



ADAPTATION FUND

AFB/PPRC.5/13
June 6, 2011

Adaptation Fund Board
Project and Programme Review Committee
Fifth Meeting
Bonn, June 20, 2011

PROPOSAL FOR SEYCHELLES

I. Background

1. The Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, adopted by the Adaptation Fund Board, state in paragraph 41 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US\$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the approval by the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would finally require Board's approval.

2. The Templates Approved by the Adaptation Fund Board (Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, Annex 3) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.

3. The first four criteria mentioned above are:

1. Country Eligibility,
2. Project Eligibility,
3. Resource Availability, and
4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:
5. Implementation Arrangements.

5. According to the Adaptation Fund Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat not less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

6. According to the paragraph 41 of the operational policies and guidelines, a project or programme proposal needs to be received by the secretariat not less than seven weeks before a Board meeting, in order to be considered by the Board in that meeting.

7. The following programme concept titled “Ecosystem Based Adaptation to Climate Change in Seychelles” was submitted by the United Nations Development Programme (UNDP), which is a Multilateral Implementing Entity of the Adaptation Fund. This is the first submission of the programme, using the two-step proposal process. It was received by the secretariat in time to be considered in the 14th Adaptation Fund Board meeting. The secretariat carried out a technical review of the programme proposal, assigned it the diary number SYC/MIE/EBA/2011/1, and filled in a review sheet.

8. In accordance with a request to the secretariat made by the Adaptation Fund Board in its 10th meeting, the secretariat shared this review sheet with UNDP, and offered it the opportunity of providing responses before the review sheet was sent to the Project and Programme Committee of the Adaptation Fund.

9. The secretariat is submitting to the Project and Programme Review Committee the summary of the programme, prepared by the secretariat, in the following section. The secretariat is also submitting to the Committee the technical review sheet and the responses provided by UNDP, in an addendum to this document.

II. Programme Summary

Seychelles – Ecosystem Based Adaptation to Climate Change in Seychelles

Implementing Entity: *UNDP*

Programme Execution Cost: USD 450,000

Total Programme Cost: 5,950,000

Implementing Fee: USD 505,750

Project Formulation Grant: 30,000

Financing Requested: USD 6,455,750

Programme Background and Context: Seychelles is a SIDS particularly vulnerable to climate change and its associated impacts, characterized by a concentration of development on narrow coastal zones and non-resilient populations and ecosystems.

The proposed project seeks to address two major climate change vulnerabilities in the country: water scarcity and coastal flooding. To do so, the project intends to take ecosystem based measures of restoring or maintaining key ecosystem services in the coastal and hinterland of the main granitic islands of Seychelles.

The overall **goal** of the project is to ensure that development in the Seychelles is sustainable, and resilient to anticipated climate change effects. The objective is to incorporate ecosystem based adaptation into the country's climate change risk management system to safeguard water supplies, threatened by climate change induced perturbations in rainfall and to buffer expected enhanced erosion and coastal flooding risks arising as a result of higher sea levels and increased storm surge.

The proposal presents three components:

- **Component 1:** Ecosystem-based adaptation approach to enhancing freshwater security in Mahé under conditions of climate change (USD 3,200,000)
- **Component 2:** Ecosystem-based adaptation approaches along the shorelines of the Granitic Islands reduce the risks of climate change induced coastal floods (1,850,000)
- **Component 3:** Ecosystem based adaptation mainstreamed into development planning and financing (450,000)

Component 1: Ecosystem-based adaptation approach to enhancing freshwater security in Mahé under conditions of climate change (USD 3,200,000)

An ecosystem-based adaptation approach will be implemented in targeted watersheds on the island of Mahé to increase water security (reducing the climate change induced vulnerability of coastal communities to water scarcity during projected dry spells). The project will finance technology development and application to restore riparian areas, in watersheds in the Western side of the island, which are not currently utilised for the purposes of providing water to the city of Mahé. The project will engineer a paradigm shift from site based protected area management, primarily for biodiversity conservation to a landscape based management system, aimed at restoring ecosystem functionality and resilience with the specific purpose of enhancing water provisioning services during the extended dry season (this will be measured by the low flow measure). This is expected

to have the added benefit of reducing flooding risk following climate changed induced intense heavy rainfall events.

A Strategic Ecosystem Based Water Resource Adaptation Assessment will be carried out. Specific ecosystem-based adaptation measures will include restoring the natural processes of wetlands and assisting the natural rehabilitation of degraded areas. This includes: restoration of forest to enhance water-soil infiltration and water storage capacities in soils and aquifers (2,500 hectares), restoration of wetlands, through the removal of alien species and reduction in abstraction to enhance wetland functionality (550 hectares), integrated management of climate change induced wildfires to reduce the impact of fire disturbances on hydrological functions, small-scale artificial raw water facilities (barrages).

Component 2: Ecosystem-based adaptation approaches along the shorelines of the Granitic Islands reduce the risks of climate change induced coastal floods (USD 1,850,000)

An ecosystem-based adaptation approach will be implemented on the shorelines of the four targeted Granitic islands aiming to reduce flood damage and shoreline avulsion in vulnerable areas arising from a combination of rising sea levels and storm surges, both climate change induced. A vulnerability assessment will be undertaken and maps produced to determine areas where additional protection and restoration activities will be needed, focusing on production lands outside protected areas. At selected sites, critical coastal ecosystems will be restored to reduce the vulnerability of coastal communities to climate changed induced coastal flooding and erosion. Interventions will increase the resilience of coupled social and ecological systems in the face of climatic variability and change.

Activities will include: (i) mangrove reforestation, restoration and active management to reduce coastal erosion, (ii) rehabilitation of sand dunes to natural state through planting of local species in order to stabilize the dunes, (iii) restoration of wetlands, through the removal of alien species and areas reclaimed by agriculture in the past, (iv) coral reef (fringing) construction, rehabilitation, restoration and protection in order to reduce wave action and reduce coastal erosion.

Coastal communities will play a critical role in implementing the restoration activities. Local community coordinating bodies will be created for each intervention site and training provided on the specific adaptation measure that will be adopted there.

Component 3: Ecosystem based adaptation mainstreamed into development planning and financing (USD 450,000)

This component aims at increasing institutional capacity in Seychelles to adapt to climate change with policy support to plan for and respond/adapt to climate change-related risks and damage. An emphasis will be placed on upscaling the ecosystem based adaptation technology/ management measures applied under components 1 and 2 respectively through targeting the land/water use planning and regulation process, the Environmental Impact Assessment process and creating the legal and economic environment for such processes to be effective.

This component will also have a strong knowledge management focus. The project will act as the knowledge window for the government and resource users regarding the ecosystem based adaptation approach, bringing in appropriate international experiences to Seychelles. Awareness raising activities targeting the decision makers and coastal communities will be an integral part of knowledge management.



ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	Regular Project (Concept)
COUNTRY/IES:	Seychelles
TITLE OF PROJECT/PROGRAMME:	Ecosystem Based Adaptation to Climate Change in Seychelles
TYPE OF IMPLEMENTING ENTITY:	MIE
IMPLEMENTING ENTITY:	United Nations Development Programme
EXECUTING ENTITY/IES:	Ministry of Home Affairs, Environment, Transport and Energy
AMOUNT OF FINANCING REQUESTED:	US\$ 6,455,750 (In U.S. Dollars Equivalent)

PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

Short Summary

The proposed project seeks to reduce the vulnerability of the Seychelles to anthropogenic climate change, focusing on two key issues—water scarcity and flooding. The climate change projections in the Seychelles show that rainfall, while increasing in overall terms, will become more irregular. Much of the precipitation will fall in sharp bursts, creating the risk of flooding, while there will be extended period of drought. As the country does not have a large water storage capacity, and the topography of the islands prevents such infrastructure from being constructed, water supplies are heavily dependent on rainfall. Furthermore, the coastal zone is vulnerable to flooding as a consequence of rising sea surface levels, and increased storm surges from cyclonic activity in the Western Indian Ocean. The project will reduce these vulnerabilities by spearheading ecosystem based adaptation as a climate change risk management measure—restoring ecosystem functionality, and enhancing ecosystem resilience to climate change in order to enhance and secure two critical ecosystem services (watershed regulation and water provisioning, and flood attenuation). The project will invest in measures to restore ecosystem functionality, building on techniques that have been piloted in Seychelles, and adapting these by incorporating other good practices. Ecosystem based adaptation will be integrated into the country's development planning and financing framework, ensuring that environmental impact assessments and management measures for development require the restoration and protection of ecosystems supplying these ecosystem services, and moreover generate funding (i.e. through water fees) to assure sustainability.

The country is undertaking a number of structural measures to improve water availability, such as by improving water distribution infrastructure, to reduce leakage, and building coastal embankments. Ecosystem based adaptation will be pursued as an additional precautionary measure, to mitigate the impacts of climate change, and enhance the adaptive capacity of the country. The project will focus its interventions on the main population centres (the islands of Mahé,

Praslin and La Digue), benefiting 52% of the country's population, and securing its economic foundations.

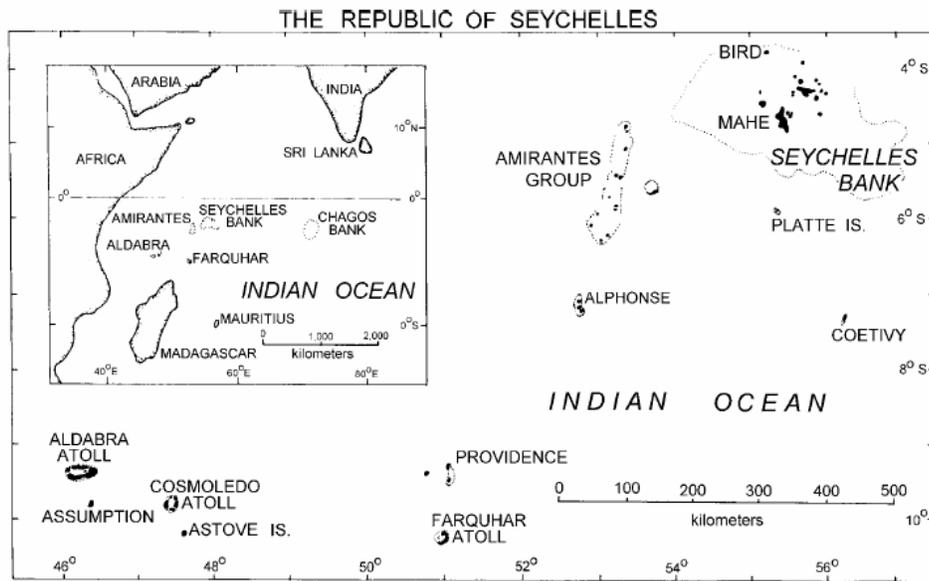
Environmental and Socioeconomic Context

The Seychelles consists of 115 islands (see Map 1) of which some 40 are granitic and the rest coral formations. The islands are located within 4° and 9° south of the equator and between longitude 46° and 57° east. The country has a land mass of 455.3 km², and an Exclusive Economic Zone (EEZ) covering 1,374 million km². The four largest granitic islands: Mahé, Praslin, Silhouette and La Digue, which vary in age from some 650 to 750 million years, together account for 48.6 % of the total landmass. The archipelago has a combined coastline of 491 km. The natural ecosystems of the Granitic islands range from beach and dune vegetation on the coastal fringe, lowland and coastal forests up to 200-300m, intermediate forests from 200 to 500m altitude and mountain mist forests over 400-500m. Coastal environments include a variety of wetland types, rocky shores and sandy shores. The coral islands are characterized by mixed scrub vegetation. The majority of the islands are fringed by coral reefs many of which were adversely affected by the mass coral bleaching event of 1998 which was caused by abnormally warm surface sea temperatures¹. The archipelago's coral reefs cover an area of 1,690 km² and include fringing reefs, atolls and platform reefs.

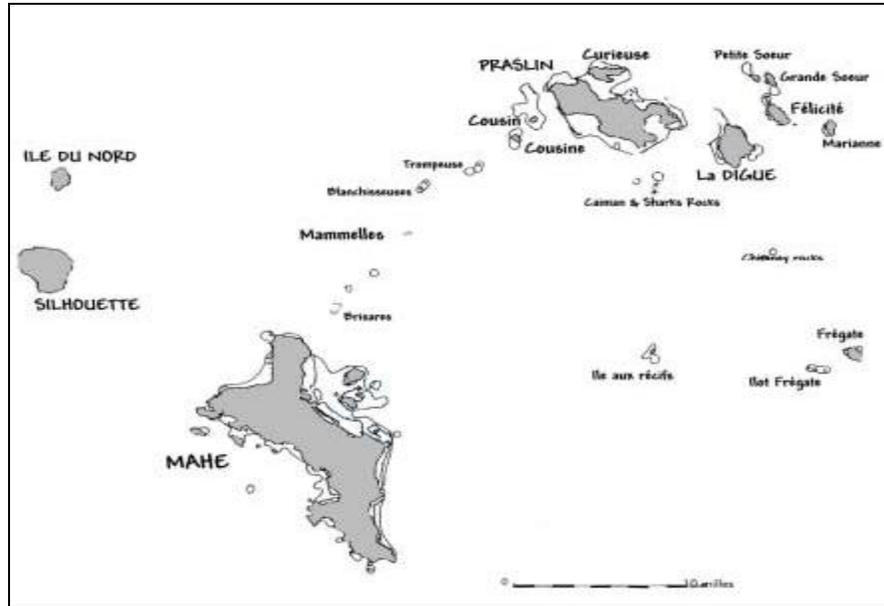
The prevailing climate of the archipelago is equatorial. Humidity is uniformly high and mean temperatures at sea level range from 24°C to 30°C. The average annual rainfall is 2,200 mm. The prevailing winds bring the wet northwest monsoon from December to March and the drier southeast monsoon from May to October, with heavier wind. Climatic conditions, however, vary considerably between islands, mainly in relation to their altitudes and location (the mean annual rainfall in the country decreases from the north-eastern to the south-western islands). Rainfall can be as high as 5,000 mm per year on the top of the highest peak (900 m) on the island of Mahé, and as low as 867 mm on the coralline island of Assumption. High intensity rainfall, with intermittent heavy downpours and even occasional torrential rains (up to 250 mm/day) may occur from December to March. The main granitic islands lie to the north of the Western Indian Ocean cyclone belt, but they can occasionally suffer from heavy seas and storm surges from cyclonic activity occurring to the south.

¹ Payet, R.A. Coral Reefs in Small Island States: Status, Monitoring Capacity and Management Priorities. Int. J. of Island Affairs, Special Issue: Island Biodiversity – Sustaining Life in Vulnerable Ecosystems (February 2004). Pp. 57 – 65.

Map 1: Location of the Seychelles Archipelago



Map 2: Inner Granitic Islands



The Seychelles has been inhabited by humans since 1770. The country has a current population of 88,311 (51% men and 49% women)². The bulk of the population resides on the narrow coastal plains of the three granitic islands of Mahé, Praslin and La Digue, where economic activities are also concentrated. Mahé in particular has about 90% of the total population, with some 40% located on the east coast in a coastal belt of 7 km by 1 km to the south of the capital, Victoria. Migration from Praslin and La Digue to Mahé continues to be significant, the main driving force being improved economic and social welfare prospects (employment, education and housing). The scarcity of land has prompted the reclamation from the sea of more than 500 hectares of land on the North East of Mahé. This has partly been undertaken to avoid the encroachment of human settlements on the island's forests, which cloak the steep hills that characterize its hinterland.

The Human Development Report 2010 classified Seychelles among the list of countries having achieved high human development, with a Human Development Index (HDI) value of 0.836 and a GDP per capita of US\$ 9,028³. Seychelles ranks amongst the highest within countries in Africa for several human development indicators with a life expectancy in 2009 of 68.4 years (male) and 77.9 years (female), primary school enrolment of 100% for both boys and girls, and an adult literacy rate of 90.8% (both men and women). However, since the beginning of the 1990's, Official Development Assistance (ODA) flows have fallen by over 90% and this has placed a financial burden on the Government's budget. Together with the increased need to borrow from commercial institutions, this has led to a slowdown of the economy resulting from a severe shortage of foreign exchange.

The Seychelles has been transformed from a quasi mono-crop agricultural economy (based on cinnamon and coconut) to a dual economy heavily dependent on tourism and fishing. Today, the main production sectors of Seychelles are fisheries and tourism. The fisheries sector is critically important for assuring food security and economic development. In terms of foreign exchange, it surpasses tourism, although the number of people employed in the sector remains relatively low, accounting for 15% of total formal employment. However, artisanal fisheries remain of great importance in terms of assuring food security for communities, and generating local employment. The tourism sector currently contributes 25.6% of the GDP (2009 data) and agriculture 1.6%.

The proposed project will target the **coastal zones and hinterland of the main granitic islands** (Mahé, Praslin, La Digue and Silhouette) **of Seychelles** (see Map 2). The coastal zone includes as a minimum, 'all the inter-tidal and supra-tidal areas of the water's edge; specifically all the coastal floodplains, mangroves, marshes and tide-flats as well as beaches and dunes and fringing coral reefs.' (Clark, 1996). Further, due to the small size of the islands the entire land area of Seychelles is regarded as a coastal zone (MFF, 2008). For the purpose of this proposal reference to the islands or the coastal zone will imply all terrestrial areas and the sea area up to the fringing reefs.

² Population and Housing Census 2010.

³ Indicative Estimate for 2009

The table below provides information on the main economic activities in the target area.

The Coastal Zone of the Inner Granitic Islands	
Socio-economic context and land uses	<p>The main production sectors of granitic islands are tourism and agriculture⁴.</p> <p><i>Tourism:</i> Prior to completion of the international airport in 1971, the only access to Seychelles was by boat. The tourism industry expanded greatly after the opening of the airport. Tourism arrivals increased steadily for the first 25 years, reaching 47,280 by 1982 and peaking at 130,955 in 1996. Arrivals declined gradually to 124,865 in 1999, before recovering to 130,046 in 2000, and then increasing to 174,529 in 2010. The Seychellois tourism sector contributed 46.1% of the country's GDP in 2010 and directly provided for 56.4% of national employment. It generated US\$ 382.5 million of foreign exchange, or 33.2% of the country's foreign exchange earnings in 2010. The contribution of tourism to the national economy is much more significant, since these statistics do not take into account the economic multiplier effect that is spawned by the industry and the creation of value added in other sectors.</p> <p><i>Agriculture:</i> Agricultural development in the Seychelles went through major changes from the 1800's through to 1960, moving away from food production and into a cash crop economy with copra as the main crop and cinnamon in a lesser position. With the growth of the tourism industry, there was a major exodus of labour from agriculture into construction, tourism and other related sectors. The production of traditional crops declined drastically. Agriculture in Seychelles is now characterized by small farms with an average size of 0.5 hectares and rarely exceeding 2 hectares. Farmers employ various levels of technology and management, some of it fairly sophisticated. Currently, about 500 registered farms are dispersed throughout the major granitic islands of Mahé, Praslin and La Digue, where they are mostly found on the coastal plateau. Current agricultural production meets about 4% of the local demand for beef, 50% for pork, 60 – 70% for vegetables and fruit, 80% for poultry and 100% for eggs. Cinnamon and coconut production have dropped considerably in the last 10 years. Agriculture employs around 3,800 persons and currently accounts for about 3.8% of GDP.</p> <p><i>Physical Development:</i> The land area suitable for development is limited. A significant proportion of the main granitic islands of Mahé, Praslin and La Digue is urbanized. The pressure for residential development is strong on the coastal area and the lower parts of the mountains.</p>

⁴ Fisheries is not considered as a major production sector in the coastal zone, as most fish is caught beyond the fringing reef.

Problem Statement: Vulnerability of Island Ecosystems and Communities to Climate Change

The Seychelles is economically, culturally and environmentally vulnerable to the effects of climate change and associated extreme weather events⁵. The effects of climate change are already noticeable in Seychelles and these effects and their associated impacts are projected to escalate in the future. The two biggest climate change vulnerabilities are water scarcity and coastal flooding.

1. Water Scarcity

The importance of freshwater needs little explanation. Water is crucial both for human needs which are indispensable for well-being, such as drinking and sanitation, as well as other sectoral uses which are intrinsic to the development process (tourism/agriculture). Although the country receives a relatively high average annual precipitation quotient of 2,200 mm of rainfall, the Seychelles is water stressed⁶. The country ranks well in terms of water access comparators - 95% of the population has access to piped water supplies. In 2009, total water demand amounted to 24,489 m³/day. However, the country has limited capacity to store water. The steep terrain of Mahé has prevented the development of dams on rivers. Instead water is pumped from rivers (a few small impoundments have been built to capture water in stream, namely Cascade, Le Noil and Rochon Sites (total capacity 119,000m³), directly to treatment plants for supply to customers. Excess water is also pumped to a high holding reservoir (La Gogue Dam - capacity 150,000m³), without its own catchment. This creates a problem during dry spells, when stream base flows can drop dramatically. During such periods, the water supply system is severely stretched to meet demand. Demand for water is growing rapidly at a rate of 8% annually, and is likely to increase as a result of tourism growth. With approximately 18% of the annual water sales in Seychelles attributed to the tourism sector, this growth will have a large impact on water resources especially in terms of planned doubling of available tourism rooms from 6,000 to 12,000 in the next three decades. Similarly, as fishery processing activities increase and diversify, they are expected to draw more water. The agricultural sector, which is heavily dependent on water, will also grow over the next three decades (estimated at 1.2 % per year) which will put additional stress on available water resources.

The annual rainfall over the main granitic islands is increasing; annual trends on Mahé for the period 1972 to 2006 showed an increase of 13.7 mm per year, signaling a wetter climate. This increase may be attributed to a few episodic heavy rainfall events and is not evenly distributed across the year⁷. Based on constructed climate scenarios for the islands of Mahé and Aldabra⁸, it is concluded that in future the rainy season in Seychelles is 'more likely than not' to be wetter, while the dry season is 'more likely than not' to be drier - a situation already emerging in the 1972 - 2006 interval.

⁵ The Seychelles National Climate Change Committee, 2009. Seychelles National Climate Change Strategy.

⁶ An area is considered 'water stressed' if the per capita water availability is below 1000m³ per year, or if there is a ratio of withdrawals to average annual run-off (water from rain, snowmelt, and irrigation, which is not absorbed by the ground or evaporated) of over 0.4.

⁷ Lajoie, F. R. 2004. Report on the WMO/CLIVAR ETCCDMI African Workshop on Extremes. Seychelles.

⁸ Chang-Seng, D. 2007. Climate Change Scenario Assessment for the Seychelles, Second National Communication (SNC) under the United Nations Framework Convention on Climate Change (UNFCCC), National Climate Change Committee, Seychelles. Also see annex for summary of methodology and conclusions.

The scenarios indicate that the impacts of climate change on Seychelles' water resources are expected to be severe. The dry southeast monsoon season is expected to become drier and the period between rainfall events during this season is likely to become longer. This will have impacts on stream flow. The water storage capacity in Seychelles will be severely challenged as a consequence.

During prolonged climate changed induced dry spells, stream flows are expected to decrease and at times stop. This will have serious consequences for coastal communities. Further, due to the limited water storage capacity, the country will not be able to benefit from increased rainfall during the wet Northwest monsoon. The climate models predict that rainfall during this period will be more intense, falling in short sharp bursts (such sporadic rainfall events accounting for the overall increase in rainfall).much of this is likely to run off into the sea. The warming in the Seychelles region, over the period 1972 – 1997, is estimated to be of the range of 0.25°C⁹. Analysis by Lajoie (2004) indicated that the number of very warm days and nights is increasing dramatically while the number of very cool days and nights are decreasing. Chang-Seng¹⁰ establishes that the mean air temperature Seychelles is *more likely than not* to warm by +3.0 ° C by the end of this century. The relative rate of warming will occur mainly during the cooler southeast monsoon. Given this projected increase in surface temperatures, evaporation will also increase putting more demand on the water storage facilities. The demand for water by the human population will also increase during hot periods causing heat stress, as a result of increased irrigation, cooling and sanitation uses.

2: Coastal Flooding

Further, this warming of the atmosphere, which has happened globally and estimated at approximately 0.7°C since 1900¹¹ has caused the average temperature of the global ocean to increase to depths of more than 3 km. The thermal expansion occurring as a consequence of the increased ocean temperature, as well as a smaller, yet significant effect of discharge of additional water into the oceans as terrestrial ice and snow melt, has led to a rise in sea level. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report estimated an average rate of 1.8 mm (with a range of 1.3 to 2.3 mm) per year global sea level rise and predicted that this would continue. The limited data on sea level rise in Seychelles makes any conclusive assessment difficult but it has been estimated that sea level is rising by 1.46 mm per year around Mahé¹².

The Western Indian Ocean region experiences severe tropical cyclones. Tropical cyclone trajectories do not come close to the main populated islands of the Seychelles, as they are located close to the equator and in the Indian Ocean, cyclones are more generally prevalent

⁹ Payet, R. A. & Agricole, W. 2006. Climate Change in the Seychelles – Implications for Water and Coral Reefs. *AMBIO*, 35 (4): 182 – 189.

¹⁰ Chang-Seng, D. 2007. Climate Change Scenario Assessment for the Seychelles, Second National Communication (SNC) under the United Nations Framework Convention on Climate Change (UNFCCC), National Climate Change Committee, Seychelles. Also see annex for summary of methodology and conclusions.

¹¹ Stern, N. 2007. *The Economics of Climate Change: The Stern Review*. Cambridge University Press, Cambridge, pp. 3 – 24.

¹² Chang-Seng, D. 2007. Climate Change Scenario Assessment for the Seychelles, Second National Communication (SNC) under the United Nations Framework Convention on Climate Change (UNFCCC), National Climate Change Committee, Seychelles.

South of the Equator South of 10°S¹³. However, it is important to note that extreme rainfall and wave swells resulting from Indian Ocean tropical cyclones do affect the Seychelles and need to be taken into consideration¹⁴. Chang-Seng¹⁵ concluded that the trend for the number of tropical depressions in the Seychelles is +0.025 and that since 1990, Seychelles has recorded an increase in tropical storms which formed and moved near the granitic islands of Seychelles. This is projected to increase as a result of climate change. With increased peak winds¹⁶, the wave action affecting the coastal areas of Seychelles has increased as a result of climate change. The sea level rise also exacerbates coastal erosion as the waves reach further inland at high tide. For the same reason flooding in the coastal strips is increased, affecting urban areas in low elevation coastal zones.

Barriers to Addressing the Climate Change-Induced Problems

The Government of Seychelles has developed a national framework for climate change mitigation and adaptation responses, for example establishing the Seychelles National Climate Change Committee and a Climate and Environmental Services Division in the Ministry of Home Affairs, Environment, Transport and Energy (MHAETE). However, barriers exist which prevent the Government and communities from addressing the two afore-mentioned climate change-induced vulnerabilities.

Ecosystems play an important role in determining the vulnerability of communities to climate change—particularly in Small Island Developing States such as the Seychelles. The forests and wetlands of the granitic islands play an important role in regulating stream flows and water quality. Forested land binds the soil, thereby decreasing soil erosion and increasing the capacity of soils to absorb and retain water. This allows water to penetrate deeper into the soil, allowing for less runoff and slower release. Wetlands and riparian vegetation also assist in the reduction of erosion and slow discharge of water from the watershed over a longer period of time. This will have two benefits in ameliorating the effects of climate change on water supplies - providing more regular stream flow during the lengthier dry season, while buffering against flooding following intense rainfall events. Similarly, mangroves and fringing coral reefs protect coastal land against coastal erosion, while coastal sand dunes and wetlands play an important role in controlling coastal flooding. These flood attenuation services are likely to be critical given projected climate change induced flooding risks.

There is growing understanding globally and evidence that such ecosystem services will play a major role in mitigating the adverse effects of climate change and in assisting human societies to adapt to its impacts. However, in Seychelles, inadequate attention has thus far been paid to this aspect. The country has made a major investment in protecting biodiversity, and maintaining the scenic values that underpin the tourism industry. This has manifested itself in the creation of an impressive protected area system, covering 47 % of the country, and in much lauded species recovery efforts. However, outside protected area, unplanned and fragmented

¹³ In the West Indian Ocean cyclones form west of 100°E and travel eastwards to the East Africa coast in the period from December to April. Cyclones normally form South of 10°S—hence South of the Seychelles.

¹⁴ The Seychelles National Climate Change Committee, 2009. Seychelles National Climate Change Strategy.

¹⁵ Chang-Seng, D. 2007. Climate Variability and Climate Change assessment for the Seychelles, Second National Communication (SNC) under the United Nations Framework Convention on Climate Change (UNFCCC), National Climate Change Committee, Seychelles.

¹⁶ See footnote 12. Also see annex for summary of methodology and conclusions.

development activities occurring over the past 30 years, without due consideration to climate change, have led to degradation of ecosystems, and the impairment of ecosystem services. Infrastructure development has led to forest loss and degradation in the hinterland. The opening up of forests resulted in the spread of invasive alien species (IAS) with most of the country's forests and wetlands now invaded with high-water use alien species especially along the riparian zones. These species outcompete native species, and do not possess the soil-binding and water regulation functions that the indigenous species have. The modification of coastal habitats such as wetlands and mangroves has been driven by beach front developments for housing, hotels and roads, which has resulted in the removal of coastal vegetation from dune land, thus increasing the vulnerability of beaches to erosion.

The modification of coastal ecosystems is understandable, given the country's geographical constraints as upland areas are mostly unsuitable for agriculture or other types of development. On the coastal areas, where land is at a premium, reclamation has been practiced extensively ever since the islands were first settled. Much of the development that has led to ecosystem modification involved the construction of infrastructure for tourism, housing and recreation, which has benefited the populace. The loss in ecosystem functionality and the consequent impairment of ecosystem services might not have been calamitous, absent climate change. But given climate change, it is a serious concern as it has the consequence of undermining the country's adaptive capacity potential.

There is an urgent unmet need to expand the paradigm the country employs in managing ecosystems, from one focused mainly on biodiversity protection and the maintenance of scenic values for tourism, to one that in addition caters for climate change risk management. There is a need to ensure that ecosystem based climate change risk management objectives are incorporated into the development agenda of the country and that their value is correctly appreciated. Further, limited experience in ecological restoration work and sub-optimal availability of knowledge on such restoration that has been accumulated in other countries hinders the application of ecosystem based climate change adaptation measures in areas where ecosystem restoration is required.

There is uncertainty in the Seychelles about the impact of climate change on ecosystem structure and functioning—the effect on the physical, chemical and biological properties of ecosystems. In the Seychelles, climate change is expected (based on higher temperatures and the drier southeast monsoon) to increase the frequency and severity of forest fires, leading to structural changes in forests, which may have adverse impacts on ecosystem services. Ocean acidification is likely to result in the loss of coral reefs that protect the coastline from storm surges - exacerbating the impact of coral bleaching. These pressures are likely to be exacerbated by a conjunction effect of threats, including existing anthropogenic threats (such as nutrient run off from coastal settlements and forest fragmentation). In this situation, effective climate change risk management demands that these additional, non climate change related stressors be strictly regulated so as enhance the resilience of ecosystems to climate change, and avoid regime change, where they tip from one ecological state into another, with the consequent loss of ecosystem services vital to adaptation.

The weak institutional capacity of government and communities to address restoration needs and manage ecosystems to ensure their resilience is a critical barrier to advancing ecosystem based approaches to climate change risk management. There is a notable lack of capacity to plan, monitor and enforce climate resilient land, water and coastal (LWC) use management systems at both national and local levels. Furthermore, ecosystem resilience to climate change is not presently being factored into land, water and coastal use planning, development activities

and investment decisions (including Government budgetary allocations) in different economic sectors. Land use decisions are made primarily with a view to optimising yields and incomes from production activities. Consequently, LWC use planning has heretofore lacked a focus on managing ecosystem services to reduce vulnerability to climate change, irrespective of the adaptation benefits. Underlying reasons for the above barriers are knowledge barriers, or insufficient awareness on climate change impacts and the necessity of addressing ecosystem restoration and resilience as an adaptation measure. These are related to an insufficient knowledge base pertaining to ecosystem and water resource dynamics under conditions of climate change, threshold (tipping points) and values, cumulative impacts of different land and water use, as well as the impacts of development activities.

■ PROJECT / PROGRAMME OBJECTIVES:

List the main objectives of the project.

The overall **goal** of the project is to ensure that development in the Seychelles is sustainable, and resilient to anticipated climate change effects. The objective is to incorporate ecosystem based adaptation into the country's climate change risk management system to safeguard water supplies, threatened by climate change induced perturbations in rainfall and to buffer expected enhanced erosion and coastal flooding risks arising as a result of higher sea levels and increased storm surge.

Project Strategy: The project will apply an integrated climate change adaptation approach melding Ecosystem-based Adaptation (EbA), with behavioural focused adaptation measures, as necessary.

The project will build on the baseline investment in biodiversity protection by additionally investing in the restoration and protection of ecosystems to enhance their ability to regulate streamflows, prevent erosion, and provide flood buffering services to reduce the vulnerability of Seychellois communities to climate change. In doing so, the project will expand the paradigm for ecosystem management, to incorporate climate change risk management as a specific objective, in addition to biodiversity protection and the maintenance of scenic values for tourists. The project will focus on technology adoption - scaling up proven technologies for ecosystem restoration geared towards climate change risk management, and managing ecosystems to enhance their resilience to climate change. Further, it will develop the regulatory and financing framework for replicating proven management solutions as part of the national climate change adaptation strategy, requiring developers to invest in restoration as part of their environmental impact mitigation obligations, and adjusting water tariffs to generate income for additional watershed restoration merited by climate change.

Ecosystem based adaptation involves the management of ecosystems and ecosystem services, and their restoration where necessary, to supply ecosystem services expressly to reduce the vulnerability of people and the resilience of ecosystems to human induced climate change. In the Seychelles, this will include the restoration of mangrove forests and sand dunes in coastal areas subject to flooding, the restoration of forests in water catchment areas, to reduce erosion where landslides are likely to occur after heavy rains, and to regulate water base flows during dry periods. This will ensure that measures responding to additional, climate-related risks (such as greater rainfall variability, unreliable recharge of aquifers, longer dry periods, and increasing damage to coastal infrastructure from extreme weather events) are addressed. This strategy takes a holistic approach and is based on the notion that societal adaptation cannot be achieved

without ensuring the continued provision of ecosystem services and without using their potential to deal with new problems.

PROJECT / PROGRAMME COMPONENTS AND FINANCING:

The following table describes indicative outputs and outcomes. During the project formulation phase, a thorough baseline study will be conducted. This will involve collation of more detailed information on climate change vulnerabilities and ecosystem status, and the identification of knowledge gaps. It will also include determination of key ecosystem variables, identification/verification of site specific drivers that undermine resilience, and feasible adaptation responses.

PROJECT COMPONENTS	EXPECTED OUTCOMES	EXPECTED CONCRETE OUTPUTS	AMOUNT (US\$)
<p>1. Ecosystem-based adaptation approach to enhancing freshwater security in Mahé under conditions of climate change</p>	<p>Forests and wetlands covering 1,090 hectares restored to fully provide water provisioning ecosystem services to the coastal communities of Seychelles.</p>	<p>1.1. Technology application to restore riparian areas in critical waterways to enhance stream base flows and control erosion to reduce climate change induced water scarcity.</p> <p>Activities will include:</p> <ul style="list-style-type: none"> – Restoration of forest to enhance water-soil infiltration and water storage capacities in soils and aquifers. – Restoration of wetlands, through the removal of alien species and reduction in abstraction to enhance wetland functionality. <p>1.2: Management of forest catchments to enhance the resilience of these areas to climate change</p> <p>Activities will include</p> <ul style="list-style-type: none"> – Integrated management of climate change induced wildfires to reduce the impact of fire disturbances on hydrological functions. <p>1.3 Small-scale artificial raw water storage facilities (barrages) designed and</p>	<p>3,200,000</p>

		constructed in critical waterways as an additional structural measure to ecosystem based adaptation approaches, to enhance water storage capacity during climate change induced droughts.	
2. Ecosystem-based adaptation approaches along the shorelines of the Granitic Islands reduce the risks of climate change induced coastal floods.	<p>Wetlands, sand dunes, mangroves and coral reef covering a total area of 55.5 hectares restored to fully provide flood buffering environmental service to the coastal communities of Seychelles.</p> <ul style="list-style-type: none"> – 30 ha wetlands – 5 ha sand dunes – 20 ha mangroves – 0.5 ha fringing reef 	<p>2.1 Critical ecosystems restored and protected to maintain ecosystem resilience and functionality for coastal erosion and flood buffering purposes under conditions of changing climate:</p> <p>Activities will entail:</p> <ul style="list-style-type: none"> – Mangrove reforestation, restoration and active management to reduce coastal erosion. – Rehabilitation of sand dunes to natural state through planting of local species in order to stabilize the dunes, – Restoration of wetlands, through the removal of alien species and areas reclaimed by agriculture in the past. – Coral reef (fringing) construction, rehabilitation, restoration and protection in order to reduce wave action and reduce coastal erosion. <p>2.2 Adaptive capacity of vulnerable communities and resource users enhanced to support direct implementation of EBA activities</p> <p>Activities will include:</p> <ul style="list-style-type: none"> – Establishment of capacitated local level coordinating body for the 	1,850,000

		assessment, implementation and monitoring of EBA approaches. – Community training in EBA methodologies.	
3. Ecosystem based climate change adaptation mainstreamed into development planning and financing.	Coastal communities actively support and benefit from the ecosystem environmental services of water provision and flood buffering throughout the granitic islands – 7563 ha forests – 450 ha wetland – 50 ha sand dunes – 40 ha fringing reef – 100 ha mangrove forest restored	3.1. Ecosystem-based adaptation approach mainstreamed in the country's land/water planning and regulation process, Environmental Impact Assessment process, creating the legal and economic environment for such processes to be effective. 3.2. Institutional mechanisms created/enhanced for supporting the internalization of climate change risks in coastal zone management plan. 3.3. Effective capturing and dissemination of EbA technology applications. 3.4. Plan for up-scaling of best practices developed and officially adopted including financing measures (banded water tariffs).	450,000
6. Project/Programme Execution cost (including M&E costs)			450,000
7. Total Project/Programme Cost			5,950,000
8. Project Cycle Management Fee charged by the Implementing Entity			505,750
Amount of Financing Requested			6,455,750



PROJECTED CALENDAR:

Indicate the dates of the following milestones for the proposed project/programme

MILESTONES	EXPECTED
Submission of Concept to AF Board	April 2011
Approval of the Concept by the AF Board (Estimate)	June 2011
Development of a Full Project Proposal	July – September 2011
Submission to AF of a Full Project Proposal	October 2011
Approval of Full Project Proposal	December 2011

Start of Project/Programme Implementation	March 2012
Mid-term Review (if planned)	September 2014
Terminal Evaluation	December 2017
Project Close	March 2018

■ PART II: PROJECT 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.

The project will focus on the development and application of technological solutions and tools for resolving specific vulnerability issues as a result of climate change in the main granitic islands of Seychelles. In doing so, the project will build on technologies that have been used in similar contexts, or successfully tested at a pilot scale in the Seychelles. The focus will be to learn from, adapt and scale up the approaches¹⁷. The overall approach is to work from the level of technical solutions at specific coastal sites to the policy and regulatory level, such that future replication of coastal adaptation measures will be catalysed, supported by new policies,

¹⁷ Known Technologies:

Enhancement/Restoration of Forests:

In Seychelles, forest restoration has been to a limited extent been tested. Approximately 35 hectares of forest have been restored on Denis Island, while a similar project is currently been undertaken on North Island. In South Africa, the Working for Water (WfW) programme has been implemented since 1995. The programme has cleared more than one million hectares of invasive alien species. The programme is globally recognized as one of the most outstanding environmental conservation initiatives on the continent. The initiative has documented the impacts of this work on enhancing the volume and duration of water discharge.

Enhancement/Restoration of Wetlands:

This technology is quite advanced. It is generally believed that it is expensive to build wetlands from scratch, but the restoration/enhancement of an existing wetland is cost effective. It has been tested to a limited scale in Seychelles, mainly by opening up waterways. Large, intensive wetland restoration projects have not been implemented.

Enhancement/Restoration of Mangroves:

This technology is well developed and being implemented in a number of countries e.g. Guyana, Vietnam, Mozambique and Sri Lanka. Some small replanting/restoration projects have been initiated in Seychelles, mainly restoring areas within larger mangrove forests that have been damaged during physical development e.g. building of bridges.

Restoration of Coral/Fringing Reefs:

Numerous coral restoration technology sites exist. In Seychelles the transplant of coral by underwater cement has been tested with success. Nature Seychelles is in the process of establishing a coral nursery where nubbins will be farmed and then transplanted on the reefs around Cousin Special Reserve. They are testing the different attachment technologies e.g. drilling, cementing or nailing to existing corals. A new novel technology going under the tradename – “Biorock” process applies safe, low powered electrical current to specially designed, submerged metal structures to stimulate the growth of solid limestone coatings. Corals show greatly increased rates of growth and survival. Coral reefs built by the Biorock process are now growing in Maldives, Thailand, Indonesia, Papua New Guinea, Mexico and Panama.

Restoration of Sand Dunes:

Restoration of sand dunes is common worldwide and in Seychelles it has been tested at a few sites. At Anse Intendance, Mahé the dune vegetation was established though physical planting of native dune vegetation. The fertilization of the plants in the early stages is very important and various technologies exist for this as well. In other parts of the World, physical measures have been used to build dunes.

guidelines, and economic incentives, and coastal communities will be increasingly climate resilient and able to protect livelihoods that are tied directly to the integrity of the coastal zone on the Granitic islands.

Component 1: Ecosystem-based adaptation approach to enhancing freshwater security in Mahé under conditions of climate change

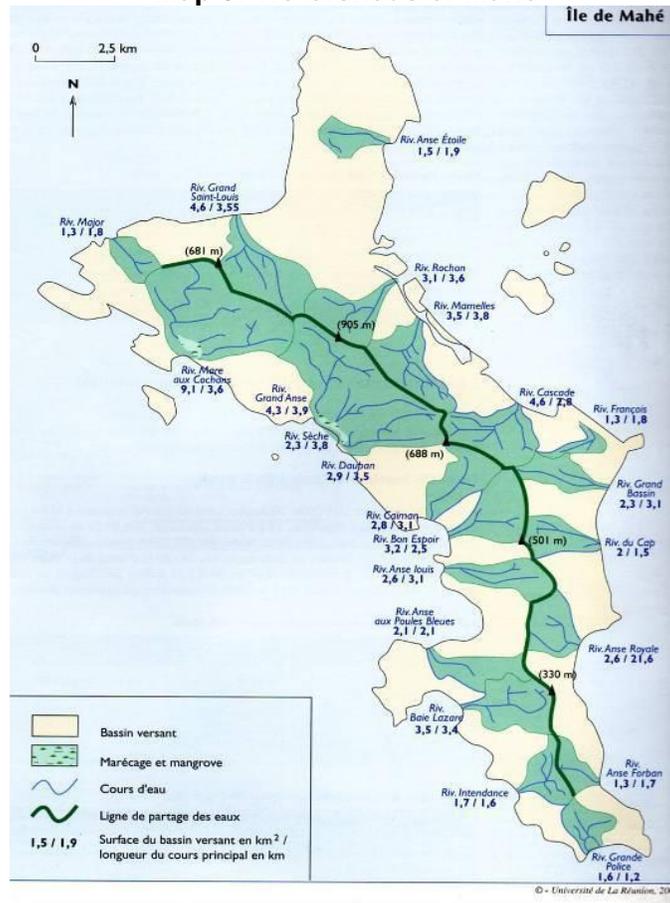
An ecosystem-based adaptation approach will be implemented in targeted watersheds on the island of Mahé to increase water security (reducing the climate change induced vulnerability of coastal communities to water scarcity during projected dry spells). Mahé is a hilly narrow island with steep slopes leading into the sea. The complex topography has created numerous watersheds, feeding perennial and seasonal rivers and streams. The project will finance technology development and application to restore riparian areas, in watersheds in the Western side of the island, which are not currently utilised for the purposes of providing water to the city of Mahé. The project will engineer a paradigm shift from site based protected area management, primarily for biodiversity conservation to a landscape based management system, aimed at restoring ecosystem functionality and resilience with the specific purpose of enhancing water provisioning services. This will have the added benefit of reducing flooding risk following climate change induced intense heavy rainfall events.

A Strategic Ecosystem Based Water Resource Adaptation Assessment will be carried out. This will establish the water provisioning capabilities of the different watersheds under conditions of climate change, document the threats to ecosystem function and resilience from climate change, map critical ecosystems from a water provisioning perspective and lay out measures to enhance their resilience.

Specific ecosystem-based adaptation measures will include the removal of Invasive Alien Species (*Ardissia crenata*, *Syzigium jambus*, *Alstonia macrophylla*, *Psidium cattleianum*, *Albizia lebeck*, etc.) that undermine hydrology, restoring the natural processes of wetlands and assisting the natural rehabilitation of degraded riparian habitats. These actions will address the drying up of rivers used for water harvesting during prolonged climate change induced dry spells. The restoration of critical watersheds will also play a role in erosion control and downstream flooding following climate change induced heavy rainfall events as the roots of riparian vegetation bind the soil. The project will further enhance the resilience of riparian forests to climate change induced fires, by strengthening fire detection, suppression and reaction capacities. The removal of flammable invasive alien trees will be undertaken to this end. Moreover, forests will be managed to reduce canopy openings and block fragmentation. This is important to enhance functional connectivity (critical for natural rehabilitation) and reduce fire hazards (as smaller forest patches are more vulnerable to fire) as loss of forest vegetation results in loss of the soils, and consequently loss of the ability to control water yield, peak flows, low flows, sediment levels, water chemistry and quality.

Because the rivers of Mahé fall so steeply to the sea there are few good sites for impounding reservoirs. Most sites with adequate river flows require excessively high dams to provide even modest storage. In the face of increasing uncertainty over water supplies, Seychelles will need to increase its artificial storage capacity, as well as the ability to transfer the water to areas of need. In watershed areas where limited extraction of water for human consumption is taking place, small-scale artificial raw water storage facilities will be constructed. This will capture water during the dry season and this water will be transferred to areas where water is needed e.g. to existing dams providing water to urban areas, mitigating the climate change impact of extended dry periods.

Map 3: Watersheds of Mahé



Component 2: Ecosystem-based adaptation approaches along the shorelines of the Granitic Islands reduce the risks of climate change induced coastal floods.

An ecosystem-based adaptation approach will be implemented on the shorelines of the four targeted Granitic islands aiming to reduce flood damage and shoreline avulsion in vulnerable areas arising from a combination of rising sea levels and storm surges, both climate change induced. A vulnerability assessment will be undertaken and maps produced to determine areas where additional protection and restoration activities will be needed, focusing on production lands outside protected areas. The assessment will focus on documenting threats to ecosystem function and include economic cost-benefit studies in order to quantify the environmental services provided by the natural ecosystems against coastal erosion and flooding in adapting to climate change. At selected sites, critical coastal ecosystems will be restored to reduce the vulnerability of coastal communities to climate changed induced coastal flooding and erosion. Interventions will increase the resilience of coupled social and ecological systems in the face of climatic variability and change.

The specific activities will be¹⁸:

¹⁸ The exact number and location of the different measures will be finalized during the full proposal development stage.

- 1) Mangrove reforestation, restoration and active management to reduce coastal erosion at Port Glaud, Pointe Larue and Anse aux Pins (all on Mahé);
- 2) Coral reef (fringing) construction, rehabilitation, restoration and protection in order to reduce wave action and reduce coastal erosion at Anse Severe (La Digue), and Baie Ternay (Mahé);
- 3) Rehabilitation of sand dunes to natural state through planting of local species in order to stabilise dunes, the coastal sand dune plays an important buffering effect against coastal erosion as well as flooding from the sea. Implementation sites will be Anse Royale (Mahé), Anse Kerlan (Praslin) and Anse a la Mouche (Mahé);
- 4) Wetland restoration and active management will mitigate the effects of floods. This will be implemented at the large wetland in La Digue, Plaine Hollandaise (Praslin) and Barbadons (Mahé).

Coastal communities will play a critical role in implementing the restoration activities. Local community coordinating bodies will be created for each intervention site and training provided on the specific adaptation measure that will be adopted there. The local coordinating body will be responsible for the assessment, implementation and monitoring of EbA approaches. Interpretive signs will be designed and installed at each site, so that the linkages between climate change vulnerability, ecosystem services, and adaptation are clear to the general public and visitors.

Component 3: Ecosystem-based Adaptation mainstreamed into National Development Planning and Financing

This project component responds to the need for increasing institutional capacity in Seychelles to adapt to climate change with policy support to plan for and respond/adapt to climate change-related risks and damage. An emphasis will be placed on upscaling the ecosystem based adaptation technology/ management measures applied under components one and two respectively through targeting the land/water use planning and regulation process, the Environmental Impact Assessment process and creating the legal and economic environment for such processes to be effective.

The institutional capacity deficiency of the government, tourism businesses and communities to plan and implement climate resilient land, water and coastal use management systems will be addressed. The project will increase adaptive capacity at the national level by identifying gaps in the policy, fiscal, regulatory and legal frameworks and weaknesses in monitoring and enforcement mechanisms, and providing assistance in the development of mechanisms to prohibit and discourage maladaptive development. Working closely with the Seychelles National Climate Change Committee, the project will promote coordination of adaptation efforts in Seychelles to improve communication between Government departments and agencies and between policy makers and communities on climate change risk management—using ecosystem based adaptation approaches.

The project will ensure that the technological solutions for ecosystem restoration applied under components one and two, are systematically replicated at a larger scale. It will ensure this by amending the land use planning, zoning and permitting system, to ensure that development is avoided in areas critical for the provision of ecosystem services to reduce climate change vulnerabilities. This will include restored areas. Moreover, the EIA legislation will be revised, to give legal teeth to the land use planning restrictions, using a mitigation hierarchy of avoid, reduce mitigate and offset. Areas of highest sensitivity from an ecosystem service perspective will be subject to the highest strictures, while development offsets will be encouraged in less

sensitive areas—with a view to raising finance for the restoration of areas of high importance. This system is already being emplaced for the purposes of biodiversity protection—catalysing reinvestment by developers in biodiversity conservation. It will be expanded under the project to manage critical ecosystems—not necessarily of importance for biodiversity, but important for ecosystem based adaptation.

Ecosystem based management objectives will also be integrated into the Island Development Plans, thereby ensuring that provision is made for financing (and Government budgetary allocation). Incentive measures will be developed and implemented where landowners (community members and businesses) will be rewarded for implementing new ecosystem-based management measures. A part of the funds for the Payment of Ecosystem Services to landowners will come from funds collected from a new banded tariff scheme, which will address both the demand and supply side of the water equation. These measures will assure the sustainability of the adaptation measures being undertaken.

This component will also have a strong knowledge management component. The project will act as the knowledge window for the government and resource users regarding the ecosystem based adaptation approach, bringing in appropriate international experiences to Seychelles. Awareness raising activities targeting the decision makers and coastal communities will be an integral part of knowledge management. Towards the end of its implementation period, the project will develop a plan to disseminate project results and upscale best practices. The plan will be agreed by central and district administrations for ensuring sustainability and replication of best practices country-wide.

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

Seychelles is a relatively small island state with a population of approximately 88,000 people. It has an impressive human development record, demonstrated by the fact that its human development index is the highest in Africa. However, decades of progress in improving human development conditions threaten to be rolled back by climate change, to which, like many other SIDS, the country is especially vulnerable. The project focuses on the restoration of essential ecosystem functions, with a view to reducing climate change induced water scarcity and coastal flooding vulnerabilities - which in both cases can be reduced through cost effective ecosystem based adaptation. These measures will build the adaptive capacity of coastal communities to climate change (reducing the need for investment in costly structural solutions, such as desalination plans and coastal sea walls). As a result of this approach, finance can be diverted to increase social welfare e.g. education and health. In the absence of this project, the country would have been forced to make continuous reactive and ad-hoc expenditures to address the loss and damage to infrastructure.

The improvement in water security under conditions of climate change will bring many social benefits to the people of Mahé. If the climate change induced water scarcity problem is not addressed then there are the risks of: 1) increased child mortality as a result of decreasing health and hygiene conditions; and 2) decreased maternal health as a result of decreasing health and hygienic post-natal conditions. These risks will directly affect the country's progress towards MDG 4: Reduce child mortality and MDG 5: Improve maternal health. All citizens of Seychelles will indirectly benefit in economical terms from the implementation of the project. This is due to the fact that the production sectors carry the economy and that their future expansion will provide additional and much needed taxes to the Government in order to improve public infrastructure as well as to create jobs. In the absence of measures to protect water

security and coastal areas from flooding under climate change, as proposed herein, these essential sectors will not be able to expand and Seychelles will not be able to harness its full economic potential domestically but also in the global economy. Further, tourists come to Seychelles to enjoy the exceptional beauty of the country and its beaches. Ecosystem based adaptation measures will ensure that these amenities are protected (alternative structural measures being unsightly, and therefore undermining amenity).

Communities will also benefit due to the enhanced protection afforded to coastal infrastructure, threatened by climate change induced flood damage. The infrastructure that is immediately adjacent to the dynamic beach zone is at risk, and there is clear evidence of this risk in some areas, with seawalls collapsing and erosion of roadbeds, especially after storms. The maintenance of beaches is critically important as a first line of defence for coastal infrastructure, and the interventions in the proposed project will demonstrate the most effective approaches in this regard. In addition, all future design and construction of coastal infrastructure in Seychelles will be informed by the land use guidelines developed in the project, which will help reduce future infrastructure losses. The project focuses on the integration of ecosystem-based adaptation approach into the different sectors of the economy. By removing other stresses from the ecosystem, it allows the ecosystems and the elements that make up the ecosystems to become more resilient towards the impacts of climate change. The environmental benefits that will be realised through the implementation of the project include: improved mangrove management, coral reef rehabilitation and protection, sand dune rehabilitation, wetland restoration and the restoration of Forest Reserves.

Benefits	Project – Adaptation Benefits
Social Benefits	<p>Direct beneficiaries of the coastal islands:</p> <p><u>Tourism</u>: 22,000 people involved in the tourism industry, including their dependents (job security and maintenance of current quality of life, as beauty and beaches of Seychelles are protected and restored).</p> <p><u>Water</u>: 40,000 people in Victoria, Mahé (maintenance of current standard of living, reduction of adverse health issues)</p> <p>Private sector and general public aware and compliant with recommended coastal adaptation measures, leading to protection of coastal assets.</p> <p>Plans for coastal development, addressing climate change issues, will ensure safety and sustainability of communities in the future (starting within the timeframe of the project), supported by new regulations, and economic instruments.</p>
Economic Benefits	<p><u>Tourism</u>: Protection of future economic benefits from tourism. The contribution of Travel & Tourism to Gross Domestic Product is expected to increase from 46.1% (US\$ 480.0 million) in 2010 to 48.6% (US\$ 916.8 million) by 2020. The contribution of the Travel & Tourism economy to employment is expected to rise from 22,000 jobs in 2010, 56.4% of total employment in Seychelles, or 1 in every 1.8 jobs to 28,000 jobs, 61.3% of total employment or 1 in every 1.6 jobs by 2020. Export earnings from international visitors and tourism goods are expected to generate 33.2% of total exports (US\$ 382.5 million) in 2010, growing (nominal terms) to US\$ 748.3 million (28.2% total) in 2020. Travel & Tourism investment is estimated at US\$ 39 million or 12% of total investment in 2010. By 2020, this should reach US\$ 67.2 million or 12% of total investment.</p> <p><u>Water</u>: Water is critical not only to life, but also to economic growth. It is</p>

	<p>a valuable resource and is essential to sustaining the wellbeing of Seychellois. The reduction of climate change induced water scarcity will be critical to all economic activities.</p> <p><u>Other sectors:</u> Residential, urban and agricultural areas will be protected from coastal erosion, flooding and fires.</p>
Environmental Benefits	<p>This is inherent in the Ecosystem Based Adaptation (EbA) approaches proposed in the project. The project will increase the resilience of ecosystems to be able to sustain essential ecosystem provisioning and regulating services. Through the interventions proposed, various ecosystems will be rehabilitated: coral reef systems, wetland systems, sand dune systems and forest systems. These systems, when healthy, provide numerous environmental services namely 1) clean, quality water; 2) sequestration of carbon; 3) erosion prevention 4) flood control.</p>

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

The main focus of the project is on applying cost effective technologies for ecosystem restoration, as a means of adaptation, to ensure that all vulnerable coastal sites and watersheds can be made climate resilient over the next 10 – 20 years. The proposed project is considered as a key catalytic investment, to set the course of action in the right direction. There is substantial physical evidence that neglect of specific climate change vulnerabilities in the past and the ad hoc responses to addressing site-specific problems have made matters worse. The main concern is the apparent (and measured) increased rate of climate change induced coastal degradation and water shortages and the clear linkages between these and sea level rise, increased frequency of storm surges, declining reef function, prolonged drought and intense rainfall; this is an alarming situation that needs attention. Water security is fundamental to the continuing wellbeing of the coastal communities.

Alternative project approaches have been considered, but deemed less cost-effective than the proposed course of action. There are only two major sources of water in Mahé, Seychelles (rainwater and desalinated water). The project invests in measures to ensure better management of the former, through the restoration of ecosystem water provisioning services. Desalination was looked at as an option but is very expensive and has high-energy demands¹⁹. As all energy in Seychelles is derived from the combustion of imported fossil fuels, the addition of more desalination plants is sub optimal because of the cost, security of supply and because it is felt that projects to mitigate the emission of greenhouse gases and adaptation projects should reinforce each other.

In addressing coastal erosion and flooding, structural engineering options were considered. Engineering options include artificial barriers constructed to diminish wave action out at sea, barriers on the beach and groynes out to sea. However these measures are costly²⁰. Further, tourism is dependent on natural beauty and aesthetic values, which such artificial barriers will

¹⁹ Desalination plant – for 17,500 m³/day – the Seychelles PUC estimates total costs USD 69 million CAPEX, USD 3 million OPEX annually.

²⁰ Seawalls – for a 500 m stretch the cost can be anything between USD 40,000 – 80,000, plus annual maintenance costs.

affect adversely. Scenic beauty can on the other hand be enhanced through careful ecosystem restoration.

In terms of cost-effectiveness, it is important to highlight that the proposed approach seeks to apply technology for ecosystem restoration and to build national capacity for in country implementation. The main entry barrier for this adaptation approach is linked to know how in the Seychelles, for restoration. However, the country has a strong record of successfully protecting biodiversity, and this knowhow can be built on this baseline, and the attached capacities in the country for ecosystem management.

As regards the development of the enabling environment (policy mainstreaming, training), and knowledge distillation and dissemination, there are no reasonable alternatives to the approaches proposed. The project is designed to address all Government instruments that will have some relationship to ecosystem based adaptation and will target the full range of coastal stakeholders and potential vulnerabilities. There are therefore no gaps in the reach of the project, which will ensure that all the necessary approaches and tools are in place for full replication of adaptation measures to all vulnerable areas in the Seychelles. The two-pillar approach of the project (technology application for EbA and the development of the enabling environment for replication as well as national awareness and knowledge management) is essential to the full replication of adaptation measures. If these pillars were not addressed simultaneously, the effectiveness of the whole investment would be put in jeopardy. During the further formulation of the project document, a more detailed cost effectiveness analysis will be undertaken, comparing the proposed resource allocation with measurable outcomes to other options, in order to validate costs, benefits and effectiveness.

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.

The proposed project is fully consistent with Seychelles's National development policies and programmes as reflected in the Seychelles National Climate Change Strategy, and the Environmental Management Plan of Seychelles 2000 – 2010 (a review of the third generation post 2010 environmental management plan is currently underway). More specifically, the project will contribute to the implementation of the following national policies, strategies and programmes:

National level:

- Seychelles National Climate Change Strategy, 2009
 1. Objective 1 – to advance understanding of climate change, its impacts and appropriate response
 2. Objective 2 – To put in place measures to adapt, build resilience and minimize vulnerability to the impacts of climate change; Of particular importance to this project, the following actions are listed under this objective:
 - Development of legally binding coastal land-use plans (incorporating the impact of climate change and natural changes in coastal processes);
 - Establish and strengthen the role of EIA and SEA in climate change adaptation and risk/impact reduction;

- Develop and implement on a pilot scale effective adaptation measures and tools at community level, including coastal ecosystem restoration approaches;
 - Demonstration of adaptation technology implementation, with focus on nature-based methods;
 - Enhance the management of coral refugia and resilient areas.
 - Evaluate and implement new plant varieties, strategies for pest and invasive control for agriculture and forestry, to cope with changed climatic conditions.
 - Develop and implement cost-effective beach restoration techniques in support of the tourism industry;
 - Explore and develop micro-insurance, risk reduction and financing mechanism and private sector financing options for adaptation.
3. Objective 4 – To mainstream climate change considerations into national policies, strategies and plans.
- Review of key procedure, guidelines and specifications to include climate change adaptation considerations into national planning.
 - Engagement of government (including the executive and legislative) with the scientific community for input of climate risk information into the development of national development strategies, policies and laws.
 - Identify key stakeholders and develop policy for involvement of key stakeholders in climate change adaptation through a multi-stakeholders coordination committee.
 - Update Town and Country Planning Act guidelines and *modus operandi* to maintain climate change into key national risk sectors.
 - Develop a knowledge platform on mainstreaming adaptation in small islands.
 - Development of incentive structures by reducing bureaucracy, barriers to introduction of new technologies and supporting capacity building activities.
 - Adoption of guidelines and codes for development which take into consideration climate change issues.
4. Objective 5 – To build capacity and social empowerment at all levels to adequately respond to climate change.
- Promote ongoing stakeholder/community involvement in decision making regarding climate change education, awareness and training at national and district level.
 - Integrate climate change education into all sectoral policies and strategies, i.e. tourism, fisheries, energy, agriculture, education, development, disaster response, etc.
 - Develop communication and awareness strategies to engage the community in responding and adapting to climate change.
- Environment Management Plan of Seychelles (EMPS) 2000 – 2010²¹
 1. Thematic Area: Land Use, Coastal Zone and Urbanisation
 2. Thematic Area: Biodiversity, Forestry and Agriculture²²

²¹ An EMPS 2010-2020 is being prepared and the full proposal will address any changes in the thematic areas that can result from the new EMPS.

²² This thematic area chapter has been completed for EMPS 2011 – 2020. The issues the project address are:

3. Thematic Area: Fisheries and Marine Resources Processes
 4. Thematic Area: Water, Sanitation and Waste²³
 5. Thematic Area: Tourism and Aesthetics
 6. Thematic Area: Regulatory, Policy and Institutional Mechanisms
 7. Thematic Area: Commerce, Industry and Production
- Seychelles MDG, Goal 4: “Reduce Child Mortality”, Goal 5: “Improve Maternal Health”, and Goal 7: “Ensure Environmental Sustainability”.
 - UN Country Programme Document for Seychelles 2007 - 2010

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

All UNDP supported donor funded projects are required to follow the mandatory requirements outlined in the UNDP Programme and Operational Policies and Procedures (UNDP POPP). This includes the requirement that all UNDP development solutions must always reflect local circumstances and aspirations and draw upon national actors and capabilities.

In addition, all UNDP supported donor funded projects are appraised before approval. During appraisal, appropriate UNDP representatives and stakeholders ensure that the project has been designed with a clear focus on agreed results. The appraisal is conducted through the formal meeting of the Project Appraisal Committee (PAC) established by the UNDP Resident Representative. The PAC representatives are independent in that they should not have participated in the formulation of the project and should have no vested interest in the approval of the project. Appraisal is based on a detailed quality programming checklist which ensures, amongst other issues, that necessary safeguards have been addressed and incorporated into the project design

There is no legislation in Seychelles covering coastal zone management in its entirety instead coastal zone management is covered by several pieces of legislation.

For the implementation of the project, the following legislation has relevance:

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- Goal 1: Conserve and manage terrestrial and aquatic biodiversity to ensure sustainable use and equitable benefits to the people.
 - Goal 2: Improve our understanding on biological diversity and ecosystem functioning in a changing environment.
 - To develop a framework for adaptive management based on our improved understanding on ecosystem change.
 - Goal 3: Achieve sustainable forest management from an ecosystem approach which further strengthens its multiple ecosystem services.
 - Review and integrate forestry management within an overall sustainable forest management framework with clear conservation objectives.
 - Address key forest issues, in particular encroachment, spread of alien invasive species through collaborative management.
 - Develop and implement forest rehabilitation and restoration programme.

²³ This thematic area chapter has been completed for EMPS 2011 – 2020. The issues the project address are:

- Goal 1: Ensure effective and integrated management of water resources.
 - To enhance the capacity for supply and storage of potable water.
 - To strengthen institutional and legal mechanisms for water resources management.
 - To ensure protection of critical watersheds and forest areas.

- The Town and Country Planning Act of 1972 provides the basis for land use planning in Seychelles, but is outdated and in the process of being updated (a process that provides the basis for planned reforms in land use zoning under component 3).
- The Environmental Protection Act 1994 provides for the protection, preservation and improvement of the environment and for the control of hazards to human beings, other living creatures, plants and property.
- Environmental Impact Assessment (EIA) is dealt with under the Environmental Protection (Impact Assessment) Regulations [EP (EIA) Regulations]. The legislation requires that an EIA study be carried out and that an environmental authorisation is obtained if any person commences, proceeds with, carries out, executes or conducts construction/ development. This legislation will be strengthened under the project and will in the future prescribe EIAs for any development especially in watershed areas, wetlands, sand dunes (even development of picnic sites in sensitive areas) and mangrove areas with a view to improving climate change risk management. The public consultation process of EIAs will also be strengthened.

New technical standards will be developed for the construction of water storage facilities. The water harvesting infrastructure to be built by the project will be small scale. Locations of the structures will be selected in close collaboration with the Public Utilities Corporation and the Forestry Division under the MHAETE. Environmental Impact Assessments will be conducted prior to the construction of any of these structures. Further, national legislation and guidelines need to be developed for improved water conservation measures. A banded tariff scheme will be developed by PUC for the payment of water by users, and will include a “life-line” tariff band for the use of 0-5m³/month for a four person-household and higher priced bands for additional consumption. A percentage of the additional revenue will go towards incentivising land owners to restore and further protect watersheds.

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

A review of ongoing projects shows that there is no duplication of the proposed project with other ongoing or planned interventions. There are several projects aiming to protect the Seychelles’ rich biodiversity. The emphasis of biodiversity management in Seychelles has largely been on strengthening management of protected areas and on species conservation. Some impressive bird species reintroductions have been undertaken e.g. Seychelles white-eye and Seychelles magpie robin. Interesting work has also been conducted on eradication of alien invasive species from private islands e.g. rat eradication on Denis and North Islands. These alien invasive species had a negative effect on the biodiversity of islands, and their removal also allowed for reintroduced species to re-establish. The Government of Seychelles is currently undertaking an initiative to mainstream biodiversity in the tourism and fisheries sectors, to reduce the threats proposed by these production activities on Biodiversity. However, the focus of these investments is on reducing threats to intact ecosystems, rather than on restoring areas or on enhancing ecosystem service functionality. These investments do not have a specific focus on climate change risk management—i.e. gearing ecosystem management to reduce the vulnerability to climate change.

In support of the Government policies and programmes on climate change adaptation, several external partners are planning initiatives in relation to the subject. However, none has the explicit focus on enhancing the resilience of ecosystems as an adaptation measure. A special effort will be made to coordinate with the GEF-funded project “Implementing Integrated Water Resource and Wastewater Management in Atlantic and Indian Ocean SIDS”. The project will employ IWRM principles on the island of La Digue, and hence provide an ideal interface for

coordination and cooperation. During the full project formulation process, all stakeholders including donor funded projects will be consulted, in order to avoid any potential duplication of efforts and geographical coverage, and to ensure synergy between the ongoing initiatives and the proposed project.

The proposed project will build on the experiences and lessons learned from past and on-going initiatives that are addressing certain elements of the ecosystem-based adaptation and catalyse them into a larger-scale resilience approach. Moreover, it will take into account the lessons learned in other countries in this sphere, and seek to apply appropriate good management practices locally.

Table 2: Relevant Ongoing and Upcoming Initiatives in Seychelles

Project & Funding Institution	Objective	Potential Synergies
Ongoing Projects		
GOS/UNDP/GEF Mainstreaming Biodiversity Management into Production Sector Activities	To integrate biodiversity conservation objectives into key production sectors of the economy.	Work done on the project will complement the work of the proposed project as activities focus basically the same production sectors. The one project will integrate biodiversity concerns into development while the other climate change concerns, using ecosystem based adaptation as the entry point, assuring synergies and efficient use of funds.
GOS/UNDP/GEF Mainstreaming Prevention and Control Measures for Invasive Alien Species into Trade, Transport and Travel across the Production Landscape	Increased capacities to prevent and control the introduction and spread of Invasive Alien Species through Trade, Travel and Transport across the Production landscape.	Invasive Alien Species has the ability to modify community structure and/or species composition of natural systems, thereby potentially increasing the impacts and effects of climate change. By controlling the influx of Invasive Alien Species into Seychelles, the ecosystems will be more resilient, thereby assisting in the adaptation of Climate Change.
GOS/UNDP/GEF Capacity Development for Sustainable Land Management in Seychelles	Capacity enhanced in Sustainable Land Management (SLM) and SLM principles applied in national policies, plans, processes and practices.	Climate Change and especially sea-level rise will changing the soil fertility of the coastal zone and at times these plateau areas will be flooded resulting in a rise in the salinity levels of the soil. The increase knowledge of improved soil conservation practices in Seychelles through this project will greatly assist in the adaptation of the agriculture sector to climate change, through change in practices as well as crop species and rotation.

Project & Funding Institution	Objective	Potential Synergies
GOS/UNDP/GEF Enabling Seychelles to prepare its Second National Communication as a response to its commitments under the UNFCCC	Strengthen technical and institutional capacity to assist Seychelles in mainstreaming climate change concerns into sectoral and national development priorities.	Information on the national circumstances provided in the Initial National Communication (INC) will be updated. Special attention will be paid on new information and data related to the sectors vulnerable to climate change (agriculture, coastal zone, water resources and fisheries)
GOS/UNDP/GEF Capacity Development for Improved National and International Environmental Management in Seychelles	To integrate local and global environmental management and enhance the capacity to implement global environmental management objectives within national programmes.	Awareness and capacity are developed for mainstreaming global environmental conventions (this includes the UNFCCC) into national programmes. Capacity for local implementation of global environmental conventions is developed, applied and disseminated – the purpose is to demonstrate how global objectives relating to climate change
UNDP/GEF Strengthening Seychelles' protected area system through NGO management modalities	Facilitate working partnerships between diverse government and non-government partners in the planning and management of the protected area system in Seychelles.	Efficacy of active reef restoration techniques are tested in Cousin Island Special Reserve
GOS/EU Climate Change Support Programme	To support sustainable development policies and the implementation of the priority areas of the Seychelles National Climate Change Strategy, in a coordinated effort with other donors.	These two projects will both support to the implementation of the National Climate Change Strategy, with the EU project focusing on technology-based approaches and mitigation strategies and the Adaptation Fund project on ecosystem-based adaptation approaches.
Upcoming projects		
GEF/UNDP/UNEP/UNOPS Implementing Integrated Water Resource and Wastewater Management in Atlantic and Indian Ocean SIDS	Protection of a coastal gravel aquifer through integrated land and water management measures demonstrated in the island of La Digue.	Project will employ IWRM principles, and hence an ideal interface for coordination and cooperation. The two projects work in different islands—with this project focusing on ecosystem based adaptation to reduce vulnerabilities to water scarcity in the main population centre of Mahé.

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

Learning and knowledge management is recognised as an important component of the project, reflecting one of the key themes of the Adaptation Fund. The project will act as the knowledge window for the government, resource users, and private sector regarding Ecosystem Based Adaptation approaches, bringing in appropriate international experiences to the Seychelles. Awareness raising activities targeting decision makers and local communities will be an integral part of knowledge management and civil society organisations will be involved in their design and roll out. Furthermore, lessons learned by the project will be disseminated with wider stakeholders.

The project will promote knowledge sharing and coordination among practitioners through three mechanisms, namely: (a) Technical Working Group: a knowledge sharing and coordination platform for the climate change adaptation initiatives established with the representation of Government, external partners, academia, NGOs and CSOs; (b) the National Climate Change Committee, a broader policy level coordination mechanism; and (c) Local Coordinating Bodies: stakeholder assemblages to “learn by doing”. Inter-community learning and dissemination of knowledge and experience will be fostered through experience sharing exchanges. Workshops will be organised at both district and central levels, in order to disseminate findings and lessons learnt from implementation initiatives that will yield policy briefs to decision makers. The project will produce information materials in a form of brochures introducing the ecosystem-based adaptation approach. In addition to regular information dissemination and experience sharing through various media (print, radio, TV etc.), project inception and closing workshops will be organised with a strong media presence and a joint project terminal report will be produced and disseminated to stakeholders. A handbook, training modules, and website content capturing best coastal adaptation practices and alternative livelihood options in the Seychelles’ context will be produced. Interpretive signs will be designed and installed at each site where ecosystem based adaptation investments are being undertaken. It will explain the science of climate change and coastal processes so that linkages between weather, stability of coastal features, and adaptation measures are clearly understood.

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

The success of this project relies heavily on stakeholder involvement. The project will need the support and involvement of Government, communities and private sector. In the full proposal, a stakeholder involvement plan will be developed that will specify the goals and objectives for stakeholder involvement, it will identify the key stakeholders and their interests relative to the project and will describe how stakeholders will be involved in the implementation of each project outcome.

The goal for stakeholder involvement in the project is to ensure that all stakeholders who are affected by, have a role in, or are interested in project themes have the opportunity to be involved and develop a sense of “ownership” of the project. The objectives of stakeholder involvement are:

1. To ensure that the laws, policies, plans and strategies produced during the project are implemented effectively by involving relevant stakeholders;
2. To promote good environmental governance mechanisms, including transparency, accountability, cooperation and collaboration among stakeholders; and

3. To promote multi-stakeholder collaboration in the implementation of project activities, including effective use of Government, NGO, private sector and community expertise and resources, improved communication channels, and innovative partnerships to address environmental issues and priorities, building on the respective strengths of each stakeholder.

In order to achieve these objectives towards the success of the project a participatory approach has been and will be taken in the development of the full proposal. The scope of this initiative was defined in close consultation with the relevant officials at the MHAETE through meetings, including the Designated National Authority for the Adaptation Fund and the operational focal points for UNFCCC, UNCBD and GEF, as well as other Government Departments, notably the Ministry of Land Use and Housing, the Planning Authority and the Public Utilities Corporation and other external partners. The initiative is based on analysis and recommendations of a number of official reports and studies such as the studies for the Second National Communication and the Seychelles National Climate Change Strategy that were finalised after thorough stakeholder consultation processes. It also draws heavily on lessons learnt from implementing other projects and Governments realisation of the need to and commitment to decentralisation. During the formulation of the full project document, further consultation will be carried out with the stakeholders to define details of the project, including a logical framework workshop to prepare a results and resources framework and an implementation plan with the full participation of all affected stakeholders.

The following stakeholders have been identified.

Table 3. Project stakeholders

Stakeholder	Anticipated roles
Government entities	
Cabinet	Final level of approval of decisions
National Assembly	A Member of the National Assembly (MNA) is elected in each district by the adult population. The MNA is the democratically elected representative of the district inhabitants. Some other MNAs are representing their party on the proportional basis.
District Administration	Under the aegis of the ministry responsible for Local Government a district administration operates in each of the districts in Seychelles. The primary role of the district administration is to serve as an interface between the community in the affairs of the district and promoting access to public service at the local level. It operates in partnership with local representative groups and associations, community-based and non-governmental agencies, the Member of the National Assembly, the District Community Council.
Planning Authority 12 members: 5 Principal Secretaries (PS), chaired by PS MLUH, 5 technical + Seychelles Chamber of Commerce	Deals with planning and building applications, setting urban guidelines and preparing land use plans.
EMPS Steering Committee	Multi-stakeholder body with over 40 members, which

Stakeholder	Anticipated roles
	oversees implementation of 2000- 2010 Environmental Management Plan Seychelles (EMPS) and will oversee the third generation EMPS Plan 2010 – 2020 currently being drafted.
Ministry of Home Affairs, Environment and Transport, Department of Environment (DOE)	Overall conservation of nature and implementing UNCCD. It is Project implementing partner and its implementing agencies , Policy and Planning Services, Legal Unit, Pollution Control & Environmental Impact Assessment, Nature and Conservation, National Parks and Forestry will be main counterparts
Auditor General (AG)	The AG Office will be actively involved in the legislative and regulatory reform processes in the project.
Seychelles Fishing Authority	Authority responsible for management of renewable marine resources.
Department of Tourism and Transport	Deals with the Government-related tourism and transport portfolio. It has a primary focus on tourism policy development, while operational matters are dealt with by Seychelles Tourism Board
Ministry of Land Use and Housing	Main partner in land use planning and management including natural resources such as sand and gravel extraction, quarrying etc.
Ministry of Local Government, Culture and Sport (MLGCS), Department of Local Government	Its mission is to empower local communities to be involved in determining their needs to promote social and economic well-being. District administrators, who live and work in the district, are appointed by the governing party and are officials of MLGCS.
Seychelles Tourism Board	Multi-sectoral Board mandated to look at development and marketing local tourism.
Seychelles National Park Authority (SNPA)	Responsible for all National Parks and Marine National Parks. SNPA will actively participate in the legislative and regulatory processes of the project.
Seychelles Agricultural Authority (SAA)	Responsible for providing policy and regulatory framework to, as well as capacity development services to, the agricultural community of Seychelles.
Public Utilities Corporation (PUC)	Responsible for the provision of electricity and water to all end users.
Academia	
University of Seychelles	Departments of Geography, Biology, Meteorology and Hydrology are partners in baseline and feasibility studies and continued monitoring of indicators.
Communities and private sector	
Communities	Project implementers and direct beneficiaries in the target islands.
Green Island Foundation	Potential technical assistance in rehabilitation of degraded coastal zones as they have gained experience in rehabilitation of areas on Denis Island.
Marine Conservation Society Seychelles (MCSS), Nature Seychelles (NS), Seychelles	NGOs with experience in implementing various environmental projects, some with conservation area management experience.

Stakeholder	Anticipated roles
Islands Foundation (SIF), Plant Action Conservation (PAC) group, Sustainability for Seychelles (S4S), Island Conservation Society (ICS)	
Islands Development Company (IDC)	Responsible for the development of the Outer Islands and Silhouette Island.
Private sector	Project implementers and direct beneficiaries in the target islands.
National media	Information dissemination

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

The following section is a summary of the baseline and additionality reasoning for each project component. They will be further expanded and articulated in the full project proposal submitted for final approval by the Adaptation Fund Board. The full proposal will outline baseline development activities that are currently financed out of government funds, traditional ODA and the private sector and further explicate the value added of outcomes financed with resources from the Adaptation Fund.

Component 1: Long-term Adaptation Measures implemented that increase the resilience of the water sector to the impacts of climate change

Baseline (without AF Resources)

Seychelles is not fully equipped with a climate-resilient water supply and management system. This has led to the imposition of numerous water restrictions and emergency measures to provide water to citizens. During the next five years, the Government of Seychelles will address existing water shortages through managing both the demand and supply side of the water equation. Demand for water will be managed through 1) public awareness campaigns implemented by the Public Utilities Corporation (PUC); and 2) drafting and enforcement of legislation and implementation of tariffs bands. The supply of water to Seychellois will be addressed through the replacement/improvement of existing infrastructure e.g. replacing pipelines. Specifically, baseline investments include \$900,000 from the ADB to develop a water master plan; US\$ 14.2 million to raise the La Gogue reservoir, and US\$ 17 million annually for infrastructure development allocated by Ministry of Finance to PUC (to be split between water and electricity). The current supply system only operates at 56% efficiency with major losses due to old infrastructure (pipelines and meters) and inadequate monitoring. The country is seeking to reduce current water shortages by reducing leakage and installing new pressure and metering systems, and also through the planned demand side management measures. This effort will not be sufficient to address the expected climate change induced dry season water shortages, caused by the reduction and cessation of stream base flows.

Under the business as usual scenario, the Mahé water catchment area (essentially the entire island except the coastal plateau zone) will be managed in a fragmented and uncoordinated manner. Focus will be on the extraction of water from these areas rather than on enhancing the water provisioning services of ecosystems under climate change. The importance of watersheds will be measured by the amount of water at the source of extraction or storage and not through potential flow if proper management practices are employed. Land resource management will not be dealt in a coordinated, integrated manner, with full recognition of the complexity of

interaction between different biotic and non-biotic elements of ecosystems. Alien high water-use species will increase and forests will also be lost due to developments, landslides, fires etc, which also directly affects provision of quality water. This will reduce the adaptive capacity of Seychelles to climate change.

Additionality (with AF Resources)

This proposed project will implement an EbA approach to enhance ecosystems' resilience in the water catchment areas of Mahé in order to maximize the supply of water resources, and reduce climate change induced water scarcity (which will serve to reduce stream base flows). Watersheds will be evaluated on their water provisioning potential and a range of restoration and other ecosystem enhancing interventions will be implemented at sites that show the highest potential for water provision. This will include restoration of forest to enhance water-soil infiltration and water storage capacities in aquifers and wetlands. It will also address the impacts of wildfires—expected to grow in frequency and intensity under conditions of climate change, in the dry season. This will lead to forest degradation if left unchecked, and will have an adverse effect on hydrological functioning. This EbA approach will be combined with the construction of small-scale water storage facilities (barrages) to capture the enhanced flow of water during dry periods from the restored forests.

Component 2: Ecosystem-based adaptation approaches increase the adaptive capacity of the coastal zone communities to climate change

Baseline (without AF Resources)

The coastal strip of the granitic islands is extremely vulnerable to the projected impacts of climate change especially coastal erosion and flooding. Under the business as usual scenario, coastal erosion will be addressed by continual upgrading of the infrastructure and by continual reclamation of lost land. This will result a largely fragmented ad-hoc approach dealing with problems as they arise. The hard structural technologies that will be employed to protect the shoreline include (1) rock armouring; (2) sea-walls; (3) break-water/piers; and (4) groynes. Tourism developments will mainly finance such structures to protect beaches, while Government will finance structures to safeguard public infrastructure. Private owners will safeguard their own investments. In extreme cases, infrastructure will be moved away from the shoreline e.g. roads. Reclaimed areas on the coast will be exposed to continual erosion. Floods will be dealt as a disaster when it happens. Drainage will be designed to redirect water in some urban areas. At times when flooding as a result of intense rainfall and wave/ocean flooding occur simultaneously, large financial losses will result. The economic costs of these measures will not be factored in, as is often the case with disasters.

In selected areas, mangroves will be protected for their biodiversity values, but as is the case in the past, not specifically to protect the shoreline from erosion and flooding. In areas outside protected areas the degradation of mangroves will likely continue. Sand dunes will continue to be seen as recreational areas, and developed into tourism resorts or private residences. Coral reefs will be conserved in marine protected area, for biodiversity reasons and for the promotion of recreational diving and artisanal fisheries. These sites for protection were not chosen on the basis of the potential ecosystem services they can provide—i.e. buffering services to protect coastal infrastructure.

Additionality (with AF Resources)

This project will demonstrate an EbA approach to enhance ecosystems' resilience in the four main islands so that they will be able to provide a continuous buffering services against erosion and floods while providing for or enhancing economic activities. A range of restoration and other ecosystem resilience enhancing interventions will be undertaken. This will include ecosystem restoration efforts to enhance buffering services of mangroves, coral reefs, sand dunes and wetlands against erosion and floods. Economic analysis of the measures will provide further strength to the use of ecosystem-based adaptation processes and these analyses will ensure stakeholders to appreciate the value of the different ecosystems. A consolidated effort to involve local stakeholders in the design, implementation and monitoring of the coastal adaptation practices will be made at each site. The project will facilitate the development of interpretive models and signs, and dynamic explanations of coastal processes and climate change impacts at each of the different chosen sites. It is expected that the sites where the coastal protection measures are implemented will become visitor destinations in their own right, attracting scientists, tourists and the general public. These efforts are expected to increase public awareness of the coastal adaptation issues in Seychelles and an understanding of cost-effective solutions to climate change impacts.

Component 3: Ecosystem based climate change Adaptation mainstreamed into Developing Planning and Finance

Baseline (without AF Resources)

Since Seychelles ratified the Kyoto Protocol in 1993, the government has taken considerable steps towards the implementation of the UNFCCC, by implementing the required commitments such as the Initial National Communication and Technology Needs Assessment. There has been a growing awareness amongst the decision-makers and government officials that climate change risks to Seychelles are very high and that this is an issue that significantly affects almost all sectors of the national economy. There is a good awareness about the need for comprehensive adaptation measures that will be required to reduce the anticipated negative impacts of climate change. The Seychelles National Climate Change Strategy approved by the Cabinet in 2009 echoes this awareness among the major decision-makers of Seychelles. Two of the five objectives refer to this component namely *“to mainstream climate change considerations into national policies, strategies and plans”* and *“to build capacity and social empowerment at all levels to adequately respond to climate change”*. Although the Strategy addresses these aspects, there is recognition of lack of capacity and knowledge to address emerging issues as well as limited financial resources for adaptation. Furthermore, existing adaptation efforts have not adequately incorporated EbA approaches. The Government has recognized that this is a shortcoming and that concrete methodologies and actions for the EbA approach are lacking. The Government has identified EBA it as its priority for adaptation fund financing—seeking to put in place the requisite management systems.

Given that different government agencies are responsible for different aspects of water and coastal zone management, tackling these issues under the expected conditions of climate change would require a coordinated approach of governmental institutions, as well as the private sector, NGOs and individual citizens at the ecosystem level. In the business as usual scenario, the government's institutional capacity for planning and implementing adaptation approaches will remain insufficient at the national and local levels with limited access to tools and information for internalizing climate change risks into land, water and coastal resource planning. Land use planning will largely be focused on physical development and urban development, with biodiversity conservation objectives incorporated in high biodiversity areas. There will be little consideration of climate change risks and comprehensive measures for enhancing ecosystem resilience. Climate change will not be internalized in land use

management, increasing the likelihood of ecosystems being degraded to a point where they are no longer resilient to climate change. Adaptation actions will remain fragmented and uncoordinated. No systematic knowledge management system with adequate EbA elements will be developed and instituted. Up-scaling of best practices will therefore be unlikely to happen.

Additionality (with AF Resources)

With the financing rendered through the Adaptation Fund, EbA will be mainstreamed in the country's legislative framework and related sector policies. Decision makers, local communities and the general public will have a good understanding of the urgent necessity for taking comprehensive adaptation measures which combine different approaches including engineered and technologically oriented adaptation options and EbA, significantly increasing the likelihood that the Seychelles will succeed in its adaptation efforts. Institutional mechanisms will also be strengthened in support of internalisation of climate change risks in district land, water and coastal use plans, as well as island development plans, and activities. In order to support this informed decision making process, environmental assessments will be conducted under the two other components, which is expected to yield much needed detailed information on threats to ecosystem functions and resilience from climate change as well as various sectors and land uses. The land use planning system and environmental impact assessment and mitigation framework will be applied, to ensure that EbA considerations are taken into account in development activities, and an effective mitigation hierarchy (avoid, reduce, mitigate and offset) is applied for the purposes of securing ecosystem services.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

Upon the request of the Government of Seychelles, UNDP will be the Multilateral Implementing Entity (MIE) for this project. The Project will therefore be implemented following UNDP's **National Implementation Modality (NIM)**. The designated Implementing Partner of the project will be the Environment Department (ED), Ministry of Home Affairs, Environment, Transport and Energy. ED is responsible for implementing UNFCCC and will hold the responsibility of the senior supplier. ED is ultimately responsible for the timely delivery of inputs and outputs and for coordination of all other Responsible parties including other line ministries, relevant agencies, and local government Authorities. The ED will appoint the **National Project Director**,

The Project Board (PB) is responsible for making management decisions for the project and plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. The PB will be composed of designated senior-level representatives of MHAETE, Ministry of Land Use and Housing, UNDP and local District Administrators' offices.

Project assurance - UNDP Mauritius/Seychelles will support project implementation by assisting in monitoring project budgets and expenditures, recruiting and contracting project personnel and consultant services, subcontracting and procuring equipment. The UNDP Mauritius/Seychelles will also monitor the project implementation and achievement of the project outcomes/outputs and ensure the efficient use of donor funds through an assigned Programme Manager.

Project Manager – (PM). He/she will be a national professional designated for the duration of the project. The PM's prime responsibility is to ensure that the project produces the results specified in the project document to the required standard of quality and within the specified constraints of time and cost.

Project-Support - PM will be supported by a core technical and support staff located within the MHET and other supporting organizations to execute the project activities, including day-to-day operations of the project, and the overall operational and financial management and reporting. At the target implementation sites, local coordinators will be recruited.

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

During the development of the project document, the risks will be further analysed and elaborated in a risk log.

Table 4. Risks and risk management

No	Type	Description	Comments	Rating
1	Institutional	Policy makers prioritize economic benefits over sustainable and resilient ecosystems	Project will also build capacity of the relevant national stakeholders at central and local levels. Moreover, awareness raising activities will be implemented at the target sites to convince and change behavior of the local communities towards sustainable resources utilisation.	Medium
2	Environmental	Extreme	As a part of adaptation measures, the	Medium

		natural disasters affect confidence of local community to adaptation measures	project will apply a proven approach of community-based disaster risk management, thus reducing the vulnerability of communities to natural disasters. The primary units will be the farmer, tourism and fishermen groups joining the efforts. Local level implementation will provide incentives for the local communities and businesses to cooperate towards a long-term resilience.	
3	Environmental/ Social	Adaptation measures increase inequity	The project will ensure that the adaptation measures are gender sensitive and demonstration at the local level that they do not limit the participation of women and the disabled as beneficiaries. Further, as climate change will impact the livelihoods of the moist vulnerable, the project will target addressing the needs and adaptive capacity of the groups that are most affected.	Low

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

The monitoring and evaluation (M&E) scheme will be applied in accordance with the established UNDP procedures throughout the project lifetime. As an implementing partner, MHAETE, together with the UNDP Mauritius/Seychelles will ensure the timeliness and quality of the project implementation. The M&E plan will be implemented as proposed in Table 5. Technical guidance and oversight will be also provided from the UNDP's Regional Bureau for Southern Eastern Africa, as well as the Project Board (PB). Audits on the project will follow UNDP finance regulations and rules and applicable audit policies.

Project start: A *Project Inception Workshop (IW)* will be held within the first 3 months of project start with those with assigned roles in the project management, AF, UNDP CO and where appropriate/feasible, regional technical advisors as well as other stakeholders. The IW is crucial to building ownership for the project results and to plan the first year annual work plan.

Annual Progress Report. An Annual Progress Report (APR) shall be prepared by the Project Manager, shared with the Project Board and submitted to the Donor. The APR will be prepared with progresses against set goals, objectives and targets, lessons learned, risk management and detailed financial disbursements.

Mid-term of the project cycle: The project will undergo an independent Mid-Term Evaluation (MTE) at the mid-point of project implementation (September 2014). The MTE 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. The findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term.

Periodic Monitoring through site visits: UNDP Mauritius/Seychelles will conduct visits to project sites based on the agreed schedule in the project's Annual Work Plan to assess, at first hand, project progress. Other members of the PB may also join these visits.

Project Closure: An independent Final Evaluation will be undertaken 3 months prior to the final PB meeting. 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 takes place. The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals.

Table 5. Monitoring and evaluation plan of the proposed project

Type of M&E activity	Responsible Parties	Budget US\$	Time frame
Inception Workshop and Report	<ul style="list-style-type: none"> ▪ Project Manager ▪ UNDP CO, RBAP, AF 	3,000	Within first two months of project start up
Measurement of Means of Verification for Project Progress on <i>output and implementation</i>	<ul style="list-style-type: none"> ▪ Oversight by Project Manager ▪ Project team 	n.a	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO 	0	Annually
Periodic status/ progress reports	<ul style="list-style-type: none"> ▪ Project manager and team 	0	Quarterly/ Annually
Mid-term Evaluation	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ UNDP RBAP ▪ External Consultants (i.e. evaluation team) 	25,000	2014
Final Evaluation	<ul style="list-style-type: none"> ▪ Project team, ▪ UNDP CO ▪ External Consultants (i.e. evaluation team) 	25,000	2017, at least three months before the end of project implementation
NEX Audit	<ul style="list-style-type: none"> ▪ UNDP CO ▪ Project manager and team 	2,000	As per UNDP regulations
Visits to field sites	<ul style="list-style-type: none"> ▪ UNDP CO ▪ Government representatives ▪ Project Unit ▪ UNDP RBAP 	20,000	Yearly
TOTAL indicative COST		US\$ 75,000	

Note: The costs indicated here do not include the costs associated with UNDP staff. Those UNDP related costs are covered by the MIE fee.

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

Detailed results framework with SMART indicators, their baseline and targets will be prepared during the preparation of the full Project Document to be submitted to the Adaptation Fund for approval.

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

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT

The proposed project is in line with Government of Seychelles's policies and priorities. Hence it has been endorsed with the approval of competent authority. A copy of the endorsement letter is attached.

Didier Dogley Principal Secretary Environment Department Ministry of Home Affairs, Environment and Transport Government of Seychelles	Date: April 18, 2010
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B. IMPLEMENTING ENTITY CERTIFICATION

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.

 <p>Yannick Glemarec Director Environmental Finance UNDP Implementing Entity Coordinator</p>	
Date: April 18,2011	Tel. and email:+1-212-906-6843 yannick.glemarec@undp.org
Project Contact Person: Fabiana Issler Tel. And Email: + 27 12 354 8128; fabiana.issler@undp.org	

ANNEX A UNDP Environmental Finance – Specialized Technical Services

Stage	Specialized Technical Services Provided
Identification, Sourcing and Screening of Ideas	Provide information on substantive issues and specialized funding opportunities (SOFs)
	Verify soundness and potential eligibility of identified idea
Feasibility Assessment / Due Diligence Review	Technical support: provide up-front guidance; sourcing of technical expertise; verification of technical reports and project conceptualization; guidance on SOF expectations and requirements
	Provide detailed screening against technical, financial, social and risk criteria and provide statement of likely eligibility against identified SOF
	Assist in identifying technical partners; Validate partner technical abilities.
	Obtain clearances - SOF
Development & Preparation	Technical support, backstopping and troubleshooting
	Technical support: sourcing of technical expertise; verification of technical reports and project conceptualization; guidance on SOF expectations and requirements
	Verify technical soundness, quality of preparation, and match with SOF expectations
	Negotiate and obtain clearances by SOF
	Respond to information requests, arrange revisions etc.
	Verify technical soundness, quality of preparation, and match with SOF expectations
Implementation	Technical and SOF Oversight and support
	Technical support in preparing TOR and verifying expertise for technical positions. Verification of technical validity / match with SOF expectations of inception report. Participate in Inception Workshop
	Technical information and support needed
	Technical support, participation as needed
	Advisory services as required
	Allocation of ASLs
	Technical support and troubleshooting, Support missions as necessary
	Project visits – at least one technical support visit per year
	Technical support, validation, quality insurance
	Return of unspent funds
Evaluation and Reporting	Technical support, progress monitoring, validation, quality assurance
	Technical support, participation as necessary
	Technical support in preparing TOR and verifying expertise for technical positions. Verifications of technical validity / match with SOF expectations of inception report. Participate in briefing / debriefing
	Technical analysis, compilation of lessons, validation of results
	Dissemination of technical findings

Service standards:

1. initial response to communication within 2 working days
2. full response to communication (with the exception of a response requiring travel) within 10 working days.

ANNEX B Climate Change Scenario Assessment

Citations from “Chang-Seng, D. 2007. Climate Change Scenario Assessment for the Seychelles, Second National Communication (SNC) under the United Nations Framework Convention on Climate Change (UNFCCC), National Climate Change Committee, Seychelles.”

“The MAGICC SCENGEN tool is used extensively to construct two climate scenarios for Mahé and the Aldabra area based on the A1 high-range emission with a high climate sensitivity and the B2 mid-range emission with a mid climate sensitivity at seasonal and annual time scales. A range of seven General Circulation Models (GCMs) [CMS, ECHS, ECH4, GFD, HAD2, HAD3, MODBAR] at 5° (~500 km) resolution are employed to assess the regional climate change patterns. The GCM-Guided Perturbation Method (GPM) and the Regional Climate-Change Projection from Multi-Model Ensembles (RCPM) technique provide an alternative assessment for comparing with the different scenario results. Scenario uncertainties are also explored as a means of quantifying regional climate change patterns and the choice of model selection. This will offer a range of policies and strategies for climate change adaptation. The local parameters assessed are rainfall, maximum and minimum temperatures, and regional sea level.”

“A1 high range emission and high climate sensitivity simulates more extreme climate changes compared to the B2 mid-range emission with mid-range climate sensitivity (BM). The BM climate scenario shows that the mean air temperature for both Mahé and the Aldabra area is *more likely than not* to warm by +3.0 ° C by the end of this century. The relative rate of warming will occur mainly during the cooler southeast monsoon. The warming ranges are +0.4 to +0.7; +0.9 to +1.4 and +1.8 to +2.9 ° C respectively for the years 2025, 2050 and 2100. Consequently, the maximum increase in seasonal rainfall for Mahé is +12.4 % (+38.6 mm) in the DJF [December, January, February] season while a decrease of -36.3% (-31.1 mm) is expected during the southeast monsoon of the year 2100. The range of percentage change in annual rainfall is -2.4 to +5.0 %; - 4.8 to +8.5 %; -8.6 to +16.3 % respectively for the years 2025, 2050 and 2100. Thus, the rainy season is *more likely than not* to be wetter, while the dry season is *more likely than not* to be dryer with the exception of the JJA [June, July, August] season of the year 2050. It is suggested that the projected upward trend in the multi-decadal 30 year-cycle in rainfall variability (Chang-Seng, 2007) could possibly balance the expected deficit during the JJA season of the year 2050 forced by anthropogenic climate changes. Scenario uncertainties methods such as change in model variability and probability of an increase in precipitation analyses support quantitatively that the DJF season will *likely* be wetter while the JJA season is *unlikely* to be wetter and the annual rainfall will *likely* be higher than the 1972-1990 base periods.

The Regional Climate-Change Projection from Multi-Model Ensembles RCPM shows seasonal precipitation rates are *more likely than not* (45-55%) to increase in the rainy season of up to +1.0 mm per day by the year 2100. On an annual basis it is *likely* (80%) that rainfall rate will be greater and equal to +0.5 mm per day.”

“Global sea level is expected to rise from +7-8, +15-17 and +35-40 cm according to the policy best guess scenario by the years 2025, 2050 and 2100 respectively. Regional sea level in the southwest Indian Ocean is expected to rise between +40 to +60 cm according to the UK Meteorological Office model. On the other hand, tropical cyclone scenario remains a major challenge, but recent modeling studies in the US, have suggested that peak winds may increase by 5 to 10 % and peak rainfall rates may rise by 20 to 30 %.”