DATE OF RECEIPT:
ADAPTATION FUND PROJECT ID:
(For Adaptation Fund Board

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	REGULAR PROJECT
COUNTRY/IES:	**UNITED REPUBLIC OF TANZANIA**
TITLE OF PROJECT/PROGRAMME:	**IMPLEMENTATION OF CONCRETE ADAPTATION MEASURES TO REDUCE VULNERABILITY OF LIVELIHOODS AND ECONOMY OF COASTAL COMMUNITIES OF TANZANIA**
TYPE OF IMPLEMENTING ENTITY:	**MIE**
IMPLEMENTING ENTITY:	**UNEP**
EXECUTING ENTITY/IES:	**VICE PRESIDENT'S OFFICE (DIVISION OF ENVIRONMENT)**
AMOUNT OF FINANCING REQUESTED:	**5,008,564** (U.S Dollars Equivalent)

1. PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

1.1 Geography

The country's total area is 945,000 Km^2 with the mainland covering 939,702 Km^2. The mainland is 881,289 square kilometers, with 58,413 Km^2 of inland lakes. The coastline extends 800 Km from 4^0S to 10^0S. Forests and woodland occupy 50 percent of the total area and 25 percent are comprised of wildlife reserves and national parks. Except for the coastal belt, most of the country is part of the Central African plateau lying between 1,000 to 3,000 meters above sea level.

The coast of Tanzania is hot and humid; it contains Tanzania's largest city, Dar es Salaam, and is home to areas of East African mangroves, and mangrove swamps that are an important habitat for wildlife. Tanzania's climate ranges from tropical to temperate in the highlands. Country-wide, the mean annual rainfall varies from 500 millimeters to 2,500 millimeters. The average duration of the dry season is 5 to 6 months. Average annual precipitation over the entire nation is 1,042 mm. Average temperatures range between 24°C and 34°C, depending on location. Within the plateau, mean daily temperatures range between 21^oC - 24^oC. Natural hazards include both flooding and drought.

Figure 1: Topographical map of Tanzania

Figure 2: Rainfall patterns - Tanzania

Within the country, altitude plays a large role in determining rainfall pattern, with higher elevations receiving more precipitation. Generally speaking, the total amount of rainfall is not very great. Only about half the country receives more than 762 mm annually (Mwandosya et al., 1998). Tanzania's precipitation is governed by two rainfall regimes. Bimodal rainfall, comprised of the long rains of Masika between March-May and short rains of Vuli between October-December, is the pattern for much of the northeastern, northwestern (Lake Victoria basin) and the northern parts of the coastal belt. A unimodal rainfall pattern, with most of the rainfall during December-April, is more typical of most of the southern, central, western, and southeastern parts of the country. The country can be roughly divided into four main climatic/topological zones:

(a) ***The Lowland Coastal Zone*** This zone can further be divided into three sub-zones: the wet sub-zone, between 0 to 500 meters of elevation, with 1,800 millimetres of annual rainfall on average; humid sub-zone, elevation ranging from 500 metres to 1000 metres with an annual rainfall of between 1000 and 1,800 millimetres; and the drier zone, about 1,000 metres in altitude, with less than 1,000 millimetres of rainfall per annum.

(b) ***The Highlands Zone*** **-** This comprises of the Northeastern Highlands, which include the Usambara Mountains, Mt. Kilimanjaro and Mt. Meru; the Southern Highlands, which include Mt. Rungwe, Livingstone ranges, and Mt. Mbeya. As catchment areas, these are generally areas of high precipitation

(c) ***The Plateau Zone*** **-** Found around Lake Victoria and much of western Tanzania, this zone is occupied by what are generally referred to as *miombo* woodlands. These are, in the main, dry areas with an average rainfall of up to 1,000 millimetres.

(d) ***The Semi-desert Zone*** Mainly found in central and North Eastern Tanzania around Dodoma, Shinyanga, Arusha, Mwanza and Mara. The zone has a rainfall of less than 600 millimeters per annum.

The Tanzania NAPA and National Communication further categorized the country into 7 agro-ecological zones, as represented in the table below.

Table 1: Agro-ecological zones

Zone	Sub-Zone and areas	Soils and Topography	Altitude	Rainfall (mm/yr)	Growing season
COAST	North: Tanga (except Lushoto), Coast and Dares Salaam	Infertile sands on gently rolling uplands, Alluvial soils in Rufuji, Sand and infertile soils	Under 3000m	North: Bimodal, 750-1200mm	North: October-December and March-June
	South: Eastern Lindi and Mtwara (except Makonde Plateau	Fertile clays on uplands and river flood plains		South: Unimodal, 800-1200mm	South: December-April
ARID LANDS	North: Serengeti, Ngorongoro Parks, Part of Masai land	North: Volcanic ash and sediments. Soils variable in texture and very susceptible to water erosion	North: 1300-1800m	North: Unimodal, unreliable, 500-600mm	March- May
	Masai Steppe, Tarangire Park, Mkomazi Reserve, Pangani and Eastern Dodoma	South: Rolling plains of low fertility. Susceptible to water erosion. Pangani river flood plain with saline, alkaline soil	South 500-1500m	South: Unimodal and Unreliable, 400-600mm	
SEMI-ARID LANDS	Central Dodoma, Singida, Northern Iringa, some of Arusha, Shinyanga	Central: Undulating plains with rocky hills and low scarps. Well drained soils with low fertility. Alluvial hardpan and saline soils in Eastern Rift Valley and lake Eyasi. Black cracking soils in Shinyanga.	Central: 1000-1500m	Central: unimodal and unreliable: 500-800mm	December - March
	Southern: Morogoro (except Kiliombero and Wami Basins and Uluguru Mts). Also Lindi and Southwest Mtwara	Southern: Flat or undulating plains with rocky hills, moderate fertile loams and clays in South (Morogoro), infertile sand soils in center	Southeastern 200-600m	Southeastern: Unimodal 600-800mm	
PLATEAUX	Western: Tabora, Rukwa (North and Centre), Mbeya	Western: Wide sandy plains and Rift Valley scarps	800-1500m	Western: unimodal, 800-1000mm	November-April
	North: Kigoma, Part of Mara	Flooded swamps of Malagarasi and Ugalla rivers have clay soil with high fertility			
	Southern: Ruvuma and Southern Morogoro	Southern: upland plains with rock hills. Clay soils of low to moderate fertility in south, infertile sands in North.		Southern: unimodal, very reliable, 900-1300mm	

Zone	Sub-Zone and areas	Soils and Topography	Altitude	Rainfall (mm/yr)	Growing season
SOUTHERN AND WESTERN HIGHLANDS	Southern: A broad ridge of from N. Morogoro to N. Lake Nyasa, covering part of Iringa, Mbeya	Southern: Undulating plains to dissected hills and mountains. Moderately fertile clay soils with volcanic soils in Mbeya	Southern: 1200-1500m	Southern: unimodal, reliable, local rain shadows, 800-1400mm	Northern: December – April
	Southwestern: Ufipa plateau in Sumbawanga	Southwestern: Undulating plateau above Rift Valleys and sand soils of low fertility	Southwestern: 1400-2300m	Southern: unimodal, reliable, 800-1000mm	Southwestern: November-April
	Western: Along the shore of Lake Tanganyika in Kigoma and Kagera	Western: North-south ridges separated by swampy valleys, loam and clay soils of low fertility in hills, with alluvium and ponded clays in the valleys	Western: 100-1800m	Western: bimodal, 1000-2000mm	Western: October-December and February- May
NOTHERN HIGHLANDS	Northern: foot of Mt. Kilimanjaro and Mt. Meru. Eastern Rift Valley to Eyasi	Northern: Volcanic uplands, volcanic soils from lavas and ash. Deep fertile loams. Soils in dry areas prone to water erosion.	Northern: 1000-2500m Granitic Mts: 1000-2000m	Northern: Bimodal, varies widely 1000-2000mm	Northern: November-January and March-June
	Granite Mts Uluguru in Morogoro, Pare Mts in Kilimanjaro and Usambara Mts in Tanga, Tarime highlands in Mara	Granite steep Mountain side to highland plateaux. Soils are deep, arable and moderately fertile on upper slopes, shallow and stony on steep slopes		Granitic Mts. Bimodal and very reliable 1000-2000m	Granitic Mts. October-December and March-June
ALLUVIAL PLAINS	K-kilomberao (Morogoro)	K-Cental clay plain with alluvial fans east and west		K—Unimodal, very reliable, 900-1300mm	K-November-April
	R- Rufuji (Coast)	R- Wide mangrove swamp delta, alluvial soils, sandy upstream, loamy down steam in floodplain		R-Unimodal, often inadequate 800-1200mm	R- December-April
	U- Usangu (Mbeya)	U-Seasonally Flooded clay soils in North, alluvial fans in South		U-Unimodal, 500-800mm	U-December-March
	W- Wami (Morogoro)	W- Moderately alkaline black soils in East, alluvial fans with well drained black loam in West		W-Unimodal, 600-1800mm	W-December-March

1.2 Population and Economy

Tanzania is one of the poorest countries in the world with a GNI per capita of only US $ 300[1]. The total population of the country is estimated at over 43,7 million people, 35% of which are living below the poverty line[2]. The 2007 Household Budget Survey shows that the proportion of people living in poverty has decreased by 2.4 percentage points, to 33.3 percent in 2007 from

[1] WB, 2008
[2] World Bank Development Indicators, http://data.worldbank.org/country/tanzania

35.6 percent of the population in 2001. The reduction in the poverty ratio, however, has not been able to compensate for the population growth rate of about 2.9 percent per year. Consequently, the reduction in the proportion of poor translates to an increase of 1.0 million people living in poverty on mainland Tanzania between 2001 and 2007.

About 85 per cent of the country's poor people live in rural areas and rely on agriculture as their main source of income and livelihood. Agriculture (including livestock) is the dominant sector in Tanzanian economy, providing livelihood, income and employment to over 80% of the overall population and accounting for roughly 56 percent of GDP and about 60 percent of export earnings[3]. Agricultural products include coffee, sisal, tea, cotton, pyrethrum, cashew nuts, tobacco, cloves, corn, wheat, cassava, bananas, and vegetables. Livestock production includes cattle, sheep, and goats. Agricultural output remains predominately based on small holder production, as opposed to estate cultivation, though the latter does account for some sisal, tea, coffee, tobacco, rice, wheat, and wattle (construction material made of tied-together poles or sticks) production. Cash crops, such as coffee, tea, cotton, cashews, sisal, cloves, and pyrethrum account for the vast majority of export earnings. Maize, paddy, wheat, and cassava are produced for domestic consumption. Most crops are under rainfed conditions.

Water quality varies significantly within the country. In the semi-arid regions (including Dodoma, Singida, Tabora, Shinyanga, and Arusha), colour and turbidity levels become problematic during the rainy season. Rivers in the fluoride belt (including Arusha, Kilimanjaro, Singida, and Shinyanga regions of the Rift Valley, and extending to the Pangani and Internal Drainage basins) have naturally high fluoride concentrations. The waters of Lakes Tanganyika and Nyasa have overall good water quality except in the vicinity of urban areas where effluent and storm water cause local contamination, whereas the water quality of Lake Victoria is poor: high turbidity and nutrient levels lead to frequent blooms of algae and infestations of water weeds. Groundwaters from the recent sediments in the coastal plain are vulnerable to marine intrusion, particularly where groundwater-pumping rates are high. Evidence of marine intrusion has been found in the coastal aquifer of the Kigamboni Peninsula (Dar Es Salaam) with elevated chloride, sulphate and sodium concentrations and with total-dissolved solids up to 1700 mg/l (Nkotagu, 1989).[4]

In population centers, sprawl and uncontrolled land use is rampant. This is made worse by unplanned settlements, both in urban and rural areas, where there is no access to potable water and sanitary systems. In some regions, 15 to 23 percent of today‘s households do not have toilets, leading to health problems like cholera and diarrhea. Decentralisation has meant that responsibility for water and sanitation service provision has shifted to local government authorities and is carried out by 20 urban utilities and about 100 district utilities, as well as by Community Owned Water Supply Organizations in rural areas.

Emerging economic sectors include coastal tourism, aquaculture and natural gas exploitation. These are seen as potentially important resources for national economic development, and form part of a diversification strategy to reduce dependency on agriculture as an engine of growth.

[3] Tanzania National Adaptation Programme of Action, 2006
[4] Groundwater: Tanzania, British Geological Services and WaterAid, 2001.

1.3 Observed climate hazards, trends and impacts

Tanzania, like neighboring countries and other developing countries, is already vulnerable to climate variability and extremes as a result of prevailing vulnerability of its people and institutions and because of existing climate variability. The observed climate trends in Tanzania and East Africa over the recent past include the following:

- Warming of 0.7°C over the 20th century for Africa with 0.05°C warming per decade through the 20th century[5]
- Inter-annual rainfall variability. During the recent decades Eastern Africa has been experiencing an intensifying dipole rainfall pattern on the decadal time scale[6].
- An increase in the frequency and severity of floods, droughts and tropical storms in Tanzania[7]. Tanzania has experienced six major droughts over the past 30 years. The most recent, in 2006, ravaged agricultural production. The single event is estimated to have cut GDP growth by 1 percent[8].

The El Niño associated events of 1997-98 led to drought and flooding, and triggered a national food emergency, with severe food shortages, increased food prices, increases in power rationing, and extensive food, cattle and cash crop losses. Flooding damaged human settlements, infrastructure, property and livelihoods, and was associated with the spread of malaria, cholera and diarrhea[9].

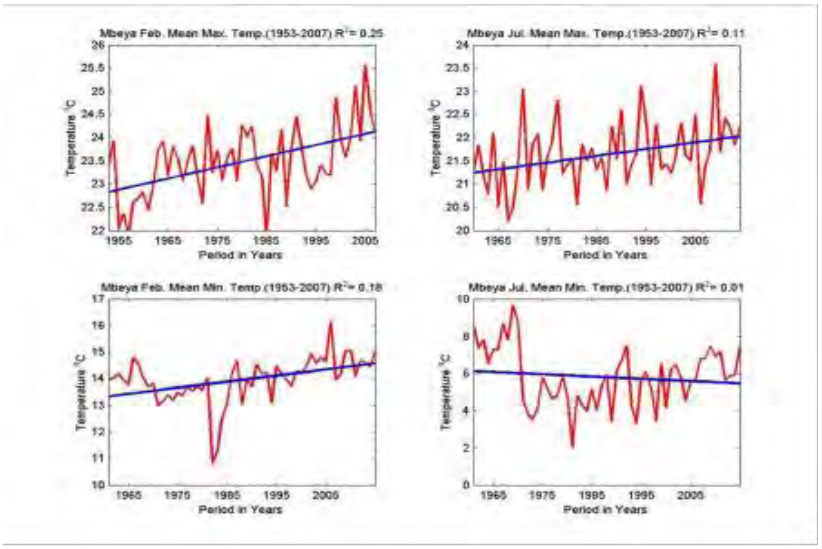


Figure 3: Long-term temperature record for Mbeya meteorological station; Source: TMA (2009)

Meteorological observations show temperature increase over the last 50 years in many areas. The data from Tanzania Metrological Agency (TMA) shows both mean maximum and mean minimum temperatures for Mbeya Metrological station which have increased steadily since 1955

[5] Hulme et al., 2001; IPCC, 2001
[6] 4AR IPCC, 2007
[7] WWF, 2006
[8] Economics of Climate Change Adaptation: –Shaping Climate Resilient Development – a framework for decision making" 2009
[9] Tanzania s First National Communication, 2003.

(MTA, 2009).

Long –term rainfall records from Mbeya metrological station (fig 4) below seem to correlate the precipitation variations with the events of 1997-98.

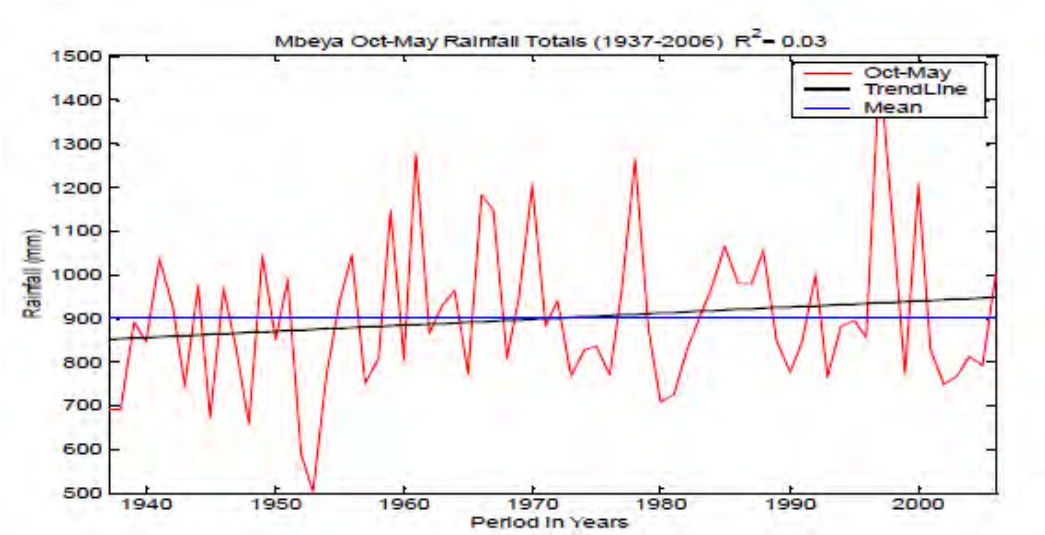


Figure 4: October –may rainfall recorded from Mbeya station (1940 – 2008). Source : TMA (2009)

Current climate variability affects the availability of water resources in Tanzania. Two of three major rivers have seen reduced flow due to declining regional rainfall, which has had ecological and economic impacts such as water shortages, lowered agricultural production, increased fungal and insect infestations, decreased biodiversity and variable hydropower production[10].

There is a strong link between climate and Tanzanian livelihoods because Tanzania depends heavily on rain-fed agriculture making rural livelihoods and food security highly vulnerable to climate variability such as shifts in growing season conditions. For example, from 1996 to 2003, there has been an observed decline in rainfall of 50-150 mm per season (March to May) and corresponding decline in long-cycle crops (e.g., slowly maturing varieties of sorghum and maize) across most of eastern Africa[11]. Long-cycle crops depend upon rain during this typically wet season and progressive moisture deficit results in low crop yields in the fall, thereby impacting the available food supply.

Increased variability (i.e., deviation from the mean) of crop production is also a major concern of farmers in eastern Africa. Inter-annual climate variability has huge impacts on the region‘s climate. El Niño events produce abnormally high amounts of precipitation in parts of equatorial East Africa and can result in flooding and decreased agricultural yields[12].

Sea level rise due to climate variability and change has caused degradation of various ecosystems and physical infrastructure in the Tanzanian coast over the last decades. The integrity of coastal

[10] Orindi and Murray, 2005
[11] Funk *et al.*, 2005
[12] WWF, 2006

ecosystems in Tanzania seems to be questionable in a changing climate. Major coral bleaching events have taken place in 1998 in the reefs of Zanzibar and Dar es Salaam, leading to the destruction of natural fish habitat. In addition to the pressure on mangroves from population living in the coastal areas (for fuel, shrimp farming and salt production), they are threatened by inundation because of the sea level rise. Coastal erosion is observed in many parts of the Tanzanian coast resulting in the loss of massive tracts of land. See section 1.5 for more information on the vulnerability of the coastal zone as priority area for this project.

1.4 Expected impacts of climate change

Climate change scenarios developed during the National Communications and NAPA processes indicate that the country is likely to undergo an increase in mean daily temperature as well as in the temperature of the warmest and coolest months. The results indicate that mean annual temperatures are projected to rise by 2.2 C by 2100, with somewhat higher increases (2.6 °C) over June, July and August, and lower values (1.9 °C) for December, January, February[13].

Annual precipitation over the whole country is projected to increase by 10% by 2100, although seasonal declines of 6% are projected for June, July and August, and increases of 16.7% for December, January, and February. These overall increases are nuanced regionally, with some parts of Tanzania projected to experience increases in annual rainfall, while others are expected to experience decreases. The National Vulnerability and Adaptation Assessment of Tanzania under the National Communication predicts increased and modified climate variability. For example, northern and southeastern sectors of the country would experience an increase in rainfall ranging from between 5% and 45%. The central, western, southwestern, southern, and eastern parts of the country might experience a decrease in rainfall of 10% to 15%. The southern highlands might similarly experience a decrease of 10%, which could alter the suitability of this area for maize cultivation. These overall average figures also mask potentially more complex seasonal variability patterns. For instance, the northeastern sector might experience an increase of 25%-60% in the short rains and an increase of 20- 45% in the long rains, and the north coastal region might get an increase of 0-20% in the short rains and a decrease of 0-10% in the long rains. Additionally, the timing of rains will become less predictable and their intensity is likely to become more volatile.

While there are no precise predictions of Sea Level rise for Tanzania, the IPCC has predicted a global average sea level rise of between 18 and 89 cm by 2100. Impacts on the Indian Ocean are expected to be highly variable, and impacts on Tanzanian Coastline and islands are also uncertain, due to variables such as currents and modifications of tidal patterns and overall regional climatic patterns. Consequently, Tanzanian government estimates are based on a conservative and a worst-case scenario of 50cm and 1m sea-level rise respectively.

Warming temperatures are projected to cause more frequent and more intense extreme weather events, such as heavy rainstorms, flooding, fires, hurricanes, tropical storms and El Niño events[14]. Tropical storms can ravage coastal areas and intensive the impacts of sea-level rise by

[13] Climate Change and Development, OECD
[14] IPCC, 2001.

accelerating erosion in coastal areas and by removing protective natural buffer areas that absorb storm energy, such as wetlands and mangroves[15]. Extreme rainfall and subsequent heavy flooding damage will also have serious effects on agriculture including the erosion of topsoil, inundation of previously arid soils, and leaching nutrients from the soil.

As a result of these climate changes, all productive sectors of the Tanzanian economy and livelihoods will experience changes and, in most regions, increased vulnerability:

Agriculture: In areas where rainfall will increase, the leaching of nutrients, washing away of topsoil and water logging would affect plant development and thus affect plant growth and yield. Climate change is bound to promote the occurrence of diseases and insect pests due to both increased temperature and rainfall. For areas that will get less rainfall irrigation will be required to substitute for moisture losses due to increased evapo-transpiration and thus drought resistant varieties would be required more than at present. Crop models used for the main cash crops in preparation for the National Communication show that:

- Cotton yields are likely to increase (under improved pest management) due to the rainfall increase in certain regions (for example Mwanza);
- Increases in rainfall will also provide positive impacts on coffee production, whereas in areas under a decrease scenario, irrigation could compensate.
- Maize is likely to undergo a yield decrease of about 33 percent over the entire country, and cultivation is likely to become more difficult under more erratic conditions.

Beyond rainfall, temperature increases are also likely to have impacts on agriculture, and shifts in growing seasons are to be expected in some cases. In the case of smallholder agriculture, vulnerability is increased by improper means of production, unsustainable methods of cultivation, as well as lack of conservation and transformation technology. Opportunities for increased productivity through agriculture can only be realized under optimal and sustainable production methods. Similarly, more frequent extreme events, such as droughts or sever rainfall, could also jeopardize any potential increase realized through average rainfall increase.

Fisheries are expected to be impacted directly and indirectly, through changes in habitat, potential destruction of breeding grounds and mangroves, and coral bleaching, as well as through changed patterns of consumption induced by decreased agricultural productivity during longer drought periods.

Water resources: Climate change is projected to have both positive and negative consequences for Tanzania‘s water-resources, specifically for the three major river basins: Ruvu, Pangani, and Rufiji. The Ruvu basin, of particular importance because it is upstream of Tanzania‘s major population center, Dar es Salaam, could experience a 10% decrease in runoff according to the Initial National Communication. The Pangani basin which supplies water to the Tanga, Kilimanjaro, and Arusha regions, supporting a number of economically important activities there is some seasonal variation with runoff projected to increase in some months runoff and decrease

[15] Magadza, 2000

in others, with annual basin runoff decreasing by an estimated 6%. However, the Kikuletwa River, also within the Pagani Basin, is projected to decrease in all months, with annual reductions of 9%. The Rufiji basin meanwhile is a large catchment in the south of the country, focused on the Great Ruaha River, which is economically important to the nation in part because of the hydropower it generates at Mtera Dam and Kidatu Dam. Its annual runoff is expected to increase with 5% and 11% at Mtera and Kidatu, respectively, most coming in the period from November to March. All these estimates however are based on scenarios from a single GCM, and should be interpreted with some caution. Real uncertainties exist concerning present and future withdrawals for irrigation, changed land use, and urbanization. Nevertheless, decreases in runoff could potentially have serious affects on socioeconomic activities in the regions of Dar es Salaam, Morogoro, Tanga, Coast, and Kilimanjaro. Dar es Salaam might be particularly vulnerable because it is the largest industrial, commercial, and administrative city in Tanzania.

Rural communities often depend on streams and rivers for drinking water, and some of these tend to dry up during droughts and dry seasons. Recurrent droughts have already had significant impacts throughout the country. In the coastal area, some saltwater intrusion in coastal aquifers and deltas can also be expected due to sea level rise and intrusion into shallow coastal rivers, as in the case of the Rufiji delta.

Energy: As mentioned above, under the climate change scenarios, the runoff of three major rivers will be altered. Reduced runoff of Pangani and Ruvu rivers, which are economically important for supplying water and hydro-electricity to major towns, where industrial activities are highest in the country, would adversely affect socio-economic activities in the country. The five regions supplied are Dar es Salaam, Coastal, Tanga, Kilimanjaro and Arusha. These changes would adversely affect water supply and socio-economic activities, and most likely lead to an increase in deforestation for fuelwood supply.

In rural areas, wood fuels provide up to 92% of energy needs (Ministry of Natural Resources and Tourism, 2000); while at the moment about 29% of urban settlements have access to the electricity supply, decreased hydrological flows could raise the costs of urban energy, leading to a sharp increase in the demand for wood-based fuels (including charcoal). Estimates place woodfuel consumption (including charcoal) at 1 to 1.5 ton per capita annually[16]. Coastal forests and mangrove tree species constitute an important resource for fuelwood and charcoal production in coastal areas, leading in some cases to complete deforestation of mangrove stands.[17] Some studies attribute the excessive dependency on woodfuels to low incomes and inadequate investment in alternative sources of energy, and there is a definite correlation between the demand for charcoal and the rising prices of other fuels.[18] It has been estimated that

[16] Wisercke, W. Towards a sustainable biomass energy supply, rural households in semi-arid Shinyanga, Tanzania A Cost/benefit analysis, 2008. See also World Bank, Transforming the Charcoal Sector in Tanzania, 2009.

[17] Statistics for fuel wood production and consumption in general are very poor and must be treated with caution because fuel wood is collected primarily for subsistence use and the charcoal trade is informal and in many countries illegal.

[18] See for example Minoya, J.R et al: "the distribution and socio-economic aspects of mangrove forests in Tanzania" and Pendo Hyera, "Environmental Flow Assessment study – Wami River Sub-Basin, Tanzania", 2007.

125,000 hectares of forests are destroyed annually for charcoal production in Tanzania[19]. However wood fuels efficiency (for cooking) remains lagging, with an average rate of 10%, using traditional three-stone stoves.

Infrastructure: Studies undertaken prior to the National Communication and NAPA processes analysed vulnerability to a 50cm and 1m sea level rise, whereas IPCC estimates place global sea level rise predictions at between 9 and 88 cm by 2100. Estimates show that in Dar es Salaam and Coast region a total of 14,757 ha and 29,485 ha could be inundated for a sea level rise of 0.5m and 1.0m respectively; in Tanga the areas could cover 2,022 ha and 4,045 ha and in Mtwara and Lindi the inundated areas could reach 7,922 ha and 15,855 ha for a sea level rise of 0.5m and 1.0m respectively. Total potential land loss is estimated to be 247 square km and 494 square km for a sea level rise of 0.5 m and 1.0m, respectively. In addition, stronger storm surges, stronger winds and cyclones may also have impacts on coastal infrastructure, and increase coastal erosion. Along the Dar es Salaam coastline (approximately 100Km), the estimated loss of important structures is estimated to cost Tshs.49,83 billion and Tshs.85.97[20] billion for a sea level rise of 0.5 m and 1.0 m respectively.

1.5 Key aspects of vulnerability – the coastal zone as priority area

Tanzania will be impacted by climate change mainly through its effects on rainfall patterns, temperature extremes and sea level rise. The direct impacts of these changes are likely to result in more frequent and intense droughts, the destruction of infrastructures in the coast and inland through flooding, inundation, erosion and storms; if no action is taken, the socio-economic impacts will include agricultural yield decreases, decreased water availability and quality, and losses of lives and livelihoods, as well as the accelerated degradation of ecosystems that form the basis of the Tanzanian economy.

The coastal zone of Tanzania was selected as a priority area for adaptation investment in the NAPA and National Communications because it is home to the 75% country‘s industries and at least 32% of its national income, because at least 25% of the country‘s population depend on its resources, and because it represents an area where all aspects of vulnerability can be found – and addressed - simultaneously. The coastal zone is also home to some of the most ecologically fragile areas, such as mangroves, wetlands and reefs, which are vulnerable to climate change and human pressures but also represent opportunities for adaptation.

The coastal zone can be divided into North and South, with the north experiencing (under normal conditions) bimodal rains, and the south under unimodal rains. The mainland coastline extends about 800 km excluding near shore islands, bays, lagoons and estuaries. Ten major rivers drain into the Indian Ocean, of which Pangani in the north, Rufiji in the middle and Ruvuma in the south are the main ones, and smaller rivers such as Zigi, Wami, Ruvu, Matandu, Mavuji, Mbwemkuru and Lukuledi. These rivers influence the coastal environment through the creation of productive brackish water environments in estuaries, maintenance of deltas, tidal flats and

[19] Lyimo, B.M., Energy and Sustainable Development in Tanzania, 2006. See also –Protecting and restoring forest carbon in tropical Africa", World Bank, and –Towards a Sustainable Biomass Energy Supply for rural households in Semi-Arid Tanzania – a cost-benefit analysis", Willem Wiskerke, 2008.

[20] Tanzania‘s First National Communication, 2003

shorelines, and nourishment of mangroves and seagrass beds. This in turn has a positive influence on fisheries.

The coastal and marine environments include major estuaries, mangrove forests, coral reefs, sandy beaches, cliffs, seagrass beds and muddy tidal flats that provide key livelihoods and environmental services. Sandy-muddy flats or rocky reef platforms are found in the intertidal zone, while the sublittoral zone consists of extensive seagrass beds and coral reefs. These coastal ecosystems interact with each other and together sustain a tremendous diversity of marine life, which is an important source of sustenance for coastal communities. For instance, a wide range of important and valued species are found, including an estimated 150 species of coral in 13 families, 8,000 species of invertebrates, 1,000 species of fish, 5 species of marine turtles, and many seabirds.[21] The map in Figure 3 below illustrates the key ecological features of the Tanzanian Coastline. In the coastal regions overall, agriculture is the most important sector in terms of employment and income. Most men and women are farmers but the agricultural potential remains to be harnessed as productivity is low, mostly due to lack of appropriate technology, extension service support, and supply of inputs.

All Tanzanian land is a public owned property but it is given to people for occupation. There are diversified land tenure systems in the coastal regions. As an example, in one survey undertaken in rural coastal settings, 54.5% households surveyed bought the lands from previous occupiers 22.2% obtained land through government allocation, 21.7% inherited the portions of land from their ancestors and an insignificant part of population (1.6%) are renting premises where they live.

Fishing is the second most important livelihood activity and source of income for inhabitants of coastal villages. Artisanal fisheries contribute more than 96 percent of total marine fish landings and 60% of protein intake for coastal populations. Fish and mollusks are the main source of protein for coastal people. An estimated 30% of coastal households also engage in seaweed farming. The number of artisanal fishermen in the coastal regions is estimated to have grown by an average 40% over the past 2 decades in all coastal regions. The number of people employed in fish processing and marketing it estimated to be five times the number of fishers, which would be about 96,465 people or 2.17 % of the population in the coastal districts[22].

Demand for forestry products in coastal regions is growing rapidly, especially due to population increases and to increasing costs of other fuels. Because it is largely unlicensed and traded informally charcoal remains considerably less expensive than other sources of energy since its price does not reflect the full cost of production. Timber cutting, and sale of wood or charcoal is an important economic activity for villagers, one that allows for generation of income without any capital investment (since wood is harvested for free). Forests in coastal regions are cut for household cooking; for fuelwood in the production of lime, salt, and charcoal; construction; boat building; crafts; and to clear land for low input, extensive agriculture. Wood and charcoal are the source of energy for most residents of coastal regions including Dar Es Salaam city, in Tanzania.

[21] Tanzanian Coastal and Marine Resources: Some Examples Illustrating Questions of Sustainable Use, *Julius Francis and Ian Bryceson, in Lessons Learned in Sustainable Development.*

[22] Shao, F. et al.. Understanding Fisheries Associated Livelihoods and the Constraints to their Development in Kenya and Tanzania – Fisheries profile for Tanzania.

It is estimated that per capita use of wood fuels in coastal areas is 1 to 1.5 ton per year (1998, Ministry of Natural Resources and Tourism) [23].

The tourism industry, which depends on coastal resources and ecosystems, is already a major source of foreign exchange, accounting for about 16% of national GDP. A large proportion of total tourism infrastructures are located along the coast in areas close to major urban development and are vulnerable to coastal erosion.

Other economic occupations in the coastal regions include salt-making (in and around mangroves), lime-making, and stone-quarrying. Tourism, an increasingly important industry in Tanzania, is based on the preservation of natural resource and biodiversity assets. Tourism operations in Tanzania coastal zones consist mostly in diving and snorkeling. Tanzania receives more than 600,000 visitors annually, mostly due to its natural resources and wildlife. Most tourism (more than 80%) in mainland Tanzania is concentrated inland, whereas coastal tourism infrastructure is less developed as compared to Zanzibar. In 2000, tourism employed 28,000 people, with most of the posts created in wildlife reserves[24]. Coastal tourism remains relatively under-developed, other than in Zanzibar, where it is the chief touristic product.

[23] See also World Bank (2009), Environmental Crisis or Sustainable Development Opportunity? Transforming the Charcoal Sector in Tanzania.

[24] Ministry of Tourism, Tourism Master Plan, 2002.

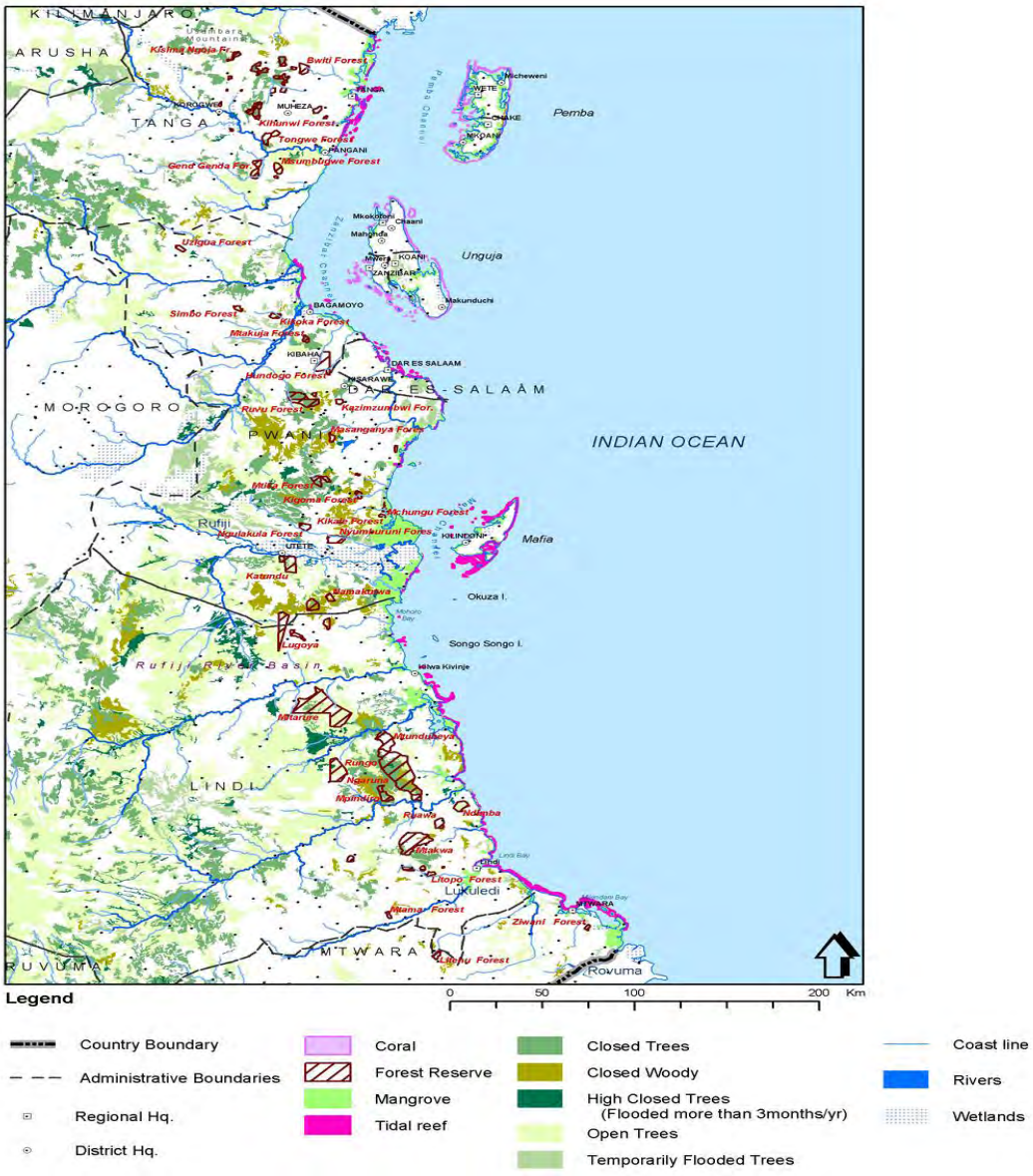


Figure 5: The coast of Tanzania

The key expected impacts of climate change in the coastal zone are likely to be as follows:

- **Increased winds and storms**, which are expected to accelerate coastal erosion and the degradation of key infrastructures, as well as to increase sediment transport and shoreline erosion.

- **Sea level rise**, which combined with increased winds and wave action, is also likely to cause significant damage to the coastal infrastructures and investments including roads, ports, buildings, hospitals and tourism facilities. Sea level rise is also expected to cause saltwater intrusion in coastal aquifers.

- **Disturbances in rainfall regimes and increased climate extremes** such as droughts and floods, which will have significant impacts on agriculture and livelihoods, and on overall water availability. Infrastructure damage has already been witnessed due to more frequent flooding events. Under the combined action of storms, sea level rise and river flooding, large urban settlements can find themselves inundated.

- **Increased temperatures**, which will have an impact on coastal forests, agriculture yields and can cause coral bleaching, leading to a sharp decline in fisheries and aggravating the food insecurity in the region. The climate induced destruction of coastal buffer systems such as mangroves, reefs and other wetlands will also contribute to the destruction of coastal fisheries.

In addition to these anticipated impacts of climate change, vulnerability in Tanzania's coastal zone is also a result of non-climate factors, which are acting as barriers to adaptation and resilience, such as:

- **Poverty**: Within the coastal zone, there are limited livelihood sources. As a result, the majority of the coastal population relies on rain-fed agriculture and fisheries, and on the exploitation of natural resources to generate income streams and maintain livelihoods. Access to water and sanitation is low in rural areas, and water demand in many coastal settlements is not fully satisfied. Agricultural productivity is low due to low access to technologies and inputs, and subject to climate variability. Fisheries are also decreasing due to the degradation of fish spawning grounds and overfishing. Drought impacts on agriculture will place communities in an even more vulnerable state, given their dependence on rainfed crops for basic subsistence.

- **Unsustainable uses of natural resources**: poverty has led many communities to resort to unsustainable uses of natural resources, such as forests, mangroves, fisheries, and reefs, that also act as buffers against the main impacts of climate change. These ecological buffers, that provide key services such as fisheries, flood control, erosion prevention as well as livelihoods, shelter and tourism services, are therefore under dual pressures. Pollution of waterways and to the degradation of ecosystems that previously provided sanitation services (wetlands, marshes). Deforestation, along with sand and coral mining are among the unsustainable practices that are increasing the vulnerability of ecosystems and as a result, the vulnerability of communities that depend on them.

- **Low or inefficient implementation of existing plans and policies and low enforcement of laws**: As recognized in Tanzania's Coastal Management Strategy, there is a need for coordination and feedback mechanisms are needed among agencies, decision-makers and implementing authorities at all levels[25]. Although plans and policies governing the use of natural resources in vulnerable areas are in force, there is limited capacity at district level for their enforcement.

[25] Government of Tanzania, National Integrated Coastal Environmental Management Strategy, 2003.

These three non-climate factors combine to create overall low adaptive capacity in local coastal communities as well as in the district and national administrations. In order to reduce coastal vulnerability in Tanzania, additional adaptation investment is required that will help address the direct and indirect impacts on coastal communities, infrastructures and ecological buffers.

2. PROJECT / PROGRAMME OBJECTIVES:

2.1 Project objective and outcomes

This project responds to the impacts of sea level rise and changes in precipitation patterns caused by climate change and their direct and indirect effects, such as droughts, floods, infrastructure degradation and environmental degradation. **The objective of the project is to reduce vulnerability of ecosystems, infrastructure and economy in Tanzania** through implementation of concrete and urgent adaptation measures.

In order to achieve this objective, the project will be delineated into three specific outcomes, grouped into three components:

Component 1: Addressing climate change impacts on key infrastructure and settlements.

1. Adverse impacts of sea level rise and floods on coastal infrastructures and settlements reduced.

Component 2: Ecosystem-Based Integrated Coastal Area Management

2. Coastal ecosystems are rehabilitated and ICAM is implemented

Component 3: Knowledge, coastal monitoring and policy linkages

3. Knowledge of climate impacts and adaptation measures is increased

2.2 Project Approach

The project focuses on the implementation of priority concrete on the ground, practical solutions to climate impacts (current and anticipated), but some foundational activities have been included where necessary in order to facilitate project output and objective achievement, replication and sustainability. It addresses climate stressors to coastal resources (sea level rise, modifications in the precipitation regime).

The project proposes an integrated blend of ~~"h~~ard" and ~~"s~~oft" coastal protection measures, in line with best international practices on coastal zone management, as well as measures designed to provide local communities with incentives to maintain the rehabilitated ecosystems.

The project has been designed around three components, and activities in each of the components are designed to be mutually reinforcing.

Components 1 and 2 together seek to provide a comprehensive and cost effective set of protective measures and are designed to be implemented jointly. Component 1 contains "hard" protective measures. Component 2 contains "soft" measures designed to increase the resilience of ecosystems that provide a protective or buffering service against climate change impacts on the coast. These ecosystem rehabilitation works also serve to maximize the efficiency of harder infrastructure works and to achieve maximal coastal protection. Activities in Component 3 ensure that appropriate learning is taking place and that policy linkages are in place for upscaling, mainstreaming and replicating of lessons into national development processes as well as for ensuring the sustainability of project achievements.

The benefits of the proposed approach will be felt at different levels. At the *local* level, communities living in areas that are most severely impacted or threatened by impacts associated with climate change, such as in areas that are susceptible to flooding will see their immediate physical vulnerability decreased. At the *ecosystem* level, degraded systems will be restored in order to continue to provide protection and livelihoods services to the communities living in coastal areas. At the *national* level, the project will provide efficient, concrete adaptation solutions that can be replicated to other areas that are determined as affected by present and future climate change scenarios. This will enable national policy makers and planners to review and revise existing policies and practices that may exacerbate vulnerability to climate change ("maladaptation"), such as inappropriate or inefficient coastal defense schemes, sand mining and coastal habitat conversions, which are commonly caused by lack of information on the potential effects of proposed developments on other sectors, or a lack of consideration of these factors.

2.3 Geographic focus

Because available resources do not permit addressing all the adaptation needs in Tanzania's coastal zone, the project will implement concrete adaptation actions in Ilala and Temeke Districts (Dar Es Salaam region). These sites were selected according to key criteria such as: (i) presence of key infrastructure and economic assets; (ii) presence of fragile and/or degraded buffer ecosystems; (iii) complementarity to other ongoing interventions; and (iv) presence of multiple factors of vulnerability.

Dar es Salaam is the major commercial, administrative and industrial centre of Tanzania. The total surface area of Dar es Salaam City is 1,800 square kilometers, comprising of 1,393 square kilometers of land mass with eight offshore islands, which is about 0.19% of the entire Tanzania Mainland's area. The total estimate coastline of Dar es Salaam is 100 Km. Based on the 2002 Population and Housing Census, Dar es Salaam houses 2,487,288 inhabitants. The City is divided into three ecological zones, namely the upland zone comprising the hilly areas to the west and north of the City, the middle plateau, and the low lands including Msimbazi valley, Jangwani, Mtoni, Kigamboni, Africana and Ununio areas. The main natural vegetation includes coastal shrubs, Miombo woodland, coastal swamps and mangrove trees.[26] Mangrove forests cover an area of 2,000 ha which shows signs of severe degradation in some strands.

[26] Government of Tanzania, Dar es Salaam City Council, Tanzania City Profile, 2004.

The city and its surrounding areas benefits from a varied economy in which urban agriculture, fisheries, industry, and tourism blend, together with commerce and services. Dar es Salaam city is prone to floods and shortage of water, pollution due to urbanization influx, increasing squatter settlements and lack of resources to facilitate functioning (Kazinja.V, 2001). The Ruvu river which is the main source of Dar es Salaam water supply, is not well managed and lands which could have been left unused are now misused due to overpopulation. Mangrove degradation, upland droughts and pollution lead to environmental impacts in the coastal area, making the area even more vulnerable to the impacts of climate change, including sea level rise and flooding, and coastal erosion[27]. Major impacts of climate change are expected to occur on key infrastructures, water infrastructure as well as on human habitations. A sea wall exists to protect the city from the sea, covering a total of 2.6 km. The wall is showing signs of severe degradation, including seepage in some locations, and complete destruction in others. During the rainy season, the city is subject to increasingly frequent flooding, due to inadequate drainage systems, which has the effect of halting traffic and creating pollution and congestion in the city center.

[27] Government of Tanzania, Dar Es Salaan Vulnerabiltiy to Climate Change, 2008.

3. PROJECT / PROGRAMME COMPONENTS AND FINANCING:

PROJECT COMPONENTS	EXPECTED CONCRETE OUTPUTS AND TARGETS	EXPECTED OUTCOMES	AMOUNT (US$)
Project objective: To reduce vulnerability of livelihoods, ecosystems, infrastructure and economy in Tanzania.			
Component 1 - Addressing climate change impacts on key infrastructure and settlements	Sea wall raised, rehabilitated and constructed along 1.335 km in areas showing particular damage in Dar es Salaam city center and in Kingamboni area	*Outcome 1 - Adverse impacts of SLR and floods on coastal infrastructures and settlements are reduced*	3,337,500
	A 50% reduction in the number of urban flooding events in Dar es Salaam city center during severe rainfall and storms through the rehabilitation of drainage systems		200,000
			3,537,500
Component 2 - Ecosystem-Based Integrated Coastal Area Management (EBICAM)	40 ha of mangroves rehabilitated through planting of resilient seedlings, dredging and the creation of no-take buffer zones. Appropriate alternative energy (efficient cookstoves, small solar) technology transferred to 3,000 households in support of sustainable mangrove regeneration including through training 2000 m^2 of coral reef rehabilitation and protection in coastal sites, leading to a 75% annual growth rate in coverage and health Shoreline stabilized and reforested along the shore (1500m in 20m wide bands) using indigenous resilient trees and grasses	*Outcome 2 - Coastal and shoreline ecosystems are rehabilitated and ICAM is implemented*	35,000 76,500 110,000 67,500 **289,000**
Component 3 - Knowledge, coastal monitoring and policy linkages	Available knowledge, science and data on coastal vulnerability gathered One operational Climate Change Observatory for Tanzania for ongoing monitoring of CZM and Coastal environmental status and scientific research Economically viable, cost effective and technically feasible adaptation measures identified for replication and upscaling (i.e. through undertaking cost-benefit analyses) Policy briefing, awareness raising and technical capacity building for policymakers and district-level planners based on project outputs, lessons and challenges, including increased capacity to manage and maintain resilient infrastructure One Ecosystem Based Integrated Area Management (EBICAM) plan for the coastal region approved	Outcome 3 - knowledge of climate impacts and adaptation measures is increased	30,000 90,000 15,000 90,000 190,000 **415,000**
5a. Monitoring and evaluation (see the M&E table under part III.C)			104,688
5b. Project/Programme Execution cost (See Execution Cost under Part III.A)			**270,000**
6. Total Project/Programme Cost (Total of 1 to 6)			**4,616,188**

7. Project Cycle Management Fee charged by the Implementing Entity 8.5% of total project cost. See Annex 5)	392,376
Amount of Financing Requested	**5,008,564**

4. PROJECTED CALENDAR:

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	Mrch 2012
Mid-term Review (if planned)	March 2015
Project/Programme Closing	March 2017
Terminal Evaluation	March 2017

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

The project seeks to respond to direct effects of climate change such as sea level rise and the predicted changes in precipitation regime on coastal infrastructure, assets and communities. In order to respond to these threats and impacts the activities proposed are designed to address the direct climate drivers of vulnerability as well as the key non-climate drivers that are acting as barriers to adaptive capacity in the target sectors (infrastructure, settlements and key investments) and locations.

Component 1 – Addressing climate change impacts on key infrastructure and settlements.

Outcome 1: The Adverse impacts of Seal Level Rise (SLR) and floods on coastal infrastructure and settlements are reduced.

This outcome is focused on climate change threats and combined local impacts of increased flooding due to increased precipitation, and coastal and infrastructure erosion due to increased tidal activity and storm surges. Activities in Component 1 are grouped together due to their common focus on physical ("hard") coastal protection and infrastructure, and because the impact of activities is expected to be felt immediately, and in the immediate vicinity of actions. They are however to be undertaken and understood in conjunction with –softer" coastal protection and ecosystem rehabilitation works contained in Component 2.

Activities in Component 1 are presented in Table format below, along with projected targets and indicators.

Special attention will be paid to the rehabilitation, construction and maintenance of coastal protection infrastructure around key economic assets (e.g., roads, buildings, ports, markets) and cultural or historical sites in Dar es Salaam, where the existing protective systems are showing signs of severe degradation and where there is threat to existing assets. For example, the staff quarters for the Mwalimu Nyerere Institute in Kigamboni area are almost being submerged due to sea level rise and coastal erosion. The costs of inaction in Dar es Salaam are potentially high: as an illustration, in Kunduchi area of Dar es Salaam, headwater waves are reported to have advanced for about 200m in the last 50 years; as a result, five residential houses were washed away as well as a historic fish market and hotel infrastructures[28].

In order to protect economic and social assets, this project will support the rehabilitation, construction and upgrade of sea wall in two areas representing the two most vulnerable parts of Dar es Salaam city (see Annex 10 for a visual illustration):

- In Kinondoni, 1.15 km along the front of Ocean Road, from the start of Garden Avenue in front of the hospital to Magogoni Road before the fish market.
- In Kingamboni, 185 m, located in front of the Mwalimu Nyerere Institute.

Rehabilitation and upgrade works will be combined so that the infrastructure can withstand higher sea levels (up to 1 meter), increased tidal action and stronger storm surges. Typical design and specifications for the rehabilitated portion of the seawall are shown in Annex 4.

The project will also address the adverse impacts of floods on the city center, which has been subject to monthly flooding during rainy season, due to blocked or inadequate storm drain systems. This has significant impacts on economic activities and the movements of local populations, as well as creating untenable public health situations. The project will support clearing and maintenance works on drainage channels and the rehabilitation of storm drains in one location of Dar es Salaam city center (Kivukoni-Gerezani), where needs have been expressed as most pressing. Since regular maintenance works on the drainage systems form part of the responsibility of municipal administrations, capacity building and technical assistance will be provided under Component 3 in order to support Dar es Salaam municipal council in ensuring adequate budgetary allocations are made to support these works. (See specifications in Annex 4; areas where works will be performed are indicated in Annex 10).

[28] Makota V., Sallema, R. and Mahika, C. 2004. Monitoring shoreline change using remote sensing and GIS: a case study of Kunduchi Area, Tanzania. Western Indian Ocean Journal of Marine Science, Vol.3, No.1.

Component 1 - Activities, Targets, Indicators

Component 1 - Addressing climate change impacts on key infrastructure and settlements					
Activity	**Output**	**Indicator**	**Target**	**Baseline**	**Means of Verification**
Outcome 1 - Adverse impacts of SLR and floods on coastal infrastructures and settlements are reduced					
Rehabilitate coastal protection facilities to protect settlements economic and cultural infrastructure	Sea wall raised, rehabilitated, constructed in areas showing particular damage	Length of sea walls raised, rehabilitated, constructed (m)	1335 linear meters of seawall rehabilitated along the Ocean Road (Kivukoni-Upanga East) and Kigamboni	Dar es salaam seawall (2.6km) showing signs of severe degradation along Ocean road and Kingamboni	visual observation, engineering reports
Cleaning up of the drainage channels, rehabilitation of storm drains	Effective storm and flood drainage systems in urban areas and near coastal communities	change in number of urban flooding events related to storm and severe rainfall	a 50% reduction in the number of flooding events during rainy season in targeted sites	According to recent data there have been on average 5 flooding events in Dar es Salaam city center during rainy seasons over the past 5 years	visual observation, engineering reports

Component 2 – Ecosystem-based Integrated Coastal Area Management

Outcome 2: Coastal ecosystems are rehabilitated and ICAM is implemented.

This component comprises a set of concrete environmental rehabilitation measures designed to enhance ecological resilience and the efficiency of infrastructure rehabilitation works. It is to be implemented as a complement to activities in Component 1, in order to form a comprehensive package of protection from climate change impacts in coastal regions.

Environmental rehabilitation activities will focus on fragile buffer ecosystems that provide protective as well as productive functions in the coastal zone: reefs, mangroves, and shorelines. Rehabilitation measures will be implemented with the direct support of district authorities, local authorities as well as local populations, through the implementation of a proposed GreenJobs[29] program targeted towards unemployed youth (that will include vocational training). Measures will include:

Mangrove rehabilitation through planting of resilient seedlings, dredging and the creation of no-take buffer zones: Mangroves act as natural buffers against tidal pressure, storm surges and coastal erosion and as such are key assets in a coastal adaptation strategy. Because they are populated with salt tolerant tree species, they also prevent saltwater intrusion into upshore ecosystems, such as wetlands, or aquifers. Mangroves provide breeding grounds for various species of fish, crustaceans and birds that provide a livelihoods when climate shocks cause crop losses (an estimated 80% of global fisheries are reliant directly or indirectly on mangroves). Promoting mangrove growth inland in response to sea level rise and related inundation provides a cost effective way of protecting coastlines. Other, non climate change related benefits of mangroves include: nutrient uptake, fixation, trapping and turnover; carbon sink and

[29] Interim modalities for the GreenJobs program are indicated in Annex 11.

sequestration; secondary production via grazing and decomposition of mangrove plants; sediment trapping that helps reduce turbidity of coastal waters; food resources for animals; occasional forest products like timber and firewood. In addition to the above, this measure is likely to add extra value by averting losses from natural hazards not directly related to climate change such as reducing tsunami damage risk. This blend of ecosystem services makes mangrove rehabilitation and conservation a cost effective no-regrets adaptation measure.

Currently, mangroves strands are considered protected areas, and subject to use restrictions by Tanzanian authorities. Despite these restrictions, all mangrove areas are subject to some harvesting by surrounding communities. Observed illegal uses in project sites include harvesting for woodfuel and polemaking. In other areas, mangroves are also subject to clearing for agricultural expansion (rice cultivation) or shrimp farming. Mangroves are also vulnerable to the impacts of climate change: changes in precipitation patters accelerate sedimentation transport, leading to potential siltation and changes in hydrological flows; temperature increases impact tree growth and development, and sea surface temperatures also modify tree growth and salinity; and stronger storm surges lead to seaward destruction of mangrove strands.

The project will support mangrove rehabilitation (see Annex 10 for location) with a view of expanding the mangrove cover and rehabilitating degraded strands. This will be undertaken using replanting methods, as well as dredging and clean-up operations where necessary to restore hydrological flows. The project will rehabilitate mangroves in a total of 40 hectares in Dar es Salaam area.

Because mangrove trees in targeted areas are primarily exploited for woodfuel (charcoal or fuel wood), the project will adopt a multi-pronged strategy for reducing deforestation: 1) assuming woodfuels and charcoal will continue to be procured, the project will make their use more efficient; 2) promoting the conservation of rehabilitated areas within mangroves, while other woody resources under license and other authorized uses will continue to be exploited; 3) introducing accessible alternative energies for the demonstration of gradual fuel shifting (small solar equipment); 4) working with local organizations, district administrations and government to gather lessons learned that will inform future energy and forestry policies (under component 3). Scaling up of successful strategies would then be supported through the recently developed Norway-supported REDD strategy for Tanzania.

The project will distribute fuel efficient cookstoves designed to reduce woodfuel demand to 1,500 households, along with a limited number of solar based charging stations (SBCS) and small solar panels for use in institutional contexts. This will be achieved by working with existing NGOs active in the development of alternative energies, and with the support of district councils. Training will be provided in order to support uptake of the new technologies and equipment, as well as to create a cadre of small enterprises suitable for home-grown production and maintenance of the fuel efficient cookstoves. The immediate benefits of energy provision will be felt among the recipient communities, in particular women since they are the primary gatherers and users of woodfuels; a second range of benefits will be felt through the existence of healthier ecosystems, which will provide enhanced productive services. Reduced health impacts (incidences of respiratory diseases) to the population due to the reduction of the smoke from the fuel efficient stoves are expected too. Training will also consider the development and management of local management and enforcement systems for mangrove management and for

the rapid uptake and dissemination of alternative energy equipment. In this context, communities have agreed to enforce no-take zones within the restored mangroves, and to participate in their restoration, provided their immediate energy needs can be met through other means. This strategy has been demonstrated as effective in many other cases in the region and in Tanzania, considering the long-term benefits to be gained from increased fuel efficiency and increased energy availability for local communities.

Coral reef rehabilitation and protection: Coral reefs provide similar adaptation services to coastal ecosystems as mangroves above. By acting as a natural barrier against wave and tidal action, reefs provide protection against erosion and storm surges and can also help protect mangroves. Reefs also constitute habitats for fish and marine life, and are the basis of tourism in many countries, including Tanzania. Both reefs and mangroves also play a role in the accretion of coastlines. Reefs produce sand that forms and replenishes sandy beaches and islands, the sediment accumulating when corals and other calcified organisms break down after their death.

In the Dar es Salaam area, coral reefs are mostly used for fishing and relatively limited touristic purposes (diving), although the degradation of some sites has meant declined attendance by operators. Unauthorized and unsustainable uses include dynamite fishing, but this occurs only in isolated instances; there are instances of overfishing and anchoring. A 1995 survey of reefs in Tanzania showed that 12% had been completely destroyed, 12% were in poor condition, 52% in moderate condition and only 24% were in good condition (measured as percentage of live coral cover). This does not account for the impacts of the 1998 coral bleaching event[30].

The project will support reef rehabilitation with a view of restoring live coverage, using in situ techniques for coral breeding and transplantation, and instituting, with the support of local NGOs and communities, better management and enforcement systems. The estimated costs of rehabilitating reefs, using in situ techniques, is based on the framework outlined in the World Bank Reef Rehabilitation Manual as well as on experiences conducted in other countries and similar sites[31]. The estimated cost of rehabilitation, including equipment and labor, training, and breeding, is 110,000US$, with which the project will undertake seeding and transplantation in a total area of 2000m^2 (0.2 ha) of degraded reef, with each plot expected to increase at a 75% annual rate[32].

The rehabilitation of coral reefs will be undertaken with the participation of local NGOs and communities, and will not imply any interruption in authorized uses of the reefs, although continued awareness raising efforts will be maintained in order to further reduce unsustainable fishing methods and reef uses. There are not expected to be any costs to the fishing communities during reef rehabilitation. (see Annex 8 for the Environmental and Social Impact Assessment, Annex 10 for approximate location of reef rehabilitation projected areas).

[30] GM Wagner, Coral reefs and their management in Tanzania, Western Indian Ocean Journal of Marine Science, Vol 3, No.2, pp.227-243, 2004.
[31] See Sprugeon, J.P.G. (2001) Improving the economic effectiveness of coral reef restoration. Bulletin of Marine Science, 69, 1031-1045 and
[32] Reef rehabilitation using in situ techniques can be undertaken in relatively small, dispersed areas. The average size of a rehabilitation ~~–p~~lot" might be 10 to 20 m^2.

Shoreline stabilization through reforestation will also be undertaken in all three areas, creating a revegetated band of 1500m long by 20m wide[33], located directly behind the rehabilitated sea wall along Ocean road in Dar es Salaam. Although some vegetation is present in some parts of the targeted area, visual observation reveals that it is sparse, comprised mostly of grasses and a few large Ficus trees, with interspersed patches of sand. In some areas the existing vegetation has sunk due to the disappearance of the sea wall or seepage. In other areas, tree roots have had an impact on the sea wall or road itself.

This is intended as a supportive measure to create a third line of projection, as well as to create an additional recreational ecosystem service. Stabilization works will consist in replanting of native and resilient trees whose impact on the sea wall are minimized but that provide additional soil stabilization functions, including bushes and grasses in sufficient density, along the shore with a particular focus on the rehabilitated infrastructures. Works will be conducted under the supervision of district-level forestry and public works services. A long list of 25 potentially usable species has been identified (see Annex 4), from which locally acceptable, climate resilient and available specimens will be further selected based on a technical and landscape design. Species could include Vetiver, Palm, Ficus or Agave.

Component 2 – Activities, targets and indicators

Component 2 - Ecosystem-Based Integrated Coastal Area Management (EBICAM)						
Outcome 2 - Coastal ecosystems are rehabilitated and ICAM is implemented						
	Activity	**Output**	**Indicator**	**Target**	**Baseline**	**Means of Verification**
	Coastal ecosystem rehabilitation for climate resilience through the implementation of a GreenJobs program	Mangrove rehabilitation through planting of resilient seedlings, dredging and the creation of no-take buffer zones; Appropriate alternative energy (efficient cook stoves, small solar) technology transferred for avoided deforestation including through training	Area of mangrove under rehabilitation % change in woodfuel use Number of people in project sites with access to alternative or efficient energy sources (disaggregated by gender)	Mangrove rehabilitation underway in a total area of 40 ha At least 30% decrease in use of woodfuels among participating communities. 1500 households with access to alternative and or efficient energy sources (disaggregated by gender)	There are approximately 2,000 ha of mangroves in Dar es Salaam surroundings. Average wood fuel consumption per capita in Tanzania is 1 to 1.3 ton m3; fuelwood efficiency is estimated at less than 10% on average in all sites; estimated mangrove deforestation rate is 2% per year	Reports, visual observation, mangrove and forest studies, surveys

33 See for example Kebede, Brown, and Nicholls (2010) - Synthesis Report: The Implications of Climate Change and Sea-Level Rise in Tanzania – The Coastal Zones for a cost-benefit analysis of various adaptation measures in coastal areas.

		Coral reef rehabilitation and protection in coastal sites	Area of reef under rehabilitation	2000m^2 (0.2 ha)	Latest data sets show a low rate of biocover in reefs (20-45%) Fringe and tidal reefs line the entire cost of Tanzania, at a short distance from the shore; patch reefs and inlets are also located a few hundred meters off.	visual observation , project reports
		Shoreline stabilization and rehabilitation using trees and grasses	Extent of shoreline revegetated	1500m (20m wide)	There is scarce vegetation along the shores in Dar es Salaam. Shorelines are often left open and unprotected with no buffer zone between the sea wall and roads, or buildings. In some instances, at high tide the waves come up to the road.	Visual observation

Component 3 – Knowledge, coastal monitoring and policy linkages

Outcome 3: Knowledge of climate impacts and adaptation is increased

This project is intended to serve as a strong example of „stage 2" adaptation implementation in the country and in the region. In this regard, the project will first build on existing and available knowledge, scientific evidence and technical studies in order to ensure the implementation of state-of-the-art technologies and approaches to adaptation. This component builds on what currently exists in the country, as well as on approaches and methods that will be implemented through this project, so as to generate policy-relevant knowledge.

Knowledge generation, dissemination and management will include the following functions:

- *Stocktaking*: at all stages of implementation, stakeholders will be called upon to perform a series of data gathering functions, baseline assessments, state-of-the art studies and feasibility studies. These will be undertaken as a means of providing best quality advice before activity implementation, particularly in the case of infrastructure and technology transfer. This function will also allow for the development of a database of information relevant to adaptation in Tanzania, that will be put together under the auspices of a coordinating entity (see below).

- *Coastal monitoring and assessment*: scientific and technical monitoring of the key indicators of vulnerability to climate change in the targeted areas will be performed under this project. This will include a technical assessment of the viability and resilience of proposed actions under the project, as well as monitoring of the key determinants of vulnerability: water availability, precipitation patterns, sea level rise, etc… These functions are currently being undertaken in Tanzania, and the information gathered by the various participating stakeholders will be brought together under the aegis of a coordinating entity (the Climate Change Observatory). Assessment of the economic viability and practical feasibility of adaptation measures (i.e. through

undertaking cost-benefit analyses) to identify successful adaptation measures and using this information to revise policy will be made under this component.

The key coordinating mechanism for the creation of policy linkages in this project will be the creation of a Climate Change Observatory for Tanzania (CCOT)[34], which will be a network institution that will bring together all relevant stakeholders and information through a clearing house function. The CCOT will be housed within the Vice President's Office, which will serve as coordinating focal point and data share-point for a network of national and international partners. Its broad mandate will be to centralize and distribute scientific and technical information related to climate change impacts. Project financing will be used to set up the institution, gather data and create databases, and initiate information sharing protocols among the various partners. The initial focus, as supported by this project, will be on gathering information relevant to coastal areas.

The project will support the creation of policy linkages, allowing lessons from on-the-ground activities to be elevated to the attention of policy makers and planners in various ministries, including for the reconstituted National Climate Change Steering Committee (NCCSC)[35]. This will entail a regular gathering of project successes and challenges and their translation into policy briefing materials for policy makers in order to facilitate mainstreaming, as well as the organization of periodical awareness seminars for sectoral partners and government representatives. In addition, as part of this activity, and in direct support of activities under Outcome 3, district-level infrastructure maintenance programs will be reviewed or renewed and district level administrations will be assisted in setting aside budgetary allocations so that rehabilitated infrastructures are appropriately maintained in the long term.

Finally, this component will include the development of an Ecosystem-Based Integrated Coastal Area Management Action Plan (EBICAM), which will become a supporting supplementary tool for the existing Tanzania Coastal Zone Management Policy. It will include the following elements:

- Revised regulations on no-take and no-build zones, protected areas, fishing management and building codes that take climate change and SLR into consideration;
- A coastal land use plan based on the principles of marine spatial planning and using the key planning tools and technologies for coastal zones.

Component 3 – Activities, indicators and targets

Component 3 - Knowledge, monitoring and policy linkages
Outcome 5 - Knowledge of climate impacts and adaptation measures is increased

[34] Although its name indicates a broad focus on all climate change issues, the project will support the initial set up of the institution focused on coastal and lakeshore regions. Future expansions of the CCOT mandate can be undertaken as part of a broader upscaling strategy for the project.
[35] NCCSC is a high-level officials body to coordinate climate change issues in Tanzania

	Activity	Output	Indicator	Target	Baseline	Means of Verification
	Stocktaking	Performance of a baseline study based on coastal vulnerability	Availability of a comprehensive baseline study; available knowledge gathered	1 baseline study in year 1	no such study; there is no recent comprehensive desk review of available knowledge	project reports
	Coastal monitoring and assessment	Create and operate a Climate change observatory for Tanzania for ongoing monitoring of CZM and Coastal environmental status and scientific research	effective implementation of clearing house function	Clearing house function is operational by mid-term	There is no climate change clearing house mechanism	project reports, institution reports
		Assessment of the economic viability and practical feasibility of adaptation measures (i.e. through undertaking cost-benefit analyses)	cost-effective measures are identified for upscaling and policy uptake	measures are identified for upscaling and policy uptake on an ongoing basis	ad hoc assessments available but none specific to this project	reports from climate observatory, project reports
	Policy linkages	lessons learned from the project outputs documented	number of policy briefs provided to key sectors and regulators; number of workshops	3 briefing notes per year; 2 workshops during the project	While there is a good degree of information on climate change, there is no systematic effort to inform policy makers based on project outcomes	project reports; briefing materials; workshop reports
		district level administration have the capacity to adequately manage rehabilitated infrastructure	Amount dedicated to infrastructure maintenance from district budgets	Dar es Salaam Municipal Councils earmarks appropriate annual allocations for infrastructure maintenance.	infrastructure budgets within district administrations are low	project reports, plans and policies, district-level budgets
		One EBICAM Action Plan for the coastal region is approved	Number of plans approved	One plan approved by end of project	No plan exists as yet but ICZM capacity exists	project reports, plans and policies

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities.

The project is expected to deliver a set of targeted and interlinked economic, social and environmental benefits, as well as serving as a model for future replication throughout the

country (see table below). The project will promote a set of innovations together with district administrations that will help create better living conditions.

Vulnerable groups benefiting from this project include:

- **Rural communities and the urban poor** whose livelihoods are highly dependent on climate or who are particularly vulnerable to extreme weather events, in particular those residing in or around mangroves in Dar es Salaam surroundings. Vulnerable groups among the rural poor include women and women-headed households, unemployed youth.

- **Fisherfolk** who, due to the degradation of fragile ecosystems such as mangroves and reefs, have seen fish stocks dwindle and have resorted to illegal fisheries to ensure food security.

- **Women** and women-headed households, who will directly benefit from the anticipated reductions in woodfuel demand, as well as from increased access to safe water, which will free time for other more productive activities.

- **Small Businesses** whose investments are at risk from sea level rise and increased variability, private sector and informal enterprises who lack adequate assets for productivity and profitability.

- **Urban dwellers** in both formal and informal settlements who are at risk of losses to life and property from sea level rise and increased flooding, lack of sanitation and decreases in access to safe water.

In addition, under component 2, a number of environmental benefits are expected to accrue from the project. The restoration of degraded mangroves can maintain water flow and storage in the face of droughts, as well as provide protection against floods or storms. Other environmental benefits to be accrued by this project include nutrient cycling and water purification, coastal protection, habitat and nurseries, and carbon sinks. Management and restoration of ecosystems offer a valuable, yet under-utilized approach for climate change adaptation, complementing other actions such as the development of infrastructure.

The table below indicates a list of quantified expected benefits from this project:

Activities and number of beneficiaries	**Expected Project Benefits**		
Component 1 - Addressing climate change impacts on key infrastructure and settlements	**Economic**	**Social**	**Environmental**
Outcome 1 - Adverse impacts of SLR and floods on coastal infrastructures and settlements are reduced			
Rehabilitate coastal protection infrastructure to protect settlements economic and	Increased lifespan of the Coastal infrastructure for sustained economic development (i.e.	Maintain the socially and culturally respected areas i.e. Mosque, Churches, Museum,	Reduction of the rate of coastal erosion, conservation of

	cultural infrastructure # of direct beneficiaries: 150,000 residents in impacted area and 200,000 daily commuters # of indirect beneficiaries: 450,000 users of protected infrastructures	buildings, hotels, hospitals, roads and private residences,) and increase the value of land along a total of 1.335 km around Ocean Road and Kigamboni in Dar es Salaam. While it is difficult to estimate the economic value of the assets to be protected, the investments located in the area can be said to be worth millions. Currently, about 8% of the land area of Dar es Salaam, 140,000 people, and economic assets worth more than $170 million, are below the 10m contour line, i.e. in potentially vulnerable areas, with 31,000 people considered at risk from sea level rise. By 2030, without adaptation, this will increase to more than 100,000 people and over $400 million assets.	and communication systems, ensure transport and circulation of goods and people, protection of property. The area is home, among others to the State House, a Hospital, a Ferry terminal, Fish Market, a Museum, Botanical Garden, Hotels, Training Institute, Embassies and Residences, Commercial buildings and assets, private sector assets.	ecosystems.
	Cleaning up of the drainage channels, dredging of estuaries, rehabilitation of storm drains in selected urban centers # of direct beneficiaries: at least 75,000 residents and daily users in the impacted area # of indirect beneficiaries: 495,000 residents of Dar es Salaam	Reduce the risk of the infrastructure damage by floods through an increase of 15% in drainage capacity in the targeted site; maintenance of property values; reductions in insurance costs and premiums; reduce losses in productivity. A recent report estimates that Individual annual climate events have economic costs in excess of 1% of GDP.	Reduce the risk of other flood related hazards such as loss of household assets, loss of life; maintain communication and circulation channels. Reduction of waterborne diseases (i.e. malaria, cholera) and water pollution. With no adaptation, the expected number of people at risk of annual flooding is estimated at 0.3 to 1.6 million people per year by 2030, rising to 1.0 to 2.1 million people per year by 2050.	Reduce damage to environment.
Component 2 - Ecosystem-Based Integrated Coastal Area Management (EBICAM)				
Outcome 2 - Coastal and shoreline ecosystems are rehabilitated and ICAM is implemented				
	Mangroves and shoreline ecosystem rehabilitation for climate resilience through the implementation of a GreenJobs program # of direct beneficiaries: 50 GreenJobs participants; 7500 residents in Dar es Salaam Indirect beneficiaries: Coastal residents and users in impacted areas - 450,000 in Dar es Salaam.	Enhance livelihood of coastal communities; job creation; increased income; reduced coastal losses. An estimated 50 jobs will be created through the GreenJobs Program. Economic assets in the coastal zone will be protected (see above).	Improved Social security and services; protection of infrastructure and property; avoided losses due to erosion. An estimated 50 young people are expected to participate in the GreenJobs program.	Protection of coastal environmental systems and increased climate change resilience; creation of buffer ecosystems; increased ecological services (water, soil, fisheries; biodiversity). The project is due to to reforest 1.5 linear km of shoreline. to rehabilitate 40ha of mangrove , as well as a 75% reef coverage growth rate by the end of the project.

	Promote alternative energy for avoided deforestation Direct beneficiaries: 1,500 households benefiting from alternative and efficient energy Indirect beneficiaries: 0	Promote low carbon growth economy through the use of renewable sources of energy; increased economic productivity and income. This is also expected to reduce the energy burden to poor rural families by promoting cheap, reliable,effective and sustainable energy sources.	Reduced smoke related health hazards due to firewood and charcoal and therefore health costs; reduced time and work burden on women and children from gathering and using inefficient wood fuels.	Reduces Greenhouse Gases emissions and decreased deforestation; maintained soil fertility; carbon sinks; maintained biodiversity. The project seeks to achieve a 30% decrease woodfuels use, translated into a deforestation rate of less than 1.7% annually

Benefits distribution: Project activities are expected to combine in order to deliver a comprehensive system of coastal protection as well as social, environmental and economic benefits to the local communities, responding to local priorities. The objective is to create, through a combination of "hard"and "soft"measures a protective system whose benefits extend beyond its immediate zone of application. Some activities are designed to have impacts and benefits both locally and in a broader geographic area, for example the provision of alternative energies will have immediate local impacts, secondary impacts as surrounding forests and mangroves are allowed to regenerate, and tertiary impacts as these ecosystems‘ services in terms of soil fertility, fisheries, coastal protection extend much further. Similarly, some project activities have only secondary benefits, for example the rehabilitation of reefs is expected to benefit fishing communities indirectly through ecological services, and coastal protection to the broader coastal communities through the creation of a line protection. The combination of project activities in Components 1 and 2 are expected to create multiple interconnected layers of coastal protection: reefs, shorelines and mangroves, and sea walls.

Sustainability

Physical works undertaken as part of this project are all expected to outlast project duration. The estimated life span of the sea wall, once rehabilitated and upgraded, would be upwards of 50 years, whereas restored shorelines, mangroves and reefs, if maintained under proper management, could continue to provide ecological services well beyond this duration. Restored drainage systems have a medium to long-term lifespan (20-50 years) and require regular maintenance works. Maintenance costs will be integrated into district and City budgets after the project is completed. Furthermore, successful activities and approaches will be slated for inclusion in the Medium Term Expenditure Framework (MTEF), hence integrated into district plans and budgets for upscaling and replication.

Because the project cannot address the full spectrum of coastal adaptation needs, Component 3 includes activities designed to extract lessons learned and best practices towards a replication and upscaling strategy, and with a view to creating a qualitative increase in the country‘s capacity to manage climate change adaptation issues. Furthermore, activities dedicated to ecosystem rehabilitation in Component 2 are also supported by training and capacity building of local community-based associations (user associations and NGOs) towards the institution of

community-based management and enforcement systems for mangroves and coastal ecosystems; these activities, combined with the demonstration of enhanced ecosystem productive services, are expected to create long term incentives and conditions for sustainability of project outcomes. For example, the introduction of alternative and/or efficient energy sources available at little or no cost to coastal communities is expected to act as an incentive to promote reduced deforestation rates in and around rehabilitated and conserved mangroves. This activity will be supported by training of local associations and NGOs, some of which are already active in the dissemination of alternative energies in Tanzania, and training for local communities and district officers to promote rapid uptake and maintenance of new energy equipment. This will also be supported by the agreement made by community-based organizations to enforce no-take zones within the mangroves.

Community based organizations in coastal communities have been functional for some years, albeit with limited means, and serve as the primary interlocutor in all projects, national or international. These organizations function on the basis of local consultations and elective processes, and also respect customary rights and traditional authorities. In addition, local natural resource user associations are also active in coastal zones, such as forest users or fishermen's associations. These associations will benefit from training and awareness raising through this project; avenues will also be explored to mobilize additional resources once the project is completed, for example using REDD mechanisms, or through the LDCF project, which seeks to build the capacity of NGOs working on climate change issues in coastal zones[36]. Their work is expected to continue after the project is completed, using regular channels and means, with the support - and in association with - district administrations.

Finally, other interventions related to climate adaptation focused on policy and institutional linkages will also make clear contribution to the sustainability of adaptation interventions: for example the coastal adaptation activities included in the forthcoming LDCF project are aiming at strengthening institutional capacities of NGOs and academic organizations and include support to interministerial and district-level authorities in integrating adaptation concerns in local planning. (A tentative logframe is included for the LDCF project, subject to approval by the GEF Council, in annex 14).

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

The adaptation measures proposed by the project comprise a portfolio of measures taken out of a shortlist of 150 different adaptation measures found as cost – effective and most promising ones among 600 measures evaluated by UNEP in the frame of the UNEP-GEF McKinsey study[37] on economics of adaptation.

[36] see Annex 14 for a tentative list of activities included in the LDCF project.

[37] Shaping Climate-Resilient Development, The McKinsey Group, 2010. http://www.mckinsey.com/App_Media/Images/Page_Images/Offices/SocialSector/PDF/ECA_Shaping_Climate%20Resilent_Development.pdf

Interventions in this project are of two different categories. First, a significant component of this project's budget is dedicated to concrete investments in coastal protection infrastructure and in the rehabilitation of key coastal and shoreline productive assets. Heavy infrastructure-related measures selected for this project were limited to areas where immediate and urgent action was necessary, lest productive assets would be lost in the shorter term (for example, the rehabilitation or construction of sea walls). In other cases, smaller-scale and less costly coastal protection technologies have been selected, including the use of natural barriers to sea level rise and flooding, and ecosystem-based coastal rehabilitation of buffer ecosystems. Although in some cases, one-time rehabilitation costs may seem elevated, these are expected to generate long-term benefits in terms of resilience that far outweigh their short-term costs.

The second group of interventions is comprised of technology transfer and modifications to the current natural resource uses and management practices that are factors of vulnerability. These activities, including the acquisition of productive assets (e.g. energy efficient cookstoves), have been selected based on available studies and technical feasibility analyses and on the basis of their potential for generating multiple social, economic and environmental benefits.

Experience from adaptation projects implemented by UNEP and other agencies has shown that building adaptation measures based on ecosystem management principles will deliver better returns on natural, human and economic capital investments, while at the same time maintaining resilient ecosystems, using less natural resources and reducing social disparities. [38]From an environmental perspective, this project is expected to generate significant benefits through the protection and rehabilitation of degraded and fragile ecosystems, who will then be able to continue to provide key ecosystem services, including water filtration (mangroves, wetlands), flood protection (mangroves, reefs and shorelines), carbon sinks (reefs and forests), as well as biodiversity that is vital to the continued livelihoods of coastal communities.

The approach taken for the development of this project has also sought to build on linkages and synergy with other projects under implementation or/and development, which is expected to generate multiple benefits nationally. By so doing the project presents the least costly means of achieving rapid benefits.

The effectiveness of the adaptation measures implemented by the project will be tested and measured during the course of the project. This will involve undertaking an economic analysis and performing cost-benefit analyses to ascertain whether each activity is an economically viable option given climate change (under Component 3). The most successful activities will be prioritized for upscaling to neighboring communes/districts and provinces and details regarding their implementation will be disseminated widely through the project's knowledge mechanisms (Component 3).

Cost Benefit Analysis

[38] For example, redesigning adaptation measures such as flood control infrastructures in Vietnam from dykes to restored mangrove forests has delivered better returns on natural and economic capital investments than engineered measures alone. Reid, H. and Huq, S. (2005)

For activities included in Component 1, which includes mostly works of a physical nature and targets infrastructures, costs have been distributed towards the most urgent required rehabilitation measures. It is postulated that priority infrastructure needs should be addressed as a matter of urgency, but that a comprehensive package of interventions that includes also activities in Component 2 (ecosystem-based adaptation) will be most effective in achieving adequate coastal protection.

As regards the coastal area, the Tanzania's Initial National Communication estimates potential damage from sea level rise to at least 50 billion Tanzanian shillings. It is estimated that a limited number of well-conceived and resilient **sea walls** can protect large stretches of shoreline, particularly when combined with ecosystem-based measures such as mangrove restoration, reef rehabilitation and shoreline revegetation. The average duration of a seawall can reach upwards of 50 years, with proper maintenance. Consequently, this project will support mainly the rehabilitation, (re)construction and upgrade of degraded sea wall in areas at high risk of increased sea level and wave action; the area identified for priority action is centered around Dar es Salaam city, in Ilala and Temeke districts, where many key economic, social and cultural assets are located, and are in danger of inundation in case of sea level rise (State House, Hospital, training institutes, commercial buildings, foreign embassies, businesses, hotels). At a cost of 3,337,500 US$, this activity will generate adaptation benefits (protection from sea level rise) for more than 450,000 people, 200,000 daily commuters, and help protect over 170 million US$ worth of public and private investment and infrastructure.

Activities designed to rehabilitate **drainage systems** are aimed at reducing damage from floods. Benefits from these activities generally include: reduced flood damage to public and private facilities, land value enhancement, reductions in traffic delays, reduced economic losses, clean-up and maintenance costs, Reduced emergency relief costs, increased possibilities for recreation opportunities (in or around nature-based systems), alleviation of health hazards and waterborne diseases, reduced risk to life and improved water quality[39]. Depending on the type of drainage system (natural or engineered), costs will vary. Engineered systems are typically used in highly urbanized areas (underground drainage and filtering systems), whereas natural systems such as ponds, biofilters or basins can be used in less urbanized areas. The project will dedicate 200,000 US$ to the rehabilitation and upgrade of drainage systems in one area particularly prone to flooding in Dar es Salaam (city center), which will provide direct adaptation benefits (protection from flooding and its impacts) to approximately 75,000 residents and daily users and indirectly to at least 495,000 urban users.

Ecosystems targeted for rehabilitation under this project are currently subject to two different types of uses: authorized uses, for example for recreational purposes (reefs and beaches) and unauthorized uses, for example illegal harvesting of trees for woodfuel making (mangroves). The project intends to work with local communities and users in order to devise sustainable management systems for all ecosystems under rehabilitation, that will include the development of no-take zones, but will also establish continued authorized uses (for example, leaves harvesting for local traditional medicine). In cases where illegal uses are caused by a basic need,

[39] Grigg, N. Benefits and costs of urban drainage and flood control projects, in Effects of Urbanization and Industrialization
on the Hydrological Regime and on Water Quality, IAHS-UNESCO,1977.

as is the case for energy derived from mangrove woodfuels, the project will provide incentives and alternatives, in order to reduce opportunity costs for local communities.

The cost of **mangrove rehabilitation** supported by this project is 35,000 US$, including the costs of consultancies, environmental engineering services, equipment, biomass, and labour. These costs were further validated based on advice received from local NGOs and mangrove management experts in the country, as well as through field visits during project preparation. This also included costs for the training of local communities on sustainable mangrove management and use. This is expected to achieve rehabilitation (through replanting and hydrological restoration) of 40 hectares of mangroves.

There are currently 2000 hectares of mangroves approximately in Dar es Salaam. It is expected that the rehabilitation will not only restore the mangrove to its original functional state but also assist in the expansion of area of coverage. This activity will directly benefit approximately 5000 people who are residing near or using the targeted mangroves, but indirectly the entire district populations stand to benefit from restored ecosystem services from the mangroves. Mangroves provide coastal erosion services to the immediate area located behind them. For example, in tall mangrove forests, the rate of wave reduction per 100 m is as large as 20%[40]; they are also known to increase the sustainability of harder coastal protective systems, such as dikes and sea walls, when located around them. In one example, in Vietnam, the coastline's restored mangrove system led to a reduction of wave height from 4 m to 0.5 m and prevented all damage to the sea dike. Healthy mangrove stands also provide clear waters (through sediment trapping) for corals and reef ecosystems that also support fisheries and coastal protection services. Some studies[41] have estimated the value of services provided by mangroves globally, and found that mangroves provided 6696 US$/ha/year in waste treatment services, 466 US$/ha/year in food production and 1839 US$/ha/year in coastal disturbances protection. Other studies cite a combined value of 9270 US$/ha/year (see footnote 58). Based on this data, the additional value created by this project would be of US$ 370,800 US$.

Mangrove restoration will be supported by efforts to **curb deforestation** through the provision of alternative and efficient energy sources. The cost of these activities supported by the project is 76,500 $ including the costs of equipment and the costs of training for local communities, undertaken through local organizations, with the collaboration of experienced NGOs (e.g. TaTEDO) and participants in the GreenJobs Program.

An analysis of the opportunity cost for local communities resulting from self-imposed restrictions on mangrove use for fuel-wood reveals that the economic benefit accrued to households from the production and sale of charcoal, for example, is on average 11$ per bag (prices vary regionally and have been known to reach 17$ in some places). Conversely, the cost of using charcoal or woodfuels is high, since under current low efficiency conditions the monthly expenditure for charcoal per household per month is estimated at upwards of 20$[42]. This of

[40] Kathiresan, K. The importance of mangrove ecosystems, UNU-INWEH.

[41] see for example: Costanza, R., D'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Linnberg, K., Naeema, S., O'Neill, R.V., Parvelo, J., Raskin, R.g., Sutton, P., Van den Belt, M. l997. The value of the world's ecosystem services and natural capital. Nature, 387 : 253-260.

[42] World Bank, 2009 and Mercer, J. et al, Protecting and restoring forest carbon in tropical Africa, 2011. See also)

course does not reflect the costs to the ecosystem, decreasing availability of wood resources, and the degradation of productive functions, nor the time and labour burden borne by women and children. A 2007 study found that charcoal and fuelwood were the two least cost-effective sources of cooking (when compared to LPG and electricity) and presented negative cost-benefit ratios as well as negative Net Present Value ratios[43], when factoring in time and health costs.

The project expects to reach 1,500 households in targeted project sites through the provision of efficient and alternative energy sources (the average household size in mainland Tanzania is 5.7 persons), and to reduce woodfuel use by at least 30%; extrapolating from available data, this would mean reduced fuelwood consumption from 1 ton per capita annually (or 5.7 ton per household) to 0.7 ton per capita (or 3.99 tons per household). This would result in deforestation rates in project sites reduced from over 2% annually in mangrove areas[44] to 1.3% annually by the end of the project, less than 1% annually if one accounts for mangrove regeneration created through the project in the longer term.

In addition, it has been demonstrated that the use of improved cook-stoves could result in a 30 to 50% reduction in fuel requirement. This is likely to have significant benefits for women, since like all household tasks, fuelwood collecting in Tanzania generally performed by women. It was estimated that on average, under current consumption rates, women have to collect and carry 13.7 kg of fuelwood each day, over a distance of 6.3 km. Any quantitative reduction in fuel needs will therefore help free time and burden for women to undertake other productive tasks.

Furthermore, the cost of charcoal has been steadily rising over the past few years, taking into consideration decreasing supplies and increasing demand. Today a bag of charcoal in Tanzania can be purchased for up to 11$[45], but its efficiency remains low (meaning the 11$ investment will only last a few days at most). A triple combustive efficiency from improved cookstoves (currently estimated at 5 to 10%) alone would help maximize the use of resources, albeit these could remain resources unsustainably obtained. Improved cookstoves and small solar appliances such as solar lanterns, and solar charging stations, can help create a more sustainable energy supply at local level. Levels of investment required by communities are generally low, including for maintenance, and local production can be increased through cooperation with the private sector. This project will introduce these mechanisms as incentives to support the ecosystem-based adaptation strategies, and will work with the local governments and stakeholders to define a strategy for building on successes and replicating this strategy through the Tanzanian Energy Policy and REDD strategy.

The cost of **reef rehabilitation** supported by this project is 110,000 US$ to support work conducted by local NGOs in partnership with local communities and district administration to undertake targeted reef rehabilitation, using in situ seeding methods, and awareness raising among reef users. The entire coast of Tanzania is lined with fringe reefs, spread out into patches and surrounding islets and exhibiting varying degrees of degradation. Reefs constitute the first

[43] Palmula, S, and M. Beaudin. 2007. Greening the Charcoal Chain - Substituting for Charcoal as a Household Cooking Fuel in Dar es Salaam.
[44] GETTING STARTED ON REDD IN TANZANIA: A SCOPING STUDY FOR THE KATOOMBA ECOSYSTEM SERVICES INCUBATOR, 2009.
[45] Local observations.

line of protection against wave action, storm surges and sea level rise. Although a visual census of reef coverage and health has not recently been completed, most data sources place reef health at 20 to 45% of biocover in most locations[46], with some areas completely destroyed by dynamite fishing or unsustainable uses.

The total annual economic value of reefs has been estimated at between US$100 000 and US$600 000 per km^2. The value of reefs and mangroves for shore protection depends on the activities under way or planned along a particular stretch of coast. For example, in Indonesia, this has been estimated at US$829 per km for reefs adjacent to sparsely populated areas where agriculture is the main activity (based on potential agricultural losses from lack of protection), and up to 1 million US$ per km2 in areas where tourism is the main activity[47]. In another example, in Sri Lanka, it has been estimated that 1 km of reef protects 5 kilometres of shoreline, and 1 km^2 of coral reef can prevent 2 000 m^2 of erosion a year.[48]

The project will support the execution of reef rehabilitation works in a total area of 2000 m^2 (spot seeding and transplantation), which, associated with protection and management, is expected to lead to a gradual restoration of reef coverage and health in and around restored areas. Although the immediate scope of work is limited, it has been deemed that, under appropriate management, reef growth could be multiplied rapidly. Documented experience in Tanzania showed that transplanted corals demonstrated 90 to 100% survival after 8 months, and growth and increased coverage rates of 54% to 125% for certain species after 23 months. Therefore, combined with appropriate training for local communities and reef users, this project could help increase reef coverage by an average of 75% annually (for an estimated area of 18,757 m^2 by the end of the project, continuing exponentially). It should be noted that dynamite fishing has not been reported in the targeted project areas for some time, however, previously degraded reefs have failed to recover under natural conditions and some unsustainable uses remain, such as drag nets and anchoring. In pure monetary terms, using an estimated value of reef services of 600,000 US$ per Km^2 per year (see page 27[49]), the project could generate a value of 11,400$ by the end of the project (0.019 km^2) which would continue to increase by 75% annually (61,093 US$ after 4 years). The number of beneficiaries from this intervention is an estimated 10,000 persons, comprised of reef users, tourism operators[50] and visitors, fishing households, as well as those benefiting from increased ecological services and protection.

---

[46] Wagner et al. Restoration of coralreef and mangrove ecosystems at Kunduchi and Mbweni, Dar es Salaam, with community participation, 2000.

[47] UNEP-WCMC (2006) In the front line: shoreline protection and other ecosystem services from mangroves and coral reefs. UNEP-WCMC, Cambridge

[48] Berg et al., 1998, Environmental economics of coral reef destruction in Sri Lanka. Ambio 27: 627-634. Brander, R.W., Kench, P.S. and Hart, D. 2004. Spatial and temporal variations in wave characteristics across a reef platform, Warraber Island,Torres Strait, Australia. Marine Geology 207: 169-184.

[49] There are various estimates of the value of reefs. In one study the value is estimated at 1 million US$ annually (Indonesia); in another 350 million US$ (Belize, WRI). The value indicated here is therefore a conservative estimate.

[50] Tourism operations in Tanzania coastal zones consist mostly in diving and snorkeling. Tanzania receives more than 600,000 visitors annually, mostly due to its natural resources and wildlife. Most tourism (more than 80%) in mainland Tanzania is concentrated inland, whereas coastal tourism infrastructure is less developed as compared to Zanzibar.

Shoreline stabilization is intended as a third line buffering area, comprised of vegetated bands of land designed to resist erosion. This will be undertaken at a cost of 67,500 US$, along a stretch of 1500m in Dar es Salaam city center (1500m long in 20m wide band) immediately behind restored sea wall (in certain cases the revegetated band would occupy the top, soil filled part of the sea wall). The expected adaptation benefits include the rehabilitation or re-creation of a buffer zone that will simultaneously help reduce erosion, promote the retention of sediments, reduce flooding and storm impacts, and reduce the possibility of settling or construction too near the water line (ie promote gradual retreat), and complement other measures, such as mangrove rehabilitation, and sea wall rehabilitation. It is also expected that this will help create a new recreational space. Although there exists some vegetation in the area along Ocean road, it has been found to be sparse, with some denuded patches, including small sink-holes, damage from large tree roots. Grasses and large trees are sporadically placed along the stretch, though species resilience is uncertain and the density of vegetative cover is insufficne to provide efficient soil retention functions.

The expected benefits of ecosystem rehabilitation included in Component 2 are also proportionate to the costs of such activities, and in many cases, will exceed the costs (including opportunity costs). Ecosystem services provided by healthy ecosystems are difficult to value; however, there is growing evidence as to the cost-effectiveness of these measures. For example:

- An investment of USD 1.1 million on restoring nearly 12,000 hectares of mangroves in Vietnam is estimated to have saved USD 7.3 million per year in dyke maintenance, while providing ecosystem services such as physical protection to coastal communities as well as productive fisheries (IUCN).
- Another case study, in Jamaica, supported by UNEP[51], demonstrated that coral reefs explained or influenced 83% of the beach erosion, with the width of coral reefs playing the main role (59%) in reducing erosion. Furthermore, sea grasses explained 41% of the beach erosion, with the width of sea grasses playing the main role (47%) in reducing erosion.

Ecosystem-based adaptation measures have multiple benefits for the environment and livelihoods that often exceed their costs and help prevent climate induced losses. Rehabilitated reefs and mangroves will regain their productivity in terms of fisheries, with immediate benefits for local fisherfolk; restored beaches and shoreline will provide added esthetic and recreational value, and potential for added touristic use.

Finally, adaptation options that were considered but not retained for this project for reasons of cost-effectiveness or feasibility in the context of this project include:

- The rehabilitation of all sea walls in major coastal settlements.
- The use of engineered structures alone as means of adaptation for the coastal zone
- The relocation of port infrastructure, transport terminals and fishing docks
- Construction of dams and dykes against flooding
- Construction or rehabilitation of groyne systems
- Resettlement of coastal populations or relocation of buildings

[51] As illustrated in the UNEP Regional Seas programme report: Using ecosystems to address climate change – Ecosystem based adaptation, 2010.

- Potable water transports and transfers
- Desalination
- Extension of the electricity grid or promotion of fossil fuels, liquid gas or kerosene
- Ex situ coral reef nurseries.

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

This project has been developed in line with Tanzania's key development priorities, plans and programs, as embodied in Tanzania's Development Vision for 2025, the National Strategy for Growth and Reduction of Poverty, and sectoral policies.

This project is also a direct tool for the implementation of Tanzania's National Integrated Environmental Coastal Management Strategy (ICM)[52] objectives, which include the improvement of the wellbeing and livelihoods of all coastal resources users, the need to undertake environmental planning and management of key economic opportunities and to manage geographic areas of concern and critical habitats, while supporting local initiatives for intersectoral development.

Tanzania's Initial and Second National Communications and National Adaptation Programme of Action emphasize the urgent need to promote adaptation and resilience in the coastal areas. Vulnerable sectors highlighted in the NAPA include agriculture, water and health, and energy. All the project activities fall within the National Climate Change Adaptation Strategy and Action Plan of 2010. It is expected that after the completion of the project, successful activities and approaches will be slated for inclusion in the Medium Term Expenditure Framework (MTEF), hence integrated into district plans, facilitating the long-term mainstreaming of climate issues into local planning.

The project is also consistent with the principles of aid harmonization and coordination, as embodied in the Joint Assistance Strategy and in the One UN Joint programme implemented by development partners in Tanzania.

E. Describe how the project / programme meets relevant national technical standards, where applicable.

Interventions targeting infrastructure rehabilitation, construction of new structures, or including construction works will be implemented in strict adherence with Tanzanian standards and legal provisions for environmental impact assessment (EIA – as enshrined in the Environment Management Act of 2004), as well as procurement and tender rules. Best international standards will also be respected in the development and rehabilitation of coastal protection structures.

[52] ICM Strategy, 2003.

The EIA regulations provide a clear and transparent process for evaluating impacts of projects from screening to ministerial decision and including access to information provisions. The associated regulations provide a list of projects requiring mandatory EIA, including (as relevant to this project):

- Water resources development projects (dams, water supply, flood control, drainage)
- Introduction of new tree species and development of forest plantation
- Dredging of bars, groynes, dykes and estuaries

A number of other smaller-scale activities included in this project are subject to registration under the EIA regulations but may not require an Assessment. The Act further provides the timing and responsibilities of the various stakeholders throughout an EIA process. Activities that are likely to be subject to EIA regulations include budgetary provisions for the process. Preliminary assessments conducted within the Ministry of Public Works and the Vice President‘s Office indicate that the proposed activities, although subject to EIA procedures, will not present undue environmental negative impacts. In the case where un-anticipated negative impacts lead the detailed EIA to recommend against a proposed activity, a more suitable intervention will be designed to achieve similar objectives, subject to approval from project Committees. For a preliminary environmental and social impact screening, see Annex 8.

Building codes and other construction will also be undertaken in adherence with the Land Use Planning Act of 2007 which, among others, indicates matters to be included in land use plans.

Interventions designed to provide technology transfer, training and extension services, including the GreenJobs program, or that will include local community participation in works will also be conducted in adherence with Tanzania labor codes.

Interventions targeting ecosystem rehabilitation will be planned and undertaken in accordance with the above, as well as the relevant sectoral laws and regulations including the Land Use Planning Act, the Integrated Environmental Coastal Management Strategy, the Forestry Act (2002), Environmental Management Act (2004).

F. Describe if there is duplication of project / programme with other funding sources, if any.

This project is designed on the basis of knowledge, studies, and analyses provided by other, ongoing related projects and programmes. As such, it benefits from a considerable body of knowledge, stakeholders and processes. A preliminary analysis of ongoing initiatives was undertaken at the start of project design, in order to determine best practices and possible areas of duplication. A list of ongoing related projects can be found in the Annex. To date, no other project has tackled, to the level sought by this proposal, coastal issues in an integrated manner. Few initiatives provide significant support for concrete investments in coastal adaptation, and fewer still promote ecosystem-based approaches to coastal resilience. Hence this project is both building on existing available knowledge and practices, and pioneering new approaches to adaptation.

The project is expected to be implemented in conjunction with the LDCF project (submitted in October) that also focuses on adaptation in coastal areas. Although the major focus of the LDCF project is on institutional capacity building and on broadening the stakeholder base, it is also expected to invest in the implementation of adaptation measures in different sites along the coastal zone (Pangani, Rujifi, Bagamoyo, Zanzibar). The LDCF project also includes activities designed to strengthen the capacities of NGOs and the academic institutions to become active participants in adaptation related initiatives, as well as support to interdepartmental and district-level planners in integrating adaptation concerns into planning frameworks. These activities are designed to strengthen the foundational capacities required to continue implementing adaptation measures and for the ongoing replication of adaptation strategies country-wide; hence the LDCF project, when implemented is expected to make a lasting contribution to the sustainability of all adaptation projects in the country, including this proposal. Given these complementarities, joint implementation management mechanisms between the two projects will be pursued, and the LDCF project will be expected to make contributions to the knowledge components of this initiative, through participation in the Climate Change Observatory (for example by ensuring studies produced by the LDCF project are shared within the Observatory and other national networks, and by creating linkages between the LDCF supported internship program and the GreenJobs program). In cases where it is administratively feasible, joint procurement and execution arrangements will be sought for similar works in order to reduce costs and delays. (A tentative logical framework for the LDCF project is presented in annex 14)

Coordination among all partners in Tanzania, through exiting donor and thematic coordination fora will be actively pursued. For example, this project will be discussed through the climate change coordinating group, which includes all relevant line ministries, donors and NGOs. Coordination will be ensured through the Vice President‘s Office, who is acting as National Executing Agency for this project. During the inception period, a thorough assessment of ongoing relevant initiatives and programs will be made, and stakeholders and partners will be invited to participate in project Committees, as well as in the Climate Change Observatory, which will act as a chief knowledge coordinating mechanism. The Project Steering Committee may create technical task forces or sub-committees to allow for coordination on specific adaptation-related themes, if required by partners, in order to allow broadest participation. This will include a sub-committee comprised of Project Managers from relevant initiatives who will meet on a regular basis to coordinate and seek opportunities for synergistic implementation.

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

Component 3 of this project describes both the cross-cutting and specific knowledge management functions that will be undertaken in this project. These include stocktaking and monitoring of various project indicators, as well as the creation of a Climate Change Observatory that will function as a clearing house for information related to project themes. The promotion of policy linkages based on project lessons is also included in Component 3. It is expected that the Climate Change Observatory will become the chief mechanism whereby adaptation knowledge is transformed into policy-relevant tools at the national and local level. In order to focus on concrete activities, however, this project focuses on the necessary elements for

successful activity implementation and policy linkages, and will work with other projects and initiatives to disseminate information as cost-effectively as possible.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation.

This project builds on a long history of consultation and cooperation on adaptation in Tanzania. In designing this project, all stakeholders were consulted and their inputs introduced in the various projects through discussions led by the Vice President's Office, in cooperation with other ministries. This project has been discussed at highest levels, including through reports to Parliament as well as through the Climate Change Steering Committee. Various other partners were consulted, including bilateral donors active in the regions targeted or in the country on themes relevant to this project. Further discussions on the formalization of roles and contributions are expected to take place during inception.

The Vice President's Office has undertaken consultations with key line ministries and other stakeholders who will be called upon to play a role in this project. Each ministry listed below will participate to the project through national-level contributions as well as through their decentralized offices at district and local levels.

Stakeholder	**Expected participation in the project**
Prime Minister's Office- (1) Regional Administration and Local Governments (PMORALG) and (2) Investment and Empowerment (PMO IE)	PMORALG will serve as key liaison between the project and local administrations. It will provide oversight and an overall policy supervision function so that activities to be delivered at district level are undertaken in accordance with policies regarding decentralization, and delivery of district budgets. PMO IE will provide policy level guidance on empowering local communities to sustain adaptation measures that will be instituted in the project areas.
Ministry of Foreign Affairs and International Co-operation	The Ministry will play an advisory role in this project, provide advice on best practices for adaptation and on linkages between national institutions and the MIE; the Ministry will also serve as relay between the project and the Adaptation Fund Board.
Ministry of Finance	The Ministry will participate in providing assistance to local authorities in mainstreaming climate change into their local development plans. The Ministry will also coordinate and oversee financial flows between national and local-level partners. The ministry will participate in activities related to assessment of cost-effectiveness, be informed of analyses related to the costs of adaptation, and will also participate in awareness raising efforts towards policy uptake.
Ministry of Natural Resources and Tourism	The Ministry will be responsible for coordinating and delivering the project components related to ecosystem rehabilitation and monitoring.

Ministry of Energy and Minerals	The ministry will provide services in order to deliver the alternative energy technologies to targeted communities.
Ministry of Works	The ministry will be responsible for developing terms of reference, procurement and monitoring the delivery of all infrastructure components of this project.
Ministry of Communication, Science and Technology	The Ministry will participate in developing the Climate Change Observatory and will work with the VPO to support its operations. The ministry will also provide linkages between the project and national research facilities.
Ministry of Education and Vocational Training	The Ministry of education will provide linkages to universities and will participate in the creation of the GreenJobs program.
Ministry of Labour, Employment and Youth Development	The Ministry will operate the GreenJobs program and will provide advice on climate related education in project sites.
Ministry of Lands, Housing and Human Settlements Development	The Ministry will provide advice at national level on the integration of climate risks into land use planning, urban planning and the revision of relevant codes. The Ministry will also provide advice on enforcement of regulations.
Ministry of Community Development, Gender and Children	The Ministry will participate in the project by providing advice and guidance on the integration of gender equity and gender sensitive activities, as well as on the monitoring of community-level resilience and well-being. The Ministry will participate in activities related to livelihoods development.
Tanzania Meteorological Agency	The agency will provide climate related information, including early warnings in project zones, designed to feed into feasibility studies, impact assessments as well as resilience modeling.

The following district and regional-level administrations were consulted during the development of the project and are intended to be at the forefront of project implementation.

- Temeke Municipal Council
- Ilala Municipal Council
- Kinondoni Municipal Council
- Dar es Salaam city Council

The following para-governmental and non-governmental (NGOs, private sector) stakeholders have been invited to participate in the project development and implementation. This list is subject to expansion once contributions and roles are formalized, during project inception, and broader consultations can take place at all levels.

- National Environment Management Council
- Environmental Protection and Management Services

- University of Dar s Salaam including the Institute of Resources Assessment and water -- Resources Engineering Department
- Tanzania Traditional Energy Development and Environment Organization (TATEDO)
- Tanzania Association of Tourism Operators (TATO)
- Tanzania Natural Resource Forum (TNRF)
- Tanzania Port Authority
- Dar es Salaam Water and Sewerage Authority (DAWASA)

Consultations on climate vulnerability and adaptation have been occurring at community level since the development of the National Adaptation Programme of Action in 2007. During this process, consultation with stakeholders was undertaken in 13 districts and 52 villages at local communities including Bagamoyo, Pangani, Rufiji, Mtera, Mbeya, Shinyanga and Dar es Salaam.

In 2009, The Vice President's Office, with support from DANIDA, undertook a comprehensive participatory Climate Impacts Assessment, that involved local level consultations, using methods ranging from village-level focus groups and surveys (100 sampled respondants), to one-on-one interviews with local leaders, technical representatives and representatives of interest groups. The final output of this exercise[53] contains the most recent expressions of local level perceptions of vulnerability as well as an analysis of vulnerable sectors for Tanzania, including in coastal areas.

More recently in 2010 and 2011, for the purposes of this project, semi-formal consultations at the local level for project development occurred in the districts of Pangani, Bagamoyo, and Ilala and Temeke (around Dar es Salaam), as well as in other locations along the coast (for the LDCF project).

Finally, interministerial consultations have been continuing throughout the process of project development, including through decentralized local officers who have been tasked with maintaining contact with local communities and to mobilize additional information as required. A series of technical design workshops at central and decentralized level were convened to provide additional guidance on project activities, involving all ministries.

Contacts and consultations with project partners have been maintained throughout the project design with the key partners in order to feed into technical design and to refine outputs and activities.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Funding from the Adaptation Fund is requested in order to begin immediately with the implementation of concrete adaptation activities in support of Tanzania's resilience to climate change. The project covers the full costs of adaptation in the coastal regions as follows:

[53] Vice President's Office, Climate Change Impacts Assessment Report.

- Through the construction or rehabilitation of protective structures along the coast, the project is covering the full costs of adapting to sea level rise, increased tidal pressures and storm surges in selected sites along the Tanzanian Coast. These costs include the costs of modifying existing infrastructure as well as rehabilitating buffer ecosystems for increased resilience and natural protection.

- The project is building on existing knowledge and best practices, scientific evidence and technology, and also promotes innovative practices in the management of fragile ecosystems. The AF funds are used to promote innovative ecosystem-based adaptation practices, that are known to increase the effectiveness of other adaptation measures.

Component 1 – Addressing climate change impacts on key infrastructure and settlements

Baseline

A number of key coastal and shoreline infrastructures are under increasing pressures from human activities and coastal erosion. In general, projects that target climate change in Tanzania have yet to address the infrastructural aspects of adaptation, due to a lack of means, and because most projects were focused on Stage 1 or pilot adaptation measures. The business as usual scenario in the coastal areas would see existing infrastructure become increasingly inadequate, particularly in Dar es Salaam, whether or not climate change scenarios for Sea Level Rise are realized. Under a sea level rise scenario, these infrastructures would be ineffective in protecting economic investments and human settlements along the coast.

In addition, human settlements would continue to suffer from the impacts of floods due to sudden heavy precipitation events. It can be expected that without intervention, lives will continuously be lost, key productive assets will degrade, including agricultural lands, and cities will be come increasingly dangerous, including from a health and sanitation perspective. Water related diseases are expected to increase under climate change if no interventions are in place to ensure proper evacuation of floodwaters, of sanitation and to ensure water quality is safe from the effects of sea level rise or drought.

Adaptation additionality

Although this project is not expected to address all of Tanzania‘s coastal infrastructure needs, it will help in covering the costs of making selected installations more resilient to climate change by funding their rehabilitation, retrofitting or modification in order to take into account modified coastal regimes. Under Outcome 1, costs are related to the rehabilitation or construction of coastal protection infrastructures:

- Raising, modifying, reconstruction and refilling of sea walls in Dar Es Salaam: sea walls and revetments form the baseline of coastal protection in Tanzania and constitute a significant investment in and of themselves; this project seeks to ensure that this infrastructure - which is already showing signs of degradation - remains

adequate to deal with sea level rise, increased storm activity and tidal pressures. Additional costs of adaptation are therefore the costs to repair, elevate and/or strengthen the existing structures where they are showing signs of degradation and around key economic assets in Dar es Salaam, as a priority.

This project will also fund the costs related to avoiding the adverse impacts of increased floods in areas due to receive increased precipitation, by providing the means of increasing drainage and storm water evacuation. The additional costs are related to the costs of civil and environmental engineering works, such as enlarging underground drain systems in urban areas (piping, connections, reservoirs). Along with the measures in Component 2, which are targeted towards buffer ecosystems, this project is expected to generate increased resilience and protection benefits in the targeted site.

Elements covered under outcome 1 should be seen in conjunction with activities foreseen in Component 2, as together these activities form a comprehensive and effective coastal protection system.

Baseline Situation	Value/Cost	Adaptation Activity	Cost
There exists a sea wall around Dar es Salaam which currently protects only part of the city's low lying areas. Along Ocean Road and Kigamboni, the wall is showing sings of degradation and in some places, complete subsidence or disappearance. The average rate of erosion for the city area has been estimated about 3 – 5 m/year.	The value of property potentially lost to a 0.5m sea level rise in Dar es Salaam city is 49.83 billion TShs and 85.97 billion in case of a 1.0 m rise.	Repairing, construction and upgrading the sea wall to allow the infrastructure to withstand stronger tidal pressure, currents and storm surges, along with higher mean sea levels.	3,337,500 for 1.335 km rehabilitation and upgrade in two stretches along Ocean Road and Kigamboni around Mwalimu Nyerere Institute.
There are currently annual flooding events in Dar es Salaam during heavy rain episodes, due to the insufficiencies in the actual drainage systems. This results in significantly disrupted circulation. Silted rivers also prevent rainwater from reaching sea channels, leading to coastal flooding.	Existing drainage systems have been established for many years and some works are ongoing in Dar es Salaam and other coastal areas to maintain, rehabilitate and upgrade the network. However, this work does not, take climate change or increased severe precipitation events into consideration and there has not yet been any attempt at upgrading the system in central Dar es Salaam	The project will support the costs of cleaning, upgrading, and where necessary enlarging the drainage structures in one flood-prone area of Dar es Salaam city center.	200,000$ to cover the costs of works in Dar es Salaam and the additional costs of factoring in climate change into ongoing urban structure design.

Component 2 – Ecosystem-Based Integrated Coastal Area Management

Baseline

There is currently no ecosystem-based coastal area management framework in Tanzania, although it is increasingly recognized that the fragile ecosystems in the coast and in the Lake region play a crucial role in sustaining communities and their own resilience. Existing coastal management frameworks are not completely implemented, and enforcement is lacking for some key aspects of natural resources management (including no-build or no-take zones).

The degradation of mangroves, reefs, sea grass beds and wetlands are all factors of coastal vulnerability and are also all factors of community vulnerability. However these fragile ecosystems are under pressures from climate as well as human activities, specifically

mangrove tree species are subject to exploitation from local communities to satisfy energy needs.

Adaptation additionality

This project will therefore support the additional costs of rehabilitating the fragile ecosystems and of mitigating the elements of human pressures that are causing their degradation. This will ensure that the coasts are resilient and can respond to climate shocks, while continuing to provide valuable ecosystem services such as protection against floods, animal habitat, water filtration and supply. Without this project, these ecosystems would gradually disappear, and the coasts and shorelines – and the communities who live there - would be starkly vulnerable to climate change impacts.

Under Outcome 2, this project will provide funding to local institutions, working with vulnerable communities and NGOs, to support the rehabilitation and sustainable management of fragile ecosystems, such as:

- Rehabilitation of mangroves, including the costs of dredging where necessary to improve water flows, replanting of resilient and appropriate species, fencing, and capacity building for local organizations to enforce no-take zones and buffer zones using community-based mangrove management systems.

- Rehabilitation and protection of reefs, including collection of specimens, construction and operation of coral nurseries (in situ), transport, monitoring and maintenance.

- Shoreline reforestation costs include the costs of purchasing seedlings of resilient and appropriate species, costs of labour for replanting as well as capacity building for the sustainable management of rehabilitated zones and the enforcement of no-take zones.

- Provision of alternate energy sources and equipment to local communities so as to reduce mangrove exploitation and maintaining this beyond the project lifetime.

Baseline Situation	Value/Cost	Adaptation Activity	Cost
The mangrove forests and cover an area of more than 2000 ha in Dar es Salaam area,. Although there is no evidence that shows a decrease in overall area under coverage, direct visual observation reveals areas of degradation, in some areas severe (e.g. around Dar es Salaam) due to deforestation. The reported rate of mangrove deforestation in coastal Tanzania is 2% (to be treated with caution due to the illegal nature of the phenomenon).	The value of mangroves and wetlands is not known in monetary terms for Tanzania. There are limited studies on the economic valuation of mangroves and wetlands in Tanzania. Economic valuation of mangroves in other East African countries (eg. Kenya[54]) suggest that that this resource is of significant economic importance. Research[55] conducted on the state of the world's mangroves estimate the value of mangrove ecosystem services of up to US$ 9270 per hectare per year. Mangroves provide ecological services that include flood and inundation protection, fisheries as well as timber products.	In order to maintain and where possible increase the resilience of mangroves and wetlands particularly for their flood protection role, rehabilitation of degraded areas, and extension of buffer zones and no-take zones in cooperation with communities.	35,000 US$ for rehabilitating 40ha of mangrove in Dar es Salaam. This could create more than 370,000 US$ in additional economic value.
Reefs and shorelines in Tanzania are subject to varying degrees of erosion. Non-climate related causes include sand and coral mining and deforestation; climate-related causes include increased tidal activity, sea level rise and storms. There are a few ongoing initiatives related to coastal management though these do not factor in the potential impacts of climate change, are site specific, and not always integrated. There is no Ecosystem-Based Integrated Coastal Area Management activity currently in Tanzania.	The value of beaches, reefs and shorelines is not known in monetary terms. However, these ecosystems provide numerous ecosystem services, including protection and livelihoods, as well as economic value for fisheries and tourism.	The project will support the costs of rehabilitating degraded beaches and shorelines, through ecosystem-based management options that will provide resilience against anticipated climate changes. An estimated 1500m of shoreline will be rehabilitated and placed under enhanced management, as well as 2000m^2 of reefs to be rehabilitated using innovative techniques.	110,000 US$ to support the costs of rehabilitation works in degraded reefs and 67,500 for revegetation of the shoreline. This will help create a 30000m^2 stretch of vegetated shoreline (1500 long by 20m wide), and 2000 m2 of rehabilitated reefs which will grow at a 75% annual rate.

[54] In a study on the economic analysis of mangrove reforestation in Kenya, it is estimated that the total economic value of mangrove plantation is approximately US$2902.87/ha/year..
[55] (World Atlas of Mangroves, June 2010).

90% of energy needs in rural areas are provided through the use of charcoal produced locally by felling and burning trees. Other energy supplies include fuel. In rural areas, energy needs are not entirely satisfied. Woodfuels consumption is estimated at 1 to 1.5 ton per year per person. Mangrove deforesation rates are estimated at 2% per year.	The cost of a 20 kg bag of charcoal is approximately 11$ US. Monthly woodfuel expenditures are estimated at upwards of 20$ per household.	The project will provide alternative energy sources such as (efficient cookstoves, small solar) to reduce fuelwood use by at least 30%. This will increase energy supply while easing pressures on mangroves that provide coastal buffering and soil fertility services.	76,500 US$ to support the cost of acquisition of equipment and appropriate training, to reach 1,500 households.

Component 3 – Knowledge, monitoring and policy linkages

Baseline

There is a wide range of climate-related knowledge, science and evidence in Tanzania, however there remains broad areas of duplication in research and in programming, while some areas are neglected. Gaps in science and technology, as well as best practices are difficult to identify because of the multiplicity of actors, methodologies and initiatives. Efforts at coordinating have thus far focused on projects and programmes.

Adaptation additionality

This project therefore will seek to bring together all available and relevant knowledge on coastal and lakeshore impacts into a single coordinating function or clearing house, which will serve as a central coordinating mechanism for Tanzania‘s future initiatives in climate change adaptation. This Climate Change Observatory will be enabled to monitor key indicators of climate change in coastal and lakeshore areas and to provide best available technical advice to future activities. The additional costs of adaptation under Outcome 3 are therefore related to the costs of activities required to engage in scientific research, monitoring and evaluation of climate change and its impacts, as well as the costs of assessing resilience and cost effectiveness. They are the costs of activities designed to enable stakeholders to anticipate, analyse and adapt to climate change and to ensure this project‘s durability and replicability.

The project will also support additional capacity building for district administrations to earmark budgets for ongoing maintenance after the project, to ensure maximum durability for coastal protective systems. This adaptation cost covers the required change in policy and practices due to climate change, along with other enabling activities such as engineering studies and modeling studies designed to make the activities above feasible and efficient. Finally the project will also support the costs of capacity building for the development of an Ecosystem-Based Integrated Coastal Area Management Action Plan.

Baseline Situation	Value/Cost	Adaptation Activity	Cost
There have been significant investments from national and international sources in developing knowledge related to climate change, science and assessments focusing on the coastal zone. Currently this knowledge is dispersed among the various partners and stakeholders throughout the country, and is therefore being under-utilized.	While it is impossible to quantify the value of existing knowledge, the value of existing programs and projects as well as scientific research and infrastructure in the country is very high, in the order of millions of US$. However there is duplication and repetition due to a lack of centralization and coordination.	The project will contribute to increased knowledge effectiveness by centralizing and coordinating available science and knowledge on coastal climate change impacts and adaptation, including through the Climate Change Observatory. This will lead to reduced duplication and costs and increased impacts for future interventions. There is currently no such coordination function.	30,000 US$ will provide for a comprehensive baseline study, and 90,000 US$ will support the setting up of the Climate Change Observatory infrastructure. Project Management budgets will also provide for increased coordination and meetings among various partners and stakeholders. This will also support the costs of identifying successful, cost-effective adaptation measures for replication.
There exists a number of sector-based planning tools and a policy framework for coastal zone management and ICZM in Tanzania. These are not fully implemented and do not contain adequate consideration of climate change or ecosystem-based measures.	The value of existing developing the existing coastal planning frameworks is estimated at 1,500,000 US$.	The project will support the cost of developing an Ecosystem Based Integrated Coastal Area Management Action Plan as a supporting executive tool for existing policy frameworks in Tanzania.	The cost of developing the EBICAM plan are US$ 190,000.

Currently there are a number of efforts designed to assist the Tanzanian government in Mainstreaming climate change into its development planning and programming. Most of these are focused on sector-based approaches and on central planning. There are few initiatives focusing on decentralized planning and programming (e.g. at district level). That being said, climate change considerations are not currently included in infrastructure and land use planning at central or local levels.	The value of mainstreaming climate change into planning is difficult to estimate as it involves a long term policy change.	The project will support the costs of capturing project lessons and of capacity building for policy planners at central and district level, focusing on coastal planning issues. The project will also support the cost of targeted assistance in developing appropriate maintenance budgets and programmes for rehabilitated infrastructures at the district level.	The project will provide a total of 115,000 US$ to the development of briefing materials for policy makers, assessments of economic feasibility and effectiveness of adaptation measures (for financial mainstreaming) and training for district-level planners.

I. Gender Considerations

This project is designed to use an ecosystem-based approach to reduce coastal vulnerability. A summary gender analysis was performed and gender disaggregated indicators are provided where the activities sought to reach local communities (access to renewable or efficient energy, reductions in water-borne diseases). In its ecosystem-based orientation, the project is expected to benefit men and women equally in terms of coastal protection, and in terms of the rehabilitation of ecological services and urban infrastructure.

In addition, the project will directly benefit women in Component 2, through the provision of fuel-efficient cookstoves and other alternative energy equipments. Since women are the main responsible for gathering wood fuels, they will directly benefit from reduced working times and distances due to more efficient burning stoves. This will help facilitate other productive activities for women. In addition, women‘s associations and women leaders will be particularly targeted during capacity building, training and awareness raising efforts, so that they play their rightful role in ensuring the proper management of mangroves and the enforcement of no-take zones.

At the level of the overall project objective, measurements taken through a participatory vulnerability assessment, and household level surveys, will also provide gender-disaggregated data, and – consistently with current practice within UNEP and Tanzania – women and men will be equally consulted during project implementation to ensure the full representation of stakeholder interests. Similarly, at least 50% representation of young women participants in the

GreenJobs program will be sought. Finally, the equal participation of women and men in project structures, committees, consultancies and procurement will also be promoted.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

UNEP will be the Multilateral Implementing Entity[56] (MIE) for the project and will oversee and provide technical backstopping to the project. UNEP benefits from significant experience in implementing projects of this type[57], and has excellent relations with the National Executing Agency, the Vice president's Office (Division of Environment). UNEP will work closely with the VPO and the Project Steering Committee (PSC) during project implementation. Overall, the project will be implemented with the support of several national government, local government and non-government partners.

The project will be supervised by the National Climate Change Technical Committee (NCCTC), which is comprised of sector environmental coordinators, senior environmental and representatives of relevant stakeholders, and chaired by the National Climate Change Focal Point. The NCCTC is itself supervised by the National Climate Change Steering Committee (NCCSC), a national-level policy committee comprised of Directors and senior environmental officers from VPO-DOE and various ministries that meets quarterly. This is chaired by the Permanent Secretary-VPO responsible for environment and climate change issues.

The VPO- DOE will be the overall coordinator of the project (through the services of a Project Coordinator). In support of the national administration and accountable to UNEP and the VPO, a Senior Technical Advisor (STA) will be hired to provide technical guidance on the implementation of the project to the NPC.

[56] The following implementation services under the MIE modality will be provided by UNEP for this project: (1) Overall coordination and management of UNEP's MIE functions and responsibilities, and facilitate interactions with the AFB and related stakeholders; (ii) Oversight of portfolio implementation and reporting back on budget performance; (iii) Quality assurance and accountability for outputs and deliverables at the project development phase, during implementation and on completion;(iv) Receipt, management and disbursement of AF funds in accordance with the financial standards of the Adaptation Fund. (v) Information and communication management, including maintaining Management Information Systems and specific project databases to track and monitor progress (financial and substantive) of project implementation; (vi) Oversight and quality assurance of evaluation processes for project performance and ensuring that lessons learned/best practice incorporated to improve future projects; (vi) General administration and support costs including legal services, procurement and supply management, IT, and human resource management.

.[57] See Annex 7 for additional information on UNEP's experience and expertise relevant to this project.

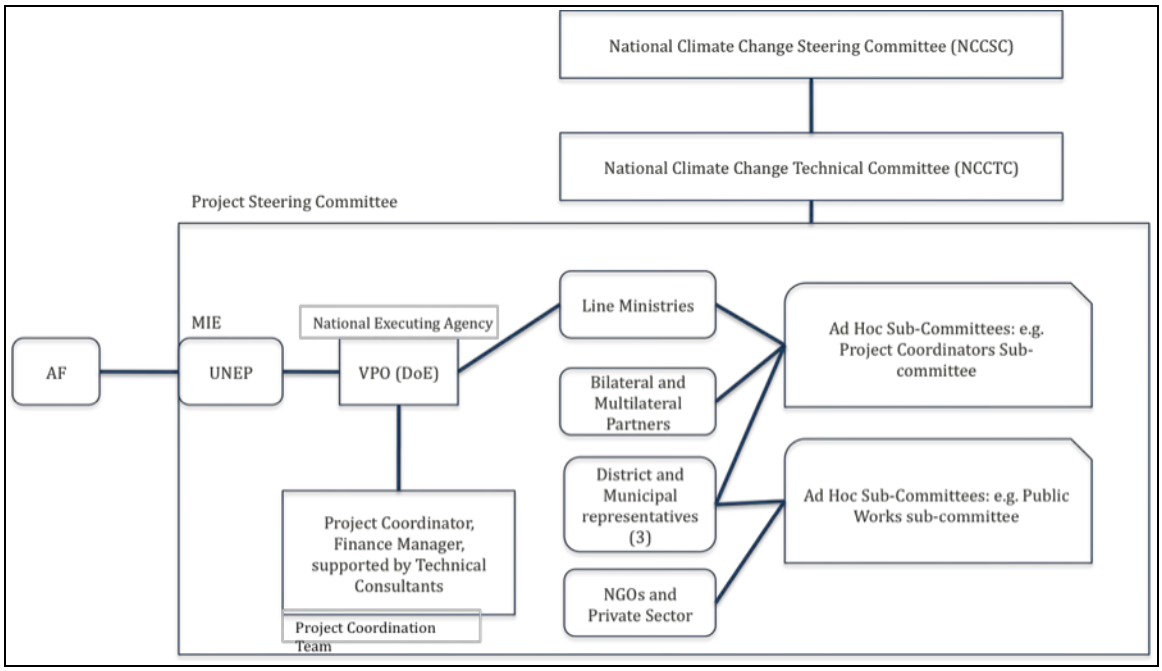


Figure 7: Project Management and Supervision structure

The key functions of the VPO-DoE, and with the possible support of the STA will be the following: i) quality assurance and technical review of project outputs (e.g. studies and assessments); ii) assistance in drafting TORs for technical consultancies and supervision of consultants work; iii) assistance in monitoring the technical quality of project M&E systems, including annual work-plans, indicators and targets; iv) providing advice on best suitable approaches and methodologies for achieving project targets and objectives; v) provide a technical supervisory function to the work carried out by the other technical assistance consultants hired by the project; and vi) assisting in knowledge management, communications and awareness raising. The STA position will be filled following a transparent and competitive recruitment process. The STA will be employed part –time. In this way, the project will strengthen and establish in-country capacity and ensure that project activities are sustainable after the project lifetime.

The VPO-DOE as coordinating unit will undertake the following responsibilities for management of the project:

- Coordinating between key line ministries and relevant departments in implementing the various project components.
- Coordinating between regional and national institutions and donors.
- Preparing regular annual reports on its activities and outcomes of the project.
- Providing advice and guidance on coastal zone management policies.
- Mobilizing additional partnerships and support for the project as necessary

The PSC will steer the project implementation process and any problems encountered will be discussed during the regular meetings (every six months throughout the project implementation with additional meetings held as and when necessary) and/or *ad hoc* sessions. The NCCFP will

serve as the secretary of the PSC. The PSC will approve annual work plans and procurement plans, and review project periodical reports as well as any deviations from the approved plans. All decisions of the PSC, such as respective responsibilities, timelines and budget will be clearly communicated to the parties concerned. PSC members will facilitate the implementation of the project activities in their respective agencies, ensure that activities are implemented in a timely manner and facilitate the integration of project-inspired activities into existing programmes and practices. Civil society representatives from the targeted communities (three per sites, elected from local communities on a rotating basis), as well as key NGOs will also be full voting members of the Steering Committee.

The Project Steering Committee will also be open to participation from representatives of other, relevant initiatives and partners, in order to facilitate coordination. In addition, joint implementation and execution arrangements will be sought with the LDCF project when implemented , in order to reduce costs, build synergies and avoid duplication.

A mechanism for the coordination of efforts to avoid overlaps and duplication with on-going projects and to benefit from synergies and mutual learning will be set up through the establishment of a –project manager's coordination group", comprised of project coordinators or managers of the ongoing relevant projects in Tanzania with which this project is seeking coordination. The group will be chaired by the VPO - DOE and will meet once every quarter with the following mandate:

i) Review the AF project implementation reports prepared by the project coordinator. The report will highlight: a) activities carried out and methods and approaches used, especially in areas of common interests; b) progress made towards the achievement of project objectives and outputs per project component; c) identification of areas of complementarity that need to be enhanced, and potential duplication and conflicts that need to be corrected; d) lessons learned including good practices and problems encountered.

ii) Make appropriate recommendations that will be shared with the steering /management committees of the participating projects;

iii) Make recommendations on how to better meet the objectives of enhancing synergy and reducing duplication among the projects, on the basis of lessons learned during quarterly meetings;

iv) Review on an annual basis, the implementation of recommendations made in previous meetings, and make appropriate comments to the respective steering or project management committees

In addition to various partners playing an advisory role, a number of project activities will be delivered through agreements, MOUs and sub-contracts where appropriate with relevant institutions, as follows:

Institutions	Responsibility for delivering
Prime Minister‘s Office-Local Governments and Regional Administration	Oversee the work of the Local Government Authorities to make sure that it is in line with policy and legal requirements of the local governments including delegation by devolution
Ministry of Natural Resources and Tourism	Responsible for all activities related to ecosystem rehabilitation and monitoring, and providing support to district administrations in setting up the Resilient Ecotourism revolving funds.
Ministry of Energy and Minerals	Delivering the alternative energy technologies to targeted communities.
Ministry of Transport	Delivery and supervision of all coastal infrastructure components of this project.
Ministry of Education and Vocational Training	Joint responsibility for the GreenJobs program with Ministry of Labour.
Ministry of Labour, Employment and Youth Development	Lead responsibility for the operation of the GreenJobs program.
Dar es Salaam City Council	Supervision of works, local consultation, and direct beneficiary of the project‘s technical assistance, through municipal councils

As the central coordinating unit, the VPO will provide central coordination functions, administration of contracts and sub-contracts and other administrative functions as per Tanzanian government rules and regulations. Technical consultants may be hired to provide ad hoc expertise during project implementation and to provide higher level thematic coordination.

Anticipated Execution Costs

The Project Execution Costs of this project include standard project management planning and budgeting. This involves the hiring of personnel whose responsibility will be to coordinate and oversee the daily tasks of the project implementation plan namely the project coordinator, finance manager and technical advisor. Staff contracted by the project will be housed within the Vice President‘s Office – Division of Environment, and will benefit from in-house support for issues related to legal matters, procurement, human resources management. The project will also provide for office equipment such as computers, software licenses, telephone and internet lines as well as costs related to reporting and regular communications through meetings and workshops.

Cost Item	5-year Total
National project coordinator	125,000
Financial manager	75,000
Office equipment and expendables	20,000
Vehicles and maintenance costs	50,000
TOTAL	**270,000**

Costed monitoring and evaluation costs are indicated under section C below.

A. Describe the measures for financial and project / programme risk management.

The following risks have been determined during project design, that could influence the project's delivery of its objective.

Risk	**Level**	**Mitigation**
Operational: The multiple ongoing initiatives on climate adaptation in Tanzania could cause operational delays for this project	Low	Coordination among various partners at national and international levels is an integral part of this project. In addition, dedicated staff for project coordination will help ensure that the project maintains its objectives. The Tanzanian government is firmly committed to achieving the objectives of this project for implementation of concrete adaptation activities.
Political: District-level stakeholders and administrations show low engagement for adaptation measures	Low	District level administrations will be engaged early on in project activity planning and delivery. Efforts will be made to increase awareness of district-level stakeholders on the potential impacts of climate change on local economy and prospects. Incentives for private sector and vulnerable groups have been included in project activities in order to encourage active participation at all levels.

Political: the project could experience difficulties in coordination and oversight for activities delivered at various sectors, levels of governments or by multiple partners	Low	Dedicated personnel for project management will be provided through the Vice President's Office – who will act as overall coordinator and provide monitoring of project outputs and activities. Close collaboration among various ministries and stakeholders participating in the project will take place through national and district level mechanisms.
Environmental: Extreme weather events such as tropical storms, floods or droughts could hinder progress in ecosystem rehabilitation and infrastructure activities	Med	Measures designed to rehabilitate buffer ecosystems will be implemented so that no-regrets measures are implemented first, gradually building resilience of targeted ecosystems. Protective infrastructure rehabilitation will be designed according to the best available technical standards, using the best available technology.
Financial: market and price fluctuations could cause price variations and variations in costs of certain project activities, leading to budgetary constraints.	Low	A financial management strategy for the project will be established as per best management standards and accounts will be regularly monitored through regular audits. A financial risk strategy and contingency plans will also be developed as part of the financial management procedures used by Tanzanian government and UNEP.

B. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The project will comply with formal guidelines, protocols and toolkits issued by the AF, UNEP, and Tanzanian government procedures.

UNEP will develop a **Supervision Plan** during the project's inception phase that will be distributed and presented to all stakeholders during the Inception Workshop. The emphasis of the Supervision Plan will be on outcome monitoring, learning and sustainability, but without neglecting financial management and implementation monitoring. Project risks and assumptions will be regularly monitored by UNEP. Risk assessment and rating is an integral part of the Project Implementation Review (PIR). The quality of the project's M&E will also be reviewed and rated as part of the PIR. Key financial parameters will be monitored annually to ensure the cost-effective use of financial resources.

The project will undergo an independent **Mid-Term Evaluation** at the mid-point of project implementation. The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the

effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, ToR and timing of the Mid-Term Evaluation will be decided after consultation between the parties to the project document. The relevant GEF Focal Area Tracking Tools will also be completed during the Mid-Term Evaluation cycle.

An independent **Final Evaluation** will take place three months prior to the project end date in accordance with UNEP and GEF guidance. The Final Evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the Mid-Term Evaluation, if any such correction took place). The Final Evaluation will assess the impact and sustainability of results, including their contribution to capacity development and the achievement of adaptation benefits. The Final Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded onto PIMS.

A key **Annual Project Review/Project Implementation Review** (APR/PIR) will be prepared to monitor progress made since the project's start and in particular for the previous reporting period. The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward the project's objective and outcomes - each with indicators, baseline data and end-of-project targets (cumulative).
- Project outputs delivered per project outcome (annual).
- Lesson learned/good practice.
- AWP and other expenditure reports.
- Project risk and adaptive management.

Periodic monitoring will be conducted through visits to the demonstration sites undertaken by relevant staff from UNEP. Visits will be jointly conducted based on the agreed schedule to assess project progress first hand. A summary of the M&E cost is provided in the table below:

M&E costs

Monitoring and Evaluation Costs/Type of activity	**Responsible Parties**	**Budget (US $)**	**Timeframe**
Measurements of means of verification (baseline assessment included in Component 3)	Project Coordination Team, UNEP TM	30,000	First quarter of year 1.
Audits	Audit Firm under responsibility of UNEP	24,688	Annually
Evaluations (Mid-term review and Independent terminal evaluations)	UNEP EO	80,000	At midpoint and at end of project implementation

Inception meeting, field visits and steering committee meetings	UNEP, NCCC	50,000	Inception meeting within first 2 months and bi-annual PSC meetings (and sub-committee meetings)
	TOTAL	**184,688**	

D. Include a results framework for the project proposal, including milestones, targets and indicators.

Note: the targets and indicators provided throughout the project and summarized in the table below are based on best available knowledge, pre-feasibility studies, previous experiences and studies by other partners as well as local cost estimations. The indicator baseline values will be further validated during the project inception through a baseline study which is included under Component 3.

	Activities	**Outputs**	**Indicator**	**Target**	**Baseline**	**Means of Verification**
Component 1 - Addressing climate change impacts on key infrastructure and settlements						
Outcome 1 - Adverse impacts of SLR and floods on coastal infrastructures and settlements are reduced						
	Rehabilitate coastal protection facilities to protect settlements economic and cultural infrastructure	Sea wall raised or rehabilitated in areas showing particular damage	Length of sea walls raised and rehabilitated (m)	1335 linear meters of seawall rehabilitated along Ocean Road and Kingamboni	Dar es salaam seawall (2.6km) showing signs of severe degradation at Ocean Road and Kingomboni	visual observation, engineering reports
	Cleaning up of the drainage channels, rehabilitation of storm drains in Dar es Salaam	Effective storm and flood drainage systems in urban areas and near coastal communities	change in number of urban flooding events related to storm and severe rainfall	a 50% reduction in the number of flooding events during rainy season	according to recent data there have been on average 5 flooding events in Dar es Salaam city center during rainy seasons over the past 5 years	visual observation, engineering reports
Component 2 - Ecosystem-Based Integrated Coastal Area Management (EBICAM)						
Outcome 2 - Coastal ecosystems are rehabilitated and ICAM is implemented						
	Coastal ecosystem rehabilitation for climate resilience through the implementation of a GreenJobs program	appropriate alternative energy (efficient cookstoves, small solar) technology transferred	% change in fuelwood use; Number of people with access to alternative or efficient energy sources (disagregated ed by gender)	at least 30% decrease in use of fuelwood; 1500 households have access to alternative and or efficient energy sources	Average wood fuel consumption per capita in Tanzania is 1 to 1.3m^3; fuelwood efficiency is estimated at less than 10% on average in all sites; estimated mangrove deforestation rate is 2% per year	reports, visual observation, household surveys
		Mangrove rehabilitation through planting of resilient seedlings, dredging and the creation of no-take buffer zones;	area of mangroves under rehabilitation	40 hectares of mangroves under rehabilitation in severely degraded strands in Dar es Salaam area	there are approximately 2,000 ha of mangroves in Dar es Salaam surroundings	reports, visual observation, mangrove and forest studies

		degraded coral reefs rehabilitated and protected	area of reef rehabilitated	2000 m2 in front of Dar es Salaam, with an increase of 75% annually	No recent local data available. Latest data sets show low biocover in existing reefs	visual observation , project reports
		Shoreline rehabilitated and stabilized using trees and grasses	Km of shoreline stabilized using vegetation	30,000m^2 in Dar broader area	rate of coastal erosion estimated between 3 and 8m per year according to recent site specific surveys	visual observation , project reports
Component 3 - Knowledge, coastal monitoring and policy linkages						
Outcome 3 - Knowledge of climate impacts and adaptation measures is increase						
	stocktaking and assessment of physical coastal processes	Performance of a baseline study	availability of a comprehensive baseline study for coastal vulnerability; available knowledge gathered	1 baseline study in year 1	no such study; there is no recent comprehensive desk review of available knowledge	project reports, baseline study
	monitoring of the evolution of coastal processes	A climate change coastal observatory for Tanzania for ongoing monitoring of CZM and Coastal environmental status and scientific research	effective implementation of clearing house function	clearing house function is operational by mid-term	There is no climate change clearing house mechanism	project reports, institution reports
			cost-effective measures are identified for upscaling and policy uptake	measures are identified for upscaling and policy uptake on an ongoing basis	ad hoc assessments available but none specific to this project	reports from climate observatory, project reports
	policy linkages	lessons learned from the project outputs documented	number of policy briefs provided to key sectors and regulators; number of workshops	3 briefing notes per year; 2 workshops during the project	While there is a good degree of information on climate change, there is no systematic effort to inform policy makers based on project outcomes	project reports; briefing materials; workshop reports
		district level administration have the capacity to adequately manage rehabilitated infrastructure	Amount dedicated to infrastructure maintenance from district budgets	Dar es Salaam Municipal councils earmarks appropriate annual allocations for infrastructure maintenance.	infrastructure budgets within district administrations are low	project reports, plans and policies, district-level budgets

		One EBICAM plan for the coastal region approved	Number of plans approved	1 plan	no plans yet available but ICZM capacity exists	project reports, plans and policies

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. **RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT**[58] *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

Eng. Ngosi C.X. Mwihava (see attached Annex 6: Letter of Endorsement)	Date*: 8 August, 2011*

B. IMPLEMENTING ENTITY CERTIFICATION *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

6. Each Party shall designate and communicate to the Secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
Ibrahim Thiaw ,Director, Division of Environmental Policy and Implementation *Implementing Entity Coordinator*	
Date: *(Month, Day, Year)* *10 October, 2011*	Tel. and email: Tel: +254 20 7624782 Email: Ibrahim.thiaw@unep.org
Project Contact Person: Ermira Fida, UNEP-GEF Adaptation Portfolio Manager, UNEP.	
Tel. and email: +254-20-762-3113, ermira.fida@unep.org	

List of Annexes:

1. Itemized Budget and Expenditure Plan
2. List of Ongoing relevant projects
3. Summary of key aspects of project sites
4. Additional technical specifications
5. Note on the use of the Implementing Entity Project Fee
6. Letter of Endorsement
7. Summary of UNEP Expertise and Experience
8. Preliminary Environmental and Social Impact Assessment
9. Letter from Mayor of Dar es Salaam
10. Maps
11. Interim modalities and Terms of reference for the GreenJobs program
12. References and relevant studies
13. Preliminary Logical Framework for LDCF Coastal Adaptation Project (subject to approval and revision by the LDCF Council)
14. Alignment of project objectives with Adaptation fund results framework

Annex 1 – Itemized budget and expenditure plan

			1	2	3	M&E	Project Execution	Total							Notes
UNEP Budget Line									Year 1*	Year 2*	Year 3*	Year 4	Year 5	**Total**	
10	**PERSONNEL COMPONENT**														
	1100	Project personnel													
	1101	National project coordinator					125,000.00	**125,000**	25,000	25,000	25,000	25,000	25,000	**125,000**	1
							-	**-**	-	-	-	-	-	**-**	
	1199	**Sub-total**	**-**	**-**	**-**	**-**	**125,000**	**125,000**	**25,000**	**25,000**	**25,000**	**25,000**	**25,000**	**125,000**	
	1200	Consultants						**-**						**-**	2
	1201	mangrove specialist		15,000				**15,000**	-	-	15,000	-	-	**15,000**	3
	1202	reef specialist		30,000				**30,000**	-	-	30,000	-	-	**30,000**	4
	1203	coastal rehabilitation specialist		25,000				**25,000**	-	-	10,000	10,000	5,000	**25,000**	5
	1204	rural energy consultant		24,000				**24,000**	8,000	8,000	8,000	-	-	**24,000**	6
	1205	Coastal zone adaptation specialist			140,000			**140,000**	30,000	30,000	30,000	30,000	20,000	**140,000**	7
	1206	Ecosystem Management Specialist			30,000			**30,000**	30,000	-	-	-	-	**30,000**	8
	1210	knowledge management expert			40,000			**40,000**	20,000	20,000	-	-	-	**40,000**	9
	1211	Coastal Climate Adaptation Consultant			15,000			**15,000**	-	-	-	15,000	-	**15,000**	10
	1212	Climate Change Knowledge Specialist			50,000			**50,000**	10,000	10,000	10,000	10,000	10,000	**50,000**	11
	1213	coatal zone management specialist			40,000			**40,000**	-	10,000	10,000	10,000	10,000	**40,000**	12
	1299	**Sub-total**	**-**	**94,000**	**315,000**	**-**	**-**	**409,000**	**98,000**	**78,000**	**113,000**	**75,000**	**45,000**	**409,000**	
	1300	Administrative Support						**-**						**-**	
	1301	financial manager					75,000	**75,000**	15,000	15,000	15,000	15,000	15,000	**75,000**	13
	1399	**Sub-total**	**-**	**-**	**-**	**-**	**75,000**	**75,000**	**15,000**	**15,000**	**15,000**	**15,000**	**15,000**	**75,000**	
	1600	Travel on official business						**-**						**-**	
	1601	mgmt travel to sites					-	**-**						**-**	
	1699	**Sub-total**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
1999	**Component total**		**-**	**94,000**	**315,000**	**-**	**200,000**	**609,000**	**138,000**	**118,000**	**153,000**	**115,000**	**85,000**	**609,000**	
								-						**-**	
20	**SUB-CONTRACT COMPONENT**							**-**						**-**	
	2100	Sub-contracts (MOUs/LOAs for cooperating agencies)						**-**						**-**	
	2101	sub-contract NGO reef rehab		60,000				**60,000**	-	-	10,000	50,000	-	**60,000**	14
								-						**-**	

	2199	**Sub-total**	**-**	**60,000**	**-**	**-**	**-**	**60,000**	**-**	**-**	**10,000**	**50,000**	**-**	**60,000**	
	2200	Sub-contracts (MOUs/LOAs for supporting organizations)						-						-	
	2205	sub-contract agri-research lab for pod multiplication		20,000				**20,000**	-	-	20,000	-	-	**20,000**	15
	2299	**Sub-total**	**-**	**20,000**	**-**	**-**	**-**	**20,000**	**-**	**-**	**20,000**	**-**	**-**	**20,000**	
	2300	Sub-contracts (for commercial purposes)						-						-	
	2301	subcontract coastal engineering firm for seawall rehab	3,337,500					**3,337,500**	-	1,668,750	1,668,750	-	-	**3,337,500**	16
	2302	sub-contract civil enginieering firm for drainage rehab	200,000					**200,000**	-	-	100,000	100,000	-	**200,000**	17
	2303	sub-contract env.engineering firm for mangrove		10,000				**10,000**	-	-	10,000	-	-	**10,000**	18
				-				**-**	-	-	-	-	-	**-**	
	2305	labour costs		10,000				**10,000**	-	-	5,000	5,000	-	**10,000**	19
	2399	**Sub-total**	**3,537,500**	**20,000**	**-**	**-**	**-**	**3,557,500**	**-**	**1,668,750**	**1,783,750**	**105,000**	**-**	**3,557,500**	
2999	**Component total**		**3,537,500**	**100,000**	**-**	**-**	**-**	**3,637,500**	**-**	**1,668,750**	**1,813,750**	**155,000**	**-**	**3,637,500**	
								-						-	
30	**TRAINING COMPONENT**							-						-	
	3200	Group training						-						-	
	3202	community training on renewable and efficient energy (through NGO and GreenJobs)		10,000				**10,000**	-	10,000	-	-	-	**10,000**	20
	3203	community and user association training on sustainable mangrove management		10,000				**10,000**	-	-	10,000	-	-	**10,000**	21
	3204	community-level and district training on coastal ecosystem management		10,000				**10,000**	-	-	-	10,000	-	**10,000**	22
	3205	District-level trainings on ecosystem based coastal adaptation			10,000			**10,000**	-	-	10,000	-	-	**10,000**	23
	3206	district-level financing and budgeting assistance			10,000			**10,000**	-	-	-	10,000	-	**10,000**	24
	3299	**Sub-total**	**-**	**30,000**	**20,000**	**-**	**-**	**50,000**	**-**	**10,000**	**20,000**	**20,000**	**-**	**50,000**	
	3300	Meetings/Conferences						-						-	
	3301	EBICAM Consultation and validation meetings			10,000			**10,000**	-	-	-	-	10,000	**10,000**	25
	3302	Climate Change Observatory meetings			40,000			**40,000**	-	10,000	10,000	10,000	10,000	**40,000**	26

	3303	Policy Briefing Workshops			20,000			**20,000**	-	-	5,000	5,000	10,000	**20,000**	27
							-	**-**	-	-	-	-	-	**-**	
	3399	**Sub-total**	**-**	**-**	**70,000**	**-**	**-**	**70,000**	**-**	**10,000**	**15,000**	**15,000**	**30,000**	**70,000**	
3999	**Component total**		**-**	**30,000**	**90,000**	**-**	**-**	**120,000**	**-**	**20,000**	**35,000**	**35,000**	**30,000**	**120,000**	
								-						**-**	
40	**EQUIPMENT AND PREMISES COMPONENT**							**-**						**-**	
	4100	Expendable equipment						**-**						**-**	
	4102	seedlings, saplings, materials for mangrove rehab		-				**-**	-	-	-	-	-	**-**	28
	4103	trees, seedlings, fertilizers (shoreline reforestation)		22,500				**22,500**	-	-	7,500	7,500	7,500	**22,500**	29
	4104	office equipment and expendables					20,000	**20,000**	8,000	3,000	3,000	3,000	3,000	**20,000**	30
	4199	**Sub-total**	**-**	**22,500**	**-**	**-**	**20,000**	**42,500**	**8,000**	**3,000**	**10,500**	**10,500**	**10,500**	**42,500**	
	4200	Non-expendable equipment						**-**						**-**	
	4201	small alternative energy appliances		42,500				**42,500**	21,250	21,250	-	-	-	**42,500**	31
	4202	computers and database software			10,000			**10,000**	10,000	-	-	-	-	**10,000**	32
	4203	vehicle and maintenance costs					50,000	**50,000**	30,000	5,000	5,000	5,000	5,000	**50,000**	33
	4299	**Sub-total**	**-**	**42,500**	**10,000**	**-**	**50,000**	**102,500**	**61,250**	**26,250**	**5,000**	**5,000**	**5,000**	**102,500**	
4999	**Component total**		**-**	**65,000**	**10,000**	**-**	**70,000**	**145,000**	**69,250**	**29,250**	**15,500**	**15,500**	**15,500**	**145,000**	
								-						**-**	
50	**MISCELLANEOUS COMPONENT**							**-**						**-**	
	5500	Evaluation						**-**						**-**	34
	5501	Audit				24,688		**24,688**	4,910	4,910	4,910	4,910	5,048	**24,688**	35
	5582	Independent mid-term evaluation				40,000		**40,000**	-	-	40,000	-	-	**40,000**	
	5583	independent final evaluation				40,000		**40,000**	-	-	-	-	40,000	**40,000**	
	5599	**Sub-total**	**-**	**-**	**-**	**104,688**	**-**	**104,688**	**4,910**	**4,910**	**44,910**	**4,910**	**45,048**	**104,688**	
5999	**Component total**		**-**	**-**	**-**	**104,688**	**-**	**104,688**	**4,910**	**4,910**	**44,910**	**4,910**	**45,048**	**104,688**	
99	**GRAND TOTAL**		**3,537,500**	**289,000**	**415,000**	**104,688**	**270,000**	**4,616,188**	**212,160**	**1,840,910**	**2,062,160**	**325,410**	**175,548**	**4,616,188**	
							MIE fee	**392,376**							
							TOTAL	**5,008,564**							

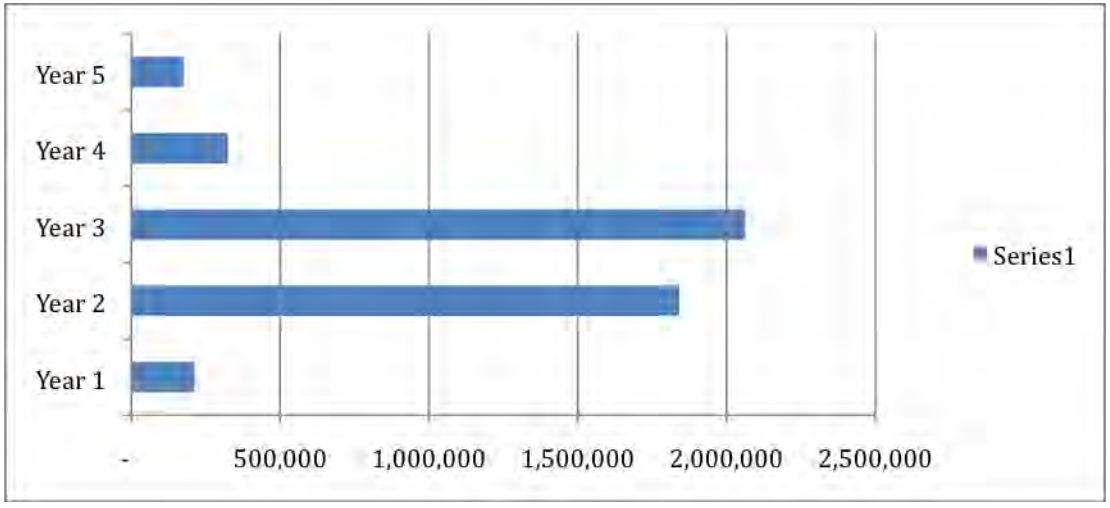
Budget notes

1	Salary costs for National project coordinator to be housed within VPO
2	Consultancies = all consultancies are calculated on the basis of 200$/day for national consultants and 600$/day for international consultants. Consultancy fees for international consultants are inclusive of travel and per diem costs where necessary
3	Consultancy contract for a mangrove rehabilitation expertise under Component 2
4	Consultancy contract for reef rehabilitation and management technical advice towards reef rehabilitation activities under Component 2
5	Consultancy contract for technical advice on shoreline rehabilitation and revegetation under Component 2
6	Consultancy for the provision of advice on energy efficiency and fuel switching under component 2
7	Consultancy contract for the provision of long-term expertise on coastal zone adaptation in support of all project components and to act as senior technical advisor
8	Consultancy contract for the provision of services in completing the project baseline study under Component 3.
9	Consultancy contract for the operationalization of the Climate Change Observatory Clearing House Functions, Component 3
10	Consultancy contreact for the provision of expert advice on cost effectiveness and cost-benefit analysis of implemented measures, under Component 3
11	Consultancy contract for the provision of services under Component 3, towards the development of policy briefing material and extraction of project lessons and best practices
12	Consultancy for the development of the EBICAM plan under Component 3
13	Salary for finance and procurement manager to support project management functions, under Execution costs
14	Sub-contract to a local NGO to undertake reef rehabilitation and monitoring activities under Component 2. Includes staff costs and equipment rental costs (boat and diving equipment)
15	Sub-contract with an agricultural research laboratory for the production of reef rehabilitation biological material under Component 2 (substrates, pods, etc)
16	Sub-contreact with a civil works or coastal engineering firm for the seawall rehabilitation in Dar es Salaam under Component 1. Includes staff, equipement and material costs
17	Sub-contract with a civil works private sector firm for the provision of drainage rehabilitation services in Dar es Salaam and Muheza. Includes staff, equipment and material costs.
18	Sub-contract with a private sector forest engineering firm for the dredding and rehabilitation of mangroves, in collaboration with local communities. Includes the cost of labour and operational equipment.
19	Costs of a sub-contract to an environmental engineering firm for the execution of replanting and revegetation works along the shoreline
20	Costs of conducting on-site seminars on the use of renewable energies and efficient energy uses under Component 2. Includes facilitation costs as well as travel and DSA for the facilitators.
21	Facilitation costs for community mobilization on the sustainable use and management of mangroves, under Component 2.
22	Costs of training for district level officers and community-level leaders on coastal ecosystem management. Includes facilitation costs, space rental and expendables. Calculated on the basis of 2 sessions for an average of 20 persons each.
23	Costs of 1 training session on ecosystem based adaptation, spaced throughout the project for capturing project lessons under Component 2.
24	Costs of one training session and technical advice for district level administrations on the financing and mainstreaming of coastal adaptation options, specifically focusing on infrastructure maintenance under Component 3. Includes facilitation and space rental costs as well as DSA for travelling participants.
25	Costs of holding two local consultations on the development of the EBICAM plan under Component 2. Costs include facilitation, space rental, and DSA for travelling participants.
26	Costs of holding regular meetings of the Climate Change Observatory during its initial phase. Includes materials, expendables, equipment rental and document acquisition, as well as communications and network expenses.
27	Costs of holding three policy briefing workshops for legislators and policy makers on project outcomes and achievement under Component 3.
28	Purchase order for nursery-grown local mangrove saplings and fertilizing material for mangrove rehabilitation under Component 2
29	Purchase order for nursery-grown locally available trees and saplings and grass seeds for the revegetation of shorelines under Component 2.
30	Computers, software, telecommunications mateiral for project management.
31	Purchase orders for solar water heaters, small portable PV battery chargers and lighting systems and fuel efficient cookstoves as part of Component 2.
32	Operational equipment for the Climate Change Observatory clearning house mechanisms including computers and cataloguing software, communications and networking material.
33	Purchase order for project vehicles to allow site visits and regular maintenance costs. Under Project Execution costs.
34	Annual estimated costs of audit on financial accounts and production of financial statements.
35	Costs of consultancy for the evaluation of the project. Includes 1 national and 1 international expert and travel and DSA costs.

Planned Expenditure Plan

Schedule of Disbursements

Milestone	Month (1-60)	Amount	Note
Approval	1	475,286	includes MIE fee, and year 1 project execution fees (advance)
Inception	4	129,250	Year 1 project operation expenditures (advance)
Y1 APR, baseline study and MIRR workshop report, ESIA report	12	946,910	50% advance year 2 expenditures and year 2 project execution
Y2 Semi-annual PIR	18	894,000	50% year 2 expenditures
Y2 APR	24	1,077,535	50% advance on year 3 expenditures and Year 3 project execution
Y3 Semi annual PIR	30	984,625	50% year 3 expenditures
Y3 APR and MTE	36	189,160	50% advance on year 4 expenditures and Year 4 project execution
Y4 Semi-annual PIR	40	136,250	50% year 4 expenditures
Y4 APR	46	134,298	50% advance on Year 5 expenditures and Year 5 project execution
Y5 Semi-Annual PIR	52	24,750	30% year 5 expenditures
Y5 APR, Final Evaluation Report, Financial statements and closing reports	60	16,500	20% Year 5 expenditures
		5,008,564	



Annex 2. List of ongoing relevant projects

Project Title	Agency/Financiers	Total Amount (Million USD - rounded)	Objective	Dates	Regional scope	Main Sector	Linkages, synergies or potential duplication
Managing Water for Dar es Salaam	UN HABITAT	TBC	# Improve the efficiency and equity of water supply and use in Dar es Salaam # Improve the knowledge base of the impact of urbanization of water and aquatic ecosystems in Dar es Salaam # Create public awareness on urban water resources management and related environmental issues # To promote value based water education in formal and non-formal education aimed at increasing the understanding and creating a new water ethic among water providers and consumers	2006-2007	Dar es Salaam	water and sanitation	this project is a direct complementary intervention to the AF project scope. Since the AF project does not intend to support water infrastructure activities in Dar es Salaam, it will directly benefit from the UN Habitat intervention, which includes efforts to reduce leakage, wastage and illegal connections. Cooperation will be sought to benefit from project studies, partners and to ensure climate risks are mainstreamed
Promoting Environmentally Sustainable Development in Tanzania	UN-HABITAT	3.65	The Sustainable Cities National Programme in Tanzania operates under the programme Promoting Environmentally Sustainable Urban Development in Tanzania. The programme focuses on two objectives: consolidation of the environmental planning and management (EPM) process in the Greater Dar es Salaam City Council and use of the methodology and experience gained from implementation of the SDP. the projec aims to build the capacity of urban local authorities to manage urban development through training and communication, to establish an environmental management information system and strategic urban development planning framework; to create gender awareness in EPM and to address poverty eradication; and to assist the city municipalities to mobilize resources in order to ensure project sustainability.	1997-tbd	dar es salaam urban	urban development and municipal planning	there are potential linkages between this initiatve and the AF project through the development of spatial plans or building plans for coastal areas of Dar es Salaam city.
SFM Extending the Coastal Forests Protected Area Subsystem	UNDP-GEF	10,6	The aim of the project is to strengthen biodiversity management fundamentals within the Protected Area network in Tanzania. This project addresses the Coastal Forests which are arguably the most threatened of all hotspots ecosystems in Tanzania and Zanzibar islands.	2009-2014	Zanzibar, Kichi–Matumbi Hills, greater Rondo	forestry	This project benefits the AF project in that it provides a missing piece of ecosystem-based adaptation, namely the rehabilitation and protection of coastal forests as a buffering ecosystem. AF project

					system on the Tanzanian mainland		and this project will cooperate on sharing lessons, studies and technical advice. Although pilot activities are not implemented in common areas, cooperation will be sought at technical levels
Mainstreaming Climate Change in Integrated Water Resources Management in Pangani River Basin	UNDP-GEF	2.5	This project will initiate Integrated Water Resource Management (IWRM) frameworks in the Pangani River Basin of Northern Tanzania. These frameworks will address climate change and pilot adaptation measures. It is one of the first field-based climate change preparation projects in Eastern Africa with strong links to basin and national planning and policy, and as such will build national and regional capacity, provide lessons and serve as a national and regional demonstration site.	2006-2009	pangani district	Water manage ment	This project provides a valuable basis on which to build additional adaptation activities since it provides local and institutional capacity for integrated water resources management, namely through training, information and awareness raising, social mobilization. The project also promotes the integration of climate change concerns in basin managemnet, and is therefore consistent with the pricniples of Ecosystem-based management as contained in the AF proposal
Integrating environment into National Strategy for growth and reduction of poverty – PEI	UNDP-PEI	4	As a follow-up to the project on mainstreaming environment into MKUKUTA, this project aims at promoting integration of environmental issues into the implementation of MKUKUTA strategies. Components include: Capacity strengthening to integrate environment in sector and district plans and implement strategic poverty-environment interventions at local level; Improved access and utilization of poverty-environment data in the MKUKUTA process and local level planning ; Sustainable financing of environment targets in the MKUKUTA and in local level planning processes; and Promotion of efficient utilization of rangelands and empowering pastoralists through improved livestock productivity and market access.	2007-2010	national	policy	this project continues to provide the basis for environmental mainstreaming into national plans, policies and regulations, and will provide essential linkages between the AF project and national policy frameworks.
Integrating Environment into Poverty Reduction policies (phase II)	UNDP-UNEP	4	the project aims to support the integation of envronmental issues into the PSGRP (MKUKUTA) throughthe following expected outcomes: Institutional capacity further enhanced to integrate environment and livelihood issues into sector and district level plans, to implement strategic P-E interventions at local level, Improved access to and utilization of environment/livelihoods data for use in MKUKUTA process and at local level planning, Sustainable financing of environmental targets contained in the	2007-2010	national	policy	this project provides a basis on which the AF project is built, namely efforts to build institutional capacity for the effective consideration of environemtnal issues, including climate change, into national devleopment planning. This project will provide national-level awareness raising and a contribution to component 4

			MKUKUTA.Promoting efficient utilization of rangelands and empowering pastoralist to improve livestock productivity through improved and market access				of the AF project on policy linkages.
Expedited Financing for (Interim) Measures for Capacity Building in Priority Areas (Phase II)	UNEP	0.1	The project is being implemented as an interim capacity-building activity between the Initial and the Second Communications. Hence it is intended to complement activities of the Phase 1 project, related to the Initial Communication, while at the same time forming basis for initiation of the Second National Communication to the UNFCCC.	2010-?	national	policy	this project provides valuable capacity and information particularly in terms of vulnerability studies and climate models which will be brought into play in the AF project
Developing Core Capacity to Address Adaptation to Climate Change in Productive Coastal Zones	UNEP	10.8	To develop institutional capacities to manage climate change impacts through improved climate information, technical capacity, the establishment of demonstration projects to reduce vulnerability in key vulnerable areas, and learning. This project seeks to implement priorities of the National Adaptation Programme of Action (NAPA) in addition to barriers to implementation as identified in the NAPA report and terminal evaluation of the preparation phase of this project.	pipelined	tbd - national and coastal areas	coastal zone management	this project will be developed and executed in close collaboration with the AF project. Activities will be jointly implemented to minimize duplication and geographic scope will also be carefully delimited. It is expected that the LDCF project will focus on smaller-scale pilot initiatives
Addressing Land-based Activities in the Western Indian Ocean (WIO-LaB)	UNEP	11.4	addresses some of the major environmental problems and issues related to the degradation of the marine and coastal environment resulting from land-based activities (LBA) in the Western Indian Ocean (WIO) region. Project Objectives: 1) Improve the knowledge base, and establish regional guidelines for the reduction of stress to the marine and coastal ecosystem by improving water and sediment quality; 2) Strengthen the regional legal basis for preventing land-based sources of pollution; and 3) Develop regional capacity and strengthen institutions for sustainable, less polluting development.		regional indian ocean	marine and coastal zones	This project provides technical lessons learned from pilot activities in Tanzania and other countries related to the development of ecotourism, as well as on technologies for ecosystem-based resileince in coastal systems (e.g. the use of vetiver grass in erosion control and leachate treatment; rehabilitation of mangroves; wastewater management and anti-erosion)
Coastal Resilience to Climate Change: Developing a Generalizable Method for Assessing Vulnerability and Adaptation of Mangroves and Associated Ecosystems	UNEP-GEF	2	he purpose of the project is to develop a generalizable method and process to develop an effective adaptation strategy that could be adapted in different sites within common ecosystems. The project will focus its initiatives on a single ecosystem type - mangrove with near shore coral reefs. Further, the project will initiate pilot initiatives to test the adaptation strategy in the ecosystem to address and ameliorate climate change impacts. The overall goal of the project is to increase the resilience of vulnerable mangrove and coral reef ecosystems to the impacts of climate change	2007-2010	national	ecosystem-based adaptation	this project and findings from its implementation has formed a basis for the development of the AF initiative as it concerns mangrove rehabilitation and protection for adaptation and resilience.

Marine and Coastal Environment Management Project (MACEMP)	WB	63	The project development objective is to improve lives and livelihoods of coastal communities of mainland Tanzania and Zanzibar, through implementing participatory and integrated coastal development/economic activities while sustaining coastal resources. The Tanzania Marine and Coastal Environment Management Project aims to strengthen the sustainable management and use of the Borrower's Exclusive Economic Zone, territorial seas, and coastal resources resulting in enhanced revenue collection, reduced threats to the environment, better livelihoods for participating coastal communities living in the Coastal Districts, and improved institutional arrangements. The project consists of the following components: Component 1) will establish and implement a common governance regime for the Exclusive Economic Zone (EEZ) that contributes to the long-term sustainable use and management of EEZ resources. Component 2) will establish and support a comprehensive system of managed marine areas in the Territorial Seas, building on Integrated Coastal Management (ICM) strategies that empower and benefit coastal communities. Component 3) will empower coastal communities to access opportunities so that they can request, implement and monitor sub-projects that contribute to improved livelihoods and sustainable marine ecosystem management. Component 4) will provide efficient project implementation services	2005-2011	National with Community Funds in Kilwa, Rufiji, Mafia, Zanzibar	fisheries, coastal zone management	This project provides a basis on which to buld adaptation initaitives because it supports planning and policy for sustainable fisheries, improved licensing o f foreign vessels; enhanced monitoring, compliance and surveillance to regulate foreign commercial fishing fleets and reduce conflicts between artisanal and industrial fishing; establishment o f a sustainable financing mechanism; and improved fishery stock assessments on near- shore stocks. the project also supports strengthened spatial planning along the coastal margin, to develop a national system plan for marine managed and marine protected areas (MPAs), and to promote marine zoning that encourages local co-management. Although both projects do not work in similar areas, cooperation will be actively pursued
Sustainable Management of Inland Wetlands in Southern Africa: A Livelihoods and Ecosystem Approach	UNEP-GEF	1.3	The objective is to increase capacity for management of wetlands in government and non-governmental agencies in southern Africa by generating new knowledge on wetland functioning and development of sustainable land management (SLM) options for wetlands. The project will generate four outcomes. (1) Enhanced information available to decision-makers and other stakeholders in Southern Africa on wetland resources, attributes, linkages with surrounding catchments and degradation status and potential risk. (2) Guidelines for SLM in wetlands developed, based on new knowledge on functions of wetland types, their processes and linkages with catchments. These will comprise protocols to assess impacts and limits of human activities in wetlands and surrounding catchments. (3) Demonstrated innovative interventions for sustainable land and water management in wetland types utilized for agriculture	2004-2010	Regional Southern Africa	wetlands	this project will provide valuable technical insight on best available technologies for wetland rehabilitation as well as guidelines on sustainable land use. Cooperation will be established based on commonalities between project areas

			and other livelihood-supporting activities. (4) Enhanced capacity and awareness of sustainable management of wetlands in the southern Africa region at government, extension and grassroots levels.				
Dar es Salaam Water Supply and Sanitation Project	WB	164.6 million	The objective of the Dar es Salaam Water Supply and Sanitation Project for Tanzania is to provide a reliable, affordable and sustainable water supply service and improve the sewerage and sanitation in the 'service area' of the Dar es Salaam Water and Sewerage Authority (DAWASA) that includes Dar es Salaam and part of the coast region to help improve public health and well-being in a city prone to cholera outbreaks or other water-borne diseases and support productive activities of the country's main economic center. The completion of this contract will increase the likelihood of sustainability by allowing for the: (i) replacement of aged high lift pumps; and (ii) the procurement of necessary spares deemed essential to the continued functioning of the Upper Ruvu and Lower Ruvu plants. Both have been experiencing frequent breakdowns that have disrupted service delivery to Dar es Salaam. Efforts to procure the pumps begin in June 2009, however, there have been significant delays. The borrower first requested the association's approval to proceed with the purchase of the pumps on July 6, 2009. However, the first attempt to procure the pumps failed as quotations from shortlisted suppliers were considered expensive and the proposed delivery period extended beyond the initial project closing date of December 31, 2009. Processing of a second request for bids was therefore suspended until an extension of the project was granted up to June 30, 2010.	2003-2010	national	Water and sanitation and infrastructure	This project provides much needed support for water sector reform and rehabilitation in Dar Es Salaam. the AF project is not intervening in infrastructural works in Dar es Salaam due to this project's presence; however cooperation will be sought so that interventiosn conducted elsewhere benefit from best technology and knowledge generated by this project and so that aspcets related to climate resilience are integrated and mainstreamed
Pangani - Saadani Coastal Protection	WTO - STEP	TBC	The Sustainable Tourism for Eliminating Poverty (STEP) project is a global initiative funded by a group of donors and steered by the UN World Tourism Organization. The ST-EP program includes four main components. The first is a research base to identify linkages, principles and model applications. There is also an operating framework for promoting and developing incentives for good practice among companies, consumers and communities. Forums for sharing and exchanging information, ideas and plans		Pangani district	tourism	this project provides a useful model for the Sustainable Tourism Revolving Fund sought to be established by the AF project since it promotes a similar small scale model in the Saadani national park. Lessons from this project will be gathered and cooperation will be sought for the tourism component of the AF project.

			are designed to bring together private, public and non-governmental stakeholders. Finally, there is the ST-EP Foundation which was originally concerned with attracting new, dedicated financing from business, philanthropic and government sources.				
UN-REDD Program Tanzania	UNEP, UNDP, FAO	4,28 (phase 1)	This is a collaboration between FAO, UNDP and UNEP that seeks to assist developing countries to prepare and implement national REDD+ strategies. The programme does this by bringing together technical teams from around the world to help develop analyses and guidelines on Measurement, Reporting and Verification (MRV) of carbon emissions and flows as well as ensuring that forests continue to provide multiple benefits for livelihoods and environment while supporting the engagement of indigenous people and civil society at all stages of the design and implementation of REDD+ strategies. The programme also seeks to build a consensus and knowledge about REDD+ to ensure that REDD+ mechanism is included in a post-2012 climate change agreement. UN REDD programme in Tanzania outcomes are: 1) national governance framework and institutional capacities strengthened for REDD; 2) Increased capacity for capturing REDD elements within national Monitoring, assessment, reporting and Verification systems; 3) Improved capacity to manage REDD and provide other forest ecosystem services at district and local levels; 4) Broad based stakeholder support for REDD in tanzania.	2009-2011 (quick start phase) (Second phase: 2012-2015)	National scale	Forestry	This program provides a solid basis towards sustainability of project interventions as far as forests related interventions are concerned beyond its lifetime

Annex 3. Summary of project site characteristics

	Dar Es Salaam
rainfall	bimodal
mangrove	yes
sea wall	yes
forest	yes
port	yes
reef	
estuary	
dunes	yes
seagrass	
wetlands + swamps	yes
crops	yes, urban and periurban ag (vegetables, cassava, legumes, sweet potatoes, cashewnut, coconuts); fisheries; industry etc.
fish	yes
livestock	
existing climate hazards	drought, floods
anthropogenic pressures	pollution, poor urbanization, deforestation
future climate impacts	droughts, floods, SLR, decreased precipitation
reg. population (district)	2.5 million
poverty levels *% below poverty line in 2001	18% below poverty line (46% for Pwani region)

Annex 4 – Additional Technical Specifications

A. Technical specifications for the Sea wall at Dar es Salaam

All the initiatives related to the protection of the Tanzania coast are well coordinated and design through important documents such as Port Master Plan (2008-2028) and National Adaptation Programme of Action, 2007.

In all cases the functions of the seawall are to:

- To control the wave overtopping in consideration of the environmental conditions and others to which the sea walls concerned are subjected.

- To protect the land area behind the seawall from waves and storm surges.

As seen below, the seawall at Dar es Salaam in Ilala district is showing signs of severe degradation and near disappearance in places and needs to be rehabilitated to take into account the projected sea level rise. In the central area of the city, the main road, Ocean road, links the major city buildings (State House, commercial buildings and offices, foreign embassies, hospital, parks) and neighborhoods. In some areas, this road is now mere meters away from the water. See Annex 10 for maps

Figure 1: Current situation along coastal zone in Dar es salaam near ocean road

Figure 2-3: Current Situation Of The Sea Wall In Dar Es Salaam To Be Re-Constructed

Figures 4-5: Evidence of water movement towards the wall and wall degradation along ocean road.

Figure 6: Relation of the current sea wall to Ocean road and other infrastructure

Figure 7: Evidence of severe degradation in sea wall along Ocean road.

Figure 8: Ocean Road. Some stretches directly behind the sea wall are left bare, or with only sparse vegetation.

Proposed technical specifications of Dar es Salaam seawall at Ocean Road.

The height of the peak of the wall will be set to + 4.50 m Chart Datum based on the following elements[59]:

- Tides: The coast of Tanzania experiences a semi-diurnal tide with two almost equal maxima and minima during a lunar day (24.8 solar hours). Using Admiralty Charts and data published by the Tanzania Port Authority, it has been established that Dar es Salaam has the lowest water level after Lindi, while Bagamoyo has the highest water levels. From measured tides it was evident that the highest water levels are observed just before the winds change direction, i.e. in March/April and October/November. The maximum tidal range was over 4 metres (e.g. 4.25 metres in 1989). Flood tide the current direction is southerly (an average of 210 degrees) and at high tide the average direction is 150 degrees around Dar es Salaam. Under climate change scenario, a tidal current of between 1Kn – 3Kn was used to derive the specifications of the seawall.

- Wave action: Wave action on the coast is usually low because the shore is nearly everywhere protected by coral barrier islands, some 5 to 15 miles offshore. Wave action is strongest during those rare times when especially high tides coincide with local storms accompanied by strong onshore winds. On the average, the current speed is 0.1 m/s. Significant waves heights increase with increasing water level, from 0.1 metres in water depth of 0.5 metres to about 0.4 metres when the water depth reaches 2.4 metres. The wave period does not show significant variation with increasing water depth. The average wave period is 8 seconds. There is currently no reliable data on the impact of sea level rise on the amplitude and frequency of wave action: ESE swell with peak period of 8 seconds to 10seconds and wave height 0.5m and 2.5m from March to December, and NE wind wave with peak wave period of 6s to 8s and wave heights between 0.5m to 2.0m from December to February.

- Sea Level Rise: the potential mean sea level rise based on present and future climate change scenarios. As per National Communications and NAPA, the minimum level expected is 50cm and the maximum level expected is +1m.

- Surcote (local weather conditions): Analysed wind data shows that the 50-year return wind speeds are 13.5 m/s for Dar es salaam. Wind peaks in Dar es Salaam occur during February, April and July. Under a climate change scenario, the data has been also adjusted to take into consideration a modified precipitation regime (higher frequency of stronger rain events), and higher mean temperatures.

- And a safety margin (for example to take into account the phenomenon of compressing which follows construction).

[59] These elements were provided through existing data, as well as discussed at a workshop with engineers and experts from relevant ministries. While there exists no single repository of technical data on coastal parameters, and while a specific design of the sea wall should be subject to its own survey and engineering plans, the data included here is judged to be the best availble approximation. See also Annotated Bibliography of Tanzania Coastal and Marine Science, 2000.

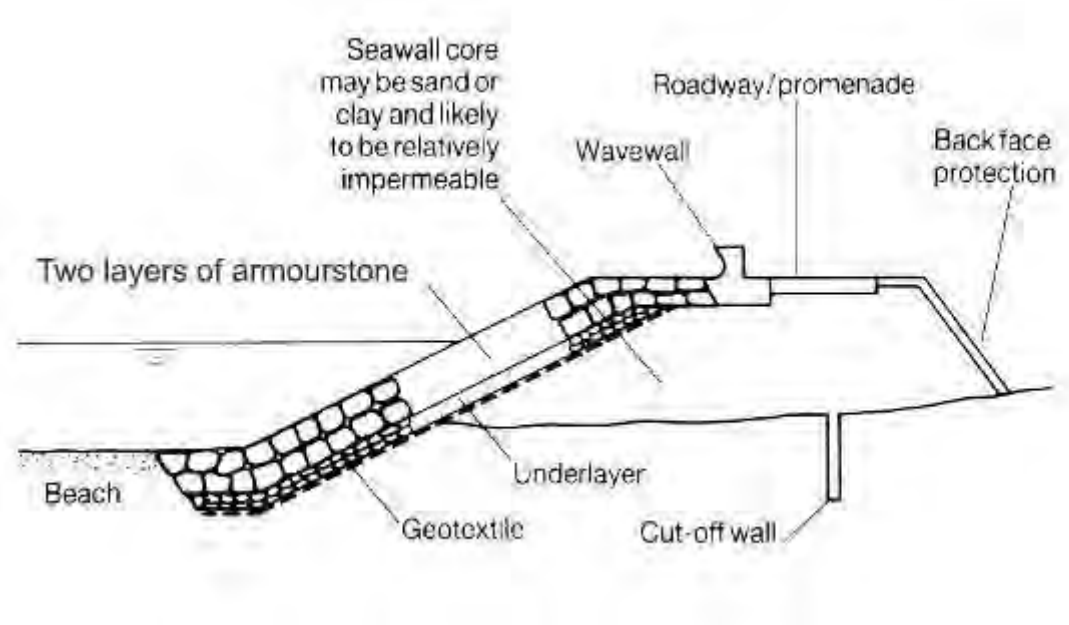


Figure 7: Typical cross section of the seawall

The table below shows the specifications of the planned coastal infrasructure.

General Configuration	Value
Total Length of the zone to be rehabilitated/constructed (m)	1020
Width wall and walk and riprap (m)	17
Total width (m)	22.5
Distance of the structure from the line of reference (m)	+10
Baseline on which the basis of the work will rest (m)	-3.4

B. Cleaning and Rehabilitation of Drainage systems

The design and technical specifications of the drainage systems in Tanzania will be subject to targeted, site-specific, engineering and hydrological reviews during project implementation. For example, new storm drain designs are usually subject to highly specific data requirements, including: total drainage area, length of the hydraulically longest drainage path, elevation of the watershed ridge, elevation of the watershed outlet, hydrologic soil group, type of terrain, land use, and information on the extent of development in urban areas. However, as this project concerns the rehabilitation, cleaning or upgrade of existing systems, based on available information and technical data, the following parameters have been outlined for the upgrade of urban drainage (e.g. storm drains), based on the Dar es Salaam case.

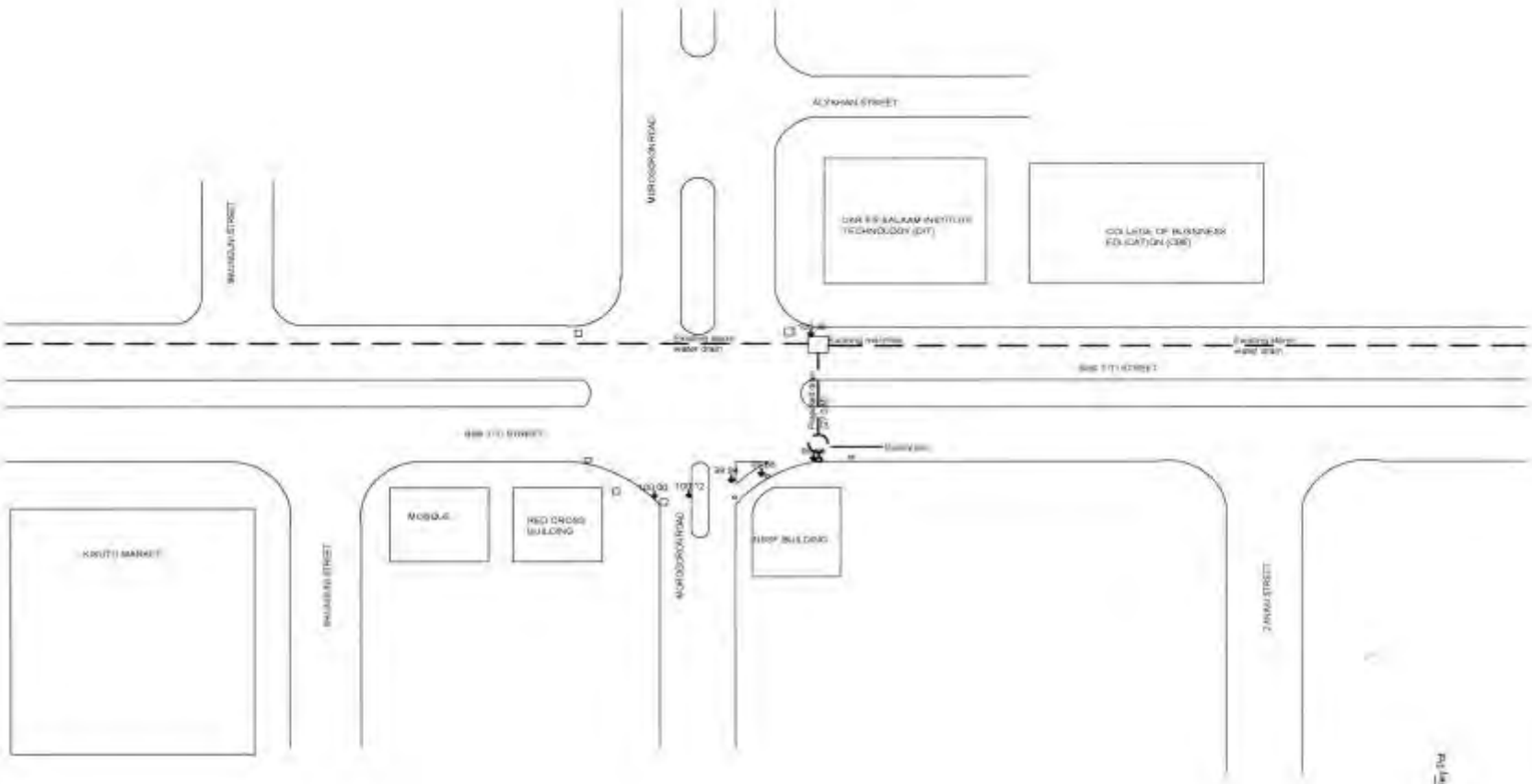
As per current practice, storm drain systems are designed to take into consideration the following minimum requirements (each element is defined according to recognized engineering standards and formulas):

- Base flood, flood frequency, and magnitude: The Base flood is a flood occurring every 100 years (taken as the maximum extreme). The frequency of occurrence or return period represents the average period of time between events equal to or greater than a given magnitude.

- Inlet type and positioning, conduit location and length: Trunk or main line conduits are located outside the roadway pavement. he final location of a conduit system is established in such a manner that its length is a minimum consistent with hydraulic requirements. Flowline depth or vertical location of conduit is generally determined by size of conduit and slope requirements. Flowline depth or vertical location of conduit is generally determined by size of conduit and slope requirements. A minimum depth of cover of 3.0 ft. is recommended. Manholes are installed at all changes in pipe grade or size.

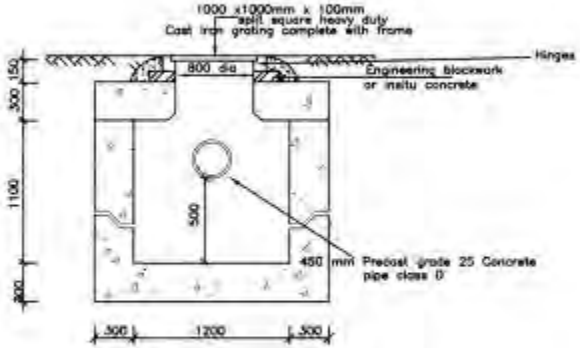
- Time of concentration and rate of discharge: The time of concentration (for pipe sizing) is defined as the time required for water to travel from the most hydraulically distant point. Typically, this time consists of two components: 1) the time for overland and/or gutter flow to reach the inlet, and 2) the time to flow through the storm sewer system to the design point.

Below are additional details on the design of the Dar es Salaam drainage system, and expected rehabilitation works.

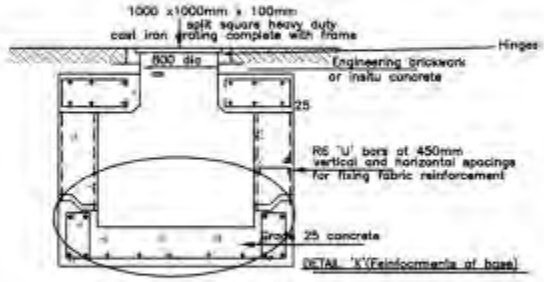


Layout Plan

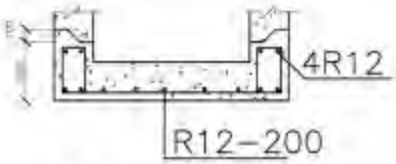
Longitudinal section



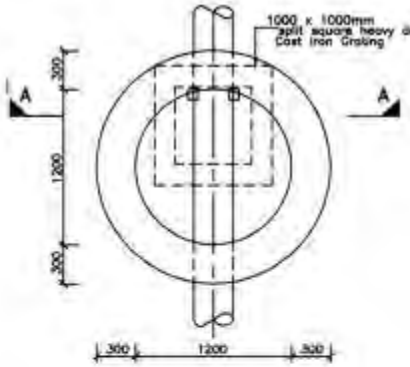
GULLEY POT



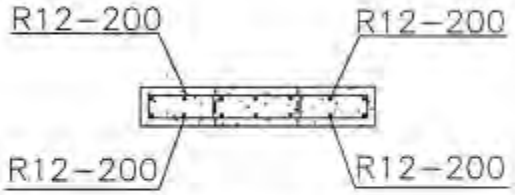
REINFORCEMENTS
OF GULLEY POT



DETAIL 'X'(Feinforcments of base)



GULLEY POT PLAN



REINFOCEMENTS
OF CAVERS

Rev Date: June 2009

Architects:

Engineers:
ILALA MUNICIPAL
COUNCIL

Client:
ILALA MUNICIPAL
COUNCIL

Job Title:
PROPOSED STORMA
WATER DRAIN AT BIBI TITI
STR/MOROGORO ROAD

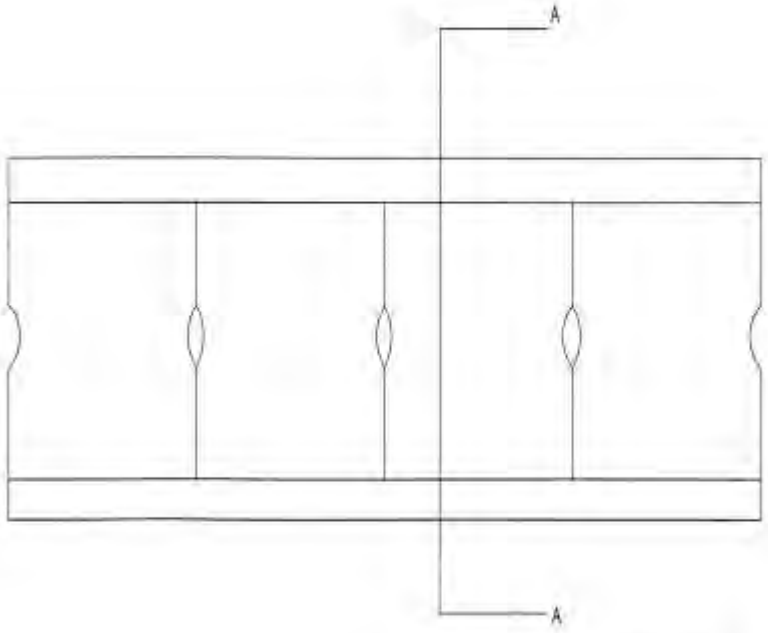
Drawing Title:
GULLEY POT
DETAIL

Designed By:	Checked By:
WD IMC	

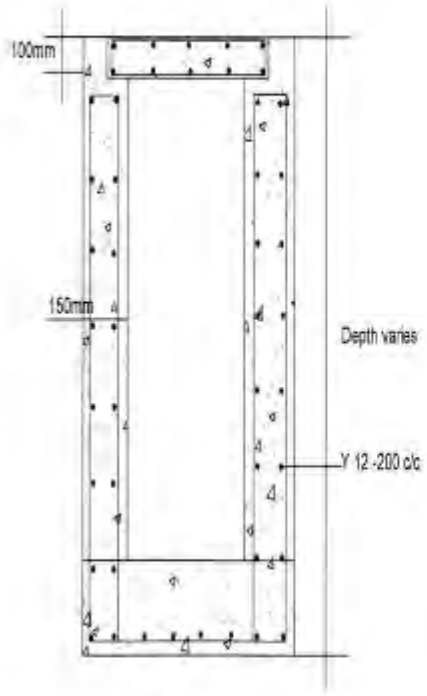
Scale	Date	Drawn
NO SHOWN	AUG 2009	CMH

Drg. No.: IMC/WD/BM/DR/02

Rev. Num.:



Drainage plan



Section A-A

Client
ILALA MUNICIPAL COUNCIL

Job Title
CONSTRUCTION OF STORM WATER DRAIN ALONG OMARI RONDO STREET

Drawing Title
Layout Plan & Sections

Designed By	Checked By	
Scale: 1:250 & 1:20	Date: Aug 2009	Drawn

Drg. No: IMC/WD/ OR/01

Rev. No:

C. Technical Specifications for Ecosystem Rehabilitation

Below are additional technical details on the activities that are proposed as part of Component 3.

C.1 Mangrove Rehabilitation

Mangrove rehabilitation is to be undertaken in each of the three sites, with a targeted area of 600ha total rehabilitated mangrove surface. Mangrove restoration aims to return an area to a condition more closely resembling its original state, including restoring the full range of biological diversity and all the essential ecological processes.

First for a given area of man- groves or former mangroves, the existing watershed needs to be analyzed, and in this case in particular, changes to the coastal plain hydrology will be documented. A forward-looking analysis will also be performed to determine the potential impacts of sea level rise on saltwater content and internal hydrological flows and bathymetry. Factors to be analysed in mangrove restoration projects include:

- Size and extent of drainage basin
- Extent and area of mangroves at the downslope (i.e., toward the sea) end of the basin
- Topography and bathymetry of the mangrove areas
- Hypsometric characteristics to calculate the current tidal prism of the mangrove areas
- Rates of terrestrial input of water, sediment, and nutrients

Mangrove restoration can take two paths: one, based on natural processes, consists in restoring the hydrological flows and functions (ie the natural ecoleogy of the mangrove) and to establish no-take zones, so as to allow for natural revegetation (known as the Ecological Mangrove Restoration method). However, this may not achieve intended results in terms of growth speed and quality. In this event, mangrove tree species produce propagules that can be collected and planted and, in the right conditions, growth is fast. Propagules may be planted directly which is generally adequate (particularly for Rhizophora spp.), although seedlings and saplings can be grown to a height of 0.3-1.2m beforehand. Where seedlings will be planted, they will be grown from existing species (taken from local samples).

In the case of Tanzania, both methods will be applied in all three sites, including with the creation of temporary mangrove tree nurseries, when not already existing. In Dar es Salaam, the accent will be on replanting. In all cases, locally available seeds will be used. Nine mangrove tree species are found in Tanzania[60].

Tree species		*Family*
1	*Avicennia marina*	*Verbenaceae*
2	*Bruguiera gymnorrhiza*	*Rhizophoraceae*
3	*Ceriops tagal*	*Rhizophoraceae*
4	*Heritiera littoralis*	*Sterculiaceae*
5	*Lumnitzera racemosa*	*Combretaceae*
6	*Rhizophora mucronata*	*Rhizophoraceae*
7	*Sonneratia alba*	*Sonneratiaceae*
8	*Xylocarpus granatum*	*Meliaceae*
9	*Xylocarpus molluccensis*	*Meliaceae*

A buffer zone will be established around replanted and transplanted sites, and no-take zones will be enforced through community-based management agreements. Monitoring of tree growth will occur every 6 months.

[60] Remote Sensing of Mangrove Change along the Tanzania Coast, Marine Geodesy, 26:1–14, 2003

C.2 Coral Reef Rehabilitation

Coral reefs have great socio-economic importance in Tanzania. They are abundant with finfish, lobsters, prawns, crabs, octopuses, mollusks and sea cucumbers, thus supporting a large part of artisanal fish production as well as being important for commercial fishing. Coral reefs are located along about-two thirds (600 km) of Tanzania's continental shelf. Fringing reefs and patch reefs predominate. These reefs are found along the continental shelf, which is 8–10 km wide along most of the coast (IUCN Conservation Monitoring Center, 1988). The islands of Zanzibar, Pemba and Mafia, as well as numerous small islands all along the coast, are for the most part surrounded by fringing reefs. Also an outer fringing reef runs along the eastern side of both the Mafia and Songo Songo archipelagos. Fringing reefs of Tanzania are usually narrow and often consist primarily of a reef flat. The fringing reef system is broken by numerous mangrove stands. Reefs on the landward sides of offshore islands and patch reefs usually have good coral development, but often the reef slope does not extend below 10 m. On the contrary, reefs on the seaward sides of islands and patch reefs have extensive reef slopes[61].

In the case of coral reef ecosystems, several restoration techniques can be applied (Wagner, 2000). A simple technique is the physical removal of sediments, rubble, and sometimes algae from the surface of reef structures to facilitate the settlement and establishment of corals. A second method is the transplantation of coral fragments taken from healthy colonies (Guzman, 1991; Clark and Edwards, 1994). Coral fragments are stuck onto suitable substrate using cement or glue. A third method is the broadcasting of coral fragments loosely onto the substratum (Lindahl, 1998). This method can be used for transplanting large, heavy fragments in deeper sites. A fourth method is the placement or creation of artificial substrates or reef structures (Edwards and Clark, 1992; Clark and Edwards, 1994), such as concrete blocks or ceramic tiles (Nzali et al., 1998). These provide suitable substrate for the settlement and establishment of coral larvae.

Methods to be used in this project will include, for the most part, assisted passive restoration, meaning that some restoration activities will be put in place in order to facilitate the ecosystem's natural regeneration – coupled with conservation and enhanced management. For example, coral larvae transplants will be used to restablish coral populations. Recruitment to a restoration site can be regarded as a three-stage process. Firstly, planktonic coral larvae can either be produced by spawning or planulation of remnant corals at the site or be carried from nearby reefs with healthy coral populations. A range of factors, including the topographic complexity of the site, presence of crustose coralline algae, amount of fleshy macro-algae, sediment build-up on surfaces, and amount of grazing by herbivorous fish and urchins to create bare space will determine what proportion of the larvae succeed in settling62. Stabilisation of the substrate is also another factor and various methods have been used, ranging from highly specialized civil engineering works, to low-tech methods such as the use of plastic mesh placed over the substrate. In this case, low-tech measures will be used wherever stabilization is necessary. No ex situ nurseries will be established, but rather coral material will be taken from existing healthy sites and transplanted to damaged areas, using in situ floating nurseries.

[61] Greg M. Wagner, Coral Reefs and Their Management in Tanzania, Western Indian Ocean Journal, 2004.
[62] Coral Reef rehabilitation manual, Alastair Edwards, Ed. 2010.

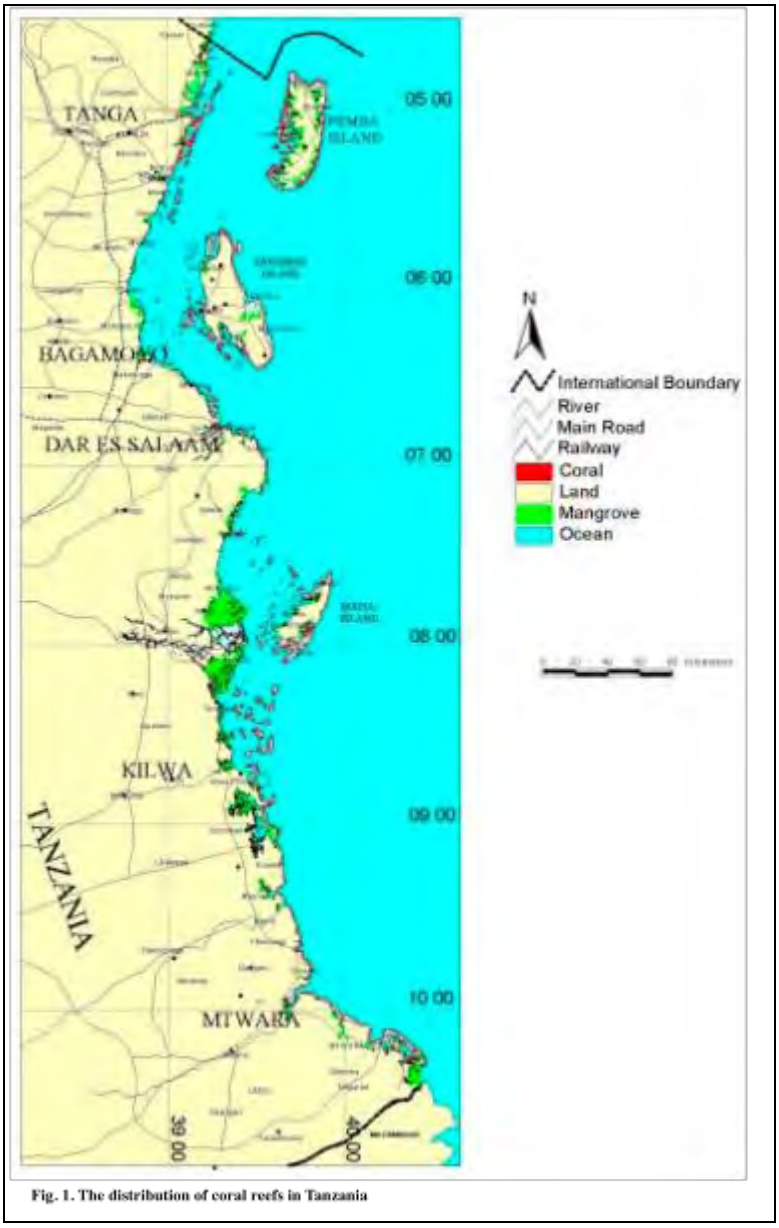


Fig. 1. The distribution of coral reefs in Tanzania

C.3 Shoreline Stabilization

Shoreline stabilization works will consist in replanting of native trees, bushes and grasses in a 1500 meter by 20 meter band. No bulkhead will be created, since this will act as a third line buffer zone. Works will be conducted under the supervision of district-level forestry services, using established channels and nurseries, with the cooperation of local NGOs and community based organizations, as well as support from participants in the GreenJobs programme created through this project. Replanting will occur in un-used areas directly above rehabilitated areas or in front of major infrastructures (e.g. between the road and the beach). Species to be used will be selected based on resistance to flood, aridity and salinity, and will combine grown saplings with seedlings and grasses. 25 species have been identified as potentially suitable for coastline reforestation and

shore stabilization in Tanzania, based on previous experience. Species selection will be undertaken in collaboration with local NGOs, district council experts and climate change advice regarding resilience. In addition to these potential 25 species, grasses such as vetiver (in dune context) and wetland species will also be used.

LOCAL NAME	SCIENTIFIC NAME
Mkaaga	*Eugenia capensis*
Mchechepwa	Un identified
Mkadi	*Pandanus kirkii*
Mla kasa	*Ipomoea prescaprae*
Mdeke(Mtumbaku)	*Scaevola sericea*
Haungongwa	*Psychotria mahonii*
Mpepe	*Dodonea viscose*
Mwiza	Unidentified
Msiliza	*Euclea natalensis*
Mbupuri	Unidentified
Mkole Pwa	*Grewia mollis*
Mkomwe	*Caesalpinia bonduc*
Mkungupwa	*Guettarda speciosa*
Mtunda	*Melea azadrachta*
Mkatani	*Agave sesaliana*
Mngombe	*Ozoroa obovata*
Mkandika	*Sideroxylon inerme*
Kidaramba	*Lumnitzera racemosa*
Mkungu	*Terminalia catappa*
Mdaa	*Euclea racemosa*
X-mas Tree	*Delonix regia*
Mla ninga	*Ficus ingens*
Mwache	Unidentified
Mti kama mlakasa	Unidentified
Mlala ngao	*Ficus lutea*

The activity also includes training at district and community level on the appropriate management and use of these recreated buffer areas. Recreational installations may be considered at a later date, depending on tree implantation (benches, tables, etc). Monitoring will take place once a month as a follow-up on the survival rate of the trees.

Annex 5. Note on the use of the Implementing Entity Project Fee

Tanzania - Adaptation Fund MIE fee budget	8.5% Fee	Project	Total financing
Overall coordination and management	80,437		
Oversight and management of project development and project implementation	101,233		
Financial management, including accounting, treasury, grant and trust fund management	61,211		
Information and communication management	21,581		
Quality assurance including internal and external audits (Note 1)	39,238		
Overall administration and support costs	88,676		
Total indirect costs (Note 2)	**392,376**	**4,616,188**	**5,008,654**
Note 1 – This portion of the MIE fees is used to oversee the M&E function of the project by the MIE.			
Note 2 - Direct costs will be recovered from the project			

Annex 6. Letter of Endorsement

THE UNITED REPUBLIC OF TANZANIA

Telegrams: "MAKAMU"
Telephone: 213983/2118416
Fax: 2125297/2113856/2113082
E-mail: ps@vpo.co.tz

VICE-PRESIDENT'S OFFICE
P. O. BOX 5380
DAR ES SALAAM
TANZANIA

Ref No: BD. 38/202/01/III/31

6th October, 2011

The Adaptation Fund Board Secretariat,
1818 H Street NW,
MSN G6-602,
Washington, DC. 20433,
UNITED STATES OF AMERICA.

Fax: 1(202) 522-3240/5
Email: secretariat@Adaptation-Fund.org

RE: ENDORSEMENT OF THE PROJECT ON "IMPLEMENTATION OF CONCRETE ADAPTATION MEASURES TO REDUCE VULNERABILITY OF LIVELIHOOD AND ECONOMY OF COASTAL COMMUNITIES IN TANZANIA"

Regarding the subject, the Vice President's Office, Division of Environment, being the Designated Authority (DA) of the Adaptation Fund, confirms that the captioned project conforms with the National Climate Change priorities, including the National Development Vision 2025, the National Adaptation Programme of Action (NAPA) and the National Adaptation Strategy and Action Plan.

I therefore wish to endorse and re-submit the project proposal with a budget of US$ 5,008,564 for funding through UNEP as a Multilateral Implementing Entity.

Your consideration and cooperation is highly appreciated.

Mwihava
Eng. Ngosi C.X. Mwihava
ACTING PERMANENT SECRETARY

Annex 7 - Summary of UNEP Expertise and Experience relevant to this project

At the request of the Secretariat, and as a supplement to the information provided to the Adaptation Fund Board during its accreditation process, UNEP is providing the following information highlighting relevant areas of experience and expertise. UNEP in Tanzania works closely with other UN agencies through the One UN platform.

UNEP's Comparative Advantage in Implementing the Project

This project will be implemented by the United Nations Environment Programme (UNEP) as selected Multilateral Implementing Entity. UNEP's experience in implementing large-scale climate change adaptation projects provides comparative advantage and value-added for the successful management and completion of this project.

UNEP's work on climate change adaptation focuses on three main areas: science and assessments; knowledge and policy support; and building the resilience of ecosystems for adaptation. UNEP's credibility as a capacity builder, ecosystem manager and knowledge mobilizer is built on the implementation of approximately 80 projects on adaptation at global, regional and national levels, spread across the globe.

UNEP has demonstrated experience in managing large projects, promoting and supporting interventions and investments on the ground, and implementing projects at a distance. More specifically, UNEP's commitments provide concrete examples of how it will meet the six objectives of the project:

- adverse impacts of sea level rise on coastal infrastructures and settlements are reduced
- adverse impacts of floods averted
- adverse impacts of climate change on water supply and quality averted
- livelihoods are sustainable, diversified and resilient
- coastal and shoreline ecosystems are rehabilitated and ICAM is implemented
- knowledge of climate impacts and adaptation measures is increased

For instance, in Haiti, UNEP is engaged in a 20 year programme to restore watersheds and coastal areas, with a particular focus on mangroves. UNEP has also helped implement Mangroves for the Future (MFF), a regional partner-led initiative to promote investment in coastal ecosystems conservation for sustainable development. It aims at strengthening the environmental sustainability of coastal development and at promoting sound investment and action in coastal ecosystem management. MFF includes all coastal ecosystems, coastal forests, coral reefs, estuaries, lagoons, sandy beaches, sea grasses and wetlands. In its first Phase (2007-2009) MFF worked in India, Indonesia, Maldives, Seychelles, Sri Lanka, and Thailand, where UNEP provided implementation of technical activities in the areas of climate change, disaster risk reduction and analysis of marine protected areas. This work demonstrates know-how in the area of coastal and shoreline ecosystem rehabilitation.

UNEP has experience in assisting countries in the prevention of impacts from sea-level rise, natural disasters and climate change. For instance, UNEP supports member countries of the Coordinating Body on the Seas of East Asia (COBSEA) in the sustainable development and rehabilitation of coastal areas. UNEP has also addressed the issue of adverse effects of climate change on water supply and quality. In Iraq, for example, UNEP has been working with the International Environmental Technology Centre in Japan, on the rehabilitation of the Iraqi marshlands, the largest wetlands ecosystem in the Middle East. This work promotes

environmental sustainable technologies (EST) to improve water quality. Similarly, in Comoros UNEP has supported the water resource management to increase the water supply and improve water quality. This has been carried out by strengthening the capacity of institutions at a national and community levels to integrate climate change information into water resources management.

UNEP‘s work has ensured that livelihoods in climate vulnerable regions are sustained, diversified and resilient. In Kenya for instance, UNEP is working with the government to rehabilitate the Mau Forest Complex. This ecosystem is one of Kenya‘s five water towers and is critical for the economic and social development of the country. UNEP has been supporting this work to promote livelihood sustainability in the areas of eco-tourism, tea plantation, local food production, and investments in the Lake Victoria basin as well as providing incentives for the local population to finance forest protection.

UNEP has been a mobilizer of knowledge on climate change impacts and adaptation measures; it has assisted 38 developing countries to conduct comprehensive vulnerability assessments and identify adaptation options through the process of preparation of National Communications. Moreover, UNEP has recently completed the Economic Analysis of Adaptation Options in Africa.

For purposes of knowledge-sharing and to meet increasing demands from developing countries for climate change responses, UNEP has launched three flagship programs, of which Ecosystem-based Adaptation (EBA) is used to build resilience of vulnerable ecosystems, and use ecosystems services for adaptation and disaster risk reduction, such as floods and coastal infrastructure degradation. UNEP is thus providing support through:

(i) methods, tools, guidelines and good practices to assess ecosystem vulnerabilities, value and evaluate ecosystem services for adaptation and equitable payment mechanisms, restore ecosystem adaptation functions, and manage trans-boundary ecosystems;
(ii) piloting, experimenting and demonstrating adaptation at ecosystem and community levels, incorporating good practices of community-based adaptation and micro-credits;
(iii) national impact and vulnerability assessments of targeted ecosystems, capacity building and technical supports for integration of EBA into national policy, planning and investment framework; and (iv) collection, packaging and dissemination of good practices through the Global Adaptation Network

This project is consistent with UNEP‘s comparative advantage as identified through the GEF Council paper C.31/5. This document delineates UNEP‘s comparative advantage in providing the GEF with a range of relevant experiences, a proof of concept, the testing of ideas, and the best available science and knowledge upon which it can base its investments. UNEP has demonstrated experience in managing large projects, promoting and supporting interventions and investments on the ground, and implementing projects at a distance which provides comparative advantage in implementing this project.

Annex 8. Preliminary Environmental and Social Impact Assessment

Under the guidance of the Vice President's Office, a preliminary screening of Environmental and Social Impacts was undertaken for this project. Findings are summarized below using the recently developed template for UNEP Environmental and Social Safeguards. Detailed ESIA will be undertaken for specific activities during project implementation, as per Tanzanian laws and regulations, and under the authority of the Vice President's Office, Division of Environment.

Project location:		Yes	No	Comments and scope of impact
Is the project area in or close to -				
	- densely populated area	X		Population density in Dar Es Salaam is high, as is the degree of concentration of buildings and economic assets along Ocean Road, where the sea wall is to be rehabilitated. Negative impacts could include disruption of circulation and road traffic during construction, temporary air pollution.
	- cultural heritage site		X	
	- protected area	X		The project intends to strengthen the current protected areas (mangroves) by rehabilitating the environment in the coast. No negative impacts expected.
	- wetland		X	
	- mangrove	X		The project intends to implement mangrove rehabilitation. No negative impacts expected.
	- estuarine		X	
	- buffer zone of protected area	x		The project intends to increase buffer zones of protected mangroves in areas not currently occupied. No negative impacts expected.
	- special area for protecting biodiversity		x	
Environmental impacts, i.e. will the project cause		*Yes*	*No*	*Comment/explanation*
	Need for temporary or permanent support facilities?		X	
	- Increase in soil erosion and siltation?		X	The project intends to promote soil fertility maintenance through reforestation and shoreline management.
	Increase in peak and flood flows? (including from temporary or permanent waste waters)		X	The project intends to reduce flooding from excessive rains.
	- Loss of downstream beneficial uses (water supply or fisheries)?		X	
	- Impairment of ecological opportunities?		X	The project is designed to protect and maintain ecological services in coastal areas.
	- Any loss of precious ecology?		X	
	- Threat to local		X	No alien species will be introduced. Reforestation activities

	biodiversity due to invasive species?			will be undertaken using locally viable and adapted species.
	- Loss of downstream ecological and economic functions due to any construction of social infrastructure (e.g., road, training or information center, office or housing)?		X	Temporary disruptions may occur during sea wall rehabilitation works and ecosystem rehabilitation; however these disruptions are not expected to last beyond the duration of works, and the impacts of such works are expected to be positive.
	- Unnecessary loss of ecological value and decreased biodiversity by replacement of natural forest with plantation with limited number of species?		X	Reforestation and mangrove rehabilitation will be undertaken using locally adapted species and in respect of the ecosystem, using integrated approaches.
	- Ecological problems due to land clearance prior to reforestation (e.g., soil erosion, disruption of hydrological cycle, loss of nutrients, or decline in soil fertility)?		X	No land clearance is expected to take place during the project.
	- Other ecological problems (e.g., pollution of water bodies from fertilizers, pesticides, and herbicides used in plantation)?	X		
	- Increased waste production?	X		Wastes may be produced during construction and rehabilitation works, particularly for sea wall rehabilitation and water well relocation. Waste disposal will take place in accordance with Tanzanian rules and regulations and practices, and construction works will be subject to a detailed EIA study prior to commencement.
	- Increased traffic?	X		Potential traffic increases along Ocean Road during rehabiliation works. A traffic redirection and mitigation plan will be developed prior to work initiation and during the EIA study.
	Polluting emissions to air?	X		Construction works may create additional temporary pollution.
	Other environmental problems, e.g. noise?	X		Noise may increase during construction works. These disruptions will be temporary and localized.
Social impacts, i.e. will the project cause		Yes	No	Comment
	- Dislocation or involuntary resettlement of people?		X	The project does not intend to create relocation or resettlement of populations.
	- Disproportionate impact to women or other disadvantaged or vulnerable groups?		X	There will be a beneficial impact on women and youth during the project due to job creation, and increased water and energy availability.

	- Impairment of beneficial uses of traditional areas?		X	The project will not intervene in traditional areas.
	- Impairment of recreational opportunities?	X		There may be temporary disruptions to beach access during shoreline rehabilitation and reef rehabilitation activities. These are intended to be limited in time, and will lead to longer term beneficial impacts due to beach enlargement and beautification.
	- Impairment of indigenous people‘s livelihoods or belief systems?		X	Beneficial impacts on livelihoods are expected, particularly in terms of fisheries through the rehabilitation of mangroves and reefs.
	- Possible conflicts with established management policies?		X	The project has been designed to supplement and enhance current management policies in order to promote resilience.
	- Social problems and conflicts related to land tenure and access to resources?		X	
	- Technology or land use modification that may change present social and economic activities?		X	All initiatives will be undertaken with communities full participation and on a voluntary basis, and are expected to lead to positive impacts on communities‘ overall well being. No changes to present social and economic activities are expected,
	- Uncontrolled in-migration (short- and long-term) with opening of roads to area and overloading of social infrastructure?		X	
	- Increased local or regional unemployment?		X	The project is expected to contribute to job creation, through the GreenJobs program as well as through the creation of opportunities for private sector companies in project initiatives.

Other considerations		Yes	No	Comment
	Does national regulation in affected country (-ies) require EIA and/or ESIA for this type of activity?	X		EIA will be undertaken as per requirements specified in Tanzanian Law.
	Is there national capacity to ensure a sound implementation of EIA and/or SIA requirements present in affected country (-ies)?	X		The Vice President‘s Office, Division of Environment, is legally responsible for the administration and oversight of the EIA requirement in the country. It has the capacity to administer EIA effectively.

Annex 9: Letter from Mayor of Dar es Salaam

DAR ES SALAAM CITY COUNCIL

STATEMENT OF LORD MAYOR ON CLIMATE ADAPTATION ACTIVITIES IN DAR ES SALAAM CITY.

Being a coastal city Dar es Salaam is one of the most vulnerable cities due to climate change. Local leaders have been addressing the impacts of climate change within their jurisdiction areas. These impacts, mostly coastal erosion due to sea level rise and floods due to precipitate rains, are continuing to threaten human lives especially the urban poor, public infrastructure and other properties.

The economic loss that will occur in the near future if no efforts are done to protect or take remedial measures within these areas is beyond what the City can afford.

We are part of the efforts being undertaken by UNEP and Vice President's office in the Implementation of concrete adaptation measures to reduce Vulnerability of Livelihood and Coastal Communities in Tanzania. Through myoffice and on behalf of VPO I have undertaken consultations with councilors and vulnerable communities in the project areas and we look forward to the start of the implementation of this project. Each vulnerable communities and councilors consulted are highly supportive of this Project.

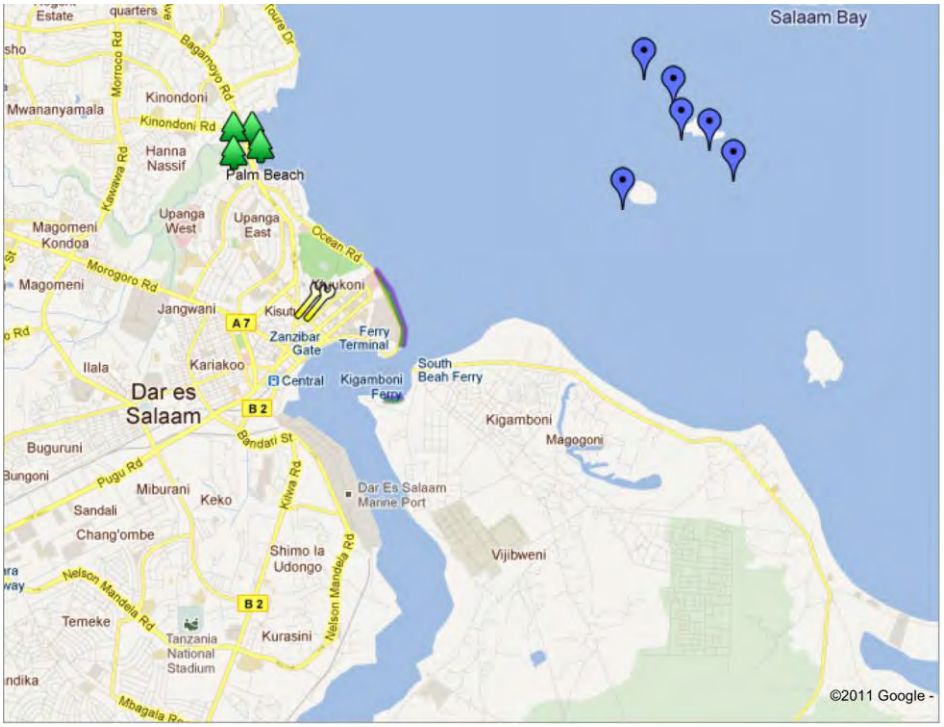
Some of important activities within the City of Dar es Salaam include reinforcing of seawall along Ocean Road and construction of new protection wall along Kigamboni creek within the City area highly impacted by sea level rise. We have also requested through this project the construction of storm water drains within the City Centre and Msasani Bonde la Mpunga which we hope will be part of key activities under this project.

On behalf of the people of Dar es Salaam we are highly complimenting these efforts and we will give all the required assistance during preparation, implementation and life circle of the project.

Lord Mayor,

Didas John Masaburi. 20/3/2011

Annex 10: Map of proposed works



Reef rehabilitation
Drainage rehabilitation site
mangrove rehabilitation (10 ha)
sea wall rehab (185m)
sea wall rehab and upgrade (1155m)

Annex 11: Interim modalities and ToRs for the Green Jobs program

Green Jobs Program for Tanzania

In support of Ecosystem Rehabilitation, Livelihoods, and Growth

Preliminary Modalities and Terms of Reference

Background

Unemployment rates in Tanzania, particularly in growing urban centers, are situated at 4.3% (2006). Tanzania's young population (aged 15-24) is high and growing, and the country's economy is not yet in place to welcome this workforce. Rural-Urban migration is also increasing the ranks of young unemployed urban dwellers, leading to poverty and sometimes insecurity in cities.

In parallel, Tanzania also faces an environmental challenge, with the growing degradation of its natural resources, and climate change expecting to take an additional toll on fragile ecosystems.

Objective

The objective of the Green Jobs Program is to create avenues for young unemployed people of Tanzania while working to protect the country's natural assets.

Modalities

The program will be jointly managed by the Tanzania Ministry of Education and Vocational Training and the Ministry of Labor, Employment and Youth Development. The Program will be comprised of the following service lines:

1. Development of public-private partnerships for placements in public interest works
2. Subsidies and tax abatements to private and public entities for recruitment Green Jobs candidates
3. Vocational training and diploma recognition services for Green Jobs candidates in the sectors of priority (see below)
4. Placement and coaching services for Green Job candidates
5. Entrepreneurship development

Sectors of Priority

In its launching phase, the Green Jobs program will focus on themes and geographic areas of particular relevance to Coastal Zone Adaptation. Themes will include:

- Water: management, monitoring, planning
- Agriculture: extension, monitoring, cropping and harvest management
- Forests: awareness raising, deforestation and fire control, community mobilization, reforestation
- Marine ecosystems: mangrove monitoring, mangrove rehabilitation, reef monitoring and rehabilitation, sustainable fisheries

Modalities

1. **Recruitment**: recruitment will be made using the broadest dissemination channels, including newspapers, internet, bulletin boards, and partnerships with universities, colleges and high schools.

2. **Partnerships**: In the initial phase of the program, partnership will be sought with private sector or NGOs working in environmental rehabilitation in the priority sectors, and in particular with private sector providers involved in the AF and LDCF Coastal Zone Adaptation Projects. These companies will be encouraged to recruit Green Jobs candidates.

3. **Remuneration**: During the first two years of employment the remuneration will be 100% at the charge of the Program, 75% during the 3rd year, 50% during the fourth and 25% during the fifth year. For sustainability purposes, Program participating organizations and candidates will receive training in resource mobilization and entrepreneurship development that will enable them to continue employment following project termination. Remuneration will be made in line with national standards, commensurate with experience, education and work requirements.

4. **Monitoring**: Green Jobs participants (employers and employees) will be subject to monitoring to ensure adherence to national laws and standards. Dispute settlement mechanisms will be made available to participants, using existing Ministerial institutions.

Expected results

The Program is expected to generate 50 Green Jobs, (50% to women) over the first 5 years. Monitoring will be undertaken to establish progress along key indicators such as income and returns on investments.

Annex 12 – References and Selected Relevant Studies

Aaheim, A., & Aasen, M. (2008). What do we know about the economics of adaptation. *Brussels: Centre for European Policy Studies (Policy Brief 159)*.

Aaheim, A., Berkhout, F., McEvoy, D., Mechler, R., Neufeldt, H., Patt, A. et al. (2008). *Adaptation to Climate Change: Why is it needed and how can it be implemented?* Centre for Europ. Policy Studies.

Adger, W. N., Paavola, J., Huq, S., & Mace, M. J. (2006). *Fairness in adaptation to climate change.* MIT press Cambridge, MA.

Alongi, D. M. (2008). Mangrove forests: Resilience, protection from tsunamis, and responses to global climate change. *Estuarine, Coastal and Shelf Science*, *76*(1), 1-13.

Badola, R., & Hussain, S. A. (2005). Valuing ecosystem functions: an empirical study on the storm protection function of Bhitarkanika mangrove ecosystem, India. *Environmental Conservation*, *32*(01), 85-92.

Berg, H., Öhman, M. C., Troëng, S., & Lindén, O. (1998). Environmental economics of coral reef destruction in Sri Lanka. *Ambio,* 627-634.

Blankespoor, B., & Development, C. f. G. (2010). *The economics of adaptation to extreme weather events in developing countries.* Center for Global Development.

Bradley, M. (1988). Realism and adaptation in designing hypothetical travel choice concepts. *Journal of Transport Economics and Policy*, *22*(1), 121-137.

Busse, E. W., & Pfeiffer, E. (1977). *Behavior and adaptation in late life.* Little Brown and Company.

Cesar, H., Burke, L., & Pet-Soede, L. (2003). The economics of worldwide coral reef degradation.

Clark, J. R. (1996). *Coastal zone management handbook.* CRC.

Corbett, B. B., Tomlison, R. B., & Jackson, L. A. (2005). *Reef breakwaters for coastal protection safety aspects and tolerances*. Proceedings from Coasts and Ports: Coastal Living-Living Coast; Australasian Conference 2005; Proceedings.

Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B. et al. (1997). The value of the world's ecosystem services and natural capital. *Nature*, *387*(6630), 253-260.

Coughanowr, C. A., Ngoile, M. N., & Linden, O. (1995). Coastal zone management in Eastern Africa including the island states: A review of issues and initiatives. *Ambio (Sweden)*.

Dannenberg, A., Mennel, T., Osberghaus, D., & Sturm, B. (2009). *The economics of adaptation to climate change: the case of Germany.* ZEW, Zentrum für Europäische Wirtschaftsforschung.

Dodman, D., Kibona, E., & Kiluma, L. (2011). Tomorrow is too late: responding to social and climate vulnerability in Dar es Salaam, Tanzania. *Case study prepared for UN Habitat. Cities and Climate Change: Global Report on Human Settlements*.

Fankhauser, S. (2006). The Economics of Adaptation. *Analyse économique de la BERD*.

Griliches, Z. (1957). Hybrid corn: An exploration in the economics of technological change. *Econometrica, Journal of the Econometric Society,* 501-522.

Groot, W. (2000). Adaptation and scale of reference bias in self-assessments of quality of life. *Journal of health economics*, *19*(3), 403-420.
Hanemann, M. (2008). *Observations on the Economics of Adaptation: Uncertainty and Timing.*

Horrill, J. C. (1995). A rationale for a strategy for the rapid assessment of coral reefs to meet the needs of integrated coastal zone management: Developed for Tanga Region, Tanzania. *Tanga Coastal Zone Conservation and Development Programme, Tanga, Tanzania*.

Horrill, J. C., Kalombo, H., & Makoloweka, S. (2001). *Collaborative reef and reef fisheries management in Tanga, Tanzania.* World Conservation Union, Eastern Africa Regional Office.

Hughes, G. (2009). The Economics of Adaptation to Climate Change: Global Estimates for Infrastructure. *Washington, DC: World Bank*.

Johnstone, R. W., Muhando, C. A., & Francis, J. (1998). The status of the coral reefs of Zanzibar: one example of a regional predicament. *Ambio,* 700-707.
Kashaigili, J. J., Rajabu, K., & Masolwa, P. (2009). Freshwater management and climate change adaptation: Experiences from the Great Ruaha River catchment in Tanzania. *Climate and Development*, *1*(3), 220-228.

Lafferty, K. D. (2009). The ecology of climate change and infectious diseases. *Ecology*, *90*(4), 888-900.

Leonard-Barton, D. (1988). Implementation as mutual adaptation of technology and organization. *Research policy*, *17*(5), 251-267.

Lundin, C. G., & Lindén, O. (1993). Coastal ecosystems: attempts to manage a threatened resource. *Ambio,* 468-473.

Mary, A. L., & Majule, A. E. (2009). Impacts of climate change, variability and adaptation strategies on agriculture in semi arid areas of Tanzania: The case of Manyoni District in Singida Region, Tanzania. *African Journal of Environmental Science and Technology*, *3*(8), 206-218.

McClanahan, T. R., Muthiga, N. A., Maina, J., Kamukuru, A. T., & Yahya, S. A. S. (2009). Changes in northern Tanzania coral reefs during a period of increased fisheries management and climatic disturbance. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *19*(7), 758-771.

McClanahan, T. R., Muthiga, N. A., Kamukuru, A. T., Machano, H., & Kiambo, R. W. (1999). The effects of marine parks and fishing on coral reefs of northern Tanzania. *Biological Conservation*, *89*(2), 161-182.

Mendelsohn, R., Nordhaus, W., & Shaw, D. (1996). Climate impacts on aggregate farm value: accounting for adaptation. *Agricultural and Forest Meteorology*, *80*(1), 55-66.

Mumby, P. J., & Steneck, R. S. (2008). Coral reef management and conservation in light of rapidly evolving ecological paradigms. *Trends in Ecology & Evolution*, *23*(10), 555-563.

Mustelin, J., Klein, R. G., Assaid, B., Sitari, T., Khamis, M., Mzee, A. et al. (2010). Understanding current and future vulnerability in coastal settings: community perceptions and preferences for adaptation in Zanzibar, Tanzania. *Population & Environment*, *31*(5), 371-398.

OBrien, G., OKeefe, P., Meena, H., Rose, J., & Wilson, L. (2008). Climate adaptation from a poverty perspective. *Climate Policy*, *8*(2), 194-201.

Obura, D. (2002). Status of coral reefs in Eastern Africa: Kenya, Tanzania, Mozambique and South Africa.

Osberghaus, D., & Reif, C. (2010). *Total Costs and Budgetary Effects of Adaptation to Climate Change: An Assessment for the European Union.*

CESifo, Center for Economic Studies & Ifo Institute for economic research.

Paavola, J. (2006). Livelihoods, Vulnerability and Adaptation to Climate Change in the Morogoro Region, Tanzania. *Centre for Social and Economic Research on the Global Environment (CSERGE), Univ. of E. Anglia, UK Working Paper,* 8-12.

Paavola, J. (2008). Livelihoods, vulnerability and adaptation to climate change in Morogoro, Tanzania. *Environmental Science & Policy*, *11*(7), 642-654.

Parry, M., Arnell, N., Berry, P., Dodman, D., Fankhauser, S., Hope, C. et al. (2009). *Assessing the costs of adaptation to climate change: A critique of the UNFCCC estimates.* Iied.

Pendleton, L. H. (1995). Valuing coral reef protection. *Ocean & Coastal Management*, *26*(2), 119-131.

ROeNNBAeCK, P., Crona, B., & Ingwall, L. (2007). The return of ecosystem goods and services in replanted mangrove forests: perspectives from local communities in Kenya. *Environmental Conservation*, *34*(04), 313-324.

Sallema, R. E., & Mtui, G. Y. S. (2008). Review. Adaptation technologies and legal instruments to address climate change impacts to coastal and marine resources in Tanzania. *African journal of science and technology*, *2*(9), 239–248.

Semesi, A. K. (1992). Developing management plans for the mangrove forest reserves of mainland Tanzania. *Hydrobiologia*, *247*(1), 1-10.

Semesi, A. K., & Ngoile, M. (1993). Status of the coastal and marine environment in the United Republic of Tanzania. *COASTAL MANAGEMENT CENTER, MANILA.,* 291-313.

Seto, K. C., & Fragkias, M. (2007). Mangrove conversion and aquaculture development in Vietnam: A remote sensing-based approach for evaluating the Ramsar Convention on Wetlands. *Global Environmental Change*, *17*(3-4), 486-500.

Stern, N. (2006). The economics of climate change. *World Economics*, *7*(2), 1-10.

Stern, N. H. (2007). *The economics of climate change.* ABC.
Taylor, M., Ravilious, C., & Green, E. P. (2003). Mangroves of East Africa. *UNEP-WCMC Biodiversity Series*, *13*.

UNEP. (2006). Ecosystem-Based Management.

Verheij, E., Makoloweka, S., & Kalombo, H. (2004). Collaborative coastal management improves coral reefs and fisheries in Tanga, Tanzania. *Ocean & coastal management*, *47*(7-8), 309-320.

Wang, Y., Bonynge, G., Nugranad, J., Traber, M., Ngusaru, A., Tobey, J. et al. (2003). Remote sensing of mangrove change along the Tanzania coast. *Marine Geodesy*, *26*(1), 35-48.

Wolanski, E. (2007). *Protective functions of coastal forests and trees against natural hazards*. Proceedings from IN: Regional Technical Workshop on Coastal Protection in the Aftermath of the Indian Ocean Tsunami: What Role for Forests and Trees.

Annex 13: Tentative Logical Framework for the LDCF Coastal Adaptation Project in Tanzania

NOTE: this project is designed to take place in five districts of coastal Tanzania and Zanzibar (Pangani, Bagamoyo, Rufiji, Pemba – Unguja). Activities, outputs and targets indicated below are subject to approval by the LDCF Council. The project is under finalization of design and will be submitted to the GEF for CEO approval in September 2011.

Objective:	To develop institutional capacities to manage climate change impacts through improved climate information, technical capacity, the establishment of demonstration projects to reduce vulnerability in key vulnerable areas, and learning. This project seeks to implement priorities of the National Adaptation Programme of Action (NAPA) in addition to barriers to implementation as identified in the NAPA report and terminal evaluation of the preparation phase of this project.

Component	Outcome	Outputs	Activities	Indicator	Baseline	Target	Verification
1. Scientific and Technical knowledge and capacities for climate change adaptation analysis	1.1 Local level capacities to effectively analyze the threats and potential impacts of climate change increased	Climate change impact assessment capacity established for project sites (monitoring climate changes)	District level training on sectoral, livelihoods and planning vulnerability and PVA (3 training workshops)	# of people trained in ICZM and vulnerability	approximately 20 people trained governnment wide	100	project reports, training reports
			Procure and provide district-level training on coastal vulnerability modeling tools (DIVA, COSMO)	# of people trained in coastal modeling	2 people trained in coastal vulnerability modeling in university of dar es salaam	100	project reports, training reports
		Detailed participatory coastal vulnerability assessment for Rufiji, Bagamoyo and Pangani districts and Zanzibar	Produce coastal vulnerability models and maps and a costal vulnerability index for Tanzania	# of available coastal vulnerability models	0 models and maps available and no consolidated vulnerabiltiy index	at least 2 models and 1 map by mid-project	project reports, publications
			Perform PVA and prepare policy recommendations	# of participatory vulnerability asssessments available at local level	no PVA available in selected sites	at least 5 local PVA	PVA reports
	1.2 substantive knowledge on coastal adaptation increased						
)							
2. Broadening Stakeholder Engagement for Vulnerability Reduction	2.1 Government and public engagement in climate change adaptation activities is enhanced	Public engagement in climate change adaptation activities is enhanced	Strengthening of NGO network on climate change	# of participating CSOs from local project sites advocating coastal adaptation issues	the Tanzanian Civil Society Forum on Climate Change was created in 2008 and includes 65 NGO members country wide	at least 10 new CSO working on coastal adaptation issues members by end of project	ForumCC meeting reports
			Implementation of an awareness campaign focused on climate change in Coastal zones	degree of awareness of local populations regarding CC and coastal vulnerability	general awareness is low among local populations	coastal communities demonstrate a sound understanding of coastal vulnerability by end of project, all groups	project reports; PVA surveys
		Student internship program established for interns to project sites	Creation and administration of a climate change internship program for undergraduate and graduate students	# of students enrolled annually	there are no students enrolled in a climate change program	at least 3 students per term	project reports
		Knowledge is integrated into university curriculum	Perform a curriculum assessment (based on WB methodology) for potential itegration of CC into 3 levels of higher education	# of recommendations on integration of CC	there is no systematic or comprehensive curriculum assessment	1 curriculum assessment produced	project reportd

			Develop pilot courses and educational materials for streamlining CC into selected courses	# of pilot courses delivered	no cc integration in current curriculum	at least 3 per semester from year 2	project reports
			Train academic staff and deliver pilot courses	# of students enrolled annually	no students enrolled	at least 10 students in year 2 and 60 students per semester by end of project	project reports; surveys
3. Priority adaptation investments for resilient Integrated Coastal Zone Management	3.1 Vulnerability to climate change is reduced in the coastal zones through adaptation investments and pilot innovations	Mangroves are restored in pilot sites	Restore mangroves using locally available resilient tree species (Rufiji, Zanzibar, Pemba)	% change in mangrove area	in Rufiji there are 5000 ha in need of rehabilitation; in Zanzibar the mangroves in Tumbe are severely degraded and deforested; in Pemba there are pockets of degradation	3000 ha rehabilitated in Rufiji, 10 in Pangani, 460 in Zanzibar	visual observation
			Creation and local enforcement of no-take zones and buffer areas				
			Create community-based mangrove nursery and management associations for ongoing sustainable management and monitoring	# of operational mangrove management associations	there is at least 1 mangrove associations it is not operational	at least 4 mangrove management associations are operational by end of project	project reports, surveys
		Water resources are protected from sea level rise and erosion and coastal communities have access to safe water	Decommission and relocate salinized wells	# of salinized wells relocated	no saline wells have been decommissioned in project sites	at least 18 salinized wells in Bagamoyo district are relocated to safe locations	visual observation, surveys
			Water harvesting systems implemented	% change in year-round water availability	there are no rainwater harvesting systems in place in the 5 bagamoyo villages	at least a 20% increase in year-round water availability	visual observation, surveys
			Train communities on water consevation, management and recycling	# of people trained	0	at least 100 people trained	project reports, surveys
		Coastal infrastructure and assets are protected	Rehabilitation and upgrade of Pangani sea wall, Kisiwa Panza sea wall and Bwawani sea wall	# of meters of seawall upgraded to CC standards	0		
			Dike and spillway construction at Ukele and Tumbe west (Zanzibar)				
4. Monitoring and Evaluation			Perform mid-term evaluation and cost-effectiveness assessment				
			Perform final external evaluation				

Annex 14 - Alignment of Project Objectives/Outcomes with Adaptation Fund Results Framework

Any project or programme funded through the Adaptation Fund (AF) must align with the Fund's results framework and directly contribute to the Fund's overall objective and outcomes outlined. Not every project/programme outcome will align directly with the Fund's framework but at least one outcome and output indicator from the Adaptation Fund's Strategic Results Framework must be included at the project design stage.

Project Objective(s)[63]	**Project Objective Indicator(s)**	**Fund Outcome**	**Fund Outcome Indicator**
Reduced vulnerability of livelihoods, ecosystems, infrastructure and economy in Tanzania	Change in vulnerability among coastal community population living in project sites; (disaggregated by gender	Outcome 5: Increased ecosystem resilience in response to climate change and variability induced stress	5. Ecosystem services and assets maintained or improved under climate change and variability induced stress
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**
1. Adverse impacts of sea level rise and floods on coastal infrastructures and settlements reduced	Kms of sea wall rehabilitated/ constructed	***Output 4:*** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)
2. Coastal ecosystems are rehabilitated and ICAM is implemented	Area of mangrove under rehabilitation % change in wood fuel use (disaggregated by gender) Area of coral reefs under rehabilitation Kms of shoreline revegetated	***Output 5:*** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	5.1.1No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)
3. Knowledge of climate impacts and adaptation measures is increased	A solid and validated project baseline study including with targets and indicators	***Output 6:*** Targeted individual and community livelihood strategies strengthened in relation to climate	6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community-livelihood

[63] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

	Number of studies and assessments to support project interventions Number of cost effective measures assessed Number of relevant policy briefs Number of project relevant trainings and workshops Number of EBICAM Action Plans approved	change impacts, including variability	strategies

TANZANIA
ANNEX 3: DISBURSEMENT MATRIX

	Upon Agreement signature USD	One Year after Project Start[a/] USD	Year 2[b/] USD	Year 3 USD	Year 4[c/] USD	**Total** USD
Scheduled Date	April 2012	October 2013 (note 1)	October 2014	October 2015	October 2016	
Project Funds	672,388	1,896,223	1,627,973	287,945	131,661	4,616,188
Implementing Entity Fee	57,153	161,179	138,378	24,475	11,191	392,376

[a/]Use projected start date to approximate first year disbursement
[b/]Subsequent dates will follow the year anniversary of project start
[c/]Add columns for years as needed

Notes:
1 The inception workshop is scheduled to take place in September 2012. And therefore one year after project start, is October 2013.