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PROJECT IDENTIFICATION FORM (PIF).

PROJECT TYPE: FULL-SIZED PROJECT

TYPE OF TRUST FUND: LDCF

PART I: PROJECT INFORMATION

Project Title:	Building resilience in the coastal zone through Ecosystem – based approaches to adaptation (EbA).		
Country(ies):	Mozambique	GEF Project ID: ¹	6983
GEF Agency(ies):	UNEP	GEF Agency Project ID:	01329
Other Executing Partner(s):	MICOA	Submission Date:	22 September 2014
		Resubmission Date:	03 November 2014
GEF Focal Area(s):	Climate Change	Project Duration (Months)	48
Integrated Approach Pilot	IAP-Cities <input type="checkbox"/> IAP-Commodities <input type="checkbox"/> IAP-Food Security <input type="checkbox"/>		Corporate Program: SGP <input type="checkbox"/>
Name of parent program:	[if applicable]		

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES²:

Objectives/Programs (Focal Areas, Integrated Approach Pilot, Corporate Programs)	Trust Fund	(in \$)	
		GEF Project Financing	Co-financing
CCA-1, Outcome 1.1	LDCF	3,500,000	13,973,784
CCA-2, Outcome 2.1	LDCF	900,000	3,530,000
CCA-2, Outcome 2.4	LDCF	1,600,000	7,400,000
Total Project Cost		6,000,000	24,903,784

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

Project Objective: To increase capacity of vulnerable communities in the larger Maputo area to implement Ecosystem-based approaches to Adaptation (EbA).

Project Component	Financing Type ³	Project Outcomes	Trust Fund	(in \$)	
				GEF Project Financing	Co-financing
1. Institutional and technical capacity of Maputo municipal and district authorities.	TA	1.1 Institutional and technical capacity of Maputo municipal and district authorities to plan and implement mangrove and riparian EbA interventions in coastal areas strengthened.	LDCF	1,540,000	7,230,000
2. Implementation of mangrove and riparian EbA interventions in the larger Maputo area.	TA/INV	2.1 Capacity of local communities to implement EbA interventions at selected project sites in the larger Maputo area increased.	LDCF	3,330,000	13,803,784
3. Public awareness and knowledge of enhancing climate resilience through mangrove and riparian EbA interventions.	TA	3.1 Public awareness and knowledge of the benefits of implementing EbA in mangroves and riparian areas increased.	LDCF	850,000	3,360,000
Subtotal				5,720,000	24,393,784
Project Management Cost (PMC) ⁴			LDCF	280,000	510,000
Total Project Cost				6,000,000	24,903,784

¹ Project ID number will be assigned by GEFSEC and to be entered by Agency in subsequent document submissions.

² When completing Table A, refer to the GEF Website, [Focal Area Results Framework](#) which is an Excerpt from [GEF-6 Programming Directions](#).

³ Financing type can be either investment or technical assistance.

⁴ For GEF Project Financing up to \$2 million, PMC could be up to 10% of the subtotal; above \$2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

If Multi-Trust Fund project: PMC in this table should be the total and enter trust fund PMC breakdown here ()

C. INDICATIVE SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE, IF AVAILABLE

Please include confirmed co-financing letters for the project with this form.

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
International donor	European Development Fund (EDF) - Kubasisa Muganga (Clean Neighbourhood) Project	Grant	681,756
International donor	EuropeAid - Nhacangara Dam and Maputo Drainage Project	Grant	22,372,028
Multilateral Agency	UN-HABITAT - Improving water and sanitation in Mafalala Neighbourhood	Grant	250,000
National Government	Ministry for Coordination of Environmental Affairs- Provincial Directorate for the Coordination of Environmental Action	Grant	1,000,000
Multilateral Agency	UNEP	Grant	600,000
Total Co-financing			24,903,784

D. INDICATIVE TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) AND THE PROGRAMMING OF FUNDS ^{a)}

GEF Agency	Trust Fund	Country/ Regional/ Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b) ^{b)}	Total (c)=a+b
N/A							
Total GEF Resources							

a) No need to fill this table if it is a single Agency, single Trust Fund, single focal area and single country project.

b) Refer to the [Fee Policy for GEF Partner Agencies](#).

E. PROJECT PREPARATION GRANT (PPG)⁵

Is Project Preparation Grant requested? Yes X No If no, skip item E.

PPG AMOUNT REQUESTED BY AGENCY(IES), TRUST FUND, COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country/ Regional/Global	Focal Area	Programming of Funds	(in \$)		
					PPG (a)	Agency Fee ⁶ (b)	Total c = a + b
UNEP	LDCF	Mozambique <input type="checkbox"/>	Climate Change	(select as applicable)	100,000	9,500	109,500
(select)	(select)	<input type="checkbox"/>	(select)	(select as applicable)			0
(select)	(select)	<input type="checkbox"/>	(select)	(select as applicable)			0
Total PPG Amount					0	0	0

⁵ PPG requested amount is determined by the size of the GEF Project Financing (PF) as follows: Up to \$50k for PF upto \$1 mil; \$100k for PF up to \$3 mil; \$150k for PF up to \$6 mil; \$200k for PF up to \$10 mil; and \$300k for PF above \$10m. On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

⁶ PPG fee percentage follows the percentage of the Agency fee over the GEF Project Financing amount requested.

F. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS⁷

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society	Improved management of landscapes and seascapes covering 300 million hectares	N/A
2. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)	120 million hectares under sustainable land management	N/A
3. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services	Water-food-ecosystems security and conjunctive management of surface and groundwater in at least 10 freshwater basins;	N/A
	20% of globally over-exploited fisheries (by volume) moved to more sustainable levels	N/A
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO _{2e} mitigated (include both direct and indirect)	N/A
5. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern	Disposal of 80,000 tons of POPs (PCB, obsolete pesticides)	N/A
	Reduction of 1000 tons of Mercury	N/A
	Phase-out of 303.44 tons of ODP (HCFC)	N/A
6. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks	Development and sectoral planning frameworks integrate measurable targets drawn from the MEAs in at least 10 countries	N/A
	Functional environmental information systems are established to support decision-making in at least 10 countries	N/A

PART II: PROJECT JUSTIFICATION

PROJECT OVERVIEW

A.1. Project Description:

A.1.1. The global environmental problem, root causes and barriers that need to be addressed

The larger Maputo area⁸ is located on the southeastern coast of Mozambique, within the Maputaland Coastal Forest Mosaic⁹. This area includes Maputo Bay and the Tembe, Umbuluzi, Matola, Incomati and Maputo Rivers that drain into the bay. In the west of the bay is Maputo City, which extends over 346 km² of urban and peri-urban settlement (see Annex I for the project locality map). Mangrove and riparian areas (including wetlands and rivers) in the Maputaland Coastal Forest Mosaic provide numerous ecosystem services that benefit local communities including:

- provisioning services such as supply of food¹⁰, fuelwood, charcoal and timber^{11,12};

⁷ Provide those indicator values in this table to the extent applicable to your proposed project. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the [GEF-6 Programming Directions](#), will be aggregated and reported during mid-term and at the conclusion of the replenishment period.

⁸ The larger Maputo area includes the municipality of Maputo and peri-urban areas surrounding Maputo City in Maputo Province. This area encompasses but is not limited to the Boane, Mugazine, Matola and Marracuene urban areas. See Annex I for the project locality map.

⁹ WWF Eco region. Available at: <http://worldwildlife.org/ecoregions/at0119>. [Accessed 14 August 2013].

¹⁰ Including fish (mangrove dependent fisheries contributes ~45% of the external revenue of the country), prawns (an important export dependent on mangroves) and crabs. See: Guveya, E. & Sukume, C. 2008. The Economic Value of the Zambezi Delta.

¹¹ For construction, furniture making and crafts.

¹² These services support local communities' livelihoods.

- cultural and social services such as recreation and tourism;
- regulating services such as carbon sequestration, decomposition of organic waste, water purification, erosion control, flood mitigation and buffering the effects of storms; and
- supporting services such as nutrient cycling and provision of nursery grounds for fish.

Agriculture – including maize, beans, cereals, groundnuts, cassava, fruits¹³ and vegetables¹⁴ – is also practised on fertile soils on the floodplains of the larger Maputo area. The population on these floodplains and of the larger Maputo area has increased greatly because of rapid rates of population growth and rural-urban migration. From 1997-2007 the population of Maputo City increased from 966,837 to 1,094,628. For the same period, the population in Boane increased from 17,222 to 23,524, Marracuene from 10,295 to 11,236 and Matola from 424,662 to 671,556. As a result of these increases, population density at the peri-urban edge of Maputo City is up to 3,200 people per km². Consequently, demands on space have led to the spread of settlements and infrastructure into riparian and coastal areas. This has increased the vulnerability of local communities to climate change-induced floods, sea-level rise (SLR) and storm surges.

The expansion of settlements and infrastructure has resulted in extensive degradation of mangrove and riparian ecosystems within the Maputaland Coastal Forest Mosaic. This has decreased the capacity of these ecosystems to deliver ecosystem services and increased the vulnerability of local communities to the effects of climate change. The primary causes of degradation¹⁵ of these ecosystems include: i) deforestation¹⁶; ii) clearing for agriculture; iii) increased soil erosion and sedimentation; iv) increased industrial pollution; and v) water extraction for agriculture, industrial and domestic use. In addition, observed climatic variability and changes have further exacerbated this degradation. Climate change in Mozambique has already resulted in: i) increased frequency and severity of flooding events and tropical cyclones¹⁷; ii) increased frequency and intensity of droughts; iii) SLR¹⁸; and iv) increased frequency and intensity of storm surges. Over the past 50 years, floods, droughts and cyclones have caused the death of over 100,000 people in Mozambique, billions of dollars in damages¹⁹ and periods of chronic food insecurity²⁰.

Environmental degradation and the vulnerability of local communities in the larger Maputo area are likely to increase as a result of climate change hazards including, *inter alia*: i) increased frequency and severity of floods and droughts because of erratic rainfall; ii) SLR²¹; and iii) increased frequency and intensity of storm surges. The expected effects of climate change include: i) damage to infrastructure in sectors such as agriculture, transport, and water and sanitation as a result of floods and storm surges; ii) increased instances of malaria and water-borne diseases such as cholera as a result of inundation from floods and resultant stagnant surface water²²; iii) reduced food security and agriculture productivity as a result of flood damage and reduced water availability²³; and iv) salinisation of water sources²⁴, beach erosion, inundation of mangroves, damage to infrastructure and loss of agricultural land as a result of SLR and storm surges.

The **problem** that the proposed LDCF project seeks to address is that communities living in the larger Maputo area are vulnerable to climate change hazards described in the paragraph above. The effects of climate change are likely to

¹³ For example, bananas.

¹⁴ For example, cabbages.

¹⁵ For example, the area of mangroves in Maputo Province has reduced by 15% over the period 1972-1990.

¹⁶ For fuelwood, charcoal, and timber (for construction, furniture making and crafts). (MICOA. 2009. The National Report on Implementation of the Convention on Biological Diversity in Mozambique. Maputo).

¹⁷ The World Bank Group. 2010. Economics of Climate Change: Mozambique. Washington D.C.

¹⁸ Trends in SLR have been difficult to monitor because of a lack of data. However, a similar trend to that of global trends has been documented on the Maputo coast with an annual average increase of 1.8 mm in sea level since 1960 and of 3.1 mm since 1993. This equates to 11.2 cm SLR since 1960, which in turn can result in storm surges of 2 m according to Brunn's Rule.

¹⁹ The cost of such disasters to the country was US\$ 1.74 billion between 1980 and 2003. (INGC. 2009. INGC Climate Change Report: Study on the impact of climate change on disaster risk in Mozambique. Maputo).

²⁰ INGC. 2009. INGC Climate Change Report: Study on the impact of climate change on disaster risk in Mozambique. Maputo.

²¹ A best-case scenario of SLR of 10 cm by 2030 and 30 cm by 2100 and a worst-case scenario of 10 cm by 2030 and 500 cm by 2100 is predicted for Mozambique. (INGC. 2009. INGC Climate Change Report: Study on the impact of climate change on disaster risk in Mozambique. Maputo).

²² Contamination of groundwater and consumption of untreated water has resulted in cases of diarrhoeal diseases (including cholera) and malaria. In Maputo City from 1997-2000 there were 250 deaths per year from cholera, and from 1996-2000, 1500 deaths from malaria.

²³ Food security can increase levels of nutrition.

²⁴ Surface and groundwater sources including lakes, streams and boreholes.

include loss of life and material belongings, food insecurity²⁵, reduced quality and availability of fresh water and outbreaks of disease. Local communities and government authorities in the larger Maputo area have limited institutional and technical capacity to address these threats. Furthermore, there is a need for government, the private sector and international donors to integrate climate change threats into the planning and implementation of ongoing initiatives in the larger Maputo area to enhance the sustainability of socio-economic and infrastructure development. Urgent action is consequently needed to strengthen the capacity to plan, implement, manage and upscale interventions to advance climate change adaptation in the larger Maputo area.

The **preferred solution** to the problem is to enhance the capacities of communities living in the larger Maputo area by: i) strengthening the capacity of municipal²⁶ and district²⁷ authorities to plan and implement mangrove and riparian Ecosystem-based Adaptation (EbA) in urban and peri-urban areas; ii) restoring mangrove and riparian ecosystems so that they are more resilient to climate change; iii) diversifying agricultural practices so that they are more resilient to climate change; and iv) increasing the available knowledge and enhancing public awareness on the benefits of mangrove and riparian EbA interventions. The interventions will take place in: i) degraded riparian forests; ii) degraded wetlands (including rivers such as the Tembe, Umbuluzi, Matola, Incomati and Maputo); iii) degraded mangroves; and iv) agricultural areas. When functional, these restored areas will provide multiple ecosystem services for local communities. These include, *inter alia*: i) soil stabilisation; ii) provision of food; iii) flood control; iv) water filtration; v) enhanced water supply; vi) provision of non-timber forest products (NTFPs); vii) coastal protection from inundation of seawater; viii) carbon sequestration; and iv) provision of habitats for economically important species. Securing and enhancing these multiple ecosystem benefits for vulnerable communities is achieved in a low-cost and effective manner through EbA interventions that have been shown to require comparatively small investments relative to the long-term social, economic and environmental benefits²⁸.

Significant **barriers** to planning and implementing EbA interventions exist in Mozambique. These include: i) limited institutional and technical capacity of municipal and district authorities to plan and implement mangrove and riparian EbA interventions; ii) insufficient demonstration of successful mangrove and riparian EbA interventions; and iii) limited understanding of mangrove and riparian EbA interventions within local communities and at all levels of government.

The proposed LDCF project will contribute to overcoming these barriers by: i) strengthening the institutional and technical capacity of authorities and community members to plan and implement EbA interventions in coastal areas; ii) implementing on-the-ground EbA interventions; and iii) sharing best practice knowledge and increasing public awareness on EbA interventions.

Local communities will benefit directly from EbA interventions through: i) improved food security²⁹; ii) the protection of infrastructure; iii) improved health; iv) reduced flooding; and v) reduced inundation of land with seawater. Furthermore, by implementing mangrove and riparian EbA interventions in various coastal areas, the proposed LDCF project will generate lessons learned on the ecological, economic and social costs/benefits of this approach. In addition, by collating and disseminating these lessons learned and undertaking public education and outreach initiatives on EbA, the project will enhance ongoing knowledge strengthening of municipal and district authorities and increased public awareness.

A.1.2. The baseline scenario and associated baseline projects

At present, the capacity of water and sanitation infrastructure in the larger Maputo area is insufficient to meet the needs of the residents because of the excessive population density. A rapidly growing population is exacerbating this problem.

²⁵ Food insecurity results in lower nutrition, which has many health implications including a greater susceptibility to disease.

²⁶ Including district and barrio authorities.

²⁷ This refers to the provincial district authorities and not district authorities within Maputo City, as this area is covered by the municipal authority.

²⁸ UNEP/STREP. 2012. A comparative analysis of ecosystem-based adaptation and engineering options for Lami Town, Fiji: Synthesis report.

²⁹ By diversifying agriculture practises in the agricultural areas, the proposed LDCF project also supports local communities' existing livelihoods and provides alternative livelihood options.

In Maputo City, the insufficiencies of water and sanitation systems have already resulted in health and hygiene risks.^{30,31} Infrastructure projects, focused on water and sanitation, are currently being implemented to address these problems. Although these projects seek to improve access to water and sanitation services, they do not directly consider climate change in their project planning and implementation.

The projects below are potential baseline projects for the proposed LDCF project. See Annex II for further information on the climate change risks to these baseline projects and the benefits of the proposed LDCF project.

The **Kubasisa Muganga (Clean the Neighbourhoods) Project (2009-2014)** is financed by the ACP-EU Water Facility II within the European Development Fund (EDF). It is being implemented by WaterAid, in partnership with the local NGOs PAMODZI, Associação para o Desenvolvimento Urbano, ESTAMOS and the Maputo Municipality. The Kubasisa Muganga project has a budget of US\$ 681,756 and the following objectives: i) improve the health and living standards of the peri-urban poor populations by providing safe potable water and sanitation facilities; and ii) improve the understanding of hygiene practices. The project focuses on four bairros³² of Maputo City, namely: Mavalane A, Luis Cabral, Inhagoia A and Inhagoia B, with a combined population of 100,000.

The **Nhacangara Dam and Maputo Drainage and Sanitation Project (2007-2015)** is financed by the European Commission's Directorate General for Development and Cooperation – EuropeAid and is being implemented by the Ministry of Public Works and Housing. The project comprises the building of a dam on the Pungue River and electrification, irrigation, drainage and sanitation interventions in Maputo City. The dam construction will take place in Manica Province, while drainage and sanitation interventions will take place in all districts of Maputo City. The drainage and sanitation interventions have a budget of US\$ 22,372,028.

The **Improving Water and Sanitation in Mafalala Neighbourhood Project** is financed by the UN-Habitat Water and Sanitation Trust Fund in partnership with the Maputo City Council, Ministry of Public Works, Municipal Directorate for Water and Sanitation (DMAS) and the National Directorate for Water Affairs (DNA). The project is operating in Mafalala, an informal settlement in Maputo City. The objectives of the project are to facilitate access to safe drinking water, reduce sanitation risks, maintain rainwater drainage, set up an effective and sustainable waste management system, and strengthen local capacity and health awareness. Interventions will target the most vulnerable community members, in particular women and children.

The **Provincial Directorate for the Coordination of Environmental Action (DPCA) (2013-2016)** has instituted a programme which: i) promotes the regeneration of indigenous mangrove species; ii) restores mangroves; iii) improves community access to water; and iv) enhances the capacity of the local natural resource management (NRM) committees. The programme has a total budget of US\$ 1,000,000 and is being implemented in multiple sites in and around Maputo City. The regeneration and restoration of mangroves is taking place from Marracuene to Macenta, and in Matutuine, Limgamo as well as Matola Rio. The latter two sites are located within the boundaries of the city, while the former are in the peri-urban and rural areas. Interventions for improved access to water are being implemented from Marracuene to Macenta, and in Matutuine, Magude, as well as Manhiça-Calanga. Interventions to strengthen the capacity of local NRM committees are being implemented in these areas as well as in Namaacha.

In addition, the project will also benefit from a UNEP- led project for **Using Ecosystem-based Adaptation for Food Security in agriculture-dominated landscapes in Africa (EbAFoS)** (2014 -2015) which focuses on building ecological resilience of food systems and enhancing food security through ecosystem-based adaptation approaches in countries in Sub-Saharan Africa. Mozambique is one of the participant countries in which demonstration projects will be implemented, as well as informational and policy guides produced from these demonstrations projects. The project will contribute parallel co-financing of US\$ 600,000 to the proposed LDCF project. One of the main activities of the project

³⁰ Contamination of groundwater and consumption of untreated water has resulted in recorded cases of diarrhoeal diseases (including cholera) and malaria. In Maputo in 1997-2000, there were 250 deaths per year from cholera and in 1996-2000, 1500 deaths from malaria.

³¹ United Nations Human Settlements Programme (UN-HABITAT). 2010. Mozambique Cities Profile. Nairobi.

³² Bairros are sub-divisions of the seven districts of Maputo City.

includes bridging the gap between science and policy that currently exists by gathering evidence from the demonstration of EbA approaches to ensure food security. This evidence can be applied to the proposed livelihood interventions proposed in this project.

*A.1.3. The proposed **alternative scenario**, with a brief description of expected outcomes and components of the project*

The proposed LDCF project will increase the climate change resilience of vulnerable communities in the larger Maputo area that depend on ecosystem services provided by mangrove and riparian ecosystems. EbA will be used to enhance services delivered from these ecosystems, which include the protection of water supplies, agricultural land and development infrastructure³³. This will entail: i) strengthening the institutional and technical capacity of municipal and district authorities to plan and implement EbA; ii) implementing EbA by restoring mangrove and riparian ecosystems; iii) developing and disseminating knowledge on EbA best practice; and iv) increasing the awareness of authorities and local communities on climate change and EbA interventions.

The project consists of three major components, described below. A detailed description of the adaptation scenario funded from LDCF resources is presented in Section A.1.4 with indicative outputs and activities for each component presented in Annex III.

Component 1: Institutional and technical capacity of Maputo municipal and district authorities.

Activities of this component will strengthen the institutional and technical capacity of Maputo municipal and district authorities to plan and implement mangrove and riparian EbA interventions in the coastal region. This will be achieved by:

- developing a database on mangrove and riparian EbA best practice for use by municipal and district authorities;
- establishing a multi-disciplinary committee to facilitate cross-sectoral dialogue on mangrove and riparian EbA;
- training municipal and district authorities in EbA;
- designing policy briefs and decision-making tools to mainstream EbA into development planning in the larger Maputo area.; and
- developing and implementing an upscaling strategy for implementing mangrove and riparian EbA in coastal areas of Mozambique.

Component 2: Implementation of mangrove and riparian EbA interventions in the larger Maputo area.

Activities of this component will implement EbA interventions to reduce the vulnerability of local communities to the effects of climate change. This will also demonstrate the use of cost-effective EbA interventions. This will be achieved by:

- developing protocols for the implementation of mangrove and riparian EbA interventions in the larger Maputo area;
- training community members on the implementation of EbA interventions;
- restoring mangrove ecosystems in the larger Maputo area to increase their climate resilience and their capacity to deliver a range of ecosystem services to local communities including protection from, *inter alia*: i) seawater inundation; ii) saltwater intrusion; and iii) storm surges;
- restoring riparian forest ecosystems in the larger Maputo area to increase their climate resilience and their capacity to deliver a range of ecosystem services to local communities including, *inter alia*: i) stabilisation of soils; ii) increased ecosystems-based food supply; and iii) provision of NTFPs;
- restoring wetland ecosystems in the larger Maputo area to increase their climate resilience and their capacity to deliver a range of ecosystem services to local communities including, *inter alia*: i) water filtration; ii) flood mitigation; and iii) provision of NTFPs;

³³ Increasing the climate resilience of water sanitation infrastructure in the larger Maputo will reduce the effects of damaged infrastructure on human health, including the spread of disease such as cholera and malaria.

- diversifying agricultural practises³⁴ to increase their climate resilience and improve the food security³⁵ of local communities; and
- developing an alternative livelihood strategy for local communities based on the ecosystem goods and services from restored mangrove and riparian ecosystems and goods from diversified agricultural practices.

During October 2013, district- and community-level surveys were undertaken in Marracuene and Boane districts across a number of riparian and coastal communities. These surveys have identified communities that are vulnerable to the effects of climate change as potential intervention sites for the project. The same surveys will take place in Matola municipality, Maputo City and Mugazine to identify suitable communities in these areas. The preliminary surveys confirm the vulnerability of the communities in the identified districts to drought, flooding and sea-level rise. The complete results of the surveys will be used during the PPG phase to finalise project intervention sites and suitable activities.

Component 3: Public awareness and knowledge of increasing climate resilience through mangrove and riparian EbA interventions.

Activities of this component will develop a knowledge base to support planning, implementing and upscaling of mangrove and riparian EbA interventions. This will be achieved by:

- disseminating information on implementing mangrove and riparian EbA through participatory workshops;
- developing a long-term research programme on the ecological, social and economic costs/benefits of mangrove and riparian EbA interventions to quantify the benefits and increase the knowledge base of EbA;
- developing and implementing a public awareness campaign on the effects of climate change and the benefits of EbA; and
- developing and implementing an upscaling strategy for EbA.

A.1.4. Additional cost reasoning and expected contributions from the baseline, the LDCF and co-financing

The proposed LDCF project will build the resilience by enhancing capacities of local communities living in the coastal zone of larger Maputo area to the expected climate change hazards described in Section A.1.1. This will be achieved by: i) enhancing the institutional and technical capacity of municipal and district authorities to plan and implement mangrove and riparian EbA interventions; ii) developing an upscaling strategy for mangrove and riparian EbA interventions in Mozambique; iii) implementing on-the-ground EbA interventions and local-level community training; iv) developing a long-term research programme; and v) planning and implementing a public awareness campaign. . The additional cost reasoning for each component of the proposed LDCF project is described below.

Component 1: Institutional and technical capacity of Maputo municipal and district authorities.

Business as usual scenario:

A number of initiatives are underway or have taken place, both nationally and municipally, to increase the institutional and technical capacity of government to plan and implement adaptation interventions for climate change in Mozambique. These include the UNDP Africa Adaptation Programme (AAP), the Mozambique Poverty- Environment Initiative (PEI II), the African Climate Change Resilience Alliance (ACCRA) and the Cities and Climate Change Initiative (CCCI) – see Section A.4 for details. Despite these efforts, there is limited knowledge and capacity in Mozambique to plan and execute activities that will increase the resilience of local communities to climate change through EbA interventions.

In the larger Maputo area, the effects of climate change are taken into account in urban planning and land management policies, for example, in the ProMaputo Program and the City Master Plan (PEUMM). However, these policies do not consider EbA as an alternative or additional intervention. Furthermore, the existing polices have had limited

³⁴ Where possible, this will take place in agricultural areas adjacent to mangrove and riparian project sites and the identification of these areas will consider existing land use patterns.

³⁵ This includes developing alternative livelihoods and improving nutrition in local communities.

implementation because of institutional and technical capacity constraints within municipal and district authorities³⁶. Furthermore, the adaptation measures operate in isolation from environmental and biodiversity strategies, such as the Environmental Management Strategy of the Greater Maputo Area, which does not account for the effects of climate change on mangrove and riparian ecosystems. Similarly, government projects for water and sanitation, including the potential baseline projects discussed in Section A.1.2, do not consider the effects of climate change. This increases vulnerability to these effects and to disease outbreak³⁷ in the larger Maputo area. In addition to a limited consideration for climate change adaptation, there is limited coordination between sectors on the activities for climate change adaptation that are taking place. This limited coordination as well as limited technical capacity to plan and implement EbA will hinder the uptake of an EbA approach at a national level.

In a business as usual scenario, the institutional and technical capacity of municipal and district authorities to plan and implement mangrove and riparian EbA interventions in coastal urban and peri-urban areas is likely to remain limited. This will increase the vulnerability of local communities to the current and expected effects of climate change outlined in Section A.1.1.

Adaptation scenario:

With LDCF funding, the proposed LDCF project will strengthen the institutional and technical capacity of municipal and district authorities to plan and implement EbA interventions in coastal urban and peri-urban areas of the larger Maputo area. To achieve this, existing gaps in information, knowledge, shortfalls of planning and barriers to implementation will be identified within government departments and research institutions. The proposed LDCF project will collate and tailor best-practise guidelines on mangrove and riparian EbA. This will include knowledge derived from other successful mangrove and riparian restoration projects in Mozambique, the rest of Africa³⁸ and globally, particularly in other coastal, urban and peri-urban areas. These guidelines will be developed into a database accessible to municipal and district authorities during and after the proposed LDCF project. The database will be developed in conjunction with the University of Eduardo Mondlane (UEM). If possible, this database will be housed within an existing internet portal on climate change adaptation in Mozambique. To address gaps in information identified within the database, the proposed project will establish targeted research groups.

To address limited institutional coordination, a cross-sectoral dialogue platform and committee will be established to facilitate dialogue between stakeholders on mangrove and riparian EbA throughout project implementation. This multi-disciplinary committee will include representatives from, *inter alia*: i) the Ministry for the Coordination of Environmental Affairs (MICOA); ii) the Ministry of Public Works and Housing; iii) the UEM; iv) the Institute for Hydrology and Oceanography (INAHINA); and v) the National Disaster Management Institute. Committee members will receive training on fund-raising and proposal writing to promote the national upscaling of EbA interventions.

The current planning guidelines and policies will be reviewed and the appropriate revisions suggested. This will be informed by mapping the existing barriers to and opportunities for incorporating EbA into planning guidelines and policies. In addition, municipal and district authorities will be trained on the effects of climate change and current climate change predictions, and how including mangrove and riparian EbA into planning can increase resilience to these effects. This training will be complemented by developing policy briefs and decision-making tools on integrating mangrove and riparian EbA into development planning.

The proposed LDCF project will build upon the ongoing activities of the baseline projects. The cofinancing is estimated to be US\$ 7,230,000 for this component. The additional cost for increasing capacity within municipal and district authorities to plan and implement mangrove and riparian EbA is estimated to be US\$ 1,540,000.

³⁶ Mozambique Cities Profile. 2010. United Nations Human Settlements Programme, Regional and Technical Cooperation Division. Nairobi.

³⁷ Contamination of groundwater and consumption of untreated water has resulted cases of diarrhoeal diseases (including cholera) and malaria. From 1997-2000 there were 250 deaths per year from cholera in Maputo city and from 1996-2000, 1500 deaths from malaria in Maputo City.

³⁸ Mangrove restoration projects are underway in Kenya and Tanzania. Personal communication with Romy Chevallier. South African Institute of International Affairs. 6 August 2013.

Component 2: Implementation of mangrove and riparian EbA interventions in the larger Maputo area.

Business as usual scenario:

The coastal zone of the larger Maputo area faces socio-economic challenges associated with rapid population growth and rural-urban migration that include, *inter alia*: i) extensive and increasing poverty; and ii) inadequate water and sanitation provision owing to limited infrastructure. To address the problems of limited water and sanitation infrastructure, several projects are currently underway to provide services to local communities. The Kubasisa Muganga Project, the Improving Water and Sanitation in Mafalala Neighbourhood Project and specific components of the Nhacangara Dam Project are addressing problems of limited water and sanitation services by developing necessary infrastructure. However, service provision to local communities remains inadequate³⁹.

The effects of climate change-induced erratic rainfall, SLR and storm surges further compound the above-mentioned challenge. For example, floods damage sanitation infrastructure causing water-borne disease outbreaks in local communities and storm surges inundate agricultural land causing food insecurity⁴⁰. Adapting to climate change has been recognised as a priority in Mozambique through numerous strategies and policies. However, funding for adaptation interventions and raising awareness of climate change is limited and there are few demonstrations of successful adaptation projects with tangible benefits. This is particularly true of adaptation interventions focused on ecosystems (green infrastructure), including EbA⁴¹. An example of an intervention focused on hard infrastructure in Maputo is the seawall along the Costa do Sol Marginal that is being upgraded to protect Maputo's coastal infrastructure against SLR and storm surges. This intervention will help to increase climate change resilience, but it does not take into account the additional benefits EbA interventions offer to enhance the resilience of these interventions. Restoration projects are also underway in the larger Maputo area. An example of this is the Provincial Directorate for the Coordination of Environmental Action that is currently restoring mangroves. However, the objectives of the project focus on conservation and biodiversity and not on the adaptation benefits of restored mangrove ecosystems.

Riparian areas are under threat from the effects of climate change and from a wide variety of terrestrial pollution sources. The latter includes, *inter alia*: i) sediment run-off from agriculture; ii) industrial pollution within the city; iii) sewage from unserved or inadequately serviced settlements; iv) litter and refuse; and v) storm water run-off. Despite these pollution sources, floodplains are often the most intensely farmed areas, as in the case of the Infulene Valley. These areas, that provide food security, will come under more intense pressure as the population grows and urbanisation increases. The climate change effects – described in Section A.1.1 – will exacerbate this pressure.

In addition to the threats posed by climate change, mangroves are also under threat from a variety of human activities. These activities include, *inter alia*: i) deforestation, primarily for fuelwood; ii) aquaculture; and iii) the construction of saltpans⁴². The greatest rate of deforestation in Mozambique has occurred in Maputo Province. The rapidly growing population of Maputo City will exacerbate this problem, as there is a notable increase in mangrove deforestation closer to urban centres, particularly Maputo City⁴³. The predicted climate change effects – described in Section A.1.1 – will place further pressure on mangroves.

In a business as usual scenario, cost-effective adaptation interventions that focus on ecosystems and consider climate change are unlikely to be implemented. Consequently, communities vulnerable to climate change will not receive ecosystem-derived benefits such as increased food security, protected material belongings and lives, secured water supply and protected of water and sanitation infrastructure.

³⁹In urban areas, 78% of people have access to water supply and 24% have access in rural areas. Household access to sanitation is 20% in urban areas and 2% in rural areas.

⁴⁰ INGC. 2009. INGC Climate Change Report: Study on the impact of climate change on disaster risk in Mozambique. Maputo.

⁴¹ Where stands of mangroves are being restored in the Zambezi Delta for carbon sequestration purposes, it is unclear whether records are being kept on the protocols and results of these projects.

⁴² MICOA. 2009. National Report on Implementation of the Convention on Biological Diversity in Mozambique.

⁴³ De Boer, W.F. 2002. The rise and fall of mangrove forests in Maputo Bay Mozambique.

Adaptation scenario:

LDCF resources will be used to implement a range of EbA interventions in mangrove and riparian ecosystems⁴⁴. Scientifically rigorous protocols, developed in collaboration with national and international experts and based on international best practice, will guide the implementation of the interventions. Workshops and outreach activities in target communities will encourage a participatory approach, promote support from local communities and build adaptive capacity. This will include community engagement to quantify: i) resource use; ii) vulnerability; and iii) adaptive capacity. Community members⁴⁵ will be trained in: i) nursery establishment and maintenance; and ii) planting techniques. Water supply for the nurseries will be supplemented by rainwater through rainwater harvesting technology, such as tanks. This will provide a supply of water required for the growing of saplings before out-planting. Training will be gender-sensitive to ensure equal opportunities for all community members. Seeds will be collected for those species that need to be grown from seed. They will be handled, treated and sowed appropriately at established nurseries where seeds and cuttings will be grown until plants are ready for out-planting.

Species for planting through the EbA interventions will be selected based on: i) predicted effects of climate change; ii) their capacity to supply ecosystem services under the predicted effects of climate change, such as species that are drought resistant, flood resistant or can survive in increased salinity; and iii) community needs and preferences. Once restored through the EbA interventions, mangrove and riparian ecosystems will enhance the climate resilience and improve the food security of local communities. Mangrove and riparian ecosystems are amongst the world's most productive ecosystems⁴⁶ and have been termed 'nature's supermarkets'. EbA interventions will be implemented in: i) degraded riparian forests; ii) degraded wetlands; iii) degraded mangroves; and iv) agricultural areas. In addition, interventions will potentially be implemented to establish or restore road-river interfaces. These interfaces will: i) buffer riparian areas and local communities from particle pollution from vehicles; ii) provide noise barriers; iii) serve as biodiversity corridors; iv) protect road infrastructure from floods; and v) stabilise soils through protection from raindrop impact.

Degraded riparian forests will be restored by planting species that: i) stabilise soils to prevent erosion; and ii) provide an enhanced and sustained supply of ecosystem-based food. Species that produce a dense system of surface roots that bind soils will be planted first. Examples of such species include the manketti tree (*Schiniziophyton rautanenii*), silver clusterleaf (*Terminalia sericea*) and sweet thorn (*Acacia karroo*). In addition to roots that bind soils, the canopy cover of the trees will reduce the erosive action of raindrop impact. Species to be planted that will supply ecosystem-based food and other goods include, *inter alia*: i) marula (*Sclerocarya birrea*) which provides fruits, timber and medicine; ii) cape ash (*Ekebergia capensis*) which provides fruits, habitats for beehives, timber and medicine; and iii) the drought tolerant tamarin tree (*Tamarindus indica*) which provides fruits, habitats for beehives and pollen for honey, timber, medicine and fodder⁴⁷.

In degraded wetland areas that are permanently or semi-permanently flooded, species will be planted that offer a variety of benefits, despite the effects of climate change. Potential species include the common reed (*Phragmites australis*)⁴⁸, bulrush (*Typha capensis*), soft rush (*Juncus effusus*) and sedges (*Cyperus spp.*)⁴⁹. The restoration of degraded wetlands

⁴⁴ Degraded mangrove and riparian ecosystems have limited capacity to mitigate the effects of erratic rainfall patterns, SLR and storm surges resulting in increased vulnerability of local communities to these effects. Without the restoration of mangroves and riparian areas to protect infrastructure local communities in the larger Maputo area will continue to be negatively affected by poor service provision.

⁴⁵ Including leaders of local communities or barrios.

⁴⁶ Barbier, E.B., Acreman, M. and Knowler, M. 1997. Economic Valuation of Wetlands.

⁴⁷ This list is not intended to be comprehensive. Other potential species are: i) African medlar (*Vagueria infausta*) which is hardy and drought resistant and provides edible fruit; ii) wild date palm (*Phoenix reclinata*) which provides fruit and utensils; iii) spiny monkey orange (*Strychnos spinosa*) which provides fruit; and iv) neem tree (*Azadirachta indica*) which acts as a natural pesticide. Further species will be reviewed during the PPG phase and the most advantageous will be selected according to a criteria.

⁴⁸ *Phragmites australis* is known for its resilience and is found globally. Its origins are obscure, and it is not thought to be endemic to Mozambique. However, its presence and persistence should be seen as an opportunity. It has numerous uses such as water filtration and flood control. While *P. australis* is particularly useful, many other grass and reed species provide similar benefits. These include *Typha capensis*, *Cyperus spp* and *Juncus effuses*. (Schachtschneider, K., Muasya, M. & Somerset, V. 2010. Are indigenous sedges useful for phytoremediation and wetland rehabilitation? CSIR 3rd Biennial Conference 2010. Science Real and Relevant. CSIR International Convention Centre, Pretoria, South Africa, 30 August - 01 September 2010).

⁴⁹ Sedges (*Cyperus spp.*) are commonly used for basketry in southern Africa, along with a number of other wetland species. This can provide an alternative livelihood source for local communities, particularly women. Cunningham, A.B. & Terry, M.E. 2006. African Basketry: Grassroots Art from Southern Africa. Fernwood Press. Simons Town, South Africa.

will provide numerous ecosystem services including: i) water filtration; ii) sediment and toxin removal; iii) flood mitigation through increased retention time; iv) riverbank stabilisation; v) provision of material for household use or sale; vi) provision of medicinal plants; and vii) provision of plants for green manure and fodder. In addition, the potential for using engineered floating ecosystems⁵⁰ in degraded rivers, in urban and peri-urban areas, to improve water quality by filtration will be investigated. This will decrease the risk of disease outbreak and decrease the pressure on water and sanitation infrastructure.

Degraded mangroves will be restored using indigenous species that provide a range of ecosystem services, despite the effects of climate change. Such services include, *inter alia*: i) habitat for important fish⁵¹ and other species including prawns (one of Mozambique's top export earners⁵²) and crabs; ii) greater ecosystem productivity of nearby waters⁵³ compared to areas without mangroves; iii) NTFPs; iv) flood and coastal protection; and v) carbon sequestration⁵⁴. Species will be chosen to cover a range of tidal classes, to account for SLR and an increase in the intensity and frequency of storm surges. This will potentially include species that can withstand the following tidal classes: i) all high tides e.g. white mangrove (*Avicennia marina*) and mangrove apple (*Sonneratia alba*), to be planted on seaward shores; ii) medium high tides e.g. red mangrove (*Rhizophora mucronata*), to be planted on the banks of tidal rivers; iii) normal high tides e.g. black mangrove (*Bruguiera gymnorhiza*) and Indian mangrove (*Ceriops tagal*), to be planted in central mangrove areas; and iv) spring high tides e.g. Tonga mangrove (*Lumnitzera racemosa*) and cannonball mangrove (*Xylocarpus granatum*), to be planted in back mangrove areas. The planting of these species will protect communities, water supply and infrastructure in areas identified as vulnerable to inundation from SLR and storm surges. Specific planting sites and associated species will be identified in the PPG phase.

Agricultural practices will be diversified to increase resilience to the effects of climate change, increase alternative livelihood options and improve food security. Where possible, agriculture areas on nearest to floodplains and the coast will be prioritised for implementing these interventions. Species that are salt tolerant, flood resilient and have great nutritional value will be selected for planting. The cultivation of current food crops – including maize, beans, groundnuts, cereal, cassava and bananas – will be diversified and alternative, sustainable agricultural practices will be promoted. For example, intercropping of leguminous beans with maize and bananas will be introduced to enrich soils. Where appropriate, tree species that offer a variety of benefits will be introduced into the agricultural areas. These will provide numerous services including: i) protecting crops from wind; ii) protecting soils from the erosive action of raindrops; iii) stabilising soils; and iv) providing NTFPs. Potential species include wild teak (*Pterocarpus angolensis*) and silver clusterleaf (*Terminalia sericea*) which increase soil fertility and provide NTFPs, such as medicines. Composting techniques – using available resources such as animal dung and urine, household ash and crop residues – will be promoted. Additionally, natural methods of pest control, such as using poultry to control invertebrate pests and planting species that produce natural pesticides such as chilli, garlic and onions, will be introduced to agricultural areas. This will enhance the resilience of agriculture to pests that may become increasingly difficult to control under changing climatic conditions. To increase the climate resilience of communities an alternative livelihood strategy will be developed. This will be based on both community needs and the goods and services produced and delivered by restored ecosystems. To do this, the proposed project will review the range of goods available for domestic and commercial use in diversified agriculture areas, and goods and services for domestic and commercial use in mangrove and riparian ecosystems. This will include a cost-benefit analysis. For goods and services that emerge as cost-effective, linkages will be made between the market and the local communities.

The EbA interventions in this component will be cost-effective as well as environmentally and socially applicable to the selected sites. UNEP's EbA Decision Framework Tool will be used to guide the selection of EbA project sites. This will

⁵⁰ This is a constructed floating structure placed in a river, canal, lake or treatment cell. On the structure a designed ecosystem is developed with plant species that provide specific benefits, such as water filtration.

⁵¹ Mangrove dependent fisheries contribute ~45% of the external revenue source of the country.

⁵² As feeding grounds for the larvae of shrimps, mangroves are particularly valuable for Mozambique's wild shrimp fisheries, one of the country's top export earners. Guveya, E. and Sukume, C. 2008. The Economic Value of the Zambezi Delta. Report to WWF Mozambique Country Office, Maputo, Mozambique.

⁵³ Katherisan, K. & Bingham, B.L. 2001. Biology of mangroves and mangrove ecosystems. *Advances in Marine Biology*, 40: 81-251.

⁵⁴ Moye, M. & Nazerali, S. 2010. Feasibility Study: Sustainable Financing of Protected Areas in Mozambique. Prepared with support from UNDP-GEF. World Wide Fund for Nature (WWF), Maputo, Mozambique.

include a using scientific, transparent and participatory process when selecting project sites. Similarly, the site-specific interventions will be guided by scientifically rigorous protocols and community preferences. Furthermore, the selection of project sites will prioritise sites that complement the ongoing activities of the baseline projects. The cofinancing is estimated to be US\$ 13,803,784 for this component. The additional cost for implementing mangrove and riparian EbA interventions is estimated to be US\$ 3,330,000.

Component 3: Public awareness and knowledge of increasing climate resilience through mangrove and riparian EbA interventions.

Business as usual scenario:

A number of existing programmes have been implemented nationally which focus on knowledge management, and upscaling of climate change adaptation and disaster risk management. These include the UN Joint Programme for Environmental Mainstreaming and Climate Change, and the Impact of Climate Change on Disaster Risk and Adaptation (INGC phase II project). See Section A.4 for details.

At present, municipal and district government, as well as local communities, have limited knowledge of the ecological, social and economic benefits of using EbA interventions to address the effects of climate change. In addition, there are no communication or outreach strategies providing such information to stakeholders. Insufficient information and public awareness are major challenges affecting the implementation and integration of EbA into planning processes. As a result, the benefits of EbA are not realised by government and local communities.

In the business as usual scenario, knowledge and awareness of EbA and the associated benefits in building climate resilience of communities and ecosystems are likely to remain limited. This will hinder the uptake of an EbA approach at a national level.

Adaptation scenario:

LDCF resources will be used to: i) conduct workshops; ii) develop a long-term research programme to quantify the benefits and opportunities offered by EbA; and iii) develop and implement a public awareness campaign. This approach will be underpinned by: i) best practice information collated in Component 1; and ii) lessons learned during project implementation in Component 2. Technical capacity for planning and implementing EbA will be strengthened. This will be achieved through information-sharing sessions and participatory workshops with community members. These sessions and workshops will be organised and guided by surveys on the perceived benefits of EbA. Support for the implementation of mangrove and riparian EbA interventions will be generated through a public awareness campaign on the benefits of EbA. This will include: i) the use of media including print, radio and mobile phone formats to disseminate information to the public; and ii) EbA input into school curricula including field trips to project sites. In addition, a long-term research programme will be developed to quantify the benefits of EbA to local communities and to increase the knowledge base on EbA. This will include the development of PhD and MSc opportunities at local universities e.g. Universidade Eduardo Mondlane, Universidade Católica de Moçambique and Universidade Politécnica. Moreover, training workshops will be held with government authorities to disseminate lessons learned and best practice knowledge. The training workshops will contribute to the expansion of mangrove and riparian EbA interventions beyond project sites. A sustainable EbA upscaling strategy, which will include a funding mechanism, will be developed to guide this expansion.

The proposed LDCF project will build on the ongoing activities of the baseline projects. The co-financing is estimated to be US\$ 3,360,000 for this component. The additional cost for knowledge and awareness raising activities is US\$ 850,000. Table 1 in Annex II provides a summary of the baseline projects, risks from climate change, their effects on the baseline projects, targeted ecosystem services as well as adaptation measures proposed by the LDCF project.

A.1.5. Adaptation benefits

If EbA interventions are not implemented, climate change is predicted to have continuing negative effects on local communities in the larger Maputo area. The proposed LDCF project will address climate change vulnerabilities within a complex socio-economic environment, by strengthening institutional and technical capacity to plan and implement EbA in the larger Maputo area. This will be achieved by collating best practice information, training of authorities, training local communities, implementing and demonstrating EbA, conducting research, increasing public awareness and revising policies.

Numerous tangible benefits will be provided by EbA at project sites⁵⁵. Furthermore, lessons learned from the implementation of cost-effective EbA interventions will be documented and used to guide the upscaling of mangrove and riparian EbA interventions in Mozambique. Upscaling of EbA reduces the vulnerability of communities to the effects of climate change as more ecosystems are enhanced to provide services and buffer extreme weather events⁵⁶.

The specific adaptation benefits of the proposed LDCF project will consequently include: i) reducing ecosystem vulnerability; ii) reducing soil erosion; iii) increasing resilience to the effects of erratic rainfall, including protecting agricultural land, water supplies, and development infrastructure; iv) improving and maintaining water quality⁵⁷ through restored wetland ecosystems; v) enhancing resilience to climate-induced SLR and storm surges, including protection of freshwater sources – from seawater inundation and saltwater intrusion – through restored mangroves; vi) providing NTFPs; vii) providing alternative livelihoods; and viii) improving food security through intensified and diversified climate-resilient agricultural areas and increased ecosystem-based food supply. The value of these benefits results in a favourable ratio when compared with the costs of the investments. Per annum, the ecosystems services provided by mangrove and riparian ecosystems have an estimated global value of US\$ 9,900 and US\$ 14,785 per hectare, respectively⁵⁸. These services include, flood mitigation, storm protection, drought recovery, food production, provision of habitats, raw materials and cultural services.

The adaptation benefits of mangrove and riparian EbA will initially accrue at the local level. However, knowledge generated and consolidated under Component 3 will guide the replication of local level interventions at a national level across mangrove and riparian areas. This will increase the geographic scale and longevity of the benefits of climate change adaptation generated by the proposed LDCF project.

A.1.6. Innovation, sustainability and potential for scaling up

Mangrove and riparian EbA interventions will be implemented at selected project sites. A growing body of research⁵⁹ has proven that an EbA approach is an innovative and cost-effective means of adapting to climate change. In this case, local communities in the larger Maputo area are vulnerable to the effects of erratic rainfall, SLR and storm surges. Not only are they at risk from loss of life and material belongings, but also from the degradation of service provision. For example, water and sanitation infrastructure in the larger Maputo area is currently not resilient to climate change. EbA will reduce the effects of floods caused by erratic rainfall, SLR and storm surges that will, in turn, increase the sustainability of this infrastructure. The use of EbA interventions to protect water and sanitation infrastructure from the effects of climate change is an innovative practice that has not been implemented in the larger Maputo area before. In addition, the benefits of restored mangroves and riparian ecosystems to local communities will include provision of ecosystem services e.g. supply of water and increased food security. To maximise benefits, the proposed LDCF project will collaborate with relevant stakeholders and use best available knowledge to avoid redundancy of project interventions and promote complementarity of project objectives. Moreover, to increase the cost-effectiveness of other adaptation interventions, the

⁵⁵ The livelihoods and food security of many communities in the larger Maputo area are reliant on ecosystem services.

⁵⁶ McIvor, A., Spencer, T., Moller, I. & Spalding, M. 2012. Storm surge reduction by mangroves. NCP Report 2012-02. Natural Coastal Protection Series: Report 2. Cambridge Coastal Research Unit Working Paper 41.

⁵⁷ This will increase the availability of fresh water and result in fewer water-borne diseases.

⁵⁸ Costanza, R., d'Argue, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R., Paruelo, J., Raskin, R.G., Sutton, P. & van den Belt, M. 1997. The value of the world's ecosystem services and natural capital. *Nature*, 387, 253-260.

⁵⁹ Jones, H.P., Hole, D.G., Zavaleta, E.S. 2012. *Nature Climate Change*, 2: 504-509.

lessons learned from EbA interventions at the project sites will be documented and used to inform the funding of these interventions.

To enhance sustainability and the replication of the results achieved through the EbA interventions, an upscaling strategy – including a funding mechanism – will be developed and institutionalised. The sustainability of the proposed LDCF project will further be enhanced by:

- developing a **database on mangrove and riparian EbA best practice** for reference use by municipal and district authorities;
- establishing a **multi-disciplinary committee** to facilitate cross-sectoral dialogue on mangrove and riparian EbA interventions;
- strengthening **institutional and technical capacity** of municipal and district authorities in EbA;
- designing **policy briefs and decision-making tools** to mainstream EbA into development planning in the urban and peri-urban areas of the larger Maputo area;
- establishing community managed nurseries;
- **demonstrating the benefits of EbA** to local communities at project sites;
- disseminating information through **participatory workshops**;
- developing a **long-term research programme** on the ecological, social and economic costs and benefits of mangrove and riparian EbA interventions; and
- developing and implementing a **public awareness campaign** on the effects of climate change and the benefits of EbA.

A.2. Stakeholders.

Will project design include the participation of relevant stakeholders from civil society and indigenous people? (yes X /no) If yes, identify key stakeholders and briefly describe how they will be engaged in project design/preparation:

The proposed LDCF project will be designed and implemented through a participatory approach with stakeholder consultation and validation for all major activities. This will include community surveys, regular meetings and training workshops. The Executing Agency of the proposed LDCF project will be the MICOA, and the Implementing Agency will be UNEP.

Government ministries involved in the proposed LDCF project will include, *inter alia*: i) the Ministry of Agriculture (MINAG); ii) the Ministry of Public Works and Housing (including the Department of Water Affairs); iii) the Ministry of Planning and Development; iv) the Ministry of Fisheries and the INAMAR (Instituto Nacional de Marinha); v) the Ministry of Tourism; vi) the Ministry of Finance; and vii) the Ministry of Health (MISAU).

A preliminary list of other relevant national stakeholders includes: i) the National Institute for Meteorology (INAM); ii) the National Council for Sustainable Development (CONDES); iii) the INAHINA; iv) the Institute for Agrarian Investigation (IIAM); v) the UEM – Faculty of Agronomy and Forestry Engineering; vi) the UEM – Department of Biology; vii) the National Disaster Management Institute (INGC); and viii) the Centre for Sustainable Development of Coastal Zones.

NGOs which have also been identified as potential stakeholders include: i) the International Union for the Conservation of Nature (IUCN); ii) the World Wildlife Fund for Nature (WWF); iii) the Peace Parks Foundation; iv) the Centro Terra Viva (CTV); and vi) the Association for Coastal and Marine Research.

A main stakeholder group of the proposed LDCF project will be the local communities of the larger Maputo area. Within these communities, the Tsonga ethnic group constitutes a large portion of the population, although Maputo City receives immigrants from all over the country. The Changanas, Bitongas, Chopes, Matsuas, and Rongas subgroups are found within

the Tsonga ethnic group⁶⁰. Through surveys, the traditional/indigenous knowledge of these local communities will inform the development of protocols for EbA interventions.

Experts in the fields related to project interventions will inform the protocols for interventions through participatory mapping exercises. These include, *inter alia*: i) socio-economic development experts; ii) riparian and mangrove ecosystems experts; iii) biodiversity managers; iv) hydrologists; v) agriculture experts and; vi) civil engineers – particularly focused on water and sanitation. These experts will assess the criteria for selection of project sites and EbA interventions to be implemented.

Representatives from aligned initiatives and projects will be regularly consulted, to enhance effective and informed collaboration and implementation. A comprehensive list of such entities is given in Section A.5. The identified stakeholders – and the specific communication and synergies that will be formed with them – will be confirmed during the PPG phase.

A.3. Gender Considerations.

Are gender considerations taken into account? (yes X /no). If yes, briefly describe how gender considerations will be mainstreamed into project preparation, taken into account the differences, needs, roles and priorities of men and women.

The proposed LDCF project will consider gender equality through all phases of design and implementation, and will take into account gender-specific needs. This will include, *inter alia*: i) promoting gender equality in training, the recruitment of new staff, stakeholder consultations, and where appropriate management and decision-making structures; and ii) developing gender-sensitive targets and indicators.

A.4 Risk:

A number of risks to the successful implementation of the proposed LDCF project are summarised in Table 1. Mitigation measures and management responses to minimise the potential threat posed by the specific risks are given. Risks will be validated and reassessed during the PPG phase.

Table 1: Risks, rating and mitigation measures.

Identified Risks	Risk rating	Mitigation Measures
Resistance of stakeholders to adopt EbA interventions during and/or after project may negatively affect the project objectives.	High	<ul style="list-style-type: none"> Stakeholders will be consulted and will participate in the design of the protocols and the implementation process. A public awareness campaign on climate change effects and the benefits of EbA will be developed and implemented. Training of local stakeholders will be conducted to increase their understanding/awareness of the benefits of the project’s activities. The benefits of EbA will be displayed at project sites.
High staff turnover in responsible government departments (in particular MICOA).	High	<ul style="list-style-type: none"> While the GEF Implementing Agencies have no control over the Executing Agency's staff turnover it can be mitigated including through: <ol style="list-style-type: none"> Provision of training to the core technical staff of the MICOA on adaptation and EbA by integrating it into their professional development plans. The proposed training could be provided within and outside the project including through those offered by UNEP. Keeping the relevant staff of the relevant institutions updated on the project progress. Integrating adaptation training modules into the familiarization courses of the MICOA. Supporting relationships will be established during the initial stages of the project design with the appropriate individuals in the respective Government bodies contacted.

⁶⁰ DNAC. 2011. Ponta do Ouro Partial Marine Reserve Management Plan, First Edition. v+65 p13.

		<ul style="list-style-type: none"> • More mitigation options are to be explored during the PPG after a re-assessment of the risk
Capacity constraints of local institutions may limit the ability to undertake the required research/assessments and project interventions.	Medium	<ul style="list-style-type: none"> • Collaboration and exchange between local and international research institutions will be initiated and maintained. • Human resource capacity will be developed as required. • International experts will be engaged to assist local researchers and institutions. • Research protocols will be developed specifically for the project.
Variation in local capacities among the targeted project sites may reduce efficiency in project implementation and impede coordination.	Medium	<ul style="list-style-type: none"> • Authorities and technical advisors will be trained in the design, planning and implementation of the interventions. • International experts will be engaged to assist local authorities and the Executing Agency (MICOA).
Unfavourable climate conditions including current climate and seasonal variability and/or extreme weather events may affect implementation.	Medium	<ul style="list-style-type: none"> • A robust strategy will be developed at PPG phase to ensure that all project pilot interventions will take into account the risks posed by Climate variability and change. This for instance will include staggered planting times, selecting of appropriate climate-resilient species for mangrove restoration, riparian restoration and agricultural areas etc...All of these are also to be taken on board during the development of the protocols of restoration / interventions.
Upscaling of interventions is limited as interventions implemented are found not to be cost-effective.	Low	<ul style="list-style-type: none"> • Cost-effectiveness will be a core principle in the implementation of climate-resilient/multi-benefit adaptation measures. • Detailed information will be recorded regarding cost-effectiveness of each intervention, best practice information will be collated, and the appropriate interventions will be included in the upscaling strategy.

A.5. Coordination. Outline the coordination with other relevant GEF-financed and other initiatives:

The proposed LDCF project will coordinate closely with public, private and local community stakeholders that are – or have been – involved in the design and implementation of the relevant initiatives listed below.

Ongoing Initiatives

The **Adaptation in the Coastal Zones of Mozambique Project** (2012-2014) funded by GEF, focuses on adaptation in three pilot sites: i) Zavora; ii) Pebane; and iii) Pemba. The project builds capacity, strengthens institutions and mainstreams climate change adaptation into coastal land use and decision making. Although the project has a different geographical context, lessons learned on adaptation and interventions could be shared and project synergies could be created.

The **Pilot Programme for Climate Resilience (PPCR)** (2013-2017) is a Climate Investment Fund initiative to increase community resilience to potential climate variability by providing incentives for implementing and upscaling pilot projects. These projects will demonstrate how to integrate climate risk and resilience into core development planning, while complementing other ongoing and related development activities. The PPCR focuses on adaptation in the private sector in: i) the Zambezi basin; ii) the Limpopo Watershed; and iii) the coastal city of Beira. Activities which align with the proposed LDCF project are those related to community-based watershed management and upgrading infrastructure in coastal cities to cope with extreme weather events.

Adaptation Learning Programme for Africa (ALP) (2010-ongoing) improves capacity to adapt to climate change, through community-based approaches in the Inhambane Province. Although the programme is not being implemented in Maputo Province, synergies could be created to share knowledge and lessons learned.

The **African Climate Change Resilience Alliance (ACCRA)** (2009-ongoing) funded by DFID, is being implemented by Save the Children. This alliance: i) increases the evidence base of successful adaptation approaches; ii) increases

investment in government capacity building; and iii) improves the institutional and policy context for DRR and climate change adaptation initiatives. It will therefore create an enabling environment for the revision of policies, strategies and legislation for EbA.

International Fund for Agricultural Development (IFAD) **Pro-poor Value Chain Development Project** (2012-2019) in the Maputo and Limpopo Corridors (PROSUL) is being implemented in the arid and semi-arid areas of southern Mozambique. The objective is to increase climate resilience in the drought-prone areas through three specific value chains: i) irrigated horticulture; ii) cassava; and iii) red meat. With a focus on water management infrastructure and agriculture techniques that are climate resilient, there is an opportunity to promote synergies and share lessons learned through the proposed LDCF project with PROSUL.

The **Coping with Drought and Climate Change Project** led by UNDP, increases the capacity of communities to cope with and respond to droughts, particularly in the Gaza Province. Synergies could be created with this project to share lessons learned on awareness raising and drought resilience. The dates of this project will be confirmed during the PPG phase.

The **Programme for Emergency Water Supply for Addressing Climate Change**, funded by JICA, will improve water supply and flood management, particularly in the Maputo and Gaza Provinces. This will be achieved through the provision of machinery and equipment for drilling of wells, emergency water supply and flood management. The dates of this project will be confirmed during the PPG phase.

The **Cities in Climate Change Initiative (CCCI)**, a UN-Habitat and SUD-Net Cities initiative which seeks to strengthen the climate change response of cities and local governments. Maputo is one of four participating cities. The initiative does not implement concrete adaptation interventions; it rather focuses on capacity development, thereby creating an enabling environment for the proposed LDCF project. The dates of this project will be confirmed during the PPG phase.

Completed Initiatives

The **UNDP Africa Adaptation Programme (AAP)** (2008–2012) provided support for developing a programmatic framework for climate change adaptation. This programme improved the strategic enabling environment for climate change adaptation and disaster risk reduction in Mozambique. The proposed LDCF project could capitalise on the capacity building, institutional strengthening and legal framework activities undertaken at a national level. It could build on and utilise the knowledge management and information dissemination components of the AAP.

The **UN Joint Programme for Disaster Risk Reduction (DRR) and Emergency Preparedness** (completed in 2011), led by UNDP with UN-Habitat participation, developed several methods and tools for mainstreaming disaster risk and vulnerability reduction into policies. The programme also strengthened government capacities, as well as established cross-sector information sharing and knowledge management of disaster risk management. The Joint Programme for DRR could provide useful information for the national upscaling strategy of the proposed LDCF project.

The **UN Joint Programme for Environmental Mainstreaming and Adaptation to Climate Change** (completed in August 2012), was led by FAO with UN-HABITAT. It focused on mainstreaming environment and climate change policies in Mozambique, and adaptation to climate change in areas outside of Maputo Province.

The **Impact of Climate Change on Disaster Risk and Adaptation (INGC phase II project)** (completed in December 2012) was an action plan jointly developed by MICOA and INGC. The project focused on: i) formulating a national strategy to respond to climate change; ii) developing a systematic focus on climate change for sectoral policies; iii) revising the legal framework and secondary legislation to adjust fiscal policies; iv) engaging the private sector in adaptation to climate change; and v) raising national, provincial and district awareness. The project focused on a national strategy for climate change and was strongly linked to the AAP.

The **Mozambique Poverty-Environment Initiative (PEI II)** (completed in December 2011), implemented by UNEP and UNDP, built on the first phase of the initiative (PEI I) and strengthened environmental policy and management capacity at the national and local levels. Synergies could be created with the results of this initiative to support Component 3 of the proposed LDCF project, particularly the national upscaling strategy.

The Climate Change and Development Project: Recognising the Role of Forest and Water Resources in Climate Change Adaptation (2008-2010) was implemented by IUCN. It promoted ecosystem approaches – specifically the role of forests and water resources – to support communities. The project activities did not fall within Maputo Province, except for dune rehabilitation. Nevertheless, the proposed LDCF project could build on lessons learned and adopt best practices from this project.

DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1. Is the project consistent with the National strategies and plans or reports and assessments under relevant conventions? (yes X /no). If yes, which ones and how: NAPAs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, etc.:

Within the Government of Mozambique’s Five Year Plan (2010-2014), the **Poverty Reduction Strategy Paper (PARPA II)** and the **Strategic Plan for Agricultural Development (PEDSA 2010-2019)**, both list the sustainable use of natural resources – including water – and mechanisms for the management of natural resources as priorities. The need to increase resilience to the negative effects of droughts and floods is also acknowledged. However, climate change as a cause of droughts and floods is not acknowledged in the PARPA II.

The proposed LDCF project addresses three priorities as defined in the **National Adaptation Programmes of Action (NAPA)**. These are: i) NAPA Priority 2.2: “strengthen capacity of agricultural producers to cope with climate change through the promotion of activities such as reforestation, forest conservation within river basins and sustainable use of natural resources”; ii) NAPA Priority 2.3: “reduction of climate change impacts in coastal zones through the promotion of activities such as planting native trees in the mangrove zones; increase knowledge in coastal zones; encourage reduction of unsustainable fishery practices”; and iii) NAPA Priority 3.4: “management of water resources under climate change”.

The **Environmental Strategy for Sustainable Development Mozambique** mainstreams climate change adaptation through its focus on “setting national and local objectives for integrated management and preservation of natural resources and ecosystems”. The strategy also focuses on the “development of infrastructure, waste management, and water and sanitation services”, while curbing environmental pollution relating to health and climate change. The Environmental Strategy has a direct focus on climate change, although specifically focusing on mitigation through greenhouse gas emissions, rather than adaptation projects. Although the Environmental Strategy focuses on the urban environment, it does not specifically address the impact of climate change on cities.

The **Strategic Environmental Assessment (SEA)**, led by MICOA and funded by DANIDA, will involve extensive data collection and a consultative process within all sectors of the 42 districts in seven provinces. This will include the coastline of Mozambique. It will inform land use decision making and territorial planning at all levels (district, provincial and national) in coastal zones. The proposed LDCF project’s focus on coastal zones and responding to climate change is consistent with these plans.

The **National Water Policy (Política Nacional de Águas)** ensures the sustainability of national water supplies, improves access to water and sanitation, and minimises the negative impact of floods and droughts. Similarly, the **National Water Resources Management Strategy (Estratégia Nacional de Gestão de Recursos Hídricos)** develops effective management strategies for water resources to contribute to sustainable socio-economic development. This is achieved through: i) enhancing human capacity for water management; ii) developing a framework for integrated water management; and iii) developing infrastructure for water supply and sanitation services.

Overall, the proposed LDCF project will directly contribute to the achievement of Mozambique's MDGs, particularly: i) Goal 1 – extreme poverty and hunger eradication; and ii) Goal 7 – environmental sustainability.

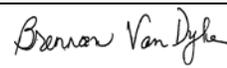
PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. Record of Endorsement⁶¹ of GEF Operational Focal Point (S) on Behalf of the Government(s): (Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this template. For SGP, use this [SGP OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Marília Telma António Manjate	Director of Cooperation and UNFCCC Focal Point	MINISTRY FOR THE COORDINATION OF ENVIRONMENTAL ACTION DIRECTORATE OF COOPERATION	30/05/2014

B. GEF Agency(ies) Certification

This request has been prepared in accordance with GEF policies⁶² and procedures and meets the GEF criteria for project identification and preparation under GEF-6.

Agency Coordinator, Agency name	Signature	Date (MM/dd/yyyy)	Project Contact Person	Telephone	Email
Brennan Van Dyke, Director, GEF Coordination Office, UNEP		November 03, 2014	Ermira Fida, Head- GEF Adaptation Unit, UNEP	+(254)20 7623113	ermira.fida@unep.org

C. Additional GEF Project Agency Certification (*Applicable Only to newly accredited GEF Project Agencies*)

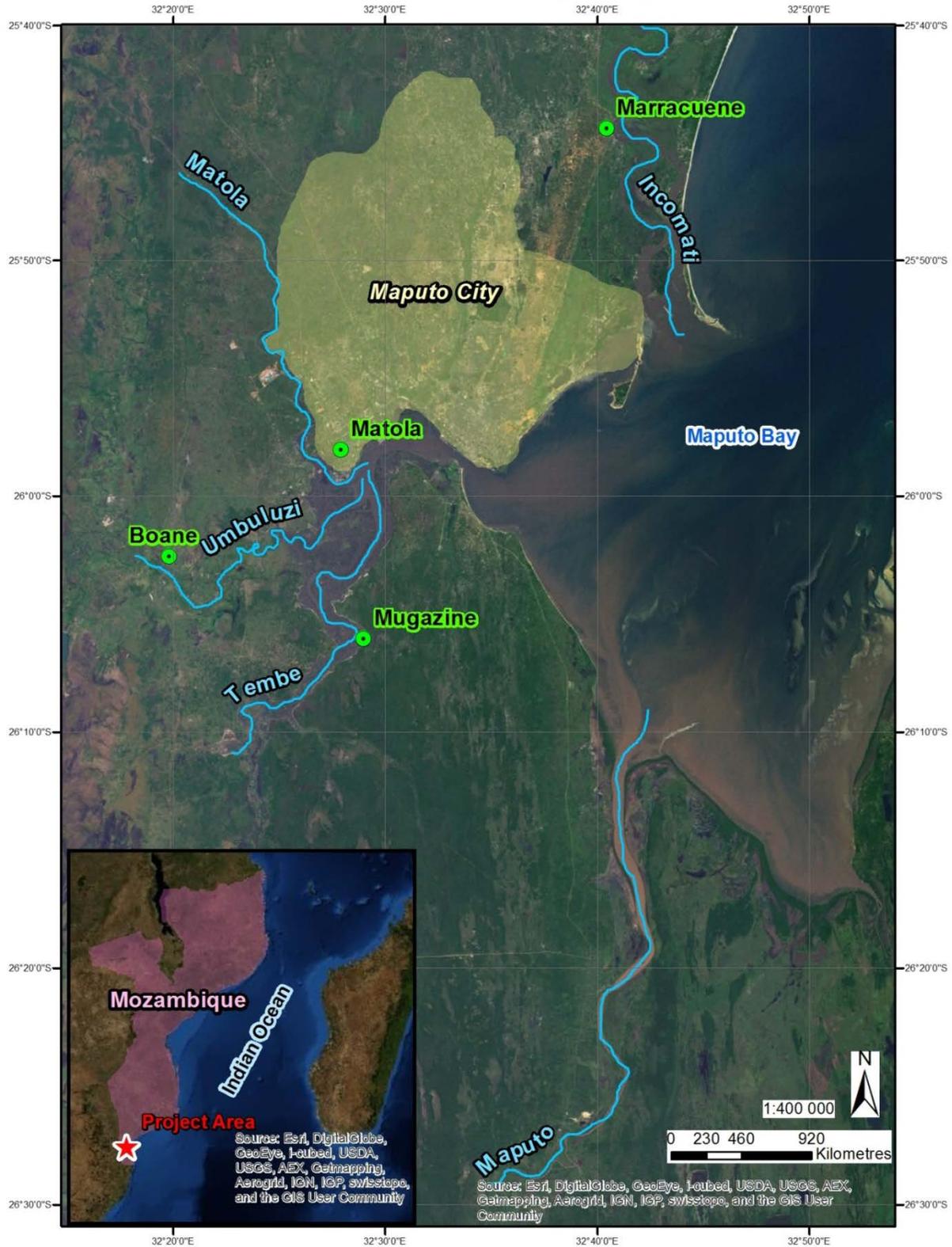
For newly accredited GEF Project Agencies, please download and fill up the required **GEF Project Agency Certification of Ceiling Information Template** to be attached as an annex to the PIF.

⁶¹ For regional and/or global projects in which participating countries are identified, OFP endorsement letters from these countries are required even though there may not be a STAR allocation associated with the project.

⁶² GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, and SCCF

Annex I: Project Locality Map.

Map showing the major rivers identified in the larger Maputo area, the boundary of Maputo City and the areas identified to be included in the larger Maputo area.



Annex II: Climate change vulnerabilities of the baseline projects versus the adaptation measures under the proposed LDCF project in the larger Maputo area, Mozambique.

Baseline projects Goals (including activities)	Climate change hazards affecting the baseline projects	Risks to the baseline projects and targeted populations as a result of climate change	Ecosystem services targeted by the proposed LDCF project	Adaptation interventions supported by the proposed LDCF project	Expected proposed LDCF project benefits
Project targeted vulnerable sites and communities: Local communities living in coastal, urban and peri-urban areas of the larger Maputo area that are vulnerable to the effects of erratic rainfall ⁶³ , sea-level rise and storm surges.					
<p>Kubasisa Muganga (Clean the Neighbourhoods) Project in Mavalane A, Luis Cabral, Inhagoia A and Inhagoia B bairros in Maputo City.</p> <p>Improved health and living standards of the peri-urban poor through: providing safe potable water; providing sanitation facilities; and improving the understanding of hygiene practices.</p>	<p>Increased intensity and frequency of flooding because of heavy rains.</p> <p>More frequent and severe droughts.</p> <p>SLR.</p> <p>Inundation from rivers and storm surges.</p>	<p>Damage to sanitation and water infrastructure.</p> <p>Increased incidence of water-borne diseases.</p> <p>Salinisation of groundwater.</p> <p>Reduced availability of potable water for domestic use.</p>	<p>Provision of freshwater.</p> <p>Buffering from storm surges.</p> <p>Flood mitigation.</p>	<p>Strengthening the institutional and technical capacity of Maputo municipal authorities to plan and implement mangrove and riparian EbA interventions in coastal, urban and peri-urban areas.</p> <p>Implementing concrete on-the-ground EbA interventions including riparian restoration, mangrove restoration and diversified and intensified agricultural areas.</p> <p>Increasing public awareness of the benefits of mangrove and riparian EbA interventions for reducing vulnerability to climate change effects.</p>	<p>Local communities aware of climate change hazards and the effects on water resources.</p> <p>Climate change risks incorporated into water supply and demand management.</p> <p>Reduced damage to water and sanitation infrastructure.</p> <p>Increased availability of potable water.</p> <p>Improved health because of improved nutrition and reduced outbreaks of water-borne diseases.</p>
<p>Project Design of Maputo Drainage and Sanitation.</p> <p>Development of electrification, irrigation, drainage and sanitation infrastructure in Maputo City.</p>	<p>Increased intensity and frequency of flooding because of heavy rains.</p> <p>More frequent and severe droughts.</p> <p>SLR.</p> <p>Inundation</p>	<p>Damage to sanitation, irrigation and electrification infrastructure.</p> <p>Salinisation of groundwater.</p>	<p>Maintenance of water flow.</p> <p>Flood mitigation.</p>	<p>Strengthening the institutional and technical capacity of Maputo municipal authorities to plan and implement mangrove and riparian EbA interventions in coastal, urban and peri-urban areas to climate-proof infrastructure.</p> <p>Implementing concrete on-the-ground EbA interventions including</p>	<p>Climate change risks incorporated into water supply and demand management.</p> <p>Reduced damage to sanitation, irrigation and drainage infrastructure.</p> <p>Climate change risks incorporated into water and sanitation management.</p>

⁶³ Erratic rainfall includes droughts and floods.

Baseline projects Goals (including activities)	Climate change hazards affecting the baseline projects	Risks to the baseline projects and targeted populations as a result of climate change	Ecosystem services targeted by the proposed LDCF project	Adaptation interventions supported by the proposed LDCF project	Expected proposed LDCF project benefits
	from rivers and storm surges.			riparian restoration and mangrove restoration to climate-proof infrastructure. Increasing awareness of municipal and district authorities of the benefits of mangrove and riparian EbA interventions for reducing vulnerability of infrastructure to climate change effects.	
<p>UN-Habitat Water and Sanitation Trust Fund in Mafalala neighbourhood of Maputo City.</p> <p>Improved health and living standards focused on women and children through: access to safe drinking water; improved sanitation; improved drainage; sustainable waste management; improved health awareness; and improved local capacity.</p>	<p>Increased intensity and frequency of flooding because of heavy rains.</p> <p>More frequent and severe droughts.</p> <p>SLR.</p> <p>Inundation from rivers and storm surges.</p>	<p>Damage to sanitation, drainage and water infrastructure.</p> <p>Increased incidence of water-borne diseases.</p> <p>Salinisation of groundwater.</p> <p>Reduced availability of potable water for domestic use.</p>	<p>Provision of freshwater.</p> <p>Flood mitigation.</p> <p>Maintenance of water flow.</p>	<p>Strengthening the institutional and technical capacity of Maputo municipal authorities to plan and implement mangrove and riparian EbA interventions in coastal, urban and peri-urban areas.</p> <p>Implementing concrete on-the-ground EbA interventions including riparian restoration, mangrove restoration and diversified and intensified agricultural areas.</p> <p>Increasing public awareness of the benefits of mangrove and riparian EbA interventions for reducing vulnerability to climate change effects.</p>	<p>Local communities aware of climate change hazards and the effects on water resources.</p> <p>Climate change risks incorporated into water supply and demand management.</p> <p>Reduced damage to water and sanitation infrastructure.</p> <p>Increased availability of potable water.</p> <p>Improved health because of improved nutrition and reduced outbreaks of water-borne diseases.</p> <p>Reduced dispersal of waste during floods.</p> <p>Improved local capacity through community training workshops.</p>

Baseline projects Goals (including activities)	Climate change hazards affecting the baseline projects	Risks to the baseline projects and targeted populations as a result of climate change	Ecosystem services targeted by the proposed LDCF project	Adaptation interventions supported by the proposed LDCF project	Expected proposed LDCF project benefits
<p>District Directorate for the Coordination of Environmental Action (DPCA). Improved natural resource management through: regeneration of indigenous mangrove species; restoration of mangroves; improved access to water for communities; and building the capacity of local natural resource management (NRM) committees for monitoring and disseminating tools for NRM.</p>	<p>Increased intensity and frequency of flooding because of heavy rains.</p> <p>More frequent and severe droughts.</p> <p>SLR.</p> <p>Inundation from rivers and storm surges.</p>	<p>Inundation of mangroves.</p> <p>Contamination of groundwater.</p> <p>Increased pressure on natural resources.</p> <p>Increased invasion of alien species.</p> <p>Changes in composition of species assemblages including increases in the abundance of pest species.</p>	<p>Protection against extreme weather events.</p> <p>Provision of freshwater</p>	<p>Strengthening the institutional and technical capacity of Maputo municipal and district authorities to plan and implement mangrove and riparian EbA interventions in coastal, urban and peri-urban areas.</p> <p>Implementing concrete on-the-ground EbA interventions including riparian restoration and mangrove restoration.</p> <p>Strengthening the knowledge base for implementing mangrove and riparian EbA interventions.</p> <p>Increasing public awareness of the benefits of mangrove and riparian EbA interventions for reducing vulnerability of natural resources to climate change effects.</p>	<p>Local communities, Natural Resource Management Committees and government officials working in conservation are aware of climate change hazards and the effects on natural resources.</p> <p>Climate change risks incorporated into natural resource management.</p> <p>Mangrove restoration considers climate change and is conducted using an EbA approach.</p> <p>Reduced pressure on natural resources through the provision of alternative livelihoods.</p>

Annex III: Indicative outputs and activities for each project outcome.

Component	Expected Outcome	Indicative Outputs	Indicative Activities
1. Institutional and technical capacity of Maputo municipal and district authorities.	1.1 Institutional and technical capacity of Maputo municipal and district authorities to plan and implement mangrove and riparian EbA interventions in coastal areas strengthened.	1.1.1 A database with collated best practice knowledge on mangrove and riparian EbA interventions in coastal urban and peri-urban areas.	Undertake an information-gap analysis in the relevant departments and research institutions to identify shortfalls in the availability of information for planning and implementing mangrove and riparian EbA interventions in the larger Maputo area ⁶⁴ . Collate existing information on mangrove and riparian EbA including international best-practice guidelines. Produce a best-practice database for mangrove and riparian EbA interventions in the larger Maputo area. Establish targeted research groups to address the information gaps identified in the gap analysis Include outcome of research group in best-practice database.
		1.1.2 A multi-disciplinary committee to facilitate cross-sectoral dialogue on mangrove and riparian EbA interventions in coastal urban and peri-urban areas.	Undertake an institutional mapping exercise to identify the relevant national sectors, authorities and institutions as well as to identify an entry point for a cross-sectoral dialogue platform. Establish a cross-sectoral dialogue platform for relevant authorities and institutions, including MICOA, Ministry of Public Works and Housing, Institute for Hydrology and Oceanography, and National Disaster Management Institute to facilitate project implementation. Train committee members on EbA planning, proposal writing and accessing climate finance to promote national upscaling of EbA interventions.
		1.1.3 Municipal and district authorities trained in climate change adaptation, and mangrove and riparian EbA interventions in coastal urban and peri-urban areas.	Undertake a knowledge-gap analysis at municipal and district level. Design training materials based on identified gaps in knowledge. Themes include i) climate change adaptation; ii) planning and implementing mangrove and riparian EbA; and iii) using the best-practice database Conduct training courses and workshops for municipal and district authorities using training materials.
		1.1.4 Policy briefs and decision-making tools that integrate mangrove and riparian EbA into coastal urban and peri-urban development planning.	Review existing environmental and development policies, city/town planning legislation and budgets and suggest revisions to mainstream EbA into the management of mangrove and riparian ecosystems. Identify the barriers to and opportunities for incorporating EbA into planning guidelines and policies. Produce policy briefs for relevant sectors for mangrove and riparian EbA interventions in the larger Maputo area. Develop a decision-making tool to assist authorities in planning and implementing mangrove and riparian EbA interventions in the larger Maputo area.
		1.1.5 Develop an EbA upscaling strategy for coastal urban and peri-urban areas of Mozambique.	Conduct workshops to disseminate lessons learned and best practices generated in Output 3.3.1 with municipal, district and provincial authorities to expand mangrove and riparian EbA interventions beyond project pilot sites. Upscale mapping activities stipulated in Activity 2.1.1 to identify barriers to – and opportunities for – EbA upscaling and implementation.

⁶⁴ This includes Maputo municipality and peri-urban areas surrounding Maputo City in Maputo Province.

2. Implementation of mangrove and riparian EbA interventions in the the larger Maputo area.	2.1 Vulnerability of local communities to the effects of climate change, including erratic rainfall, SLR and storm surges at selected project sites in the larger Maputo area reduced.	2.1.1 Protocols for site-specific implementation of mangrove and riparian EbA interventions in the larger Maputo area.	<p>Quantify and map – using participatory approaches – resource use, adaptive capacity and vulnerability⁶⁵ of communities in the larger Maputo area⁶⁶.</p> <p>Assess subsistence needs and community preferences, and identify species that are salt tolerant, flood resilient and nutritious to inform planting in agricultural areas.</p> <p>Map the effects of erratic rainfall on water and sanitation services in the larger Maputo area using a GIS.</p> <p>Map degraded mangrove and riparian areas in the larger Maputo area using a GIS.</p> <p>Map agricultural areas in the larger Maputo area using a GIS.</p> <p>Identify areas in the larger Maputo area for potential buffer interventions along river-road interfaces⁶⁷ using town plans.</p> <p>Identify appropriate mangrove⁶⁸ and aquatic plant species for restoration of degraded mangroves (coastal and estuarine) and riparian ecosystems.</p> <p>Develop protocols for mangrove and riparian EbA interventions using the information collected on natural resources, subsistence needs, resource use, adaptive capacity and community vulnerability^{69,70}.</p>
		2.1.2 Local communities or barrios trained on the implementation of selected EbA interventions.	<p>Establish community-managed nurseries to facilitate propagation and planting.</p> <p>Train local community members to help implement – in conjunction with the project team – mangrove and riparian EbA interventions.</p> <p>Train local community members at each project site as planting liaison officers to ensure the provision of constant on-the-ground support to the community.</p>
		2.1.3 Mangroves in the larger Maputo area restored to increase their climate resilience.	Restore degraded mangroves in the larger Maputo area according to developed protocols (Output 2.1.1).
		2.1.4 Riparian areas (including wetlands) in the larger Maputo area restored to increase their climate resilience	Restore degraded riparian areas (including wetlands) in the larger Maputo area according to developed protocols (Output 2.1.1).
		2.1.5 Agricultural practices diversified to increase their climate resilience.	Diversify agricultural areas according to potential mapped areas (Output 2.1.1) and developed protocols (Output 2.1.1) ⁷¹ .
		2.1.6 Alternative livelihood strategies based on community	<p>Review the range of ecosystem goods and services for domestic and commercial use in mangrove and riparian EbA.</p> <p>Review the range of goods for domestic and commercial use from diversified agricultural practices.</p>

⁶⁵ Including a vulnerability impact assessment.

⁶⁶ Communities will likely include people living along the Tembe, Incomati, Umbuluzi, Matola and Infulene Rivers.

⁶⁷ The spatial plan of the larger Maputo area will be analysed during the PPG phase to determine whether there are any roads that run alongside rivers and whether there is scope to develop indigenous or productive buffers along these interfaces. The buffers – that would protect roads against flood damage – could potentially serve as biodiversity corridors (if indigenous species are planted) or productive agricultural strips.

⁶⁸ Productive pioneer species include: i) *Avicennia marina* (Invede); ii) *Lumnitzera racemos* (Mpiripito); and iii) *Yxlocarpus granatum* (Inrubo/ M'rubo)

⁶⁹ This activity will apply to road-river interfaces if such areas are identified.

⁷⁰ Regular consultations will be conducted with communities throughout the protocol development process to ensure an inclusive and participatory approach that promotes community buy-in.

⁷¹ This activity will apply to road-river interfaces if such areas are identified.

		needs and EbA measures implemented through Output 2.1.3 and 2.1.4.	<p>Conduct a cost-benefit analysis of identified goods and services.</p> <p>Conduct a market analysis to identify market needs regarding goods and services from mangrove and riparian EbA, and diversified agricultural practices.</p> <p>Review current community ownership systems that determine the distribution of costs and benefits from community-owned natural resources.</p> <p>Facilitate workshops to establish/confirm – through a participative approach – an ownership system for the ecosystem goods and services from mangrove and riparian EbA.</p> <p>Compile business plans for the most viable goods and services</p> <p>Facilitate communication between community members relevant market stakeholders to establish market linkages.</p>
3. Public awareness and knowledge of increasing climate resilience through mangrove and riparian EbA interventions .	3.1. Public awareness and knowledge of the benefits of EbA in mangroves and riparian areas increased.	3.1.1 Information on the performance of EbA interventions in Output 2.1.3 and 2.1.4 generated.	<p>Conduct community surveys to establish the perceived benefits of mangrove and riparian EbA interventions.</p> <p>Analyse the costs and benefits of mangrove and riparian EbA interventions at project sites.</p> <p>Collate and synthesise lessons learned and best practices from project results and update the best-practice database.</p>
		3.1.2 A long-term research programme developed on the benefits of mangrove and riparian EbA interventions for urban and peri-urban areas.	<p>Propose a selection of PhD and MSc topics on mangrove and riparian EbA interventions in coastal, urban and peri-urban areas. These will be offered at local universities, including: i) Universidade Eduardo Mondlane; ii) Universidade Católica de Moçambique; and iii) Universidade Politécnica.</p> <p>Select appropriate students and monitor their progress.</p> <p>Ensure that PhD and MSc studies are developed into scientific papers that are submitted for publication.</p>
		3.1.3 A public awareness campaign on climate change and the benefits of EbA in coastal urban and peri-urban areas developed and implemented.	<p>Design and implement awareness raising activities for local communities, including media campaigns⁷² and public information sessions including the information generated in Output 3.1.1.</p> <p>Develop and institute modules on the benefits of EbA for school curricula to promote youth awareness.</p> <p>Implement long-term ecosystem research protocols to establish the benefits of EbA to local communities and the Maputaland Coastal Forest Mosaic ecosystem.</p>

⁷² Possibly including mobile platforms.