the Government in preparing the Territorial Planning Law and the Housing Policy.		
Cities Without Slums	Jul. 04 Apr. 05	80,000	UN- HABITAT	MICOA, Faculty of Architecture of UEM	To produce a City Situation Analysis of Manica, Nacala and Maputo, and prepare a National Slum Upgrading Intervention Strategy.		
Sustainable Land Use Planning for Integrated Land and Water Management for Disaster Preparedness and Vulnerability Reduction in the Limpopo Basin	Sep. 04 Sep. 07	995,000	GEF	UNEP, Govts of Mozambique South Africa, Zimbabwe, Botswana	To develop and implement participatory land use tools and plans for sustainable land management in the Limpopo River Basin in order to reduce the impact of floods.		
UN-HABITAT Response to the 2007 and 2008 Floods and Cyclone in Mozambique	Apr. 07 Mar. 08	170,000	IOM UNDP	INGC, MICOA, MOPH, Red Cross	To provide urgently required technical assistance to flood and cyclone victims in resettlement and reconstruction processes.		
		С	losing Project	ts			
Improving Water and Sanitation in Mafalala Neighbourhood, Maputo City	Jun. 05 Jun. 09	200,000	UN- HABITAT	Maputo City Council, DNA and FIPAG	To improve water, sanitation, drainage and waste management through community involvement through active community.		
Improving Water and Sanitation in Quelimane City	Jun. 06 Mar. 09	500,000	Cities Alliance	City Council, DANIDA, UNICEF, World Bank, FIPAG	To improve water, sanitation, drainage, roads and waste management in slum areas through community involvement and local capacity building.		
		Oi	n-going Proje	cts			
Water for African Cities in Mozambique (Beira and Dondo)	Sep. 07 Sep. 10	1,500,000	UN- HABITAT	DNA, FIPAG CRA, Municipal Councils	To strengthen local and central capacity and implement WATSAN interventions in slum areas.		
Capacity Building for Mainstreaming Urban Governance in Mozambique	Jun. 07 Jun. 10	700,000	Spanish Govt.	MAE, ANAMM, academic sector	To strengthen municipal capacities and processes in urban governance, local leadership, gender mainstreaming, local participatory planning, budgeting finance and accountability.		
Joint Programme for Disaster Risk Reduction and Emergency Preparedness	Oct. 07 Jun. 10	990,000	One Fund	INGC, MICOA, MOPH, local authorities and several UN Agencies	To mainstream disaster risk and vulnerability reduction in devpt. plans and policies; strengthen DRR capacities at decentralised levels; set up an Information System on DRR.		

Table 1 (cont.)

Project Title	Time frame	Budget (in US\$)	Donor(s)	Partners	Objectives/Main Activities		
On-going Projects (cont.)							
Joint Programme for Environmental Mainstreaming and Adaptation to Climate Change	Sep. 08 Aug. 11	1,262,000	Spanish MDG-F	MICOA, INGC, district authorities of Chicualacuala and several UN Agencies	To support the Government's efforts towards sustainable development through (i) mainstreaming of environment and climate change policies, and (ii) adaptation of human activities to climate change.		
Joint Programme for Support to Decentralisation and Integrated Local Development	Oct. 08 Jun. 10	400,000	One Fund	MAE, ANAM and several UN Agencies	To coordinate UN projects in Mozambique to ensure efficient contribution to the MDGs and the UNDAF.		
Supporting Innovative Local Mitigation Interventions for Reducing Vulnerability to Floods and Cyclones in Mozambique	Oct. 08 Dec. 09	500,000	EC (DIPECHO)	INGC, Municipal Councils of Vilankulos and Marromeu	To identify and test innovative small- scale mitigation interventions for floods and cyclones through participatory approach and local capacity building, disseminate the initiative and prepare for replication.		
Cities and Climate Change Initiative	Jan. 09 Dec. 10	300,000	Cities Alliance	MICOA, INGC, Maputo Municipal Council	To build institutional capacities in Mozambique for developing appropriate policies, strategies, tools and methods with aim at carrying out climate change adaptation and/or mitigation measures in urban areas.		
Slum Upgrading and City Development Strategy for Nampula City, Mozambique	Jan. 09 Dec. 10	500,000	Cities Alliance	Nampula Municipal Council	To build municipal capacity and increase participation for urban planning and management of Nampula city and surrounding areas, through the design of a city-wide slum upgrading plan and of a city development strategy.		
Empowering urban women entrepreneurs through housing development and land ownership in Mozambique	Jan. 09 Dec. 10	300,000	Spanish MDG-F	MMAS, Manica Municipal Council	To establish a women land trust fund in Manica town, promote micro- finance and build social houses through women association schemes.		
Participatory Slum Upgrading Programme (Phase 2)	Jun. 09 Dec. 10	120,000	EC	МІСОА, МАЕ, МОРН	To enhance dialogue and exchange of experiences, build technical capacities and undertake feasibility studies for slum upgrading.		

UN-HABITAT developed several activities which will be relevant to the CCCI, among others:

- Elaboration of participatory urban plans involving central and municipal authorities and slum dwellers (see an example for Maputo city in Fig. 11)
- Support to the delineation of a strategy for vulnerability reduction and sustainable development in flood-prone areas (to be soon submitted to the attention of the Cabinet), which includes the installation of elevated platforms (see Fig. 12);
- Provision of technical assistance to the government in developing improved building codes in order to confer resistance to natural disasters;

Figure 10: Board of the River Game

<u>Fiqure 11</u>: Example of a quick assessment of the drainage conditions of Malanga Neighbourhood in Maputo City by involving the resident community

Source: Spaliviero (2006)

<u>Fiqure 12</u>: Proposed model of elevated platform for flood-prone areas to serve as safe-haven in case of emergency and as social facility in normal times

- Several in-depth assessment studies on DRR-related issues, focusing on shelter, land tenure, water and sanitation, gender and basic/social services;
- Design and construction of flood-proof (see Fig. 13) and cyclone-proof (see Fig. 14) social houses through "on the job" training of master builders among the resident community;
- Preparation of a manual for building in cyclone-prone areas (see Fig. 15).

<u>Figure 13</u>: Model of flood-proof house built with local materials





Figure 14: Model of cyclone-proof house





Along these years UN-HABITAT in Mozambique has established strong partnership with most of the stakeholders listed in Section 6 which will be important to the CCCI, in particular with:

- MICOA, MOPH, MAE and MCT at government level;
- MMC and ANAMM at municipal level;
- the Faculty of Architecture and Physical Planning at UEM in the academic sector;
- National and international NGOs with on-going activities in Maputo city;
- CBOs and community associations in Maputo city;
- Most of the UN Agencies operating in Mozambique;
- Multi/bilateral organisations dealing with municipal/urban development or CC related issues.

An example of partnership which could be relevant to the CCCI is UN-HABITAT's participation in the UNDP/BCPR Global Risk Identification Programme (GRIP) launched in May 2008, in which the agency has tested the RADIUS (Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters) methodology in Maputo City (UN-HABITAT, 2008). This is an interesting tool using a rapid mapping concept which could be adapted to the CCCI requirements, also by taking advantage of the trained municipal staff involved in the RADIUS activity.

Another example is the strong interest demonstrated by an international partner such as Hydraulic Research Wallingford (HRW), one of the most important hydraulic engineering firms in the United Kingdom, in taking part to the CCCI. HRW has already collaborated with UN-HABITAT in the past in identifying sustainable flood mitigation strategies in Southern Africa. This company, in the form of a joint venture with UN-HABITAT through the CCCI, could apply for international funding for studying climate change impacts in the Maputo Bay and its microregion from a scientific perspective in order to derive strategic policy recommendations and identify appropriate CC adaptation/mitigation measures for Maputo city.

Importantly, from its own programme in Mozambique, UN-HABITAT will be able to financially contribute to the CCCI especially by allocating some funds from the three Joint Programmes (JPs) it is participating in, as follows (for more details, see the proposed budget in Section 11):

- <u>The JP for DRR and Emergency Preparedness</u> will co-finance in the form of:
 - ✓ Percentage of staff time (CTA and national/international consultants) for support to coordination, DRR strategy formulation, development of DRR awareness-raising materials and design of innovative CC adaptation/mitigation measures, including some mission costs to and from UN-HABITAT Head Quarters;
 - ✓ Percentage of national sub-contractor time (Faculty of Architecture and Physical Planning) for contributing to the preparation of the CC Adaptation and Mitigation Urban Plan of Maputo city;
 - ✓ Percentage of capital investment costs for implementing of a CC adaptation/mitigation pilot intervention in Maputo city.

- <u>The JP for Environmental Mainstreaming and Adaptation to CC</u> will co-finance in the form of percentage of staff time (CTA and national/international consultants) for support to coordination, strategy/policy formulation and tools development for addressing CC issues and design of innovative CC adaptation/mitigation measures.
- <u>The JP for Support to Decentralisation and Integrated Local Development</u> will co-finance the costs for missions and for delivering CC/DRR training and capacity building activities to Maputo's municipal staff.

9. Final recommendations

From this preliminary assessment several recommendations can be derived, which will be used to propose an intervention strategy for implementing the CCCI in Mozambique. The main ones are the following:

<u>1st recommendation</u>: obtain a stronger involvement of key stakeholders, set up efficient institutional and communication mechanisms and reach consensus on the proposed intervention strategy.

A launching workshop needs to be organised in Maputo during which the CCCI in Mozambique will be presented. To this should follow a comprehensive and consistent consultation process. Among other stakeholders, it will be important to actively involve key institutions such as MICOA and INGC at central level and the MMC at the municipal level.

As a result of these consultations, consensus on a functional and efficient institutional set up of the whole initiative should be reached, which defines roles and responsibilities of the different counterparts (i.e. central government, municipality, target communities and development partners – including UN-HABITAT) and establishes clear communication channels. Among other aspects, the initiative will have to ensure as much as possible participation and transparency mechanisms at all stages of implementation, from decision-making to planning until the execution of physical interventions.

In general, a stronger involvement of the academic sector (concerning the research and urban planning activities), civil society (for carrying out advocacy and awareness raising activities) and private sector (for setting up sustainable investment schemes in the long term) is expected. Potential bi/multi-lateral development partners will need to be identified in order to coordinate with on-going projects and create synergies at a very early stage of the CCCI, including the identification of potential sources for funding the follow-up investment phase. For this purpose, liaising with key discussion/coordination fora such as the Working Groups for Municipal Development and for Environment will be very useful.

Importantly, the hereafter proposed implementation strategy will have to be discussed and revised until full consensus is reached by all parties involved.

<u>2nd recommendation</u>: establish an effective management and implementation capacities for fulfilling the different CCCI prerogatives from the very beginning

A full-time National Project Officer (NPO) needs to be recruited in order to facilitate the implementation of all project activities, according to the outcomes of the consultative process specified above. The NPO will receive appropriate technical and administrative support from

UN-HABITAT, especially through the team working in Mozambique, and work under the general supervision and in full collaboration with central government and municipal institutions.

In particular the capacity of MICOA, in its quality of focal point Ministry for coordinating climate change activities in Mozambique within central government, will need to be strengthened, putting a special emphasis on urban development issues. The details of such capacity building process will have to be discussed as part of the activities specified under the first recommendation. In addition to its coordination role, MICOA should be the main agent for disseminating the CC adaptation/mitigation tools and methods to be developed during this initiative through ad-hoc workshops and Training of Trainers at the national level.

On the other hand, as critical activity for ensuring the success of this initiative, it is strongly recommended to create a specific Unit dealing with CC-related impacts and DRR issues within the Maputo Municipal Council. This Unit, which at an initial stage could be of modest dimension (one technical person, office space and basic equipment), will be instrumental for facilitating the implementation of the CCCI at the municipal level. Later on its functions and importance will progressively expand, as it will fully integrate in the different functions, decision-making mechanisms and projects activities of the municipality.

<u>3rd recommendation</u>: prepare a fully-fledged and multi-dimensional assessment study on the impacts of climate change in Maputo city in order to determine the adaptationmitigation measures to be applied and the priority interventions to be implemented

This study will have to contemplate, among others, at least the following aspects/components:

- ✓ A detailed assessment concerning the degree of awareness of climate change impacts in Maputo city, by conducting a field survey (including semi-structured interviews) of a representative sample of the different urban population classes (e.g. those living in the urbanised areas, those living in the peri-urban/degraded neighbourhoods, etc.); the results of this assessment will have to be analysed statistically and useful recommendations derived, in order to prepare appropriately for carrying out awareness-raising campaigns;
- ✓ An extensive policy/strategy review of existing instruments dealing with CC, with more specific and elaborated recommendations on the gaps to be filled in;
- ✓ A review and analysis of existing/historical climatic and hydrological data records of the Maputo micro-region, including hydro-morphologic dynamics of the bay; as a result of such review, specific recommendations should be formulated whether or not considering the interconnected metropolitan system of Maputo and Matola municipalities and Marracuene District, also called Greater Maputo, as target area for CC adaptation/mitigation interventions;
- ✓ Identification of potential threats and impacts in Maputo city (or Greater Maputo) according to different climate change scenarios, with a special focus on flooding (associated with heavy precipitation), sea level rise and cyclones;
- ✓ In-depth assessment of specific vulnerable urban areas of Maputo (e.g. coastal strip, flood-prone peri-urban slum, etc.) and sensitive sectors (water supply, drainage system, energy, transportation, building codes, green and wetland areas, solid waste management, health, etc.), including an estimation of potential socio-economic and infrastructure costs of climate impacts at city level;

Prioritisation of physical CC adaptation/mitigation measures to be undertaken in the short, medium and long term in Maputo city, with a special focus on the following sectors: urban infrastructure and planning; (ii) housing and building codes; (iii) water, sanitation and health; (iv) urban environmental quality and green areas (see Table 5); this shall include an economic and cross-sectoral analysis of the different adaptation/mitigation measures/options.

The involvement of an international partner such as HR Wallingford in this study might be considered. In order to avoid duplication of efforts, retrieving quickly the World Bank study report on the potential climate change impacts in Mozambique for the next 50 years is essential.

<u>4th recommendation</u>: develop proper climate change adaptation/mitigation strategies, tools and methods for urban areas in Mozambique to be tested in Maputo city

It is necessary to conduct urgent trainings involving the government and municipal counterparts of the CCCI in order to develop adequate CC adaptation/mitigation strategies, tools and methods adapted to the urban situation in Mozambique. In fact, the preliminary assessment has found out that there is currently a complete vacuum of this kind of instruments. The latter need to be simple, understandable and applicable, as well as inscribed within an overall strategic framework for ensuring sustainable urban development in Mozambique

In particular, a key activity to be carried out by the CCCI shall be the preparation of a Climate Change Adaptation and Mitigation Urban Plan (CCAMUP) of Maputo City. This plan will have to be linked with the recently approved Urban Master Plan of Maputo Municipality (PEUMM) and provide a range of adaptation/mitigation measures/options targeting policy and decision-makers to be applied in the short, medium and long-term. The CCAMUP will have to be prepared and coordinated through the Unit to be set up by the project in the MMC. The plan will be part of a set of tools and methods to be disseminated and applied in other Mozambican cities.

In the same line of thought, the CC/DRR Unit at the MMC should develop a database in order to systematically record existing knowledge and data of events related with climate change which threaten Maputo city. Such database will allow updating and revising constantly the CCAMUP so that it better serves its purpose, which is of carrying out appropriate adaptation/mitigation interventions.

<u>5th recommendation</u>: implement demonstrative CC adaptation/mitigation projects or interventions in Maputo city, and secure funding sources of follow-up investment

Within the framework of the developed CCAMUP of Maputo City, a pilot adaptation/mitigation intervention should be carried out, taking advantage of the experience and know-how developed by UN-HABITAT in Mozambique. Such demonstration activity can have a catalytic role in producing a potentially positive impact at both institutional and ground levels on how to address in practical terms CC-related impacts in Mozambican urban areas.

The intervention, if properly carried out, can then serve as best practice and stimulate the formulation of an improved policy framework, which will allow to better addressing CC-related issues in the context of the on-going accelerated urbanisation process in Mozambique. It will also serve the advocacy purpose, together with the development of adequate capacity and planning tools, of securing funding sources for follow-up investment, such as the World Bank PRO-MAPUTO and PPCR initiatives.

<u>6th recommendation</u>: set up policy dialogue, knowledge management and dissemination mechanisms concerning CC-related issues in urban areas, and carry out awareness-raising activities

Last but not least, it will be very important to systematise all collected information concerning CC-related issues in urban areas during this initiative. Central government institutions such as MICOA and INGC will have a major role to play for this purpose. In particular, the following actions should be undertaken:

- ✓ Firstly, proper policy dialogue mechanisms should be established through the organisation of workshops aiming at promoting/improving current policies/strategies dealing with CC in order to mainstream the urban dimension of this phenomenon.
- Secondly, all produced strategies, tools, methods and plans shall be adequately organised and transmitted to interested parties through a knowledge management set up.
- ✓ Thirdly, efficient dissemination mechanisms should be established, starting from the preparation of brochures, advocacy materials and best practice reports, until the delivery of such information to all concerned municipalities through seminars and adhoc trainings. ANAMM could also help for this purpose.
- ✓ Finally, based on the results of the assessment study, awareness campaigns focussing on the identified potential impacts of CC in urban areas should be carried out.

10. Proposed implementation strategy

Proposed time frame: 2 years

Intervention Logic	Objectively Verifiable Indicators	Means of Verification	Assumptions
Goal	Number of workshops, expert group meetings and	Workshop proceedings	Good collaboration
To build institutional capacities in Mozambique for developing appropriate policies, strategies, tools and methods with aim at carrying out climate change adaptation and/or mitigation measures in urban areas	 Number of workshops, expert group meetings and consultations for establishing proper institutional, communication and implementation mechanisms of the initiative, as well as an appropriate policy dialogue Office equipment purchased, staff hired and training delivered in order to build up an effective management and implementation capacity in MICOA and MMC for dealing with CC impacts in urban areas Fully-fledged and multi-dimensional assessment study on the impacts of climate change in Maputo city carried out Number of climate change adaptation/mitigation strategies, tools and methods for urban areas developed Number of data collected and publications/dissemination materials prepared for knowledge management and dissemination purposes Number of awareness-raising activities carried out 	 Workshop proceedings Progress reports Consultations reports TOR of hired staff Training reports Assessment study report Strategies, tools, studies and methods produced Photographic report of the pilot interventions, including technical drawings Access to the digital database created for data collection and knowledge management purposes Publications and dissemination materials produced Awareness-raising campaigns reports 	 Good collaboration established with Central Government (in particular MICOA and INGC) and the MMC Efficient and effective project implementation mechanisms in place Positive political will in addressing CC issues in urban areas

Objectives	Expected Results	Planned Activities
Objective 1 To establish an effective management and implementation capacity at both MICOA and MMC for dealing with CC impacts in urban areas, with clear institutional roles and communication channels, including policy dialogue mechanisms	Result 1.1. Proper institutional, communication and implementation mechanisms of the initiative established Result 1.2. Policy dialogue mechanisms concerning CC impacts in urban areas created Result 1.3. Concerned sectors of MICOA and of MMC trained and reinforced to deal with CC impacts in urban areas	 1.1.1. Hire a National Project Officer who will coordinate the initiative with UN-HABITAT technical and administrative support, who will liaise constantly with MICOA and INGC, and with MMC, ensuring a smooth project implementation 1.1.2. Carry out 3 workshops with stakeholders from central government, MMC, academic sector, private sector, civil society organizations, community representatives and multi/bilateral development partners: one for launching, one for the mid-term review and one for the final review of the initiative; these workshops will ensure, among other aspects, that collegial steering decisions are taken at critical implementation stages and proper coordination/synergetic mechanisms are set up with other on-going/starting CC projects 1.1.3. Conduct consultations with key stakeholders, in particular MICOA, INGC and MMC until a consensual implementation strategy of the CCCI is produced, defining the different institutional roles and responsibilities, and establishing top-down and bottom-up communication mechanisms which ensure public participation during the implementation of the initiative 1.2.1. Organise expert group meetings among key stakeholders for establishing proper policy dialogue mechanisms, which should result in the elaboration of revised/improved CC policy/strategy documents 1.2.2. Participate to relevant discussion/coordination fora such as the Working Groups for Municipal Development and for Environment 1.3.1. Identify key sectors of MICOA which needs to be strengthened to deal with CC impacts in urban areas, and deliver appropriate training and capacity building activities and tools; as a result both the coordination and dissemination roles of the Ministry should be reinforced 1.3.2. Create a specific Unit dealing with CC-related impacts and DRR issues (UCC&DRR) within the MMC, by hiring one technical person and purchasing basic office equipment; the UCC&DRR will be the focal point for facilitating the implement into of

Objectives	Expected Results	Planned Activities
Objective 2 To carry out a fully-fledged and multi-dimensional assessment study on the impacts of climate change in Maputo city and to develop CC adaptation /mitigation strategies, tools and methods for urban areas	Result 2.1. A fully-fledged and multi-dimensional assessment study on the impacts of climate change in Maputo city prepared in order to determine the adaptation-mitigation measures to be applied and the priority interventions to be implemented <u>Result 2.2.</u> Proper climate change adaptation/mitigation strategies, tools and methods for urban areas in Mozambique developed, to be tested in Maputo city	 2.1.1. Carry out a detailed assessment on the degree of awareness of climate change impacts in Maputo city, including a field survey of a representative sample of the different urban population classes; the results will be analysed statistically and useful recommendations derived for planning the awareness-raising campaigns; 2.1.2. Perform an extensive policy/strategy review of existing instruments dealing with CC, with specific recommendations on the gaps to be filled in; 2.1.3. Prepare a review and analysis of existing/historical climatic and hydrological data records of the Maputo micro-region, including hydro-morphologic dynamics of the bay; 2.1.4. Identify potential threats and impacts in Maputo city according to different climate change scenarios, with a special focus on flooding, sea level rise and cyclones; 2.1.5. Carry out an in-depth assessment of specific vulnerable urban areas of Maputo and sensitive sectors, including an estimation of potential socio-economic and infrastructure costs of climate impacts at city level; 2.1.6. Prioritise physical CC adaptation/mitigation measures to be undertaken in the short, medium and long term in Maputo city; this shall include an economic and cross-sectoral analysis of the different adaptation/mitigation measures/options 2.2.1. Conduct trainings involving the government and municipal counterparts of the CCCI in order to develop adequate CC adaptation/mitigation strategies, tools and methods adapted to the urban situation in Mozambique; 2.2.2. Through the UCC&DRR at the MMC, prepare a Climate Change Adaptation and Mitigation Urban Plan (CCAMUP) of Maputo City, to be linked with the recently approved Urban Master Plan of Maputo Municipality (PEUMM), and provide a range of adaptation/mitigation measures/options targeting policy and decision-makers to be applied in the short, medium and long-term. 2.2.3. Through the UCC&DRR at the MMC, develop a database in order to systematically record

Objectives	Expected Results	Planned Activities
Objective 3 To set up knowledge management and dissemination on CC impacts in urban areas, and carry out demonstrative adaptation- mitigation interventions in Maputo city, including awareness-raising activities	<u>Result 3.1.</u> Proper knowledge management and dissemination mechanisms concerning CC-related issues in urban areas are set up <u>Result 3.2.</u> Demonstrative CC adaptation/mitigation projects or interventions are implemented in Maputo city, and related awareness-raising activities are carried out	 3.1.1. Organise all strategies, tools, methods and plans produced in a proper knowledge management set up, so that they can easily be shared with interested parties 3.1.2. Establish efficient dissemination procedures by preparing brochures, advocacy materials and best practice reports on the CCCI and delivering them to all concerned municipalities through seminars and ad-hoc trainings; 3.2.1. Within the framework of the developed CCAMUP of Maputo City, implement pilot adaptation/mitigation interventions, taking advantage of the experience and know-how developed by UN-HABITAT in Mozambique. 3.2.2. By sharing the results of the CCCI with potential donors, secure funds for follow-up investment 3.2.3. Based on the results of the assessment study, carry out ad-hoc awareness campaigns focuring on the identified potential impacts of CC in urban areas

Figure 16: Proposed communication flow for project implementation



<u>Legenda</u>

CC:	Climate Change	MMC:	Maputo Municipal Council
CTA:	Chief Technical Adviser	NPO:	National Project Officer
DMP:	Disaster Management Programme	ROAAS:	Regional Office for Africa and the Arab States
DRR:	Distaster Risk Reduction	TCBB:	Training and Capacity Building Branch
INGC:	Instituto Nacional de Gestão de Calamidades	UEPB:	Urban Environment Planning Branch
MICOA:	Minstério para a Coordenação da Acção Ambiental	UN-HABITAT:	United Nations Human Settlements Programme

11. Estimated budget

Class/Code Name	Working Months	Budget to be requested to UN-HABITAT HQ (in US\$)	ROAAS Co- Financing (in US\$)	Co- Financing Project Source
Project Personnel				
International Chief Technical Adviser (for coordination and technical inputs)	3	0	36,000	JP Env
International Consultants (for designing innovative CC adaptation/mitigation solutions/interventions)	4	0	48,000	JP DRR/Env
National Project Officer	24	40,000	20,000	JP DRR
Administrative and Financial Assistant	6	4,800	4,800	JP DRR
National Consultants (for supporting in policy/strategy formulation)	12	18,000	18,000	JP DRR/Env
Missions costs (to or from HQ)		10,000	10,000	JP DRR/Dec
Sub-Total Project Personnel	46	72,800	136,800	
Sub-Contracts/Agreement of Cooperation				
National sub-contract for carrying out an in-depth CC assessment study of Maputo city	6	35,000	0	
Agreement of Cooperation with the MMC for establishing the CC/DRR Unit, prepare the CCAMUP and implement the CC pilot adaptation/mitigation intervention	24	100,000	20,000	JP DRR
Agreement of Cooperation with the Faculty of Architecture of UEM for providing technical assistance in the preparation of the CCAMUP	12	20,000	20,000	JP DRR
Sub-Total Sub-Contracts		155,000	40,000	
Training and capacity building				
3 coordination/project review workshops in Maputo		30,000	0	
Training on CC adaptation/mitigation tools and methods for urban/municipal areas		20,000	10,000	JP Dec
Awareness-raising campaigns/activities		10,000	5,000	JP Dec
Knowledge management and dissemination activities		10,000	5,000	JP Dec
Sub-Total Training		70,000	20,000	
Miscellaneous				
Sundry, Communication and miscellaneous office costs		5,000	5,000	JP Dec
Sub-Total Miscellaneous		5,000	5,000	
PROJECT TOTAL		302,800	201,800	

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