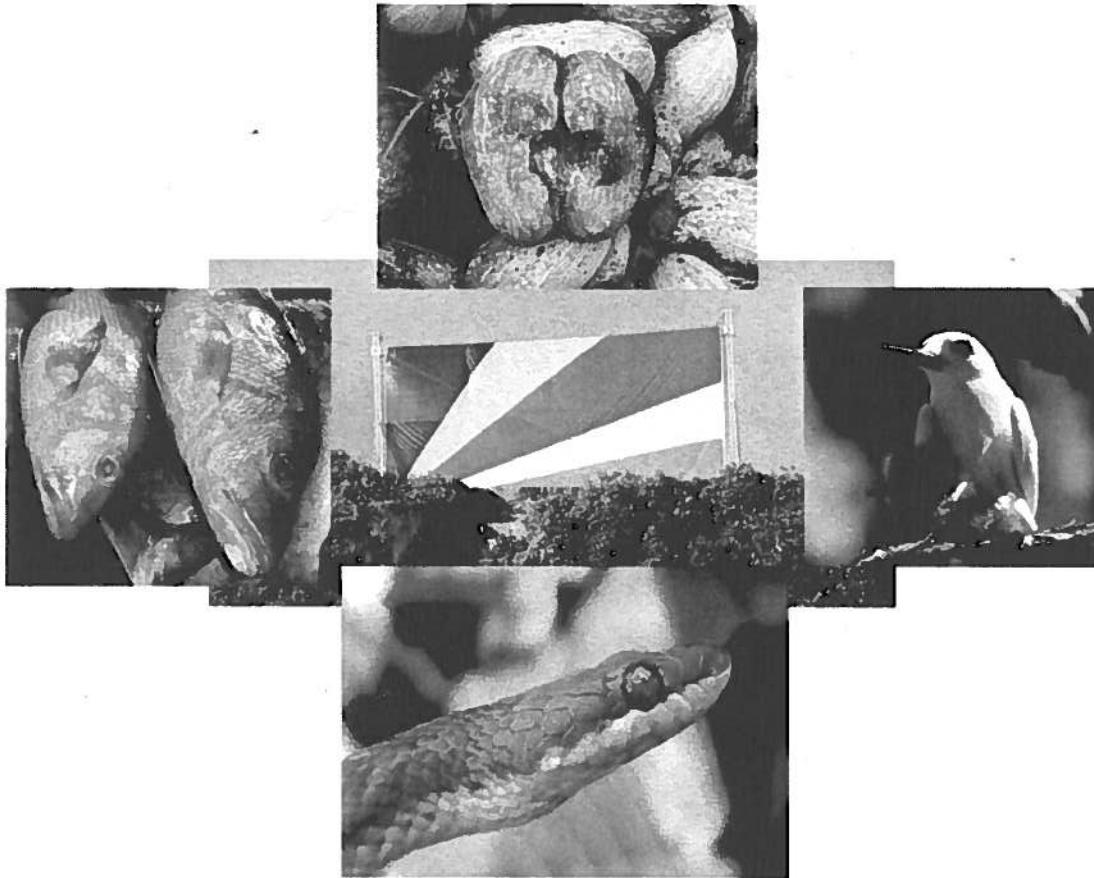


Seychelles' National Biodiversity Strategy and Action Plan

2015-2020



*Empowered lives.
Resilient nations.*

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Acronyms and Abbreviations

ABS	:	Access and Benefit Sharing
ASFA	:	Artisanal Shark Fishers Association
BioFin	:	Biodiversity Finance Project
CBD	:	Convention on Biological Diversity
CHM	:	Biodiversity Clearing House Mechanism
EEZ	:	Exclusive Economic Zone
EIA	:	Environmental Impact Assessment
EMPS	:	Environmental Management Plan for Seychelles
EPA	:	Environment Protection Act (1994)
ETF	:	Environment Trust Fund
GEF	:	Global Environment Facility
GIF	:	Green Islands Foundation
ICS	:	Island Conservation Society
IU	:	NBSAP Implementation Unit
IUCN	:	International Union for the Conservation of Nature
KBA	:	Key Biodiversity Area
MCSS	:	Marine Conservation Society, Seychelles
MEE	:	Ministry of Environment and Energy.
MLUH	:	Ministry of Land Use and Housing
MNRI	:	Ministry of Natural Resources and Industry
MoF	:	Ministry of Finance
MPA	:	Marine Protected Area
MSP	:	Marine Strategic Planning
MTC	:	Ministry of Tourism and Culture
NBF	:	National Biosafety Framework
NBPF	:	National Biodiversity Partnership Forum
NBSAP	:	National Biodiversity Strategy and Action Plan
NEDIP	:	National Environmental Data and Information Portal
NGO	:	Non-Governmental Organisation

NPNCA	:	National Parks and Nature Conservancy Act (1971)
PA	:	Protected Area
PAN	:	Protected Area Network
PCA	:	Plant Conservation Action Group
PFA	:	Praslin Fishers Association
SAA	:	Seychelles Agricultural Agency
SCCAT	:	Seychelles Conservation and Climate Adaptation Trust
SCCI	:	Seychelles Chamber of Commerce and Industry
SFA	:	Seychelles Fishing Authority
SHTA	:	Seychelles Hospitality and Tourism Association
SIDS	:	Small Island Developing State
SIF	:	Seychelles Islands Foundation
SNPA	:	Seychelles National Park Authority
SRFS	:	Shark Research Foundation Seychelles
SSDS	:	Seychelles Sustainable Development Strategy
TCPA	:	Town and Country Planning Act (1972)
TNC	:	The Nature Conservancy
TRASS	:	Terrestrial Restoration Action Society of Seychelles
UNDP	:	United Nations Development Programme
UniSey	:	University of Seychelles
WABPA	:	Wild Animals and Birds Protection Act (1966)
WCS	:	Wildlife Clubs of Seychelles
WWF	:	World Wildlife Fund

Executive Summary

The Seychelles National Biodiversity Strategy and Action Plan 2015-2020 (NBSAP) has been prepared through an iterative process of stakeholder consultation and approval. The NBSAP addresses Seychelles' obligations under Article 6a of the Convention on Biological Diversity (CBD) and replaces the previous version produced in 1997. This document builds upon a review of its predecessor and preparatory documents addressing financing, capacity building and climate change related biodiversity issues.

The NBSAP was developed through a truncated process with stakeholder consultations and development of a draft undertaken in 2012 and 2013. Following international independent review of the draft it was decided to re-align its content to the CBD's Aichi Biodiversity Targets a process which was undertaken in 2014.

Seychelles is home to significant biodiversity with high endemism: 50-85% for different animal groups and approximately 45% for plants in general, and is recognized as a biodiversity hotspot by Conservation International and a centre of plant biodiversity by the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund (WWF).

In **Chapter 2**: Seychelles' biodiversity is described in the context of three of the CBD's thematic areas namely: Forest Biodiversity, Inland Waters Biodiversity and Marine and Coastal Biodiversity. For each thematic area an overview is provided of the habitat types and species content. Maps show the distribution of the habitats over the three main populated islands and the overall status and trends nationally are discussed. Drivers of biodiversity loss and are investigated for each main habitat type and the key threats to biodiversity are identified and analysed in **Table 9**. In summary, whilst the relative significance of threats may vary from one habitat type to the next, the main threats to terrestrial biodiversity are Invasive Alien Species (IAS) and loss of habitat/change in land use. Climate change is a cross-cutting threat and complicating factor in assessing priority threats to terrestrial biodiversity. In marine ecosystems the primary threat is that of overfishing. There is strong evidence showing significant and progressive overfishing of the demersal fishery and "fishing down" of the food chain which can destabilise ecosystems. These matters are covered at length in **Section 2.2**. Climate change is also a major threat to the conservation and sustainable use of marine biodiversity and particularly so with regard to the most biodiverse habitat of coral reefs which suffered severe loss of live coral cover in the 1998 ENSO-related bleaching event. The effects of overfishing and raised sea temperatures compound each other in terms of the impact on reef systems. The known losses of biodiversity are discussed in **Section 2.4**.

Section 2.5 summarises Seychelles' key biodiversity successes which reflect the focus of conservation action over the last 40 years namely: i). the eradication of IAS from and the rehabilitation of small island ecosystems which has resulted in remarkable success stories, particularly in the conservation of endangered endemic landbirds; and ii). the Protected Area Network (PAN) which covers some 46.6% of the country's landmass and includes world class protected areas like Aldabra, Cousin Island, Aride Island and the Vallee-de-Mai which have yielded enormous conservation benefits not least the ongoing recovery of turtle rookeries on Aldabra and Cousin Island.

Sections 2.6 & 2.7 describe and discuss Seychelles' PAN its legal basis, classifications and constituent parts and the issues it faces in terms of: the representative nature of the PAN, the shortfall in Marine Protected Areas, "Paper Parks", effective management and the lack of sustainable financing mechanisms; and how these issues are addressed under the NBSAP.

Chapter 3 discusses the Policy, Institutional and Financial context of biodiversity management in Seychelles.

The existing mechanisms for mainstreaming biodiversity such as the Planning Authority, Environment Protection Act, Town and Country Planning Act, the previous Environmental management Plans (EMPS) and the current Sustainable Development Strategy (SSDS) are summarised; and the proposed mechanism for mainstreaming the NBSAP covered.

The lack of substantive biodiversity valuations preventing the integration of biodiversity into national accounting and budgeting is identified as a key barrier to the effective conservation and sustainable use of biodiversity in Seychelles and is addressed in **Project 23**. The incentives for biodiversity, perverse and positive, are alluded to and addressed in **Project 26**. The financing options for biodiversity, current and potential, including the Public Sector Investment Programme (PSIP), Environment Trust Fund and debt for adaptation swap are discussed and recommendations made to enhance the uptake of funds for biodiversity which are addressed by **Projects 22,23,26 and 31**.

Issues of data management (**section 3.4**), Biosafety (**section 3.5**) and Capacity Building (**section 3.6**) are covered and linkages to the projects that address them (i.e. **projects 14, 8 & 31** respectively) are made.

Chapter 4 sets out the actual strategy and action plan. The NBSAP adopts the same vision as its overarching national strategic document the SSDS:

"To contribute to the realisation of the nation's economic, social and cultural potential through an innovative, knowledge-led approach, being mindful of the need to conserve the integrity of the Seychelles natural environment and heritage for present and future generations."

The Mission statement reflects Seychelles' commitment to the three objectives of the CBD:

"To effectively implement the Convention on Biological Diversity within the Seychelles context through the integrated conservation and sustainable use of biodiversity and the equitable sharing of benefits arising from the use of genetic resources."

The strategic goals and objectives of the NBSAP mainstream the CBD's strategic plan by directly reflecting the 20 Aichi Biodiversity Targets. The NBSAP has a 6-year duration (2015-2020) with a mid-term (3-year) review built in. It is intended to be a living document and hence also incorporates an adaptive mechanism whereby stakeholders can develop, submit and approve additional projects for inclusion in the NBSAP portfolio. Stakeholders will interact, for various purposes, to ensure the transparent and equitable implementation of the NBSAP, through the means of a National Biodiversity Partnership forum (NBPF).

Great emphasis is placed on the formation of an Implementation Unit (IU) that will oversee and coordinate the implementation of the NBSAP and serve as secretariat to the NBPF. The funding and establishment of the IU is considered a critical factor for the successful implementation and mainstreaming of the NBSAP and its structure and duties are set out in **Project 31**.

Finally 31 projects, as approved by stakeholders, are set out in a modified logframe format. The projects are prioritised on a 1-4 scale, with implementation timelines, activities, targets, results and a cross-reference to the pertinent Aichi Targets that their implementation supports. Matrices are also provided summarising project prioritisation and which Aichi Targets each project supports.

In addition to the establishment of the IU two other project are considered of fundamental, cross-cutting precursory nature, namely: **Project 26** the NBSAP Financing Action Plan and **Project 23** on Biodiversity and Ecosystems Services Valuation.

Introduction

The Republic of Seychelles lies in the southwest Indian Ocean, north east of Madagascar and consists of 155 islands. The central archipelago lies on the Mahé Plateau (between 3°30" and 5° South and 55° and 56° East) and serves as home to approximately 98-99% of the 95,000 human population (2014 mid-year population estimate 94,664 [NSB 2014]). These islands are unique being the only oceanic islands in the world of continental (granite) origin and are of considerable ecological interest having been isolated from continental landmasses for some 70 million years. The terrestrial ecosystems display African and Indo-Malayan elements. The Amirantes and southern Atolls lie to the south and south west of the central archipelago and are coralline in origin – atolls and sand cays.

The Seychelles is recognized as a biodiversity hotspot by Conservation International and a centre of plant biodiversity by the International Union for the Conservation of Nature (IUCN) and the World Wildlife Fund (WWF). Endemism is high at 50-85% for different animal groups and approximately 45% for plants in general. The Seychelles are also of note, as like other islands of the Mascarene groups, it had no aboriginal human population.

The islands, although being spread over a sea area of some 1.4 million square kilometres, are very small with a total surface area of approximately 455 km² (the central archipelago approx. 244km² and the outer islands 211km²). Man's activities therefore despite their short duration have had extensive impacts on terrestrial and coastal ecosystems through direct exploitation, change in land use and the introduction of Invasive Alien Species. Today only relict fragments of original vegetation structure remain and indigenous fauna abundance has been greatly reduced. The coastal environment has undergone major anthropogenic change with early historical extirpation of some key species and ecological extinction of various others. Since the Second World War artisanal fishing capacity and pressure has expanded out geographically from the central archipelago with significant impact in terms of fishing down the food chain. Today the entire Mahé plateau is subject to intensive fishing pressure with strong signs of general overfishing. Industrial fishing of tuna was initiated in Seychelles in the 1980s and has expanded since that time establishing Seychelles as the main tuna fishing port in the Western Indian Ocean.

The Seychelles was the second country to sign the Convention on Biological Diversity (CBD) in 1992 and became a Party that same year. The first National Biodiversity Strategy and Action Plan (NBSAP), developed in 1997, was successful in galvanising national stakeholder action for the implementation of the objectives of the Convention of Biological Diversity in Seychelles. It was superseded as the primary national strategic document for biodiversity in 2002 by the biodiversity thematic area of the national Environmental Management Plan (EMPS 2000-2010). Subsequent reviews have identified this as an error and recommended that the next NBSAP be retained as the primary sectoral approach for the conservation and sustainable use of biodiversity, with the biodiversity component of the national sustainable development plan (SSDS 2012-2020) serving as the primary means for mainstreaming of biodiversity through other socioeconomic sectors.

This second Seychelles National Biodiversity Strategy and Action Plan (NBSAP 2015-2020) was written to meet Seychelles commitments as set out in Article 6a of the CBD. The NBSAP was developed through an iterative process of stakeholder consultation and endorsement and has been aligned with the Aichi Biodiversity Targets to ensure the national approach is coordinated with the Convention's strategic plan and to facilitate later reporting on implementation.

1. NBSAP Revision Process

The Ministry of Environment and Energy (MEE) with the financial and technical assistance of the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) undertook to prepare a new National Biodiversity Strategy and Action Plan (NBSAP). A Steering Committee chaired by MEE and consisting of 16 stakeholder organisations (see **Annex 1**) was established to guide the NBSAP Process.

This document was developed in two distinct phases. Primary stakeholder consultations to elaborate the Strategy and Action Plan were undertaken in 2013. This process was led by Mr. Jacques Prescott (International Consultant) supported by Mr. Nirmal Jivan Shah (NBSAP Technical Advisor) and Ms Marie-May Jeremie (Director, MEE). This resulted in a draft NBSAP with framework action plan. Following peer review of the draft it was decided to expand upon the background text and restructure the overall document directly in line with the Aichi Biodiversity Targets, elaborating the action points into project formats; this process was undertaken in 2014 by Mr John Nevill (Consultant).

1.1 Stakeholder Analysis

Biodiversity by its very nature is a cross-cutting socioeconomic issue and therefore has a broad and complex stakeholder community. The primary Governmental agencies are the Department of Environment (within the Ministry of Environment and Energy, MEE), the Department of Natural Resources (within the Ministry of Natural Resources and Industry, MNRI) and their associated parastatal agencies and bodies corporate: the Seychelles National Parks Authority (SNPA), The Seychelles Islands Foundation (SIF) and the Seychelles Fishing Authority (SFA). Secondary Government stakeholder agencies include the Ministry of Land Use and Housing (MLUH), the Planning Authority, the Ministry of Tourism and Culture (MTC), the Seychelles Tourism Board and the Seychelles Agricultural Agency (SAA).

Civil society stakeholders are also diverse. Seychelles has a vibrant biodiversity NGO community. Nature Seychelles (NS) and the Island Conservation Society (ICS) both manage Island Special Reserves amongst other much broader activities. The Marine Conservation Society, Seychelles (MCSS) is the only NGO dedicated exclusively to the conservation and sustainable use of marine biodiversity. Other biodiversity NGOs include the Green Islands Foundation (GIF), the Plant Conservation Action group (PCA), the Terrestrial Restoration Action Society of Seychelles (TRASS), the Shark Research Foundation, Seychelles (SRFS) and the Wildlife Clubs of Seychelles (WCS).

There are various other civil society organisations with direct involvement such as fishers associations - notably the Praslin Fishers Association (PFA), the Bel Ombre Fishers Association, the Seychelles Sports Fishing Club and the Artisanal Shark Fishers Association (ASFA) - and private sector associations notably the Seychelles Chamber of Commerce and Industry (SCCI) and the Seychelles Hospitality and Tourism Association (SHTA).

The full listing of stakeholders that contributed to the consultations is included in **Annex 2**.

1.2 Review and Assessment of NBSAP implementation

The implementation of the NBSAP is reviewed in detail in Seychelles' Fourth National report to the CBD (GoS 2011). To summarise, the first NBSAP was prepared in 1997 and was structured to address Seychelles' strategic commitments to the CBD in terms of implementation of the Convention's articles. The NBSAP set out a framework with strategic objectives and elaborated a series of prioritised projects, conceptualised and developed through stakeholder consultation, identifying implementing agencies, budgets and timelines. The review found implementation of the NBSAP's strategic objectives was good and broad. Implementation of specific projects was "fair" and underestimated actual national implementation as the NBSAP was not periodically updated, meaning that emerging issues and priorities which were addressed are not reflected in the project components of the NBSAP. Of particular note was the broad societal implementation of projects: of the successful projects 37.5% were implemented by NGOs, 37.5% by Government and 25% as direct Government/NGO partnership. The NBSAP was therefore considered successful in the mobilization of biodiversity stakeholders, the identification of key priorities for action and the provision of a national framework for civil society involvement. The NBSAP served to galvanise stakeholder involvement and has seen the blossoming of a dynamic and effective biodiversity NGO sector.

With the benefit of hindsight flaws in the administration of the NBSAP are noted, in particular the utilisation of the biodiversity thematic area in the EMPS 2000-2010 as the primary mechanism for the implementation of biodiversity issues in Seychelles. In retrospect this served to dilute biodiversity issues and stakeholders in a broader national environmental forum that itself had significant administrative flaws.

The report concluded by recommending that the proposed "NBSAP 2" be utilised as the primary mechanism for implementation of the CBD in Seychelles, with a flexible format that allows for the periodic updating of the plan in line with CBD COP decisions. The Seychelles Sustainable Development Strategy 2011-2020 (SSDS) with its Biodiversity thematic area was proposed to serve as the means to mainstream biodiversity.

1.3 Consultation Process

In the first phase of NBSAP development 3 national workshops were held. The Inception workshop in December 2012 adopted the NBSAP work plan & outline and discussed the proposed implementation framework. Stakeholders met again in May 2013 to review and adopt the proposed action plan and identify barriers to financial resource mobilisation. To facilitate the contribution of key organisations to the NBSAP process, several one-to-one meetings were held with stakeholders by the programme coordinator and consultants. The third workshop was held in October 2013 to review the draft NBSAP prior to submission to Government. This draft was circulated for international peer review and on receipt of comments the Steering Committee agreed to have the NBSAP redrafted so as to align it with the Convention on Biological Diversity's Aichi Biodiversity Targets and address certain information deficits in the baseline text.

The Draft NBSAP identified and listed various "Action Points". In the second phase, in addition to elaborating introductory text, projects were developed from the Action Points. These projects were circulated to stakeholders and then subject to review and approval in a final National Stakeholder Workshop held in October 2014.

Decisions were reached by consensus throughout the stakeholder workshops. A list of contributors to the NBSAP process is presented in **Annex 2**.

2. Biodiversity Status and Trends

Seychelles has a landmass of some 455 km² divided between 155 islands spread over a vast marine Exclusive Economic Zone (EEZ) of approximately 1.4 million km². Seychelles' resource area is therefore 0.03% terrestrial and 97.97% marine and in terms of habitat this ratio is much greater when the water column is factored in. In terms of endemic biodiversity, however, this relationship is inverted with the vast majority of known endemic species being terrestrial.

Seychelles has a very brief human history with no indigenous people and permanent human habitation only being established in the 1770s. Even in this short time however, due to the limited land area, terrestrial habitats have been extensively modified. In the granitic islands nearly all forest cover has been clear felled in the past and thus despite some 90% forest cover today the vast majority of it is secondary and dominated by introduced species. The small areas of forest that may still be primary are also subject to significant alien species invasion. The coralline islands have also been extensively changed, most having been cleared of natural vegetation from the late 19th century onwards for conversion to coconut plantation. Even the remote Aldabra Atoll was extensively modified *inter alia* by harvesting activities and the introduction of invasive species.

There has been widespread extirpation of many key animal species such as the Giant tortoise which was the primary herbivore, sea bird colonies, endemic land bird populations and extinction of the key coastal predator, the salt water crocodile.

In the marine ecosystems degradation was far more restricted until the latter half of the 20th century, but even so three key predators, the saltwater crocodile and two species of seal were extirpated early on in the human history of the islands. After the second world war advances in available technologies and skilled human resources have seen a progressive geographical expansion of fishing resulting in a significant fishing down of the marine food chain with the biomass of sharks and marine turtles dramatically reduced and more recently secondary predators such as the large serranids and key commodity species such as the Emperor red snapper showing widespread declines in occurrence and/or abundance.

2.1 Terrestrial Biodiversity (Forest and Inland Waters biodiversity).

The central archipelago is made up of granitic islands, except for the two northernmost islands of Bird and Denis which are coralline. The Seychelles bank is in fact a sunken micro-continent with the granite islands constituting the mountain peaks of this geological plate. The granite that underlies the bank and emerges in outcrops as the islands is some 750 million years old and is a fragment of the former super continent of Gondwana¹. The remainder of the Seychelles archipelago i.e. the numerous islands to the south and southwest of the Mahe Plateau are composed of coral rock or are calcareous sand cays built on reefs. An older class of raised reef-rock atolls can be distinguished in the south-west - Aladabra, Astove and Cosmoledo - and Assomption and St Pierre islands are composed of partly recrystallized elevated reefs (Baker 1963).

The first European explorers found the granitic islands densely forested except for the hill sides of Curieuse Island and some of the smaller islets such as Recif². The mountainsides of Mahe and Silhouette from 200 metres upwards harbour the bulk of Seychelles known endemic biodiversity whilst Praslin Island supports unique stands of Coco-de-mer dominated forest and associated species. The great antiquity of the granite islands coupled with their isolation and topography has served to create and maintain high endemic biodiversity. The relative "youth" of the coralline islands coupled with their lack of topographic relief means that endemism is much less prevalent. The greater age and larger size of some of the raised atolls and islands, in particular Aldabra, has however resulted in higher rates of endemism.

In the context of the Convention on Biological Diversity Seychelles' biodiversity can be covered by three of the thematic work programmes namely: Forest, Inland Waters and Marine and Coastal biodiversity. The species make-up, status and trends of Forest and Inland waters biodiversity are summarised in **Tables 1 to 5** respectively.

¹ Gondwana was comprised of what are today South America, Africa, Madagascar, India, Australia and Antarctica.

² The first European explorers recorded the hills of Curieuse as showing extensive areas of exposed red earth suggesting perhaps the impacts of forest fire and subsequent erosion whilst the hill side of Recif was grassland perhaps due to the impact of intensive grazing by giant tortoises on this small island.

Table 1: Terrestrial and Inland Water Biodiversity Overview		
Taxa	No. of Species	Notes
Fungi	Unknown	Fungal diversity is poorly known but overall species richness is considered low. 17 taxa, mostly macromycetes, have been recorded all of regional or pan tropical nature. 37 species of ectomycorrhizal fungi identified to date. 16 species of lichens and lichenicolous fungi recorded.
Bryophytes	218	110 species of moss and 108 of liverworts recorded. Bryophyte flora is still insufficiently known with each survey making new discoveries.
Pteridophytes (Ferns & allies)	72	90 species of ferns recorded – 12 endemic, 60 indigenous and 20 probably introduced.
Vascular plants	707	136 endemic and 571 indigenous species (913 introduced).
Diptera	589	295 endemic, 294 indigenous (plus 41 introduced).
Arachnida	347	204 endemic, 128 indigenous, 15 uncertain, 15 introduced.
Myriapoda	76	34 endemic, 34 indigenous, 8 uncertain origin (plus 3 introduced) main diversity and endemism in granitic islands.
Coleoptera	825	506 endemic, 319 indigenous, (plus 35 introduced species). Highest diversity found on large granitic islands. Aldabra has 122 species, 40 endemic.
Orthopteroidea	162	56 endemic, 106 indigenous (plus 5 introduced) species. Greatest diversity on the large granite islands, Aldabra has 34 species, 11 of which are endemic.
Lepidoptera	546	275 endemic, main diversity on larger granite islands, (Aldabra 57 sp. 20 endemic, Alphonse 46 sp. 35 endemic). The 271 non-endemic taxa include 11 probable introductions.
Mollusca	76	69 land species: 50 endemic, 19 indigenous (8 introduced). 7 freshwater species: 1 endemic, 6 indigenous (5 introduced)
Vertebrata		
Fish	15	2 endemic and 13 indigenous species. Several introduced.
Amphibia	11	11 endemic (4 frogs, 7 caecilians), (1 Introduced) species. Possible further speciation in endemics under investigation.
Reptilia		
Snakes	2	Both endemic (plus 1 introduced species).
Lizards	19	12 endemic (3 introduced). Various endemic subspecies.
Tortoise	1	Endemic giant tortoise (<i>Aldabrachelys gigantea</i>).
Birds	65	65 resident species – 18 breeding seabird species, 47 land and water birds of which 13 ³ are endemic. (13 introduced species).
Mammals	6	All indigenous mammals are bats, 4 endemic. (11 introduced)

³ This does not include the Aldabra rail (*Dryolimnas (cuvieri) aldabranus*) which has yet to receive mainstream recognition as distinct species, work is in progress to determine its status.

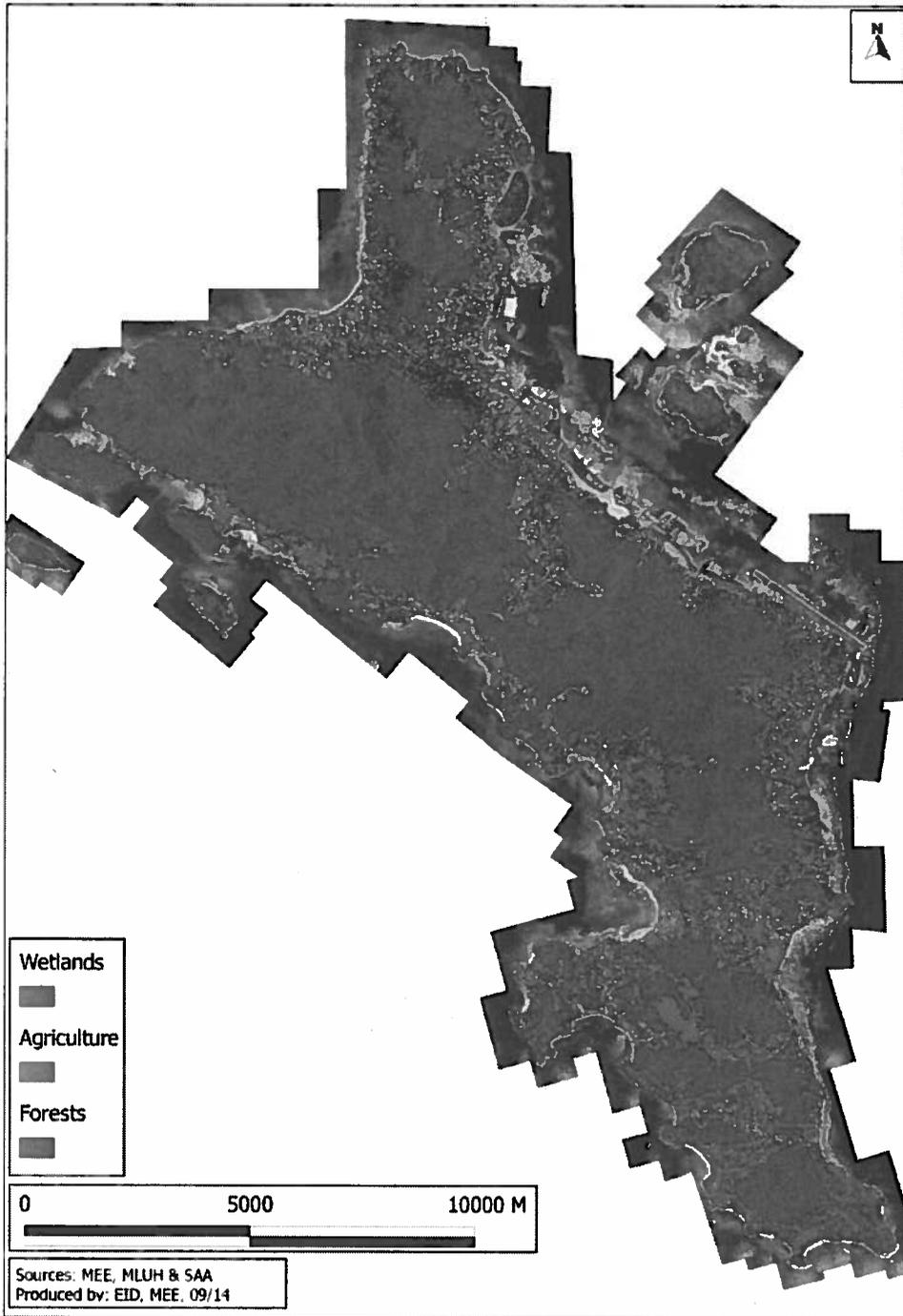
2.1.1. Forest Biodiversity

The main granitic islands of the Seychelles were originally covered in tropical forest. The main island of Mahé in particular had exceptional hardwood forests (e.g. *Mimusops sechellarum*, *Vateriopsis sechellarum*, *Intsia bijuga*) on the coastal plains and lower mountain slopes, exhibiting very tall (30m), straight trees of huge girth. The intermediate and higher slopes were likewise heavily forested with valuable timber (e.g. *Northea hornei*, *Dillenia ferruginea*, *M. sechellarum*, *V. sechellarum*) though of lesser proportions. Valuable timber forests were found on the main islands of Mahé, Silhouette, Praslin and La Digue and to lesser extent on islands such as Saint Anne, Cerf, Felicite and Curieuse. Also of note were the Palmaceae (six species in six monotypic genera) with a wide range of habitat preferences and often forming palm-dominated communities in dryer and more exposed regions – most notably on the islands of Praslin and Curieuse where the famous Coco-mer (*Lodoicea maldivica*) dominated such communities⁴. The smaller granitic islands had less substantial forest structure sometimes dominated by *Pisonia grandis* (e.g. Cousin and Cousine) or scrub species typical of small Indo-pacific tropical islands.

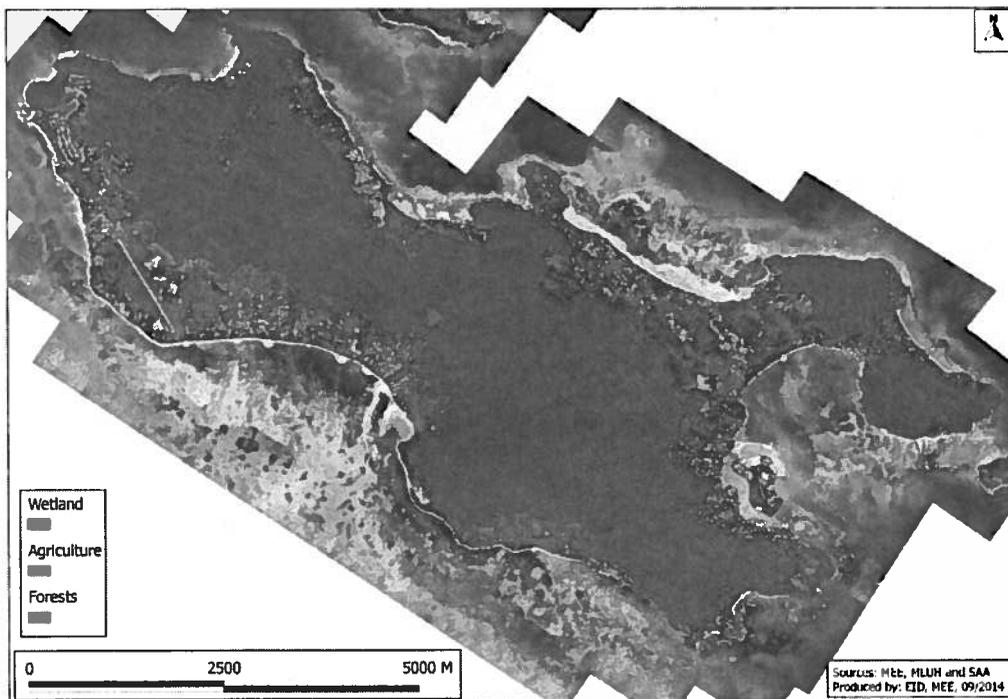
Successive phases of human economic and development activity rapidly denuded these forests starting from the coastal plains and working up such that by the beginning of the 20th century only a few percent of original forest cover, remained on the main island of Mahe restricted to the highest and most inaccessible slopes. The same was true on the satellite islands of Mahe and to a lesser extent on Praslin and La Digue. The island of Silhouette because of its very steep terrain and relative isolation was the least effected with significant areas of forest above 250 metres not clear felled. Changing market demands and greater environmental awareness saw a major shift in land use from the 1950s and 1960s onwards and forest cover has recovered extensively in the subsequent 50-60 years and is approaching 90% (distribution of forest on the three main populated islands is shown in **Maps 1 -3**). This forest however is secondary and highly invaded by alien species with for example much of the canopy dominated by Albizzia (*Paraserianthes falcataria*), Cinnamon (*C. verum*) and *Alstonia macrophylla*; the most abundant birds (*Acridotheres tristis*, *Geopelia striata* and *Foudia madagascariensis*) are invasive and most of the top predators (i.e. *Rattus spp*, *Felis catus*, *Canis domesticus*, *Tenrec ecaudatus* and *Tyto alba*) are alien to the islands.

⁴ Good accounts of Seychelles flora can be found in: Baker 1877, Friedmann 1986 & Robertson 1989.

Map 1: The Distribution of Forest Cover, Agricultural Land and Lowland Wetlands on the Principal Island of Mahe (Courtesy of J. Prosper EID, MEE)



Map 2: The Distribution of Forest Cover, Agricultural Land and Wetlands on the Island of Praslin (Courtesy of J. Prosper EID, MEE)



Map 3: The Distribution of Forest Cover, Agricultural Land and Wetlands on the Island of La Digue
(Courtesy of J. Prosper EID, MEE)

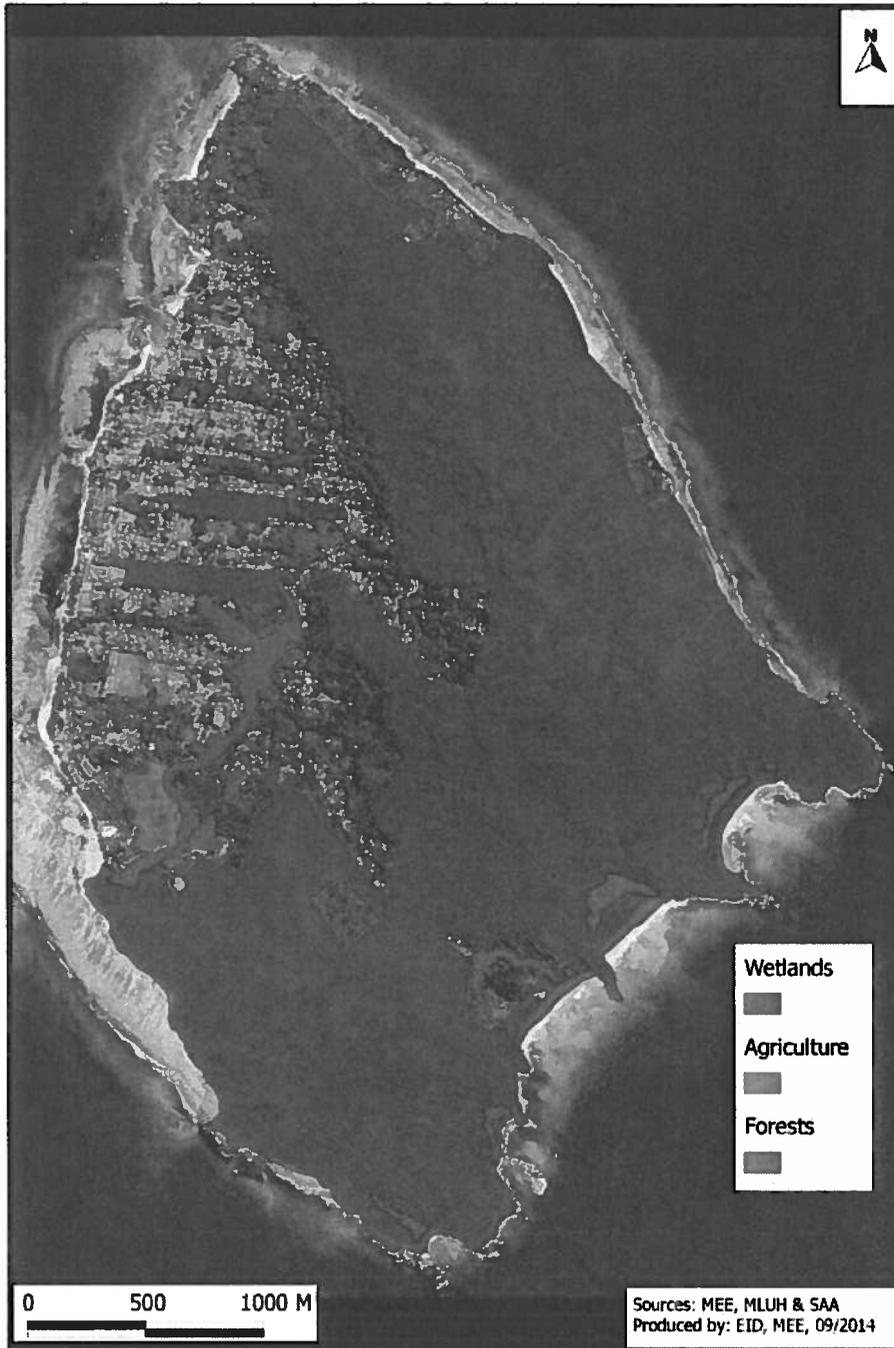


Table 2: Description and Status of Forest Biodiversity		
Main Habitats	Typical/Key Species	Status
Coastal and Lowland Forests (up to 200m asl).	<p>Granitic Islands: Typically littoral bush species on beach crest with broadleaf canopy starting some metres inland. Quite large patches of former coconut plantation are still to be seen. Increasingly highly developed on main populated islands. Typical species include:</p> <p>Flora: i). Littoral: <i>Calophyllum inophyllum</i>, <i>Cordia subcordata</i>, <i>Hernandia nymphaefolia</i>, <i>Hibiscus tiliaceus</i>, <i>Pisonia grandis</i>⁵, <i>Scaevola sericea</i>, <i>Suriana maritima</i>, <i>Thespesia populnea</i>, <i>Tournefortia argentea</i> etc... introduced <i>Cocos nucifera</i> and <i>Casuarina equisetifolia</i>.</p> <p>ii). Lowland: (Native) <i>Terminalia catappa</i>, <i>C. inophyllum</i>, <i>Heritiera littoralis</i>, <i>C. subcordata</i> etc... Introduced <i>Cinnamomum verum</i>, <i>Adenantha pavonina</i>, <i>Tabebuia pallida</i>, <i>C. nucifera</i>, various fruiting and ornamental species.</p> <p>Fauna: i). Endemic : <i>Pleuropoma theobaldiana</i>, <i>Grandisonia spp</i>, <i>Lycognathophis seychellensis</i>, <i>Phelsuma spp</i>, <i>Tachycnemis sechellensis</i>, <i>Trachylepis sechellensis</i>, <i>Trachylepis wrightii</i>, <i>Acrocephalus sechellensis</i>, <i>Alectroenas pulcherrima</i>, <i>Copsychus sechellarum</i>, <i>Falco araea</i>, <i>Foudia sechellarum</i>, <i>Hypsipetes crassirostris</i>, <i>Nectarinia dussumieri</i>, <i>Terpsiphone corvina</i>, <i>Coleura seychellensis</i>, <i>Pteropus seychellensis</i> etc...</p> <p>ii). Native : <i>Anous stolidus</i>, <i>Anous tenuirostris</i>, <i>Gygis alba</i>, <i>Onychoprion fuscata</i>, <i>Phaethon lepturus</i>, <i>Puffinus lherminieri</i>, <i>Puffinus Pacificus</i>, <i>Sterna anaethetus</i> etc...</p> <p>iii). Introduced : <i>Achatina fulica</i>, <i>Achatina immaculate</i>, <i>Acridotheres tristis</i>, <i>Foudia madagascariensis</i>, <i>Geopelia striata</i>, <i>Streptopelia picturata</i>, <i>Tyto alba affinis</i>, <i>Canis familiaris</i>, <i>Felis catus</i>, <i>Mus musculus</i>, <i>Rattus spp</i>, <i>Tenrec ecaudatus</i> etc...</p> <p>Coralline Islands. Typically a dry broadleaf forest grading to open mixed bush, markedly less species diverse than the Granitic island equivalent.</p> <p>Flora: i). Native: <i>Guettarda speciosa</i>, <i>Pemphis acidula</i>, <i>P. grandis</i>, <i>S. sericea</i>, , <i>Suriana maritima</i>,</p> <p>ii). Introduced: <i>C. nucifera</i>, <i>C. equisetifolia</i>,</p> <p>Fauna: i). Endemic: <i>Aldabrachelys gigantea</i>, <i>Cyathopoma picardense</i>, <i>Quickia aldabrensis</i>, <i>Rhachistia aldabrae</i>, <i>Dicrurus aldabranus</i></p> <p>ii). Native: <i>Birgus latro</i>, <i>A. stolidus</i>, <i>A. tenuirostris</i>, <i>Gygis alba</i>, <i>O. fuscata</i>, <i>Phaethon lepturus</i>, <i>Phaethon rubricauda</i>, <i>P. lherminieri</i>, <i>P. Pacificus</i>, <i>Sterna dougalli</i>, <i>Sterna sumatrana</i>, <i>Sula spp.</i> etc...</p> <p>iii). Introduced: <i>Capra hircus</i>, <i>Rattus spp</i>, <i>F. catus</i>, <i>Sus scrofa</i> etc..</p>	<p>The vast majority of human habitation and development infrastructure is found on the coastal plateau. Historical exploitation and the impact of IAS has seen significant decline in occurrence and abundance of biodiversity (e.g. seabird colonies and endemic avifauna). <i>Rattus spp</i> are a notable vector of human disease, and have had major impact on native biodiversity as have various other IAS e.g. <i>F. catus</i>, <i>A. tristis</i>, <i>T. ecaudatus</i> etc...</p> <p>Coastal forests today are entirely secondary but there have been excellent small-scale restoration projects on smaller islands that serve to maintain endangered endemic species.</p>

⁵ Typically occurring on smaller islands and associated with seabird colonies.

<p>Intermediate Forest (200 – 500m asl)</p>	<p>Broadleaf forest canopy with palm stands in drier areas. Flora: i). Endemic: <i>Aphloia seychellensis</i>, <i>Campnosperma seychellarum</i>, <i>Colea seychellarum</i>, <i>Dillenia ferruginea</i>, <i>Northia hornei</i>, <i>Pandanus hornei</i> etc... ii). Introduced: <i>A. pavonina</i>, <i>A. macrophylla</i>, <i>C. icaco</i>, <i>C. verum</i>, <i>Paraserianthes falcataria</i>, <i>Sandoricum koetjape</i>, <i>Swietenia macrophylla</i>, <i>T. pallida</i>, etc... iii). For dry forest see Palm forest. Fauna: i). Endemic: <i>Cyathopoma blandfordi</i>, <i>Pachnodus niger</i>, <i>P. theobaldiana</i>, <i>Grandisonia spp</i>, <i>Phelsuma spp</i>, <i>T. sechellensis</i>, <i>T. seychellensis</i>, <i>Sooglossus gardineri</i>, <i>S. pipilodryas</i>, <i>A. pulcherrima</i>, <i>F. araea</i>, <i>H. crassirostris</i>, <i>N. dussumieri</i>, <i>O. insularis</i> (Mahé only), <i>Zosterops modestus</i>, <i>P. seychellensis</i> etc... ii). Introduced: <i>A. fulica</i>, <i>A. immaculata</i>, <i>A. tristis</i>, <i>F. madagascariensis</i>, <i>G. striata</i>, <i>S. picturata</i>, <i>T. a. affinis</i>, <i>F. catus</i>, <i>C. familiaris</i>, <i>Rattus spp</i>, <i>T. ecaudatus</i>, etc...</p>	<p>Despite being almost entirely secondary and exotic dominated this vegetation type supports the greatest diversity of Seychelles' endemic species. This vegetation band plays a vital role in maintenance of water and soil cycles. Forest cover has expanded significantly in the last 60 years.</p>
<p>Mountain Forest (500 – 910m asl)</p>	<p>Flora: i). Endemic: <i>Dillenia ferruginea</i>, <i>Excoecaria benthamiana</i>, <i>Nepenthes pervillei</i>, <i>Northia hornei</i>, <i>Pandanus sechellarum</i>, <i>P. Multispicatus</i>, <i>Randia sericea</i>, <i>Roscheria melanochaetes</i>, <i>Timonius sechellensis</i>, etc... ii). Introduced: <i>A. macrophylla</i>, <i>C. verum</i>, <i>P. falcataria</i>, <i>P. indicus</i> etc Fauna: i). Endemic: <i>Edentulina moreleti</i>, <i>Pachnodus spp</i>, <i>Pilula mahesiana</i>, <i>Punctum seychellarum</i>, <i>Grandisonia spp</i>, <i>Phelsuma spp</i>, <i>Sooglossus sechellensis</i>, <i>S. thomasseti</i>, <i>T. sechellensis</i>, <i>Aerodramus elaphrus</i>, <i>A. pulcherrima</i>, <i>F. araea</i>, <i>H. crassirostris</i>, <i>N. dussumieri</i>, <i>O. insularis</i>, <i>Z. modestus</i> etc... ii). Introduced: <i>A. tristis</i>, <i>T. a. affinis</i>, <i>Rattus spp</i>, <i>T. ecaudatus</i> etc...</p>	<p>Predominantly secondary and highly invaded, forest cover in this range has increased significantly over the last 60 years and plays a vital role in maintenance of water and soil cycles. Important area for human aesthetic and leisure value.</p>
<p>Palm Forest</p>	<p>The islands of Praslin and Curieuse exhibit special palm forest climax vegetation communities including the presence of <i>Lodoicea maldivica</i> (endemic to the two islands). Palm forest communities also occur in dryer areas and on ridges of other forest categories. Flora: i). Endemic: <i>Deckenia nobilis</i>, <i>L. maldivica</i>, <i>Nephrosperma vanhoutteana</i>, <i>Phoenicophorium borsigianum</i>, <i>Roscheria melanochaetes</i>, <i>Verschaffeltia splendida</i>, <i>Pandanus spp</i>, <i>D. ferruginea</i> etc... ii). Introduced: <i>C. verum</i>, <i>C. icaco</i>, <i>A. macrophylla</i>, various vine species etc... Fauna: i). Endemic: <i>Filicaulis seychellensis</i>, <i>Pachnodus praslinus</i> (Praslin only), <i>P. niger subfuscus</i> (P only), <i>Stylodonta studeriana</i> (P only), <i>Ailuronyx trachygaster</i>, <i>A. Tachyscopaeus</i>, <i>Phelsuma spp</i>, <i>A. pulcherrima</i>, <i>Coracopsis barklyi</i> (Praslin and Curieuse only), <i>H. Crassirostris</i>, etc... ii). Introduced: <i>A. Tristis</i>, <i>F. catus</i>, <i>Rattus spp</i>, etc...</p>	<p>The <i>L. maldivica</i> dominated palm forest communities of Praslin and Curieuse with 6 endemic species of palm are of particular interest. Research has shown that natural regeneration of <i>L. maldivica</i> is limited due to excessive nut harvesting, but the management of Fond Ferdinand since 2003 has seen enhanced protection and greater planting out of nuts.</p>
<p>Inselbergs</p>	<p>Flora: i). Endemic: <i>Erythroxylum sechellarum</i>, <i>Excoecaria benthamiana</i>, <i>Lophoschoeneus hornei</i>, <i>Medusagyne oppositifolia</i> (M only), <i>Memecylon eleagnai</i>, <i>Nepenthes pervillei</i>, <i>Pandanus multispicatus</i>, <i>Soulamea terminaloides</i> etc... ii). Introduced: <i>C. verum</i>, <i>Annas commosus</i></p>	<p>Important refuges for specific endemic flora. Human aesthetic and leisure value.</p>
<p>Riverine Forest</p>	<p>Flora: i). Endemic: <i>Pandanus balfouri</i>, <i>Pandanus hornei</i>, <i>Pandanus sechellarum</i>, <i>Phoenicophorium borsigianum</i>, <i>Verschaffeltia splendida</i> ii). Indigenous: <i>Barringtonia racemosa</i>, <i>Heritiera littoralis</i>. ii). Introduced: <i>Paraserianthes falcataria</i>, <i>Artocarpus spp</i>, <i>Bambusa spp</i> etc... Fauna: i). Endemic: <i>Calumma tigris</i>, <i>O. Insularis</i> etc... ii). Introduced: <i>Rattus spp</i> etc...</p>	<p>Vital for the preservation and maintenance of the water cycle. Higher reaches of the river gorges also still harbour relict flora assemblages.</p>

Only small relict areas of primary forest remain. The primary hardwood forests are gone with valuable species such as *Mimusops*, and *Intsia* reduced to scarcity and *Vateriopsis* driven to the brink of extinction. The main herbivore giant tortoises were extirpated in the early 19th century, some bird species lost and many others restricted to small vestige ranges and populations.

The coralline islands were also heavily impacted by historical exploitation from the felling of mangroves for timber and the unsustainable harvesting of seabirds, giant tortoises and nesting turtles to complete transformation to establish coconut plantations. Guano was also mined on some islands, through to the mid-20th century, with considerable impact. Latterly failed agricultural initiatives and the collapse of the coconut oil market in the 1980s resulted in livestock (e.g. pigs and goats) being left feral on highly disturbed islands along with diverse other introduced plant species. Seabird colonies have been lost or greatly reduced in abundance and diversity; giant tortoises have been extirpated from all their previous colonies, except for Aldabra, and nesting marine turtle populations greatly reduced. Finally all such low lying islands are now threatened by sea level rise.

Table 3: Trends in Forest Biodiversity

Habitat	Trend	Drivers and specific trends
Coastal and Lowland	↔	<p>⚠: In general the trend is for further but controlled development 25 metres from the high water mark with ongoing overall decline in area.</p> <p>⚠: IAS (diverse plant species and mammals especially rats, cats and dogs) are established on the main granitic islands.</p> <p>⤴: There are, however, some very notable successful and ongoing rehabilitation projects in this habitat.</p> <p>↔: Likely therefore that there is overall quantitative decline in this habitat but notable qualitative improvement due to various small island ecosystem rehabilitation projects.</p>
Intermediate	↔	<p>⚠: The primary issue is the dominant presence of IAS – rate of ongoing encroachment and degree of impact upon indigenous biodiversity however, is not known.</p> <p>⚠: Increased habitation, infrastructure and small scale agriculture (farming, tea, timber plantations).</p> <p>⚠: Fire is a regular occurrence in this habitat particularly on Praslin island.</p>
Montane	↓	<p>⚠: The primary issue is the ongoing incursion of IAS (including introduced mammalian predators); more than three quarters of Seychelles' forests are dominated by invasive exotics.</p>
Palm	↔	<p>⚠: Fire is a particular concern for palm forests on Praslin and Curieuse.</p> <p>⤴: The Valle-de-Mai and Fond Ferdinand areas are effectively managed for Palm forest habitats.</p> <p>⤴: Sustainable management of c-d-m initiative and the planting of a certain proportion of nuts each year.</p> <p>⚠: Population demographics in the <i>L. maldivica</i> however indicate that there is currently insufficient recruitment into the population due to excessive nut harvesting and poaching.</p>
Riverine	↔	<p>⤴: Long history of legal protection. Expansion of protected areas and general forest cover are assumed to have positive impact.</p>
Inselbergs	↔	<p>⤴: Research indicates that the temperature variation and aridity of this habitat are limiting to IAS incursion.</p>
<p>Notes: There is a cross-cutting concern regarding the impact of climate change on rain fall patterns affecting moist/humid habitats, increasing forest fires in dry habitats and stressing native species to the potential further advantage of IAS.</p>		

2.1.2. Inland Waters Biodiversity

The geographically and evolutionarily isolated inland waters of the granitic Seychelles offer great scope for biodiversity interest yet despite this they are still relatively poorly studied. Inland waters in Seychelles can be divided into three categories: i) Rivers and streams, ii). Highland wetlands and iii). Lowland wetlands. **Maps⁶ 4, 5 & 6** depict the distribution of catchment areas, rivers and wetlands on the three main islands of Mahé, Praslin and La Digue.

i). Rivers and streams. 146 water courses on the three main populated islands of Mahe, Praslin and La Digue are listed for protection under the State Lands and River Reserves Act (1976) in recognition of their importance for socioeconomic development. Increasing demand for water means that ever greater quantities of water are being extracted from the upper reaches of water courses with ramifications for downstream biodiversity. The lower reaches of watercourses in many regions have been affected by human activity including enrichment and chemical pollution, canalisation and reclamation of flood plains etc... A 2003 study of the lower reaches of 12 selected permanent water courses (7 on Mahé and 5 on Praslin) identified 12 native species of crustacea, including the endemic crab (*Seychellum alluaudi*) and 17 native species of fish including the endemic *Panchypanchax playfairii* and the discovery of a new endemic species *Parioglossus multiradiatus* (Valade, P. *et al* 2004). Additional work is required on more widespread watercourses and in their higher reaches to gain a better overview. Research on freshwater invertebrates is also required the diversity of which may have previously been underestimated (Malicky, H. 1993 & 1995).

ii). Highland wetlands are a very specific habitat type in Seychelles being restricted to just three sites⁷. All three sites were historically subject to extensive agricultural use and related species introduction but such activities have long since ceased. Rehabilitation work has been undertaken at the Mahé, Mare aux Cochons site which lies within the Morne Seychellois National Park and was designated a Ramsar site in 2010. The Silhouette site, also called Mare aux Cochons, lies within the Silhouette National Park (declared in 2010). The third highland wetland is La Plaine Hollandaise on Praslin Island, this area is currently unprotected by national legislation, though it has been earmarked for designation. Trends in these habitats, which are important for endemic biodiversity (see **Table 4**) and harbour unique biodiversity assemblages, can be considered stable but IAS incursion remains an ongoing issue for management attention.

iii). Lowland wetlands were a characteristic feature of many of the original coastal plains of the granite islands. The coastal dune formations naturally created a simple basin-like structure to the landward that prevented free drainage resulting in the formation of extensive inland wetlands. These habitats were historically used for agricultural purposes such as rice production. However as agricultural patterns and development pressures changed these areas were increasingly drained to meet the demand for flat land and this trend has continued into the 21st century, such that lowland wetlands can be considered the most severely threatened habitat type in Seychelles. It is estimated that some 90% of lowland wetlands have been lost to reclamation since the colonisation of the islands in 1770. The largest remaining wetlands are Grande Barbe on Silhouette, Police Bay on Mahé and "La Mare Soupap" on the west coastal plain of La Digue. In 2010 Grande Barbe was, to a greater extent, incorporated into the Silhouette National Park, but it lies on the boundary adjacent to area that has been earmarked for tourism development. Police Bay on Mahe, which represents the last undeveloped, intact hydrological system on Mahe has been identified for tourism development and

⁶ Proper mapping of catchment areas is not available what is depicted on these maps are catchment management areas as provided by the Seychelles' Public Utilities Corporation.

⁷ Mare aux Cochons on Mahé, La Plaine Hollandaise on Praslin and the Mare Aux Cochons on Silhouette.

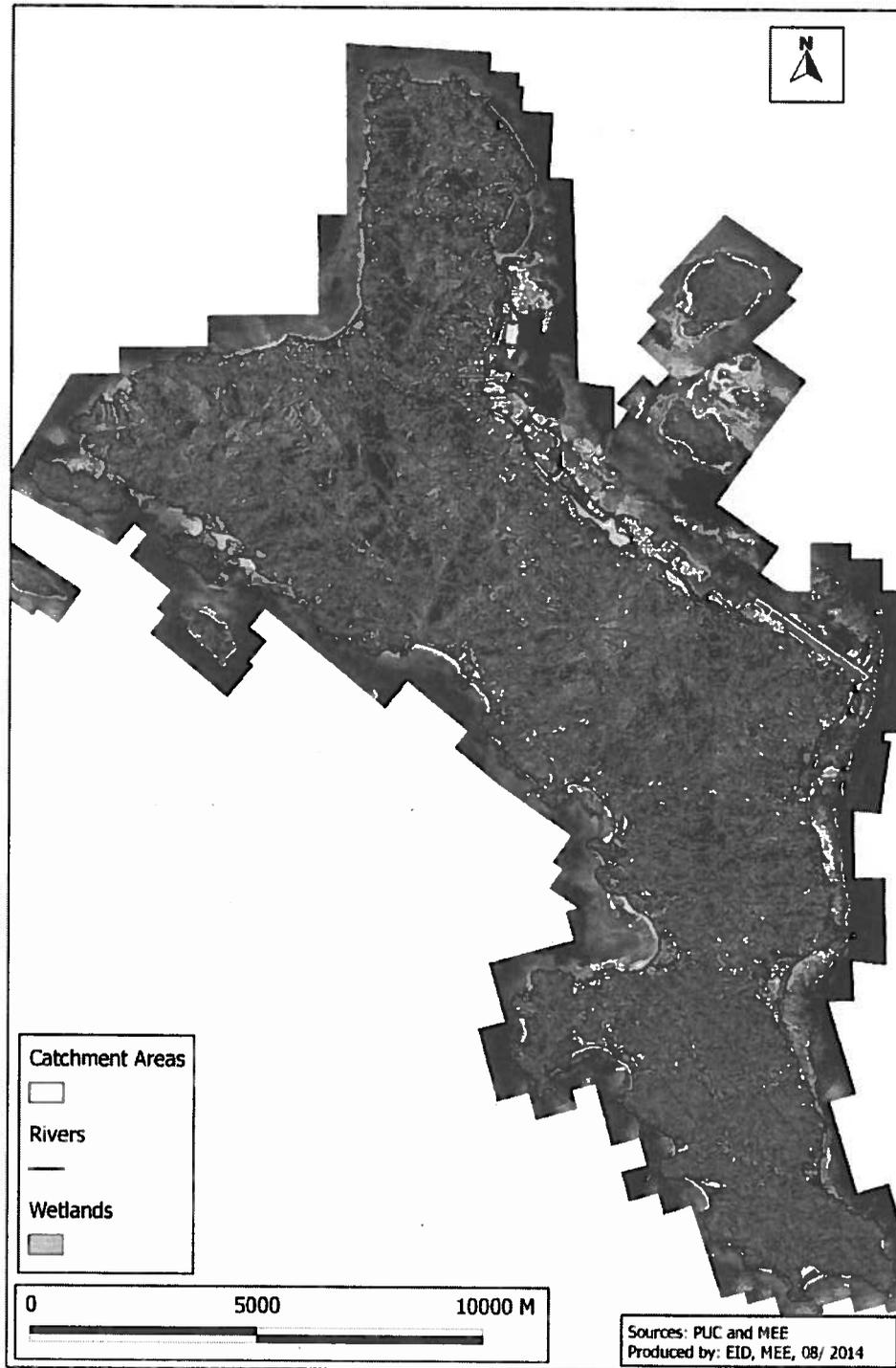
despite some considerable public dissent the development appears likely to proceed. La Mare Soupap, although in part protected, lies in the centre of human development and habitation and hence faces diverse pressures and has been significantly canalised in recent years. Other smaller and vestige lowland wetland areas on populated islands in the central archipelago are subject to ongoing ad-hoc reclamation, canalisation and pollution meaning this habitat and its natural denizens are in a particularly perilous state. To counter this wetland creation and rehabilitation initiatives have been undertaken on some smaller islands such as North, Fregate and Aride. Since the 1990s wetland management has faced the additional challenge of IAS from the water hyacinth (*Eichornia crassipes*) and water lettuce (*Pistia stratiotes*) control programmes have been instituted but are costly and have yielded mixed results. Finally changing rainfall patterns – namely shorter more intense periods of rainfall – considered to be related to global climate change represent a key threat to the country's future water supplies and the health and resilience of watercourse and wetland biodiversity.

Table 4: Description and Status of Inland Waters Biodiversity

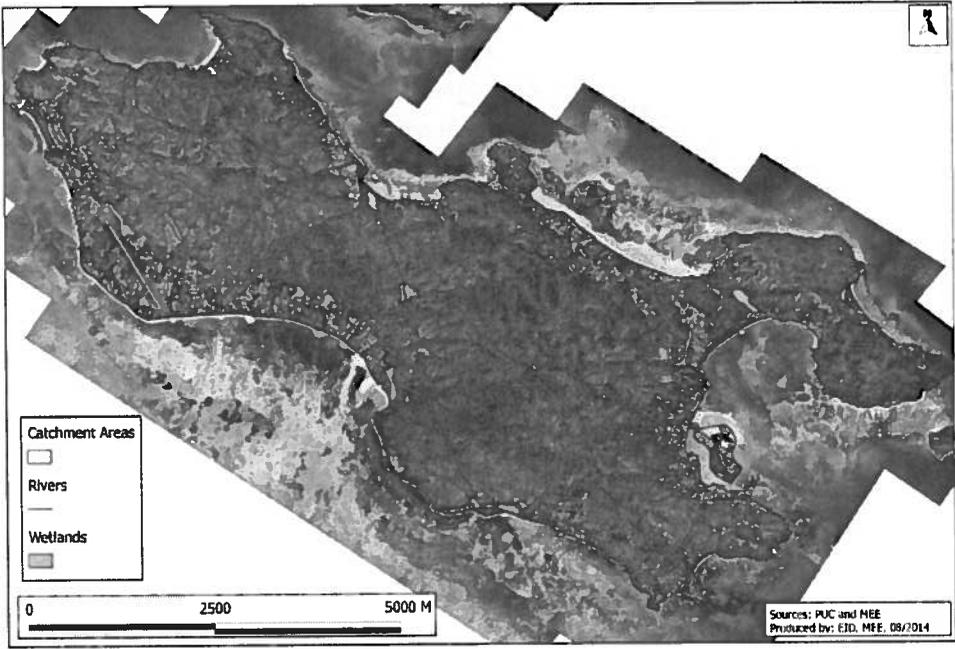
Main Habitats	Typical/Key Species	Status
Lowland wetlands	<p>Flora: i). Native: <i>Cyperus spp</i>, <i>Eleocharis dulcis</i>, <i>E. Variegata</i>, <i>Fimbristylis spp</i>, <i>Polygonum senegalense</i>, <i>Terminalia catappa</i> <i>Typha javanica</i>, etc...</p> <p>ii). Introduced: <i>Alocasia macrorrhiza</i>, <i>Eichornia crassipes</i>, <i>Ludwigia octovalvis</i>, <i>Nymphaea lotus</i>, <i>Pistia stratiotes</i>.</p> <p>Fauna: i). Endemic: <i>Hypogeophis rostratus</i>, ii). Native: <i>Ixobrychus sinensis</i>, <i>Gallinula chloropus</i>, iii). Introduced: <i>Gyraulus mauritanus</i>, <i>Physella acuta</i>, <i>Ptychadaena mascareniensis</i>, <i>Trachemys scripta elegans</i> (Mahé only to date), <i>A. tristis</i>, <i>Felis cattus</i>, <i>Rattus spp</i>, etc...</p>	<p>Most threatened habitat type in Seychelles due to reclamation, drainage/canalisation. Estimated that more than 90% has been lost in the last 200 years and the trend is ongoing.</p> <p>Important habitat for endemic/indigenous biodiversity.</p> <p>Important habitat for diverse and abundant migrant birds.</p> <p>Increasingly important for research and ecotourism activities.</p>
Highland wetlands	<p>Flora: i). Endemic: <i>Allophylus sechellensis</i>, <i>Camposperma sechellarum</i>, <i>Canthium sechellense</i>, <i>Gynura sechellensis</i>, <i>Mimusops sechellarum</i>, <i>Pandanus hornei</i>, <i>Randia lancifolia</i>, <i>Verschaffeltia splendida</i> etc.. ii). Introduced: <i>A. macrophylla</i>, <i>C. verum</i>, <i>C. icaco</i>, <i>P. falcataria</i>, <i>T. pallida</i>, <i>C. hirta</i> etc...</p> <p>Fauna: i). Endemic: <i>Trichoptera spp</i>, diverse molluscan spp - both endemic and indigenous⁸ <i>Pachypanchax playfairii</i>, <i>Grandisonia spp</i>, <i>Sooglossus spp</i>, <i>Otus insularis</i> etc...</p> <p>ii). Introduced: <i>Rattus spp</i>, <i>M. musculus</i>, <i>T. ecaudatus</i></p>	<p>2 of 3 three sites now lie in National Parks and the 3rd site is scheduled for protection. One site has been subject to rehabilitation management measures previously.</p> <p>Provides important habitats for endemic biodiversity</p> <p>Vital areas for water catchment capacity and maintenance.</p> <p>Increasing importance for ecotourism and scientific research.</p>
Rivers and streams	<p>Fauna: i). Endemic: <i>Allolestes maclachlani</i>, <i>Ecnomus maheensis</i>, <i>Hughscotiella auricapilla</i>, <i>Leptocnemis cyanops</i>, <i>Oxyethira sechellensis</i>, <i>Praslina cooperi</i>, <i>Seychellum alluaudi</i>, <i>Pachypanchax playfairii</i>, <i>Parioglossus multiradiatus</i>, <i>Hypogeophis rostratus</i>, <i>Tachycnemis sechellensis</i> etc... ii). Native: <i>Caridinia spp</i>, <i>Macrobrachium spp</i>, <i>Septaria borbonica</i>, <i>Sesarmops impressum</i>, <i>Varuna litterata</i>, <i>Neritina gagates</i>, <i>N. Pulligera</i>, <i>Anguilla bicolor</i>, <i>Ardea cinerea</i>, <i>Butorides striatus</i>, <i>Nycticorax nycticorax</i> etc iii). Introduced: <i>Gyraulus mauritanus</i> <i>Poecilia reticulata</i>, <i>Lymnaea natalensis</i>, <i>O. mossambicus</i> etc...</p>	<p>Status of upper and mid-reaches of water courses has improved over the last 50 years with recovering catchment areas. Lower reaches are increasingly canalised and subject to enrichment pollution.</p> <p>Important habitat for endemic and indigenous biodiversity.</p> <p>Important habitat for diverse and abundant migrant birds.</p>

⁸ See Gerlach, J. (2006) for full current account.

Map 4: The Distribution of Catchment Areas, Rivers and Lowland Wetlands on the Principal Island of Mahé (Courtesy of J. Prosper EID, MEE)



Map 5: The Distribution of Catchment Areas, Rivers and Wetlands on the Island of Praslin (Courtesy of J. Prosper EID, MEE)



Map 6: The Distribution of Catchment Areas, Rivers and Wetlands on the Island of La Digue
(Courtesy of J. Prosper EID, MEE)



Table 5: Trends in Inland Waters Biodiversity		
Habitat	Trend	Notes
Lowland	↓	<p>↘: Physical change - reclamation, drainage/canalisation (to mitigate flooding but often also leading to salt water intrusion).</p> <p>↘: Pollution – illegal point source chemical in flow, general enrichment pollution are not alarming</p> <p>Considered the most endangered habitat type in Seychelles.</p>
Highland	↔	<p>↘: Ongoing incursion of IAS.</p> <p>↘: Current and potential future expansion of water extraction from the Mahé and Praslin sites.</p> <p>↗: Conservation management interventions at Mare aux Cochons, Mahé.</p> <p>↗: 2 of the 3 sites now fall within National Parks.</p>
Rivers and Streams	↔	<p>↘: Encroachment, canalisation and pollution particularly in lower reaches of watercourses.</p> <p>↘: Water extraction</p> <p>↗: Long history of river reserve management</p> <p>↗: Improved catchment management with increased forest cover and wider protection through Protected area network particularly in higher reaches of watercourses.</p> <p>General trend in lower reaches of watercourses is ↘ but is significantly ↗ in mid to upper level over the last 50 years.</p>
<p>Notes: The impact of climate change on rain fall patterns, with heavier rain falling for shorter periods, affecting water supply, duration and flow rates is an issue the impacts of which have not been assessed.</p>		

2.2 Marine Biodiversity.

The granitic islands originally supported populations of salt water crocodile; seals were found on the smaller granite and more isolated islands of the central archipelago and were abundant in the Amirantes. The coral reefs teemed with fish, rays and sharks; and the beaches supported huge rookeries of hawksbill and green turtle. These resources were exploited heavily by man on his arrival, supporting the human population by providing cheap high quality protein and commodities for trade driving the socioeconomic development of the colony. Today the coastal environment of Seychelles remains central to the country's development. The beautiful coconut and Takamaka fringed white sand beaches and crystal clear tropical blue waters provide the key basis for the tourism industry. The coastal environment today however is very different from that found by the first settlers in the 18th Century. Crocodiles and seals were early victims of human activity and were extirpated. Marine turtles supported prolonged exploitation that has drastically reduced their occurrence and abundance. Marine turtles received full protection under the law in 1994 but poaching remains an issue and their nesting habitat is unprotected outside of protected areas. Sharks a vitally important component in marine ecosystems were dramatically reduced in abundance on the Mahé plateau by a targeted fishery in the 1940s-1960s and the populations on the smaller banks of the outer islands soon followed suit. The rising commodity value of shark fin has maintained fishing pressure and the downward trend in shark populations continues. It has become increasingly apparent since the mid-1980s that the demersal fishery resources of the Mahé plateau are being overexploited. Initially it was considered a concern of the inner reefs but Vessel Monitoring System data coupled with steadily declining catches since 1991, indicate that the entire plateau is overexploited. This is particularly apparent in the decline of the occurrence, diversity and abundance of Serranidae on the plateau with several species now very scarce or absent from the Mahe plateau catch. Declines are also apparent in key commercial species most notably the Emperor red snapper (*Lutjanus sebae*) and the Brownspotted grouper (*Epinephelus chlorostigma*).

The removal of so many key species, entirely or functionally, and the progressive fishing down of the food chain has a destabilising effect on the ecosystem with likely impacts upon: future productivity coral reef recovery from the 1998 major bleaching event and reef resilience to climate change. Key steps however have been taken; all marine mammals and marine turtles have received complete legal protection since 1979 and 1994 respectively. Turtle rookeries in some key protected areas have shown significant and sustained population recoveries. There are management plans and approaches for various fisheries and Seychelles was amongst the first ten countries globally to develop and commence implementation of a National Plan of Action for the Conservation and Management of Sharks.

The marine environment is central to Seychelles' development; artisanal, semi-industrial and industrial fisheries are key to the economy and local food security⁹ and hence improved management of these activities and the ecosystems upon which they depend, is a priority for the country's sustainable development.

⁹ Seychelles has one of the highest global per capita fish consumption indices with estimations varying between 65-75kg per annum.

Table 6: Marine Biodiversity Overview		
Taxa	No. of Species	Notes
Macroalgae	approx. 330	Rich species composition at most islands. Occurs in high density in nutrient rich waters off Port Victoria and certain seabird colony islands.
Alismatales (Sea grasses)	8 species	
Porifera (Sponges)	>350	351 species recorded. 135 sp exclusive to the granitics, 95 exclusive to the Amirantes and 121 sp shared. 14 species to date have been confirmed as endemic:
Anthozoa		
Sea Anemones	55 species	
Scleratinian corals	>200	Diversity greater around coral islands. At least 34 species are classified as Vulnerable or Endangered by the IUCN.
Octocorallian corals	>70	
Molluscs		
Gastropods	500	
Bivalves	>100	
Crustacea		
Shrimps	>165	At least 5 endemic species:
Macrura	7	Lobster fishery managed by periodic closures.
Echinoderms		
Crinoids	10	
Asteroidea	32	
Ophiuroidea	44	
Echinoidea	33	
Holothuroidea	43	43 species recorded including more than 20 commercial species. 6 species constituting the vast bulk of the catch.
Osteichthyes	>1,150	Endemism is low considered to be at about 1%. More than 400 coral reef associated species. Some 150 species (several of which are threatened) make up the artisanal fishery.
Chondrichthyes	79	79 confirmed species of Chondrichthyan: 60 shark, 16 ray and 3 guitarfish species. Of the 71 identified to species level 30 are threatened (i.e. Vulnerable or Endangered) and 15 are Data Deficient.
Chelonii	5	Hawksbill (<i>E. imbricata</i>) and Green (<i>C. mydas</i>) turtles nest in Seychelles though much reduced from historical numbers. The Leatherback (<i>D. coriacea</i>), Loggerhead (<i>C. caretta</i>) and Olive Ridley (<i>L. olivacea</i>) turtles occur in Seychelles waters.
Mammals		
Cetaceans	27	including the Endangered Sei, Blue and Fin Whales (<i>Balaenoptera borealis</i> , <i>B. musculus</i> & <i>B. physalus</i>), and eight species of dolphin. There is a small but apparently increasing population (approx. 20-25) of the Dugong (<i>D. dugong</i>) at Aldabra atoll.
Sirenia	1	

i). Beach Crest and Beach. The beach, beach crest and adjacent low lying coastal land are of vital importance to Seychelles. The topography of the granitic islands means the coastal plateaux are usually narrow strips of flat land making them subject to the stereotypical SIDS pressure of "coastal squeeze" with habitation, development and economic activities all concentrated in these limited areas. Economically these habitats provide the basis for and appeal of the country's tourism industry. Socially this area is also vitally important being the centre of human leisure and cultural activity on the main populated islands. The beach dune, adjacent plateau and the beaches themselves are consequently amongst the most disturbed habitats, with vegetation of most sandy shores¹⁰ in Seychelles having been severely modified. Direct human disturbance is further complicated by what are considered to be the impacts of climate change as evidenced by increasing coastal erosion and more intense storm surges.

This habitat is vital for nesting turtle populations (*Chelonia mydas* and *Eretmochelys imbricata*) but whilst turtles have received full protection under the law since 1994 protection of nesting habitat outside of Protected Areas is lacking. The habitat is also vital for wading birds (native and migratory), various species of nesting sea bird (see **Table 7**), and diverse crab species.

ii). Rocky Shore is the most common shore habitat in the granitic islands and is typified by a limited vegetation structure consisting of species such as *Hibiscus tiliaceus*, occasional stands of the endemic Balfour's pandanus (*Pandanus balfouri*), *Scaevola sericea*, creepers (e.g. *Ipomea pes-caprae*) and grasses. In their natural state and particularly on promontories and rocky islets rocky shores historically supported important seabird populations and and/or roosts (e.g. *Sterna anaethetus*, *Phaethon lepturus*, *Puffinus pacificus*) such as can still be found on reserve islands like Cousin and Aride.

The intertidal zone is rich in gastropods some of which are commonly exploited for food (e.g. *Patella exusta* and *Cellana radiata*). The trochus *Monodonta australis* and the majority of Seychelles Nerites (*Nerita albicilla*, *N. plicata*, *N. polita*, *N. textilis*) are common in this zone; as are various species of Littorinid (*Littorina kraussi*, *L. scabra*, *L. undulata* and *Peasiella roepstorffiana*). *Planaxis sulcatus* occurs in large colonies in this zone, the Morulas, *Morula granulata* and *M. uva* are also common and the cowrie *Cypraea caputserpentis* is common in rocks clefts typified by strong wave action. Rocky shores also harbour large crab populations (*Grapsus* and *Geograpsus* spp) and occasionally the distinctive chiton, *Acanthopleura brevispinosa*.

Accessible rocky shores are quite intensively harvested for shell fish for both domestic and commercial use and increasingly physical development is encroaching in these areas to meet the demand for seaside properties.

¹⁰ For a thorough investigation of man's impact upon coastal vegetation see Sauer 1967.

Table 7: Description and Status of Marine and Coastal Biodiversity

Main Habitats	Typical/Key Species	Status
<p>Beach Crest & Beach (and open or grassland interiors of coralline islands)</p>	<p>Flora: i). Native: <i>Scaevola sericea</i>, <i>tournefortia argentea</i>, <i>Pemphis acidula</i>, <i>Sideroxylon inerme cryptophlebia</i>, <i>C. inophyllum</i>, <i>Cordia subcordata</i>, <i>T. catappa</i>, <i>Hernandia nymphaeifolia</i>, <i>Guettarda speciosa</i> etc... ii). Introduced: <i>Cocos nucifera</i>, <i>Casuarina equisetifolia</i>. Fauna: <i>Atactodea striata</i>, <i>Coenobita spp</i>, <i>Donax spp</i>, <i>Birgus latro</i>, <i>Ocypode spp</i>, <i>Eretmochelys imbricata</i>, <i>Chelonia mydas</i> (nesting habitat), wading/coastal birds etc... <u>Sea bird colonies:</u> <i>Onychoprion fuscata</i>, <i>Sula dactylatra</i>, <i>S. Leucogaster</i>, <i>Anous stolidus</i>, <i>Puffinus pacificus</i>, <i>Phaethon lepturus</i>, <i>Hydroprogne caspia</i>, <i>Thalasseus bergii</i>, <i>Sterna dougalli</i>, <i>S. sumatrana</i> etc...</p>	<p>Subject to extensive and widespread development and diverse and intensive human activity on populated islands. Increasingly heavily modified with growing problem of coastal erosion believed to be climate related. Important habitat for diverse and abundant migrant birds. Beaches are a vital socioeconomic asset.</p>
<p>Rocky shore</p>	<p>Flora: i). Native: <i>Pandanus balfouri</i>, <i>H. tiliaceus</i>, ii). Introduced: <i>C. nucifera</i>, <i>Casuarina equisetifolia</i>. Fauna: <i>Grapsus spp</i>, <i>Geograpsus spp</i>, <i>Littorina spp</i>, <i>Cellana cernica</i>, <i>Tetraclita spp</i>, <i>Nerita spp</i>, <i>Chitonidae</i>, <i>Blennidae</i>, <i>Sterna anaethetus</i>, <i>Phaethon lepturus</i>, <i>Puffinus pacificus</i> ...</p>	<p>Growing development and intensive harvesting of shell fish on populated islands. Important habitat for sea and shorebirds.</p>
<p>Mudflats and Mangroves</p>	<p>Flora: <i>Avicennia marina</i>, <i>Bruguiera gymnorhiza</i>, <i>Ceriops tagal</i>, <i>Lumnitzera racemosa</i>, <i>Rhizophora mucronata</i>, <i>Sonneratia alba</i>, <i>Xylocarpus granatum</i>, <i>Xylocarpus moluccensis</i> etc... Fauna: <i>Terebralia palustris</i>, <i>Bivalvia spp: Gafrarium tumidum & pectinatum</i>, <i>Ctena divergens</i> etc... <i>Littorina scabra</i>, <i>Cardisoma carnifex</i>, <i>Scylla serrata</i>, <i>Geograpsus spp</i>, <i>Metopograpsus spp</i>, <i>Sesarma spp</i>, <i>Uca spp</i> etc... <i>Periophthalmus kalolo</i>, <i>P. argentilineatus</i>, <i>Sula sula</i>, <i>Fregata spp</i>, <i>Dryolimnas aldabranus</i>, <i>Ardea cinera</i>, <i>Butorides striatus</i>, numerous wading bird species, <i>Dugong dugon</i> (aldabra only).</p>	<p>Though significantly reduced from historical occurrence on populated islands mangroves areas are now stable or recovering in most areas. Mudflats have been lost to and altered by reclamation along the east coast of Mahé. Important habitat for diverse and abundant migrant birds.</p>
<p>Sea grass</p>	<p>Flora: <i>Cymodocea rotundata</i>, <i>Cymodocea serrulata</i>, <i>Enhalus acocroides</i>, <i>Halodule uninervis</i>, <i>Halophila ovalis</i>, <i>Syringodium isoetifolium</i>, <i>Thalassodendron ciliatum</i>, <i>Thalassia hemprichii</i>. Algae: <i>Caulerpa spp</i>, <i>Codium spp</i> etc... Fauna: Diverse species of invertebrates e.g.: polychaete worms, amphipods, molluscs, crustacean, bivalves (e.g. <i>Pinna muricata</i>, <i>Gastropods</i>, <i>C. moneta</i>, <i>C. tigris</i>, <i>Strombus spp</i>, <i>Morula margaritcola</i> etc... Grazing fish species e.g. <i>Siganus spp</i>, <i>Chelonia mydas</i>, <i>Eretmochelys imbricata</i>, <i>Dugong dugon</i> (Aldabra only),</p>	<p>There is evidence of decline near shore sea grass beds around the main populated islands. Data for extensive offshore sea grass beds is lacking but the collapse of green turtle populations is likely to be having a negative impact.</p>
<p>Reef flat</p>	<p>Fauna: <i>Bursa bufonia</i>, <i>B. cruentata</i>, <i>Cerithium zebrum</i>, <i>Conus leopardus</i>, <i>C. litteratus</i>, <i>C. virgo</i>, <i>C. maldivus</i>, <i>C. betulinus</i>, <i>C. quercinus</i>, <i>Cypraea moneta</i>, <i>C. annulus</i>, <i>C. Lynx</i>, <i>C. caurca</i>, <i>C. helvola</i>, <i>Rissoina ambigua</i>, <i>R. plicata</i>, <i>Smaragdia rangiana</i>, <i>Strombus gibberulus</i>, <i>S. mutabilis</i>. <i>Holothuridae</i>, lobster, octopus.</p>	<p>Important habitat for migrant birds. Important for gleaning fishing practitioners and as a leisure resource.</p>
<p>Coral Reef (Incl: reef ridge, slope, patch reefs)</p>	<p>Fauna: Scaridae (23 species of Parrot fish: e.g. <i>Bolbometopon muricatum</i>, <i>Chlorurus sordidus</i>, <i>Hipposcarus harid</i>, <i>Leptoscarus vaigiensis</i>, <i>Scarus ghobban</i>), <i>Serranidae</i> (Groupers: e.g. <i>Cephalopholis sonnerati</i>, <i>Epinephelus chlorostigma</i>, <i>E. fuscoguttatus</i>, <i>E. polyphkadion</i>, <i>Plectropomus laevis</i>), <i>Lutjanidae</i> (e.g. <i>Lutjanus sebae</i>, <i>L.</i></p>	<p>Severely degraded by 1998 bleaching event (90% loss of live coral cover on Mahe plateau and 50% on outer banks). Important habitat for diverse and abundant</p>

etc)	<i>gibbus</i> , <i>L. sanguineus</i>) <i>Amphiprion fuscocaudatus</i> (endemic), Octopus, lobster spp, <i>Eretmochelys imbricata</i> , more than 400 coral species. Numerous mollusc spp (including <i>Cypraea helvola</i> , <i>C. histro</i> etc...). Diverse elasmobranch populations including: <i>Carcharhinus amblyrhynchos</i> , <i>C. melanopterus</i> , <i>Triaenodon obesus</i> , <i>Himantura uarnak</i> etc...	biodiversity and specific biodiversity assemblages. Important tourism resource and source of recreation to local population.
(Mahé) Plateau	Sea cucumber spp. (<i>Holothuria nobilis</i> , <i>H. fucogilva</i> , <i>H. fuscopunctata</i> , <i>H. atra</i> , <i>H. edulis</i> , <i>H. scabra</i> etc...) <i>Carangid</i> spp (<i>Trevally and Bludger</i>), <i>Lutjanid</i> spp (e.g. <i>Lutjanus sebae</i> ,) <i>Lethrinids</i> , <i>Serranids</i> etc... Shark spp: <i>Carcharhinus albimarginatus</i> , <i>C. leucas</i> , <i>C. limbatus</i> , <i>C. plumbeus</i> , <i>Nebrius ferrugineus</i> , <i>Galeocerdo cuvier</i> , <i>Sphyrna</i> spp, <i>Rhincodon typus</i> etc... <i>Aetobatus narinari</i> .	Strong evidence of wide scale overfishing of demersal resources on the Mahe Plateau.
Pelagic	Tuna spp (<i>Katsuwonus pelamis</i> , <i>Thunnus albacores</i> , <i>T. obesus</i> , <i>T. alalunga</i> etc...). Billfish (<i>Xiphias gladius</i> , <i>Makaira</i> spp, <i>Tetrapturus audax</i> , <i>Istiophorus platypterus</i>). Shark spp (<i>Prionace glauca</i> , <i>Carcharhinus falciformis</i> , <i>C. longimanus</i> , <i>Isurus</i> spp, <i>Sphyrna</i> spp, <i>Carcharodon carcharias</i> , <i>Rhincodon typus</i> etc...). <i>Manta birostris</i> Turtles: <i>Chelonia Mydas</i> , <i>Dermochelys coriacea</i> , <i>Caretta caretta</i> , <i>Lepidochelys olivacea</i> . Seabirds: <i>Sterna bengalensis</i> , <i>S. caspia</i> , <i>Onychoprion fuscata</i> , <i>Sula dactylara</i> , <i>S. leucogaster</i> , <i>Macronectes giganteus</i> etc... Marine Mammals: 27 species of cetacean have been recorded in Seychelles waters including: <i>Megaptera novaeangliae</i> , <i>Physeter macrocephalus</i> etc...	Management of semi-industrial and industrial fisheries is a major challenge, reduced effort due to piracy impact appears to have enabled some stock recovery. By-catch issues require urgent substantive measures but are currently large neglected.
Deep Sea Bed	Limited Data.	

iii). **Mudflats and Mangroves.** The original mangrove forests on the East coast of Mahé were rapidly cleared after human settlement and the resulting mud flats progressively reclaimed to meet the need for flat buildable land. Mangroves were also harvested for timber and for bark, for example on Aldabra, well into the 20th Century. Total natural mangrove area continued to decline through much of the 20th Century but has been considered relatively stable since the 1980s at approximately 25km². The various phases of land reclamation on the east coast of Mahé have served to create lagoons where a limited mangrove flora (dominated by *Avicennia marina* and *Rhizophora mucronata*) and fauna has re-colonised, these areas are however subject to repeated and significant disturbance. Despite this the habitat supports significant populations of crabs, molluscs and fish and hence provides important habitat for native heron species and migratory wading birds.

Eight species of mangrove naturally occur in Seychelles (see **Table 7**). The mangrove fauna is characterized by limited species diversity when compared to its continental counterparts. In the central archipelago today mangroves are rather restricted; the last continuous belt exists between Port Launay and Port Glaud on the west coast of Mahé. Curieuse supports a diverse mangrove area on its west coast and Praslin retains a few isolated mangrove areas around river mouths; other very small areas occur on other islands such as Cousin. In the outer islands mangroves are only found in atoll environments, which provide the sheltered lagoon habitat suitable for their establishment. The most extensive forests are found in Aldabra, Cosmoledo and Astove.

Mangrove habitat management has received considerable attention over the last 20 years with the development of pilot management projects and ecotourism (boardwalks and canoeing) activities. Notably the Port Launay mangroves were incorporated into the Morne Seychellois National Park providing for protection of a watershed from mountain top to mangrove forest. The importance of this area was highlighted by its 2004 designation as a Ramsar site.

The main threats to mangroves are coastal development and climate change with rising sea levels posing a significant threat to mangrove forests in the Seychelles.

iv). Sea Grass Beds. The extensive shallow submarine banks of Seychelles support significant sea grass areas. A particularly large sea grass bed (estimated at 45km long and 15km at its widest) lies on the Providence-Cerf bank. Many of the outer islands, such as the lagoons of Aldabra, Cosmoledo and Astove, support large sea grass communities. Sea grass habitats are also common around the granitic islands notably in the St Anne Marine National Park and off Grand Anse-Amities coast of Praslin. A brief survey of inshore sea grass bed substrate around the island of Mahé recorded 58 species of infaunal invertebrates. Sea grass beds are also essential for many marine herbivore species including megafauna such as the green turtle and the Dugong.

There is evidence that sea grass beds around the main populated islands are in decline due to a combination of anthropogenic factors – pollution, reclamation, coastal development and climate change. It is also likely that the historical exploitation of the main sea grass grazers, green turtles, and ongoing fishery activities mean that the natural grazer/growth balance in sea grass beds has been lost potentially leading to changes in community structure and health.

v). Reef flats. This mixed habitat complex has been subject to intensive disturbance around populated islands. In the central archipelago reef flats are utilised extensively for gleaning fisheries (e.g. octopus and shell fish) and shell collecting activities. In the last 25 years significant areas of this habitat have been lost to major land reclamations. Sedimentation and in some areas pollution are also factors of concern.

Most reef flats consist of a complex patchwork of habitats: areas of sand and gravel interspersed between areas of coral rubble, coral outcrops, sea grass and algal growth. In their natural state these habitats are rich in life and commodity species such as octopus, lobster and sea cucumber. Mollusc fauna can be very rich with Cowries (*Cypraea moneta*, *C. annulus*, *C. Lynx*, *C. caurca* and *C. helvola* being common), Cones (*Conus leopardus*, *C. litteratus*, *C. virgo*, *C. maldivus*, *C. betulinus* and *C. quercinus*) readily found in the seagrass; whilst species such as *Bittium zebrum* and *Smaragdia rangiana* can be found in algal mats. Four Shell Reserves were declared in the 1960s and were subsequently incorporated under the 1986 Fisheries Act (1987 Shell Reserve Regulations) but the areas are not managed or enforced. Reef flat areas are also covered in other Protected Areas most notably Aldabra.

vi). Coral Reefs. Seychelles has some 1,700 km² of coral reef the vast majority of which occurs around the south eastern islands. The ENSO-related coral bleaching event in 1998 had a major impact on Seychelles' reefs. The reefs of the central archipelago were particularly badly affected with some 90% coral cover mortality. Fast growing *Acroporas* and *Pocilloporas* suffered most and a phase shift from live coral cover to coral rubble/macroalgae dominated-reefs was initiated. The outer islands were in general less badly affected with coral mortality more in the region of 40-50% and it has been postulated that this may reflect greater resilience due to reduced anthropogenic stress and an existing natural adaptation to greater temperature fluctuations.

Reef fish diversity showed a lag effect following the bleaching event with some impact noted on certain live-coral dependent species but in general diversity was maintained. However as time progressed recruitment of new individuals to fish populations appears to be reduced possibly related to the progressive break down of reef structure.

In the sixteen years following the bleaching event natural recovery has been slow. Various factors are believed to have contributed to this:

- The loss of live coral was so extensive and widespread that sources of coral larval influx for recruitment are greatly reduced.
- The spread of algae coverage is limiting to coral recruitment and development.
- There have been further bleaching events in 2002, 2003 and 2010 that have accounted for much of the natural recovery.
- Most recently a new Crown-of-thorns starfish (*Acanthaster planci*) outbreak, the first since 1996/97 has been recorded in the reefs around Mahé, signalling further problems for recovering reefs and likely reflecting the impacts of ongoing overfishing and enrichment pollution around the main islands.

Recognising that enhanced reef ecosystem resilience is vital to fend off the impacts of stresses Seychelles has embarked on a series of measures that have the objective of greatly improving management of the demersal fishery (see **Project 28**) and designating approximately 30% of the EEZ as protected areas, half of which or 15% of the EEZ to be strict no take zones. Area prioritisation and marine spatial planning initiatives are underway to support this (see **Project 2**).

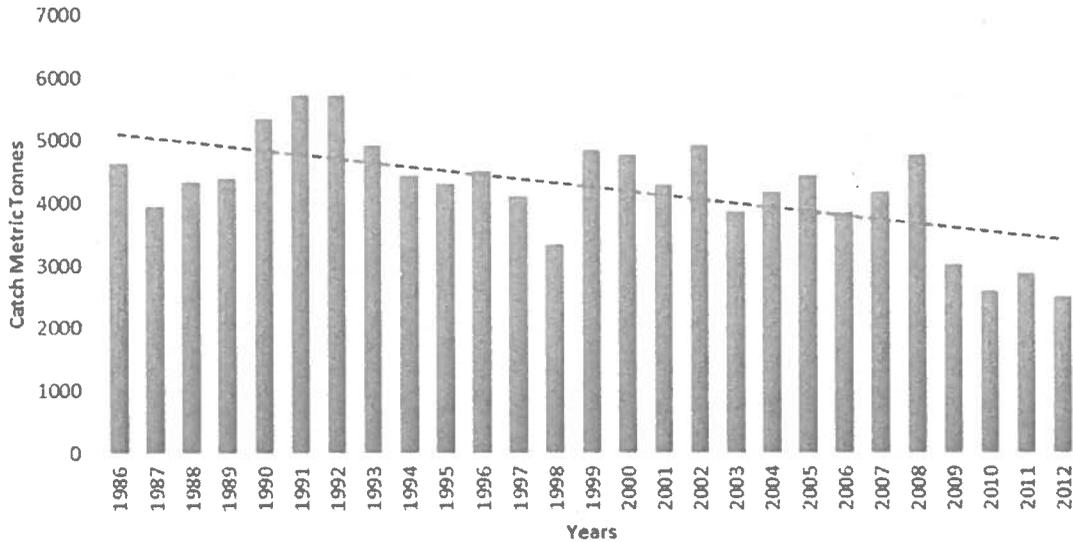
General climate trends suggest that raised sea-temperature events will occur with increasing regularity in the future and as such temperature induced coral bleaching remains the primary threat to coral reefs and their wider recovery in the Seychelles. An innovative pilot project, led by Local NGO Nature Seychelles, has been initiated at two sites near the island of Praslin to plant climate-resilient coral species with the objective to restore ecosystem services. Coral nubbins are cultivated in mid-water ocean nurseries made of ropes or nets. Corals are then transplanted onto bleached and degraded reefs. By mid-2014 some 30,000 corals from 45 species had been transplanted. It is intended to expand these trial projects to larger areas under this NBSAP (see **Project 21**).

vii). Marine Plateau.

The submarine banks of the Seychelles form the basis of the artisanal fishery providing vital food security, employment and high value trade commodities. The Mahé plateau is of particular importance. This shallow bank of some 39,000 km² supports important demersal fisheries such as: *Lethrinidae*, *Lutjanidae*, *Scaridae*, *Serranidae*, *Siganidae* some 100 species of demersal fish are commonly caught in the fishery. Also important are the sea cucumber, lobster and octopus fisheries.

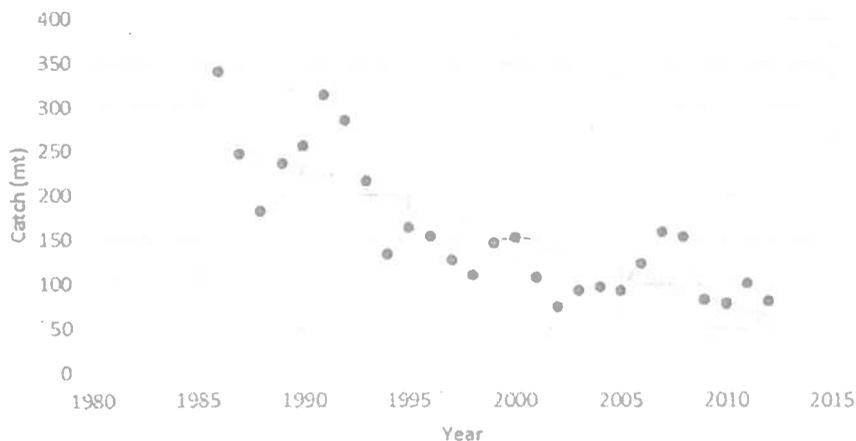
Artisanal fishery catches peaked in 1991 have declined steadily since (See Fig 1), providing very strong indication that the demersal stocks have been heavily overfished¹¹.

Fig 1: Artisanal Catch 1986-2012

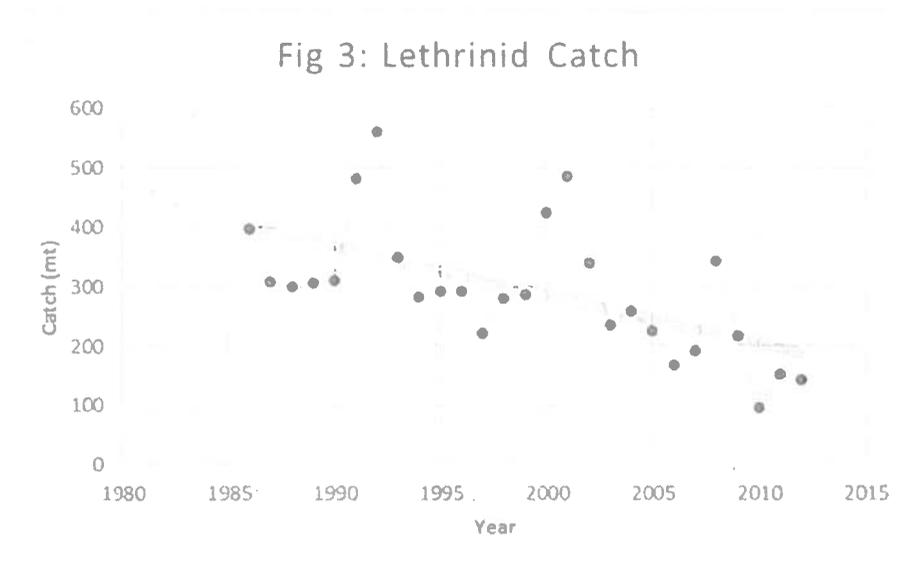


Key economic components of the fishery such as Serranids (see Fig 2) and Lethrinids (see Fig 3) have also shown distinct decline. Furthermore many of the larger species – e.g. *Epinephelus tukula*, *E. fuscoguttatus*, *Plectropomus laevis* and *P. punctatus* - have shown a marked decline in area of occurrence and abundance.

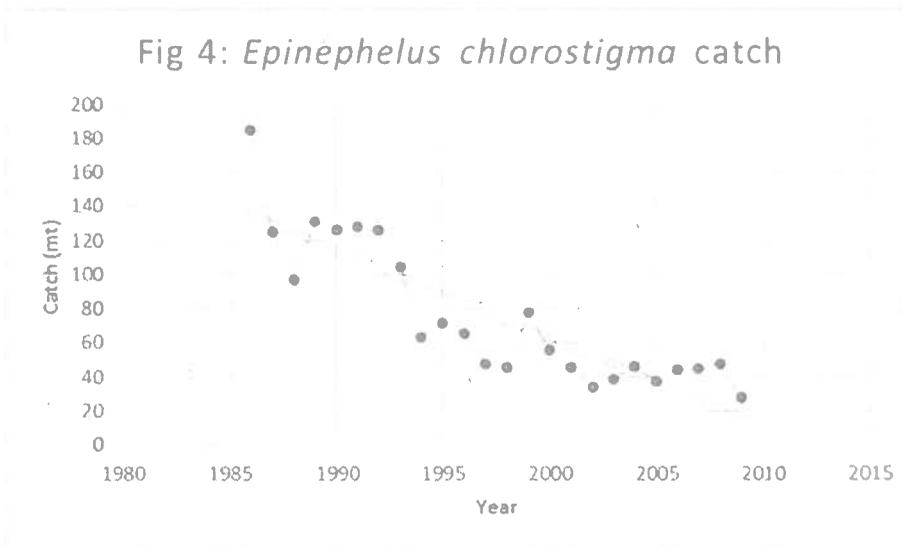
Fig 2: Serranid Catch



¹¹ Pelagic species caught in the artisanal fishery typically constitute between 30-40% of the catch.

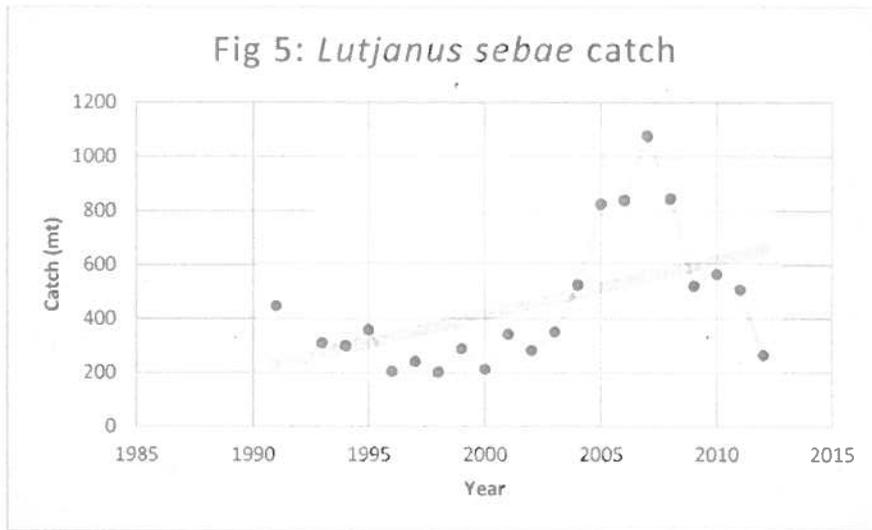


Where species-level catch data is available for key economic species it also shows very worrying trends such as for the Brown spotted grouper (*Epinephelus chlorostigma*) known locally as “Makonde” which exhibits a steep decline in catch (see Fig 4) and the Emperor red snapper (*Lutjanus sebae*) – see Figures 5 & 6.

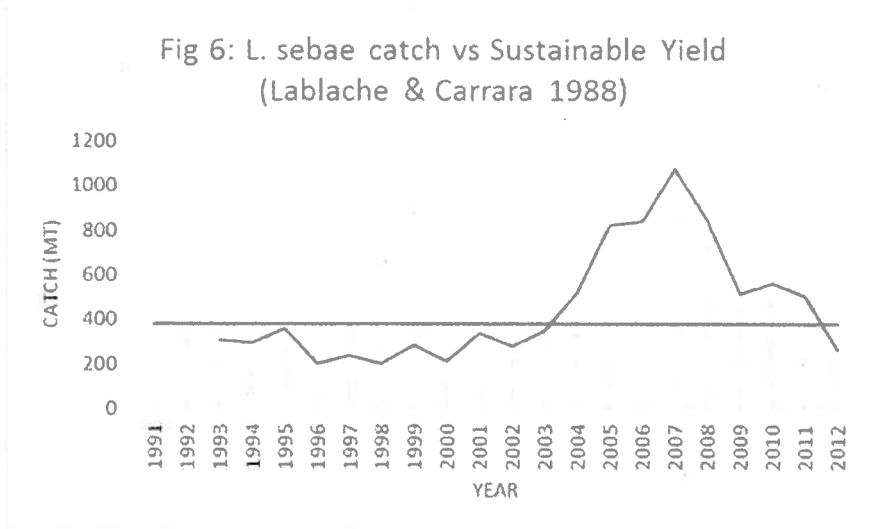


The Emperor red snapper is the most prized fish in the demersal fishery fetching very good prices on both the domestic and international markets¹² and this has driven a targeted fishery for this species. Targeted fishing of the species, most likely focusing on spawning aggregations, saw a dramatic peak in *L. sebae* catch between 2005 and 2008 followed by marked decline (see Fig. 5).

¹² Prized species of snapper and grouper are packed in ice and flown to overseas for high commodity prices such as to the lucrative European restaurant market.

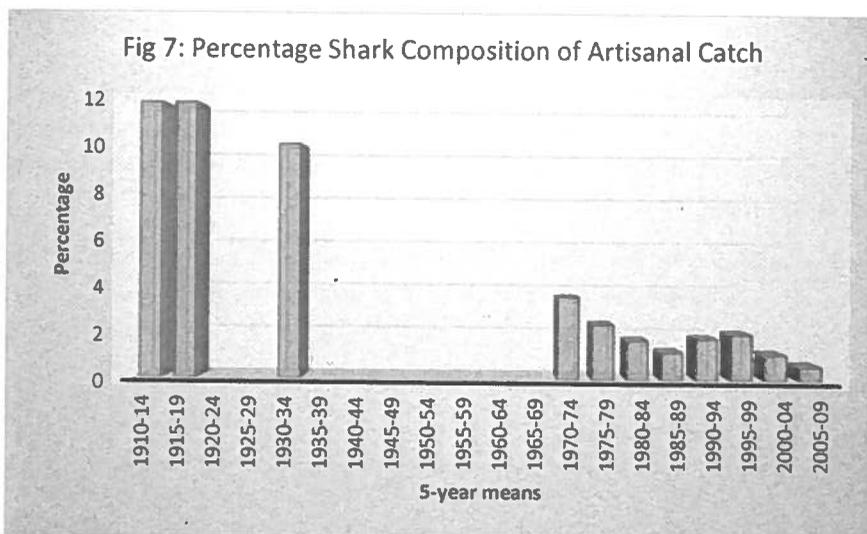


Worryingly catches from 2004 to 2011 were significantly above what had previously been estimated as a sustainable yield for the fishery and were followed by a dramatic decline in catch (see Fig. 6).

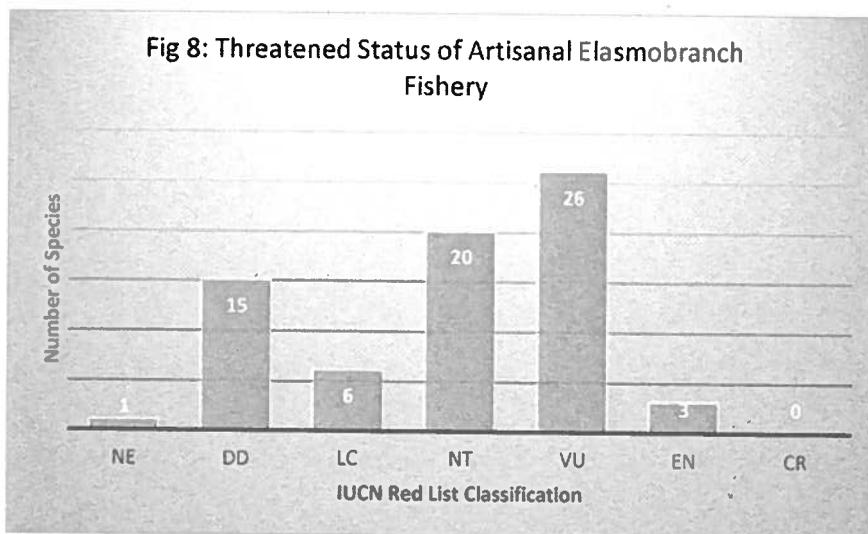


Fishing down the food chain is also apparent, in particular with regard to shark catches which as key apex predators, and coupled with the decline of large serranids discussed previously, is of considerable ecological concern in terms of the plateau ecosystem's stability, resilience and productivity.

Shark as a proportion of the artisanal catch has declined dramatically over the last 80 years from 10.2% to 0.6%, in 5-year means (see Fig 7). This situation has been exacerbated by the targeted and by-catch activities of the domestic semi-industrial fleet on and around the plateau since the late 1990s.



Furthermore a high proportion of the species make-up of the elasmobranch fishery is considered threatened under IUCN Red List criteria (See Fig 8).

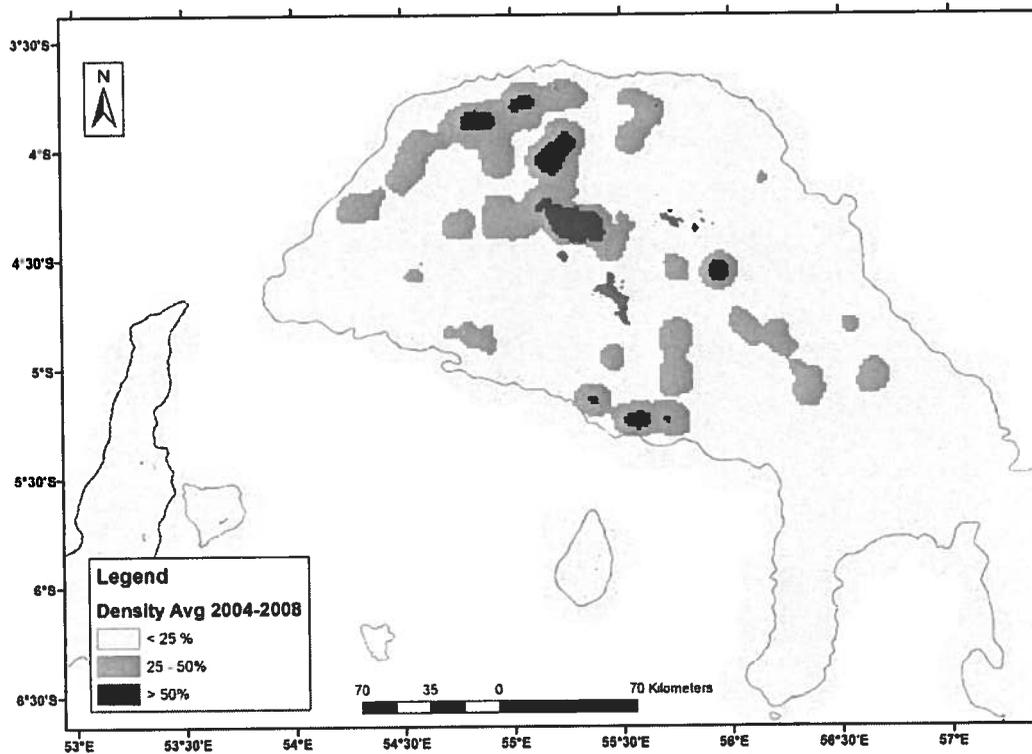


Management of demersal resources remains a challenge with the SFA continuing to develop and refine management mechanisms. The lobster fishery is managed on a cyclical basis with limited licenses being issued for two to three year periods and the fishery then closed for a number of seasons to allow stocks to recover. The sea cucumber fishery is also operated on a limited license basis as opposed to a Total Allowable Catch approach and there is considerable concern that the various species stocks are being significantly overexploited.

Management of the marine banks of Seychelles is vital for the socioeconomic development and food security of the country – overfishing of various stocks is a clear matter of concern, along with ongoing degradation of habitats through anthropogenic stressors including climate change. The ongoing fishing down of the food web which has extirpated (crocodile and seals) or likely rendered

ecologically extinct various key species (turtles, several shark species and some secondary predators such as large serranids) with negative ramifications for the stability, resilience and overall production of the system. Usage of the marine banks is very widespread with modern GPS technology allowing all areas to be mapped, recorded and re-visited accurately for highly effective and thorough resource exploitation as can be seen in the VMS usage maps for the demersal and sea cucumber fisheries respectively (See Maps 7 & 8).

Map 7: The Average VMS Fishing Effort Ratio for the Demersal Fishery through the Years 2004-2008. (Courtesy of the Seychelles Fishing Authority)



viii). **Pelagic.** The pelagic zone is of key importance to Seychelles constituting the vast majority of its EEZ. The expansion of industrial tuna fishing in the western Indian Ocean and the establishment of a tuna cannery in Port Victoria in the mid-1980s has made fisheries the primary source of foreign exchange to the economy. Industrial fishing raises considerable concern about sustainable use of pelagic resources. Seychelles is a member of the Indian Ocean Tuna Commission that seeks to manage this complex fishery but there are substantive reasons for concern not least with the lack of progress in addressing issues of by-catch.

Seychelles played a lead role in the establishment of the Indian Ocean Whale Sanctuary in 1979 under the auspices of the International Whaling Commission. Seychelles' entire EEZ lies within the Sanctuary and all marine mammals are protected under the Seychelles Fisheries Act. There is some evidence to suggest that the waters around Seychelles are seeing a gradual increase in certain cetacean populations but as yet no substantive data has been collated to support this and further research is required.

Map 8: Sea Cucumber Fishing Effort Ratio and Geographic Expansion 2002-2009. (Courtesy of the Seychelles Fishing Authority)

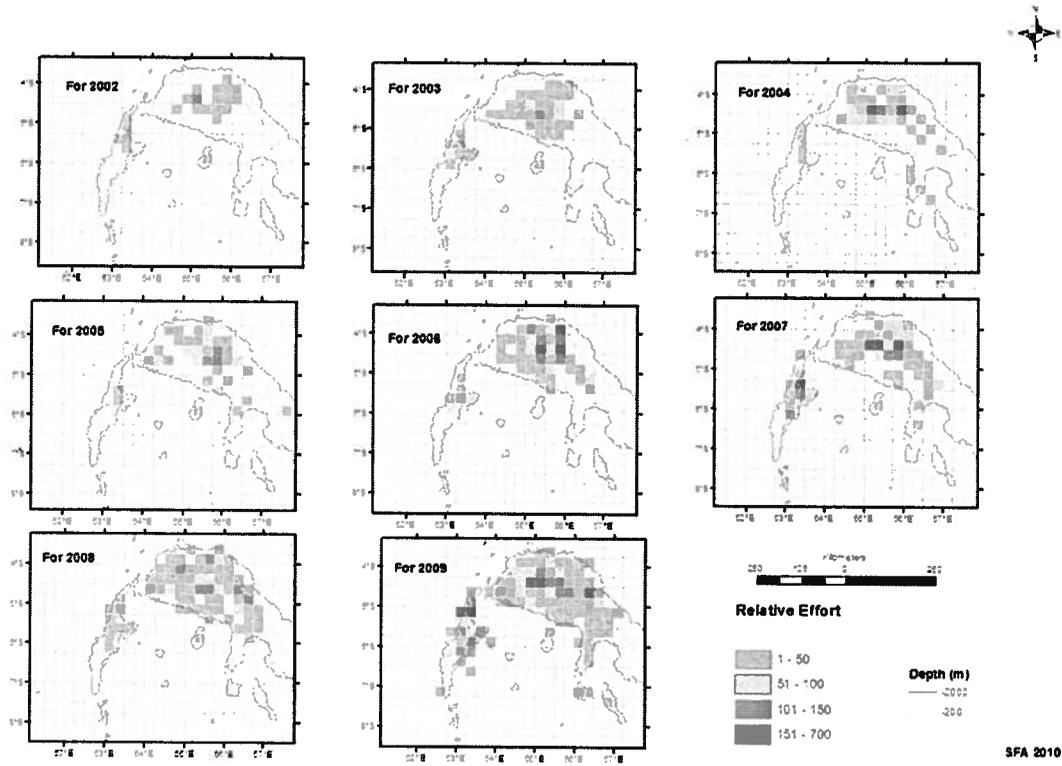


Table 8: Trends in Marine and Coastal Biodiversity		
Habitat	Trend	Notes
Beach Crest and Beach	↓	<ul style="list-style-type: none"> ⚠: Increasing coastal development (tourism developments and private habitations). ⚠: Increasing intensity of human activity. ⚠: Resource harvesting and poaching. ⚠: Coastal erosion/ rising sea level.
Rocky Shore	↓	<ul style="list-style-type: none"> ⚠: Increasing development. ⚠: Resource exploitation. ↔: Significant areas still relatively inaccessible by land.
Sea Grass	?	<ul style="list-style-type: none"> ⚠: Evidence of localised decline in inshore grass beds around main populated islands due to factors such as reclamation, dredging, siltation and pollution. ? : Insufficient data on large offshore sea grass beds to provide baseline – though removal of/dramatic reduction in key grazer species (e.g. <i>Chelonia mydas</i>) suggest likelihood of destabilisation.
Reef Flat	↓	<ul style="list-style-type: none"> ⚠: Extensive land reclamation on the main granitic islands. ⚠: Excessive disturbance, utilisation and increasing pollution.
Coral Reef	↓	<ul style="list-style-type: none"> ⚠: Ongoing loss of rugosity and phase shift following 1998 bleaching event. ⚠: Recurrent bleaching events 2002, 2003, 2010 inhibiting recovery. ⚠: Anthropomorphic stresses on reef systems includes widespread overfishing and near main populated islands sedimentation and physical damage are significant factors. ⚠: Reclamation.
Mudflats and Mangroves	↔	<ul style="list-style-type: none"> ↗: Direct exploitation of mangroves has ceased and some localised natural expansion in area has been noted. ↗: Mangrove recolonisation of the east coast of Mahé. ⚠: Mangroves on Mahé east coast are disturbed and subject to periodic clearance and pollution events. The mudflats created in the same areas are equally disturbed.
Mahé Plateau	↓	<ul style="list-style-type: none"> ⚠: Expanding effort, range & sophistication of fishing pressure. ⚠: Ongoing habitat degradation (see habitats above). ⚠: Ongoing decline in marine megafauna impact on ecosystem structure and function: e.g. shark population decline. ⚠: Ongoing decline of secondary predators Serranidae, Lutjanidae etc...
Pelagic	↓	<ul style="list-style-type: none"> ↗: Total protection of cetacean population in EEZ and wider Indian Ocean Whale Sanctuary. ⚠: Ramifications of significant and ongoing reduction in shark populations. ⚠: Cause for concern in various large predator populations subject to the industrial tuna fishery by catch.
Deep Sea Bed	?	No data.

2.3 Key Threats to Biodiversity.

Tables 3, 5 and 8 in Sections 2.1 and 2.2 respectively of this document set out the trends and their contributing factors in the main habitat categories of Forest, Inland Waters and Marine biodiversity respectively. Table 9 in this section breaks down the main threats to Seychelles' biodiversity and itemises the drivers behind these threats and the likely implications if these issues are not effectively addressed. To broadly summarise however:

i). In Terrestrial Ecosystems the primary threat is posed by IAS in particular in terms of the intermediate, montane and palm forest habitats which harbour the highest level of endemism. The secondary threat is change in land use or habitat loss and this particularly prevalent in coastal habitats such as lowland forest and most dramatically for lowland wetlands where development pressures are threatening the last remaining examples of this habitat. A cross-cutting threat for all terrestrial ecosystems is the projected impacts of climate change and how it may "squeeze" habitats and species niches which have little scope for movement/migration in the very limited landmass of the islands.

ii). In Marine Ecosystems over-fishing constitutes the primary and most immediate threat and in particular with regard to demersal stocks where there is strong and clear evidence of decline in many species and collapse of some populations, particularly of megafauna – e.g. primary herbivores (green turtles) and primary and secondary predators (elasmobranchs and serranids). Climate change is again a cross-cutting and complicating factor. In Seychelles the prolonged raised sea temperatures in 1998 caused severe and extensive coral bleaching and death in Seychelles resulting in some 90% and 50% loss of live coral cover in the central archipelago and outer islands respectively. Recovery from this bleaching has been patchy and hindered by three subsequent bleaching episodes. Issues of changing currents and shifts in seasonal weather patterns may have significant impacts upon the occurrence and distribution migratory and pelagic species with potentially damaging ramifications for conservation and sustainable use. Raised levels of atmospheric carbon dioxide a key driver of global climate change is also driving acidification of marine environments which is a longer term threat to marine biodiversity. Finally the ongoing exploration for oil and its potential future exploitation pose significant risks for biodiversity on the Mahé plateau and beyond.

Table 9: Threats to Biodiversity

Ecosystem type	Threats	Direct and Indirect Drivers of Threats	Implications
Forest Biodiversity	Invasive Alien Species	Change in land use. Development –increased trade & tourism. Lack of public awareness on horticultural introductions. Lack of capacity and techniques to address existing IAS problems in key areas of endemic biodiversity. (i.e. montane forest 200-500m asl). Capacity lacking in border control and inter-island movements.	Degrading biodiversity, decline in environmental service provision, and loss of future development potential.
	Fire	Human activity Climate Change.	Loss of forest cover, facilitation of IAS spread, increase of erosion and downstream sedimentation, decline in environmental services provision.
	Disease	Increase of disease linked to IAS pests. Climate Change?	Loss of economic resources, diversion of limited resources to address disease outbreak.
Inland Waters Biodiversity	Drainage/Canalisation	Economic development Lack of planning, management and enforcement capacity.	Loss of biodiversity and environmental services, increased sedimentation in marine environment.
	Sedimentation	Change in land use, deforestation. Lack of management capacity	Decline in water quality and related loss of biodiversity and environmental services.
	Pollution	Economic development Lack of awareness Lack of management capacity	Decline in water quality and related loss of biodiversity and environmental services.
	Invasive Alien Species	Lack of awareness	Loss of biodiversity and environmental services.
Marine and Coastal Biodiversity	Over Exploitation	Economics Lack of management capacity, inappropriate incentives.	Unsustainable exploitation of resources, extensive future income loss and impact upon livelihoods, cost of living etc... Potential phase shift in some habitats.
	Pollution	Economic development Oil exploration and extraction. Lack of management capacity	Impact upon localised coastal habitats and production (much broader threat of oil shipping and exploration).
	Coral Bleaching	Climate Change, Sedimentation, pollution, over exploitation etc...	Economic loss in artisanal fisheries and tourism industry, rise in cost of living, potential for ecosystem phase shift and increased coastal erosion.
	Sea Temperature change	Climate Change	Change in occurrence and distribution of pelagic resources, change in weather patterns, increased frequency of coral bleaching events etc...
	Sea Level Change	Climate Change	Loss of biodiversity, coastal erosion, potentially disastrous socioeconomic impact as economic activity and human habitation focused on coastal plains.

2.4 Loss of Biodiversity

For an isolated island archipelago documented species extinction/extirpation is actually relatively low. It is known from historical accounts that marine crocodiles, two species of seal and a large species of gallinule, most likely *Porphyrio porphyrio* were all extirpated by the mid-19th Century.

There are more detailed accounts of the extinction of three endemic species of bird:

- The Seychelles parakeet (*Psittacula wardi*), endemic to Mahe, Silhouette and Praslin was wiped out towards the end of the 19th century due to habitat loss and direct persecution.
- The Seychelles chestnut-flanked white-eye (*Zosterops semiflava*) is believed to have been lost in the first few years of the 20th century a victim of habitat loss.
- The Aldabra warbler (*Nesilas aldabranus*) only discovered in 1967 was last seen in 1983 and was listed as extinct in 1994 believed to be a victim of IAS (rats and possibly cats).

Other extirpations include:

- Abbott's Booby (*Sula abbotti*), now only found on Christmas Island in the eastern Indian Ocean, formerly occurred on Assumption but was wiped out in 1909 following the establishment of a guano mining operation.
- The Pinked-backed pelican (*Pelacanus rufescans*) formerly had a breeding colony on St Joseph Atoll but was reported as extirpated by the 1930s, likely due to direct persecution.

There has been extensive decline in both occurrence and abundance of many species. The main terrestrial herbivore, the giant tortoise (*Aldabrachelys gigantea*) has been extirpated from much of its original range. There has been a dramatic decline in abundance and range of many of the endemic bird species primarily due to IAS, and particularly rats, but also due to habitat loss. The Seychelles sheath-tailed bat (*Coleura seychellensis*), formerly common has been extirpated from much of its former breeding range and is now restricted to two known locations with a total population of less than 100 and classified as critically endangered. It is believed the dramatic loss of lowland wetlands has played a key part in this decline along with various other contributing factors.

The greatest terrestrial biodiversity loss is however without doubt in terms of loss in area of habitats. It is estimated that more than 90% of lowland wetlands have been lost over the last 250 years and the trend is continuing. Only very small relict stands of original forest remain and are under threat from IAS incursion. This extensive loss of habitats makes it quite possible that various species flora and fauna (particularly invertebrates and small vertebrates) may have been lost before their existence was recorded.

Little is known about the genetic diversity of species in Seychelles except for the few (most notably endemic land birds) that have been subject to intensive study, but the decline in numbers and range and particularly the loss of distinct island populations will doubtless have resulted in considerable degradation of the gene pool for some species.

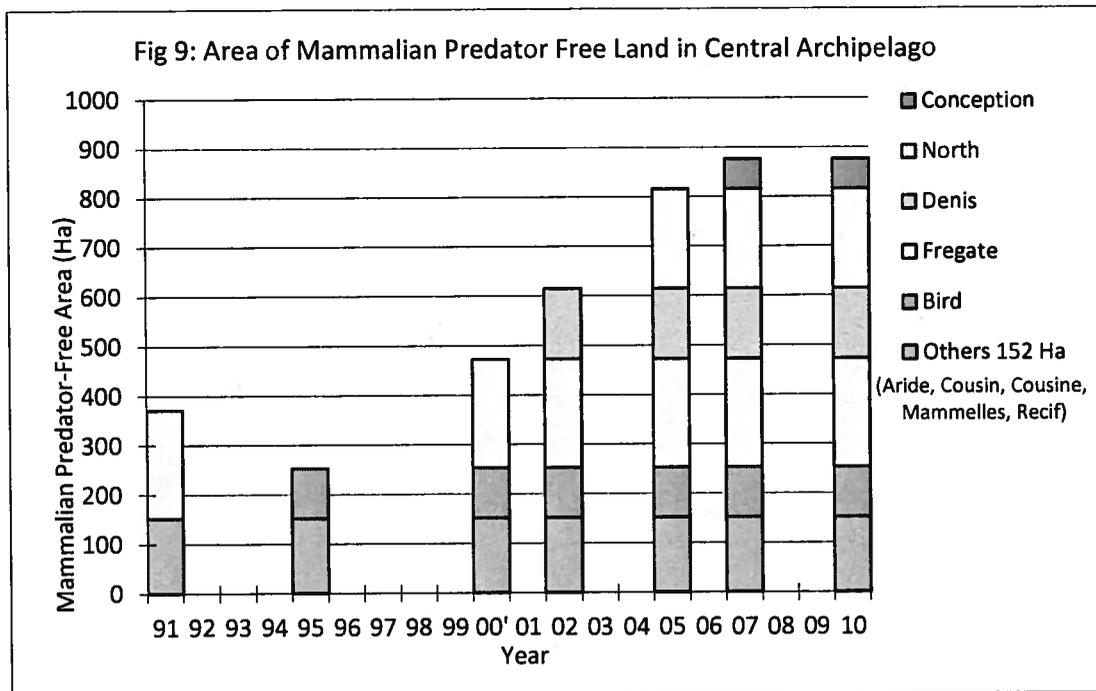
In the marine ecosystems species endemism is considered low (at a little less than 1%) and no extinctions have been recorded. Decline in occurrence and abundance of species is however a major concern. Both species of marine turtle that nest in Seychelles, the Green turtle (*Chelonia mydas*) and Hawksbill Turtle (*Eretmochelys imbricata*), have undergone enormous declines in terms of both nesting populations and number of rookeries. These declines are a result of sustained long-term over exploitation; and though marine turtles have enjoyed full protection under the law since 1994 poaching continues and the loss of nesting habitat is a growing problem. It is estimated that the biomass of shark on the Mahé plateau has declined by more than 90% in the last 80 years, whilst

there is strong evidence of widespread decline and population collapse of various larger species of serranid.

Finally the enormous loss of live coral reef cover following the 1998 ENSO-related bleaching event has seriously degraded this most biodiverse of the marine ecosystems. Recovery has been limited and rugosity of reef structure is being progressively lost as the dead corals crumble. This must have resulted in significant biodiversity loss and is likely a significant contributing factor to the ongoing decline in the catch of the demersal fishery.

2.5 Biodiversity Success Stories

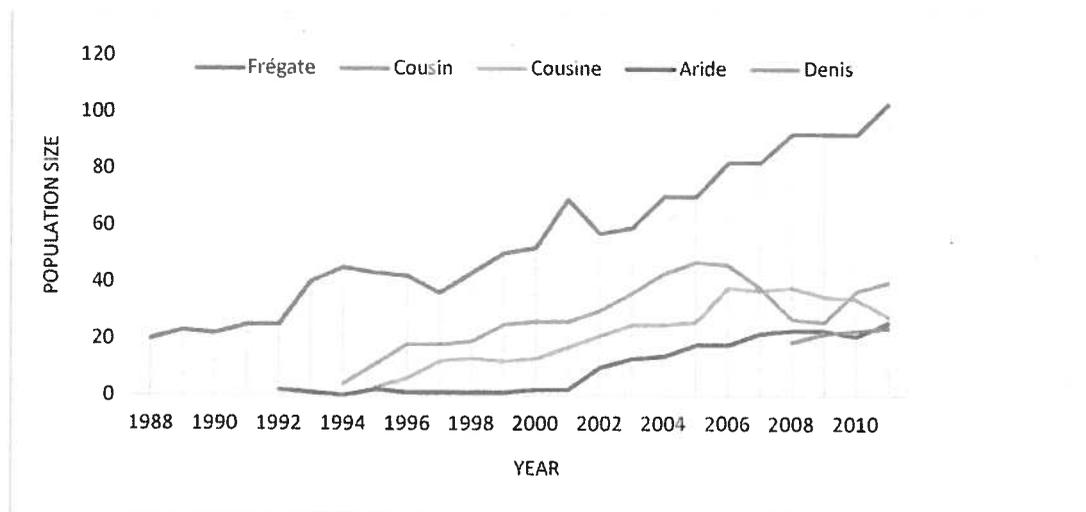
The primary threat to biodiversity in terrestrial ecosystems is IAS and it is in this domain that Seychelles has realised some of its most notable successes. This in particular with regard to the eradication of key IAS from small islands, the rehabilitation of those island ecosystems and subsequent (re)introduction of endangered endemic land bird species. Seychelles, with expert and technical support from New Zealand, pioneered the eradication of introduced mammalian predators (cats, rats and mice) from tropical island ecosystems. This has seen a near fourfold increase of rat free land in the central archipelago (see Figure 9)



Eradications were undertaken in conjunction with long term habitat rehabilitation programmes producing suitable areas for the reintroduction of threatened endemic species that cannot co-exist with mammalian predators. These activities have contributed to remarkable species population recoveries (see Table 10) such as that for the Seychelles warbler and Seychelles magpie robin (see also Figure 10) and enhanced conservation status see (Table 11).

Table 10: Species (Re-)Introduction							
Species	Islands						Notes
	Aride	Cousin	Cousine	Denis	Fregate	North	
Seychelles warbler (<i>Acrocephalus sechellensis</i>)	1989	Naturally Present	1990	2004	2011		From 30 birds in 1968 on one small island to more than 3,000 on five islands in 2012.
Seychelles magpie-robin (<i>Copsychus sechellarum</i>)	2002	1994	1995	2008	Naturally Present		From c. 15 birds on one island in 1965 to 220 birds on five islands in 2010.
Seychelles fody (<i>Foudia sechellarum</i>)	2002	Naturally Present	Naturally Present	2004	Naturally Present		From 3 to 5 breeding populations in the central archipelago.
Grey white-eye (<i>Zosterops modestus</i>)			2007		2001	2007	From 320 birds in 2 populations in 1999 to 575 birds in 5 populations in 2009.
Black paradise flycatcher (<i>Terpsiphone corvina</i>)				2008			Establishment of second breeding population.

Figure 10: Seychelles Magpie-robin Population Trends (Provided courtesy of Nature Seychelles).



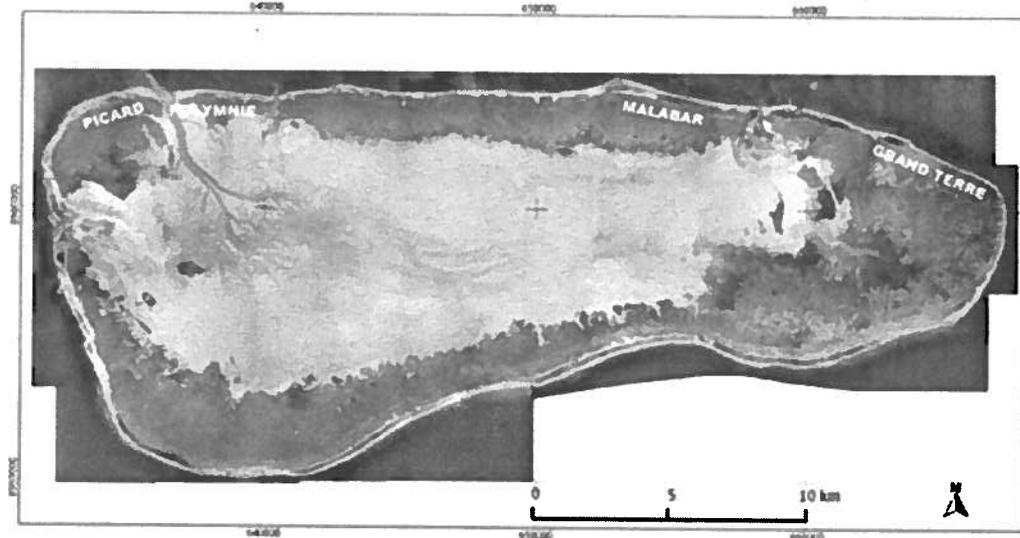
What is also very notable in these activities is the prominent role Tourism has played. Denis, Fregate and North islands are all privately owned and their rehabilitation has been funded largely by their tourism operations with the objective of producing world class ecotourism products. The integration of biodiversity concerns with tourism development has been a key component of the country's approach to the conservation and sustainable use of biodiversity over the last 20 years.

Species	IUCN status		Notes
	1997	2014	
Seychelles Magpie Robin (<i>Copsychus sechellarum</i>)	Critically Endangered	Endangered	Once reduced to as a few as 12-15 birds confined to Fregate island. Conservation actions including introductions to Cousin, Cousine, Aride islands saw it down listed to Endangered in 2006. Successful introduction to Denis Island followed in 2008.
Seychelles White-Eye (<i>Zosterops modestus</i>)	Critically Endangered	Endangered	Re-categorised to Endangered in 2006 following successful conservation Action - including successful introductions to Fregate and North Islands. This species is listed as Endangered because it has an extremely small population following intensive conservation work the population may now number more than 250 mature individuals. Confirmation of this would likely make the species eligible for down listing to Vulnerable (IUCN 2012).
Seychelles Paradise Flycatcher (<i>Terpsiphone corvina</i>)	Critically Endangered	Critically Endangered	Once reduced to a single viable population on La Digue Island with ongoing loss of habitat area. The Flycatcher was introduced to Denis Island in 2008. The species will merit down listing "after five years" if both populations are still self-sustaining, as the species occurs at multiple locations (IUCN 2012a).
Seychelles Warbler (<i>Acrocephalus sechellensis</i>)	Vulnerable	Vulnerable	On the verge of extinction in the 1960s with only some 25-30 birds confined to Cousin Island, the warbler is perhaps Seychelles greatest single conservation success story. Introduced to Aride (1988), Cousine (1990) and Denis Islands (2004) the global population was estimated to be more than 2,500 in 2007 (IUCN 2012b). The introduction of 59 warblers to Fregate island in 2011 will likely pave the way to the down listing of the Warbler and removal for the threatened species list.
Seychelles Fody (<i>Foudia sechellarum</i>)	Vulnerable	Near Threatened	At one stage reduced to 3 small island populations. Down listed to Near Threatened in 2006 following introduction to Aride and Denis islands. Total population was estimated to be 3,500 birds on 6 islands in 2004 (IUCN 2012c).

The other main national approach to the conservation and sustainable use of biodiversity has been the designation of Protected Areas (PAs) (see **Section 2.6** for details). Seychelles has world class examples of small PAs such as Aride Island and Cousin Island Special Reserves and the Vallee-de-Mai Nature Reserve (see **Table 12**) but faces much more difficult circumstances in the larger mountainous and densely forested PAs so important for the conservation of endemic biodiversity such as the Morne Seychellois and Silhouette National Parks. Seychelles' largest and most isolated PA, that of Aldabra Special Reserve (see **Map 9**), is a growing success story. Aldabra is one of the largest raised coral atolls in the world and at 153.8 km² constitutes over a third of Seychelles' terrestrial surface area whilst the entire lagoon (of 224km²) and the sea surrounding it for a kilometre from the high watermark also form part of the Special Reserve. Saved from military development in the 1960s by an international conservation campaign, Aldabra was designated a UNESCO World heritage site in 1982. Aldabra hosts significant endemic biodiversity including some 40 species of plant and an estimated 380 species of insect. Aldabra is famed for its endemic Giant tortoise (*Aldabrachelys gigantea*) considered threatened with extinction at the beginning of the 20th century the population on Aldabra has recovered to more than 100,000 individuals. Despite the substantial logistical difficulties in working on such an isolated (Aldabra lies some 1,100km southwest of the principal island of Mahé) and large atoll significant successes have been realised in recent years including the eradication of feral goats (*Capra hircus*) after 25 years of successive

efforts; and the reintroduction of the flightless Aldabra rail to Picard Island with subsequent rapid population growth. Other IAS programmes have recently been initiated including the pre-emptive eradication of invasive birds from the neighbouring island of Assumption and now trial projects to assess the feasibility of eradicating rats from the Atoll.

Map 9: Photo-map of Aldabra Atoll (© Seychelles Island Foundation)



Aldabra has notable success on the marine front as well. Over the last 15 years it has become evident (Hamilton *et al* 2012) that the Atoll harbours the country's only, small but growing, population of the globally threatened Dugong (*Dugong dugon*). Aldabra also plays host to a globally important rookery of the endangered Green turtle (*Chelonia mydas*) which has seen significant growth since protected status was imbued to the Atoll (see below) as well as a breeding population of the critically endangered Hawksbill turtle (*Eretmochelys imbricata*).

Protected Areas have also played a vital role in the Conservation of Marine Turtles and specifically the two species which nest in Seychelles namely the critically endangered Hawksbill turtle (*Eretmochelys imbricata*) and the endangered Green turtle (*Chelonia mydas*). The marine turtles of Seychelles sustained an intensive fishery for over 100 years that saw populations plummet. Marine turtles received full protection under the law in 1994 but poaching remains an issue and development and human activity continue to degrade nesting habitat and destroy former rookery areas. Two PAs have however bucked this national decline and provide clear evidence that effective protection of nesting sites enables turtle populations to recover. The tiny Special Reserve of Cousin Island has recorded a ten-fold increase¹³ in the annual numbers of nesting Hawksbill turtle between 1973 and 2008 (see Fig. 11) making it the largest rookery for the species in the western Indian Ocean. Whilst Aldabra, as alluded above, has seen an increase in Green turtle nests recorded on 17 indicator beaches from 500 per annum in the late 1960s to a 4-year mean of 4,600 nests per annum for the period 1999-2002 (see Fig. 12)

¹³ Nesting females: 23 in 1973 to 256 in 2007/2008 season.

Figure 11: Number of Hawksbill Turtle Nesting Annually on Cousin Island (adapted from Allen 2010).

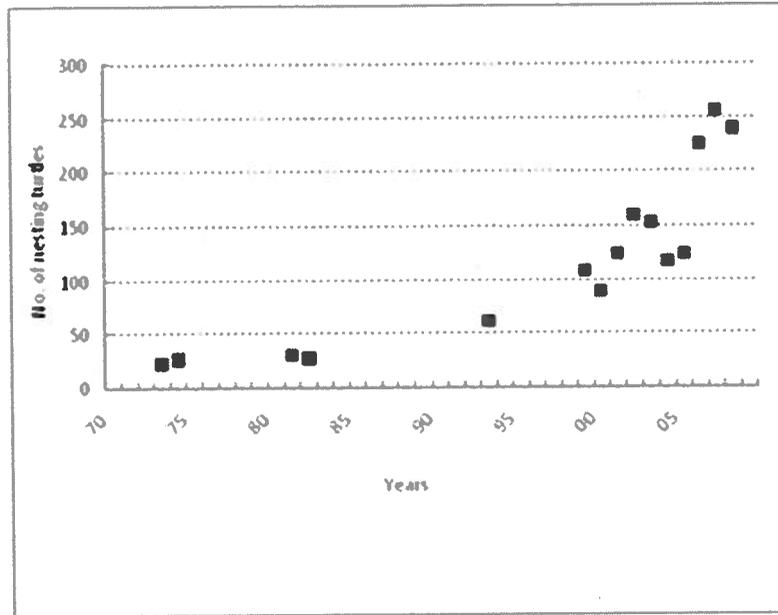
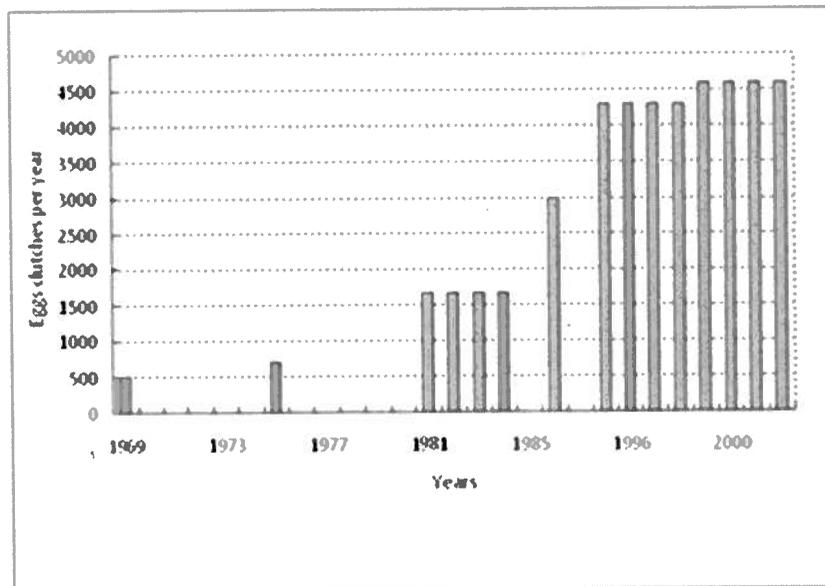


Figure 12: Average Annual (4-year means) Green Turtle Nests on 17 Indicator Beaches on Aldabra (from Mortimer 2004)



2.6 Protected Areas

The Seychelles terrestrial Protected Area Network (PAN) constitutes 46.6% of Seychelles' total landmass, an enormous commitment to biodiversity conservation. Furthermore the President has stated the political objective of incorporating more than 50% of Seychelles landmass in the PAN and indeed preliminary approval has been given for the declaration of additional areas to take the total over 50%. These percentages are very impressive but perhaps more important than the quantity is the quality of protected areas in question. The vast majority of Seychelles endemic biodiversity is to be found in the ancient granitic islands. Within the granitic islands however, "only" 22.3% of the landmass or significantly less than the national average is protected.

In order to assess the contemporary occurrence and distribution of endemic biodiversity in the central archipelago a detailed assessment of Key Biodiversity Areas was undertaken under the auspices of the GEF full-size Mainstreaming Biodiversity project. Using a list of 776 species of special concern, species occurrence was mapped and indices of conservation value developed for map grids to generate maps of key biodiversity areas. This lengthy, detailed and high quality study (Senterre *et al* 2013) made numerous discoveries and re-discoveries of species, populations and population occurrence and generated detailed biodiversity maps for the 6 main granitic islands to inform future Protected Area planning and management. It resulted in the identification of an additional 2,169 hectares of land, on the two main islands of Mahe and Praslin, as priority on the basis of biodiversity interest, for inclusion an extended Protected Area Network.

Declaring 50% of the national landmass protected is one thing, effectively managing said area to realise its conservation and sustainable use objectives is another (see **Project 3**). Seychelles has a significant "Paper parks" problem i.e. areas designated and regulated but not effectively managed. Morne Seychellois National Park, for example, an area of great importance for the provision of ecosystem services (e.g. primary water catchment area) and a key centre of endemism is hampered by its size and particularly terrain and the key management issues it faces – namely widespread and ongoing encroachment of IAS. Currently the resources are not available to implement the management measures required to fulfil its conservation objectives.

Protected Areas (PAs) are central to Seychelles' implementation of the CBD. To this end Seychelles has received and is implementing two full-size GEF projects on PAs, one for the central archipelago and the other for the outer islands that address the spectrum of PA issues in Seychelles. It has developed a new Protected Area Policy (GoS 2013) that establishes the framework for the review of existing PAs and a standardised process for the identification and designation of new ones that will reflect best international practice. In particular it establishes a mechanism for stakeholder involvement in the designation and operation of PAs including: a national stakeholder PA steering committee, new models to enable the mechanisms for co-management of sites and structures to harness the full national capacity in that regard and optimise the realisation of benefits from PA management.

Marine Protected Areas (MPAs) in Seychelles present a very different scenario. Seychelles was the first country in east Africa to establish a network of MPAs but at the time of their selection (Procter 1971) they were primarily chosen for touristic utility, as opposed to biodiversity criteria, as at that time the marine environment was still of a relatively homogenous high quality. Subsequent human development activities and impacts, and notably the 1998 ENSO-related coral bleaching event have changed that scenario. Furthermore, unlike the terrestrial scenario where nearly 50% of the landmass lies within the PAN, the existing MPAs in Seychelles constitute less than 1% of the country's EEZ.

The Seychelles Government has recognised this short fall in the marine domain and, mindful of its international commitments, has initiated a marine spatial planning process with the ultimate objective of designating 30% of the EEZ as protected. Half of that area, or 15% of the EEZ, is to be designated as strict no take zones (see **Project 2**).

Sustainable financing is also a key problem and to that end a PPG has been approved by the GEF Secretariat to prepare the Full Size Project for Seychelles' protected area finance project that will seek to develop mechanisms to sustainably bridge the current PA funding gap (see **Project 4**).

Table 12: Protected Area Summary

Legislation: National Parks and Nature Conservancy Act	
Category	Description
Special Reserves (IUCN Category 1b)	
Aldabra (Designated 1981)	<p>Objective: Ecosystem conservation and management Area: Terrestrial 152.6km². Marine 281.2km². Managing Agency: Seychelles Island Foundation (SIF) Status: Under active management with management plan due for review. Notes: One of the largest and least disturbed raised atolls in the world Aldabra was designated a UNESCO World heritage site in 1982. The unique biodiversity of Aldabra make it ecologically and scientifically valuable. Aldabra is a refuge for many endangered species including <i>Aldabrachelys gigantea</i>, <i>Chelonia mydas</i>, <i>Fregata minor</i>, <i>F. ariel</i>, <i>Dryolimnas cuvieri aldabranus</i> and numerous endemic taxa. Key Threats: IAS, climate change and proximity to shipping lanes.</p>
Aride (Designated 1975)	<p>Objective: Protection of diverse seabird colony Area: Terrestrial 0.68km². Marine: Approx. 6.4km². Managing Agency: Island Conservation Society Status: Under active management with current management plan. Notes: An exemplary Special Reserve hosting the major sea bird colony (10 breeding spp) in the central archipelago and threatened endemic land bird species, and home to the endemic Wright's Gardenia. Key Threats: Poaching and climate change.</p>
Cousin (Designated 1975) (Also a Nature Reserve from 1966)	<p>Objective: Conservation of Seychelles warbler, Seychelles fody. Area: Terrestrial: 0.27km². Marine: 1.7km². Managing Agency: Nature Seychelles Status: Under active management with current management plan due for review. Notes: An exemplary PA having undergone significant ecosystem rehabilitation and received introduction of endangered endemic fauna, hosts largest <i>Eretmochelys imbricata</i> nesting colony in Seychelles and significant seabird populations. Key Threats: IAS and climate change.</p>
La Digue Veuve Reserve (Designated 1980)	<p>Objective: Conservation of habitat for the Seychelles Paradise Flycatcher Area: 7.8 Ha (11.8 Ha) Managing Agency: Seychelles National Parks Authority (SNPA). Status: Actively managed, management plan outdated. Notes: The original area of 7.8 Ha extended by purchase of approx. 11ha of contiguous wetlands 1998-2001. Key Threats: Tree disease, loss of habitat adjacent to PA, IAS.</p>
Recif (Designated 2010)	<p>Objective: Conservation of seabird colony. Area: 0.13km² Managing Agency: Environment Department Status: Actively managed on a seasonal basis, key management objectives identified and under implementation. Notes: Important seabird colony with 8 breeding species. Key Threats: Poaching, IAS.</p>

Table 12: Protected Area Summary (cont).

Legislation: National Parks and Nature Conservancy Act	
Category	Description
National Parks (IUCN Category 2)	
Baie Ternay (Designated 1979)	<p>Objective: Protection of reef biodiversity and maintenance of public amenity. Area: Marine 0.86km², Terrestrial 0.01km². Managing Agency: SNPA Status: Marine Park. Actively managed, management plan outdated. Notes: Beautiful scenic bay with representative marine habitats. Key Threats: Poaching, Tourism development.</p>
Curieuse (Designated 1979)	<p>Objective: To protect reefs between Praslin and Curieuse, Coco-de-mer forest and mangrove ecosystem). Area: Marine 13.7 km². Terrestrial 2.66 km². Managing Agency: SNPA Status: Terrestrial and Marine Park. Actively managed Notes: Re-designation of terrestrial area excluded 6% of the landmass, the plateau area at Baie Laraie appearing to make space for a future (tourism) development. Key Threats: Marine: Climate change. Terrestrial: IAS, tourism development.</p>
Ile Coco, Ile La Fouche, Ile Platte (Designated 1997)	<p>Objective: Protection of coral gardens Area: Marine 1.65km², Terrestrial 0.05km². Managing Agency: SNPA Status: Active management in place but no management plan. Notes: Designated in 1997 to protect the spectacular, shallow coral gardens that occurred there, much of this interest was lost to the coral bleaching event of 1998. Key Threats: Climate change.</p>
Morne Seychellois (Designated 1979)	<p>Objective: To preserve the scenic beauty and protect its wildlife. Area: Terrestrial 31.02km². Managing Agency: SNPA Status: Limited management interventions, management plan (2001) outdated. Notes: Terrestrial Park. Key area for endemic biodiversity and forest cover vital for preservation of water and soil cycles. Insufficient capacity to address IAS issues. Key Threats: IAS, lack of funding and management capacity.</p>
Moyenne Island (Designated 2009)	<p>Objective: Conservation of native flora and fauna. Area: 0.09km². Managing Agency: Moyenne Island Foundation Status: Unclear. Notes: Key Threats: IAS.</p>
Port Launay (Designated 1979)	<p>Objective: Protection of reef biodiversity and maintenance of public amenity value. Area: Marine 1.54km², Terrestrial 0.04km². Managing Agency: SNPA Status: Marine Park. Actively managed, management plan outdated. Notes: Key Threats: Tourism development.</p>
Praslin (Designated 1979)	<p>Objective: Preservation of water and soils cycles, natural habitat and wildlife. Area: Terrestrial 5.3km². Managing Agency: SNPA Status: Actively managed, management plan outdated. Notes: Includes the Vallee-de-Mai (Nature Reserve and World Heritage Site) with endemic palm forest and unique biodiversity. Key Threats: Forest Fire, IAS.</p>

Table 12: Protected Area Summary (cont).

Legislation: National Parks and Nature Conservancy Act	
Category	Description
National Parks (IUCN Category 2)	
Silhouette (Designated 1987 and 2010)	<p><u>Objective:</u> 1987 Marine Park: Protection of marine turtle rookery. 2010 to protect the terrestrial ecosystem and (particularly the endemic) biodiversity.</p> <p><u>Area:</u> Terrestrial 18.6 km². Marine 10km².</p> <p><u>Managing Agency:</u> SNPA/ICS</p> <p><u>Status:</u> Some management by ICS, no management plan.</p> <p><u>Notes:</u> SNPA has legal management mandate but no staff presence on the island.</p> <p><u>Key Threats:</u> Marine: Climate change. Terrestrial: IAS, Tourism development.</p>
Ste Anne (Designated 1973, amended 1997)	<p><u>Objective:</u> To protect marine life, reefs and shores for the enjoyment of the public.</p> <p><u>Area:</u> Marine 9.96km²</p> <p><u>Managing Agency:</u> SNPA</p> <p><u>Status:</u> Actively managed, management plan outdated.</p> <p><u>Notes:</u> Important turtle rookery on St Anne Island that lies within the park.</p> <p><u>Key Threats:</u> Ongoing tourism development, pollution, sedimentation, poaching.</p>
Area of Outstanding Natural Beauty (IUCN Category 6)	
Grande Anse Mahe (Designated 2000)	<p><u>Objective:</u> Preservation of natural beauty, human utilisation and ecosystem services of mangroves and vacoa woodlands for human enjoyment and sustainable use.</p> <p><u>Area:</u> Not available.</p> <p><u>Managing Agency:</u> Environment Department</p> <p><u>Status:</u> No active management and no plan.</p> <p><u>Notes:</u></p> <p><u>Key Threats:</u> Lack of management.</p>
Legislation: Wild Animals and Birds Protection Act	
Nature Reserves (IUCN Category 4)	
Vallee-de-Mai (Designated 1966)	<p><u>Objective:</u> Protection of bird life</p> <p><u>Area:</u> Terrestrial: 0.19km².</p> <p><u>Managing Agency:</u> SIF</p> <p><u>Status:</u></p> <p><u>Notes:</u> Designated as part of Praslin National Park in 1979, see above for further information.</p> <p><u>Key Threats:</u></p>
Cousin (Designated 1966)	<p><u>Objective:</u> Protection of bird life</p> <p><u>Area:</u> Terrestrial 0.27km².</p> <p><u>Managing Agency:</u> Nature Seychelles</p> <p><u>Status:</u></p> <p><u>Notes:</u> Designated as a Special Reserve in 1975, see above for further information.</p> <p><u>Key Threats:</u></p>
Ile Seche (Beacon Island) Ile Aux Fou (Booby Island) Boudeseuse, Etoile, Les Mammelles, Vache Marine, (All Designated 1966)	<p><u>Objective:</u> Protection of bird life.</p> <p><u>Area:</u> Ile Seche < 0.01km². Ile Aux Fou 0.01km². Boudeuse 0.01km². Etoile 0.01km². Les Mammelles 0.1km². Vache Marine 0.04km².</p> <p><u>Managing Agency:</u> Environment Department.</p> <p><u>Status:</u> Occasional management input to Les Mammelles otherwise no active management or management plans.</p> <p><u>Notes:</u></p> <p><u>Key Threats:</u> Poaching, lack of management.</p>

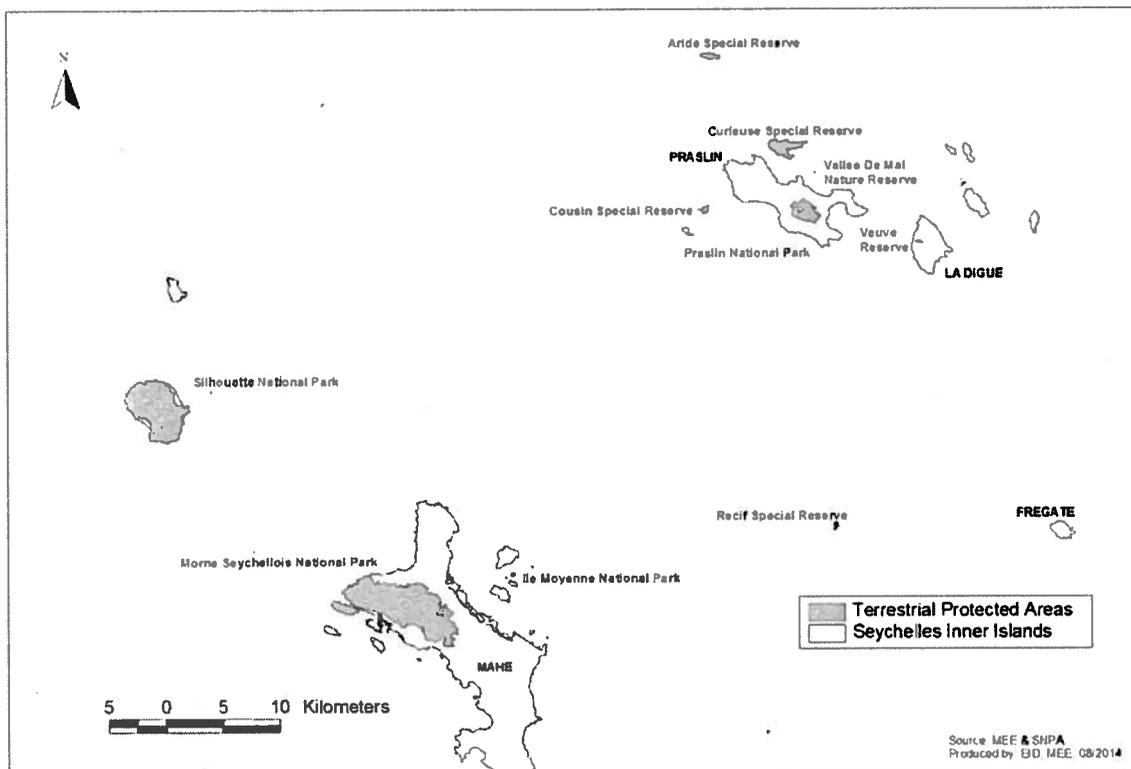
Table 12: Protected Area Summary (cont).

Legislation: Fisheries Act	
Shell Reserves (IUCN Category 4)	
Category	Description
Mahe: i). Anse-Faure to Fairy Land. ii). North east Point to Carana. Praslin: iii). Pointe Zanguilles to Pointe Chevalier La Digue: iv). Anse Severe to Anse Grosse Roche. (Designated 1987 ¹⁴)	<p>Objective: Conservation of Shell Biodiversity.</p> <p>Area: (i). 1.08km² (ii). 2.99km² (iii). 1.74km² (iv). 1.58km².</p> <p>Managing Agency: Seychelles Fishing Authority (SFA).</p> <p>Status: Not managed and not enforced, no management plans.</p> <p>Notes:</p> <p>Key Threats: Poaching activity and disturbance, nutrient enrichment.</p>
Fishery Reserves (IUCN Category 6)	
	<p>Objective: Conservation and management of certain fishery stocks.</p> <p>Area: Area not quantified, boundaries specified.</p> <p>Managing Agency: SFA</p> <p>Status: Not managed or enforced.</p> <p>Notes: Bans use of any kind of net over the prescribed reef areas, dates back to the 1920s.</p> <p>Key Threats:</p>
Legislation: Protected Areas Act	
Protected Areas (IUCN Category N/A)	
African Banks and surrounding reefs (Designated 1987)	<p>Objective: Not Specified, believed to be for biodiversity protection.</p> <p>Area:</p> <p>Managing Agency: Department of Land Use and Habitat.</p> <p>Status: Not managed or enforced, no management plan.</p> <p>Notes:</p> <p>Key Threats: Poaching, lack of management capacity, climate change.</p>
Ile Cocos, Ile La Fouche, Ilot Platte and surrounding areas (Designated 1987)	<p>Objective: Not Specified, believed to be for biodiversity protection.</p> <p>Managing Agency: SNPA</p> <p>Notes: Designated as a Marine National Park in 1997, see above for further info.</p>

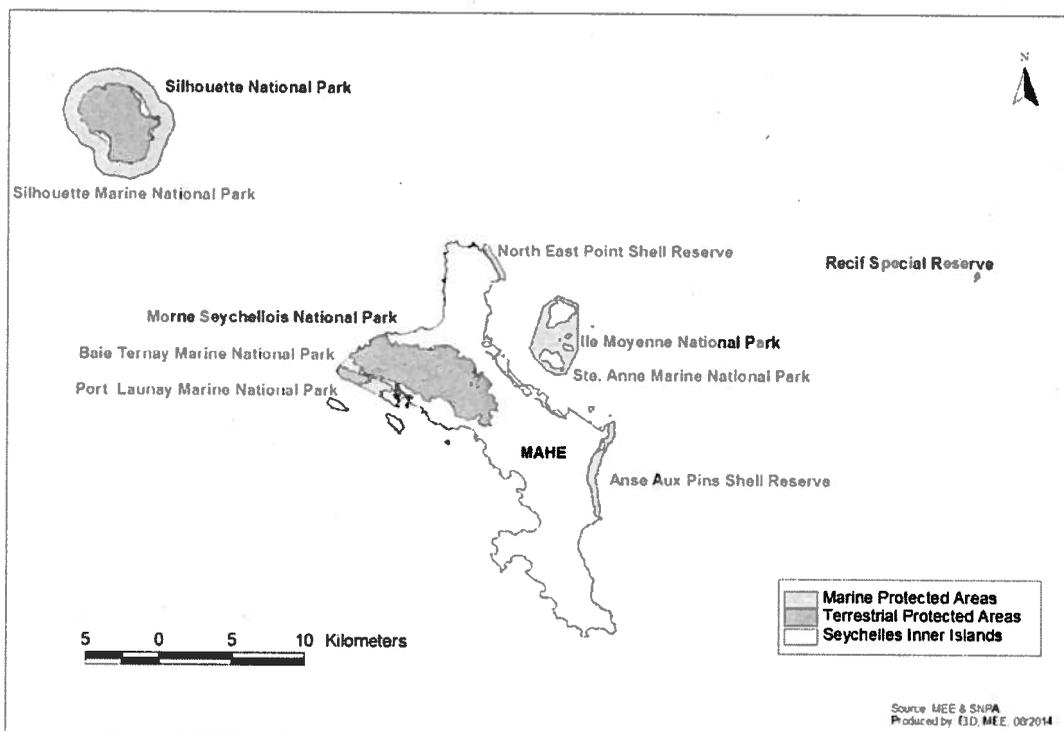
Note Maps 10 -12 (overleaf) depict the protected Areas in the central archipelago with the following omissions: the terrestrial areas of Grand Anse, Mahé Area of Outstanding Natural Beauty, Booby Island, Ile Seche, Les Mammelles and Ile Cocos Nature Reserves.

¹⁴ Designated under the Fisheries Act in 1987, but actually in existence under previous legislation since the 1960s.

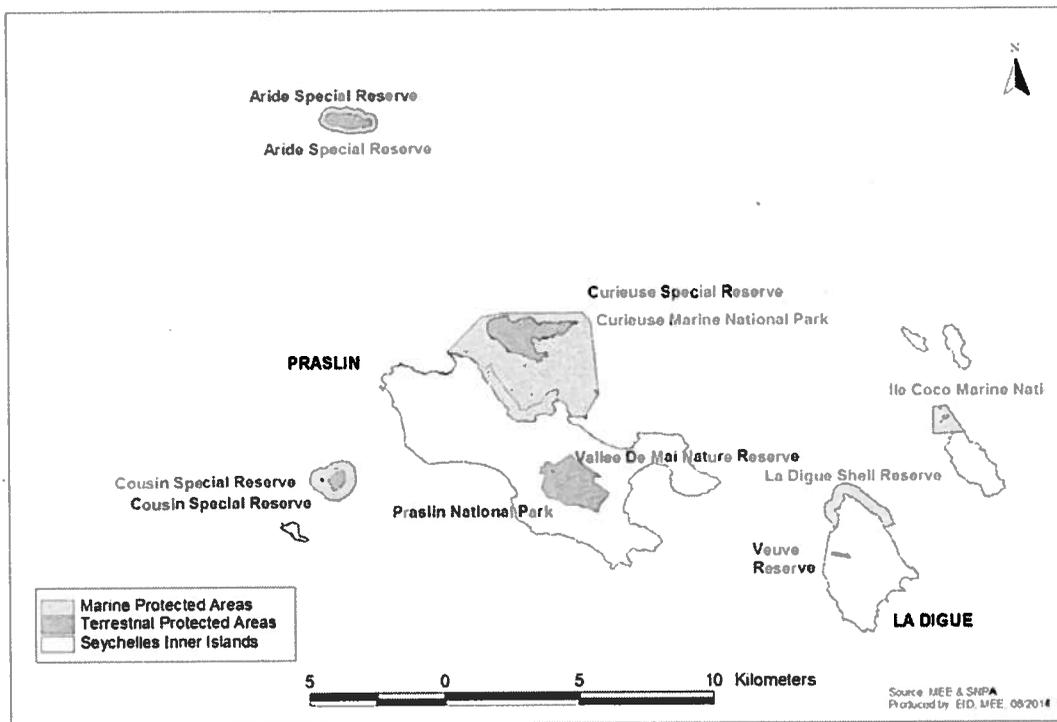
Map 10: Terrestrial Protected Areas in the Central Archipelago (Courtesy of J. Prosper EID, MEE)



Map 11: Marine and Terrestrial Protected Areas Mahé Group and Silhouette (Courtesy of J. Prosper EID, MEE)



Map 12: Marine and Terrestrial Protected Areas, Praslin and La Digue (Courtesy of J. Prosper EID, MEE)



2.7 Key Biodiversity Areas, Corridors and incorporation into the Protected Area Network (PAN)

In order to assess the contemporary occurrence and distribution of endemic biodiversity in the central archipelago a detailed assessment of Key Biodiversity Areas (KBAs) was undertaken under the auspices of the GEF full-size Mainstreaming Biodiversity project. Species occurrence was mapped and indices of conservation value developed for map grids to generate maps of key biodiversity areas. Senterre *et al* (2013) made numerous discoveries and re-discoveries of species, populations and population occurrence and generated detailed biodiversity maps for the 6 main granitic islands to inform future Protected Area planning and management; including the recommendation for inclusion of an additional 2,169 hectares on the islands of Mahe and Praslin.

The work of Senterre *et al* (2013) has much broader potential applications in the context of sustainable use and integration of biodiversity concerns into the broader production landscapes. When coupled with the previous work of Carlstrom (1996, 1996a), Duncombe (1996, 1996a) and Hill (2002) it provides a new baseline for development planning in the central archipelago.

The KBA work of Senterre *et al* also provides a vital precursor for the implementation of NBSAP **Project 2** entitled: Enabling Informed Extension of Protected Area Network. The objective of this project is to optimise the representative nature and viability of biodiversity covered by the PAN. This project of Systematic Conservation Planning, ongoing during the completion of this revised NBSAP document, utilising the MARXAN software will generate for least cost/ highest benefit, best fit models for PA expansion and designation in both terrestrial¹⁵ and marine environments.

The Marine Strategic Planning (MSP) process, part of a proposed debt for adaptation swap being coordinated in partnership with The Nature Conservancy (TNC), is further seeking to designate some 30% of the EEZ as protected. Half of which (i.e. 15% of the EEZ) to be strict no-take zones. The Marine Conservation Society, Seychelles (MCSS) is also carrying out, under the auspices of the GEF Protected Areas project, an assessment of potential temporospatial PAs to provide for seasonal protection to critical habitats and corridors for marine turtles and whale sharks.

¹⁵ Aspects of the outer island analysis will be addressed by the GEF Outer islands project (2015-2019).

3. Policy, Institutional and Financial Scenario.

3.1 Mainstreaming Biodiversity

Seychelles has a structured and long standing strategic, legal and institutional framework for the mainstreaming of biodiversity into the country's development sectors. The Environment Protection Act (EPA) (1994), with its 1996 Environmental Impact Assessment (EIA) Regulations, and the 1972 Town and Country Planning Act (TCPA) provide the primary legal framework. The Planning Authority created under the TCPA requires approval from both environmental and development planning portfolios in order to approve new developments. The EIA regulations incorporate biodiversity concerns through their recognition of some 19 different categories of sensitive area and a sensitive area atlas. In principle this establishes a balanced development assessment process reflecting the norms of international best practice. There is a perception amongst environmental stakeholders, however, that the EIA process is often little more than a rubber stamp: that developments that should be refused on environmental grounds often proceed under other priority criteria and that often when EIA conditions are accepted they are not subsequently enforced or assessed for implementation. There is however no data or review available to assess the substance of concerns of this nature, such as the development of lowland wetlands which are a highly threatened habitat type. It is perhaps pertinent to note that the Planning Authority is currently chaired by a representative of the Ministry of Environment and Energy.

In terms of strategic planning there have been very substantive attempts made on the national level to mainstream biodiversity issues across the developments sectors. Where the first national environmental management plan 1990-2000 was simply an environmental plan for the country, its successor the Environmental Management Plan for Seychelles (EMPS) 2000-2010 (GoS 2000) had ten thematic areas which included the main socioeconomic sectors (inter alia: Society, Population and Health, Land Use, Coastal Zones and Urbanisation, Energy and Transport, Tourism and Fisheries) and addressed the environmental aspects of each. The final assessment of the EMPS implementation considered it more than 80% successfully implemented.

The third generation environmental management plan for Seychelles has evolved to address the sustainable development of Seychelles. The Seychelles Sustainable Development Strategy (SSDS) 2012 – 2020 (GoS 2012 & 2012a) has 14 programmes: 12 thematic areas based on those of its EMPS predecessor but refined and elaborated to address the further aspects of Sustainability, the addition of a thematic area on Climate Change and an enabling "operationalisation" programme. The SSDS seeks to mainstream the three Rio Conventions (on Biodiversity, Climate Change and Desertification) in the Seychelles context with some basic cross-referencing of projects with international obligations.

The Tourism sector is a main driver of development in Seychelles in terms of being the major employer and attracting foreign capital investment for infrastructure development, typically hotel resorts and related amenities such as marinas and golf courses. The mainstreaming of biodiversity in this sector is therefore important to the overall attainment of biodiversity conservation and sustainable use objectives. Assessing the costs and benefits of tourism development to biodiversity is complex and no quantified study has been undertaken. Tourism is one of the key drivers of coastal biodiversity degradation on the main islands of the central archipelago. To counter this, tourism infrastructure provides the clientele which makes possible the realisation of revenue from the non-

consumptive use of biodiversity through ecotourism and the imbuing of value to biodiversity that finances its conservation. The great success stories of Cousin Island Special Reserve and the Vallee-de-Mai world heritage site have been enabled through revenue derived from tourism. Likewise the significant profitability of St Anne Marine and Curieuse Marine Parks funded and maintained the operation of the former Marine Parks Authority. Tourism has been a key driver in the rehabilitation of small island ecosystems with significant investment of funds in IAS eradication programmes. The rehabilitation of small island ecosystems has seen the major biodiversity conservation breakthroughs over the last 15 years in Seychelles (see **Section 2.5**). This trend is continuing and expanding with Foundations being established in several islands, in the Amirantes archipelago, for the conservation and management of biodiversity by the parastatal Islands Development Company, the Islands Conservation Society and tourism operations and/or tenants' organisations.

The Fishery sector (see **Section 2.2**), the other main pillar of the national economy, has a much more chequered history. There are significant concerns about sustainable use of the overall resource base with excessive and largely uncontrolled targeting of high value commodity species and major by-catch concerns in the industrial fisheries. Most data gathering to date in the demersal fishery is based on the recording of guilds rather than species and is allowing various species populations (e.g. serranids) to be reduced without it being evident in fishery data. The nature of the ecosystem, the large areas involved and the traditional open access status of fisheries make effective management or enforcement very problematic. New measures are being undertaken to try and address many of the above mentioned shortcomings including the development of a new demersal fisheries plan (see **Project 28**) which will include stock assessment of various important species. The Government has also stated its desire to designate 30% of Seychelles' waters as protected, half of which (i.e. 15%) as strict no take zones, the marine spatial planning process for this has begun and funding mechanisms to enable the establishment of such large PAs are being investigated.

The NBSAP will seek to further mainstream biodiversity into and across the developments sectors through the role of its Implementation Unit which will be nested in the broader SSDS framework and work with the National Biodiversity Partnership Forum (See **Section 4** and **Project 31** for details).

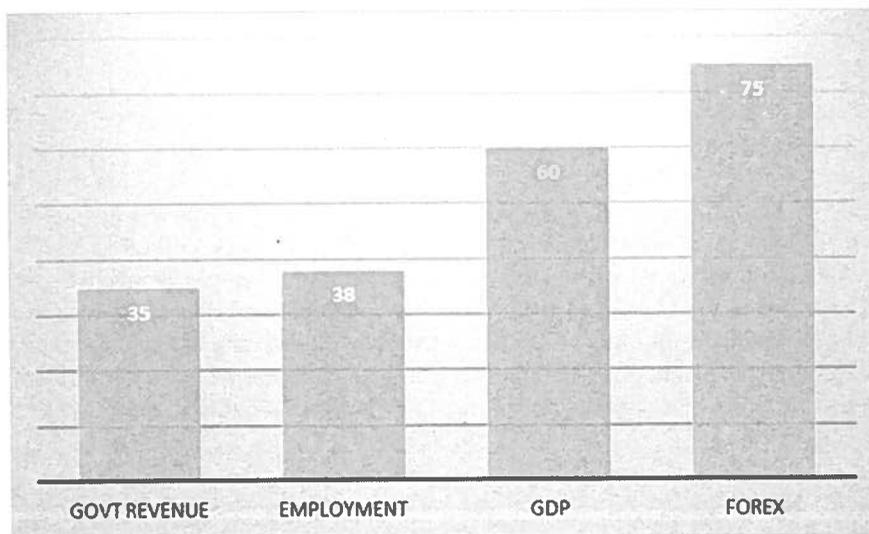
3.2 Environmental Economics

Biodiversity offers diverse values and benefits to society (See **Table 13**). Key sectors of the Seychelles economy, fisheries and certain aspects of tourism, and their historical predecessors, agriculture and forestry, depend directly upon the consumption of raw biodiversity materials. Light-industrial production and consumption also rely indirectly on ecosystem (biodiversity-based) services such as sinks for waste production or provision of water. Non consumptive use is embodied by many tourism activities. Optional values exist in the maintenance of healthy ecosystems to support future use perhaps through use of endemic genetic information in medicines or food production and the application of biotechnology, or others ways not yet known. Biodiversity has cultural and spiritual values that augment the quality of life and human well-being. Biodiversity also has fundamental intrinsic value as recognised in the preamble of the Convention on Biological Diversity.

Table 13: Values of Seychelles Biological Resources				
Use Values				Non-Use Values
Direct		Indirect	Option	Existence
Consumptive	Non-consumptive			
Biodiversity products that can be consumed directly e.g. Fish, timber, plants and animals	Biodiversity usage that does not necessarily degrade it – particularly true for ecotourism activities such as hiking, bird watching, snorkelling/diving etc...	Ecological service provision such as Water and soil cycle maintenance. Or support of populations with direct consumptive value.	Future value of biodiversity maintained in healthy, diverse, productive state for future, perhaps as yet unknown, consumptive and non-consumptive modes of use.	Intrinsic value. Additional existence values such as cultural, spiritual and bequest values.

Economic valuations of Seychelles' biodiversity are limited however and an economic assessment that was to contribute to the development of this NBSAP was, for a variety of reasons, not undertaken. A basic assessment was undertaken in 1997 (Emmerton 1997) as part of the process to develop the first NBSAP. Subsequent basic studies have been undertaken on: the socioeconomic impacts of the 1998 severe coral bleaching event (Cesar *et al* 2004), a travel cost analysis for marine parks (Mwebaze & MacLeod 2013) and contingent valuation assessments of two coastal areas on the main island of Mahe (MCSS 2013 a & b). The most recent overarching study of the value of biodiversity to the Seychelles' economy (Murray & Henri 2005) calculated that the contribution of biodiversity to the Seychelles economy was very significant (See Fig 13), constituting 35% of total Government revenue, providing for 38% of national employment, contributing 60% of gross domestic product and accounting for 75% of foreign currency inflow to the country.

Figure 13: Percentage Biodiversity Contribution to the Seychelles Economy
(From: Murray & Henri 2005)



No assessment has been undertaken of the cultural and spiritual value of Seychelles biodiversity, though culturally it would appear to be unquestionably high.

The lack of a basis for the incorporation of biodiversity values into national accounting is recognised as a key obstacle to Seychelles effective conservation and sustainable use of biodiversity (GoS 2014) and is hence addressed as a priority in **Project 23** of the NBSAP.

3.3 Incentives and Financing to Support CBD Implementation.

3.3.1 Incentive Measures

The Biodiversity Finance project (BioFin) was underway at the time of finalisation of the NBSAP and seeks to address all the key issues of NBSAP financing including quantifying the current biodiversity funding environment, costing all the NBSAP projects and integrating the NBSAP into the budget planning process (see **Project 26**). It will also assess and make recommendations on the current scenario of Biodiversity incentives, both perverse and positive, in terms of legislation, policies and institutional standard operational procedures. It will then serve to develop and propose a new incentive regime that will actively foster the conservation and sustainable use of biodiversity.

3.3.2 Government Recurrent Budgeting

A review of the national biodiversity financing scenario (Barois 2013) was undertaken in the lead up to the development of this new NBSAP. It compiled the figures for the Government's recurrent biodiversity related budget for 2013 and calculated that SR 164 million, equivalent to just 3.03% of the total national general recurrent budget, is invested in the biodiversity domain (see **Table 14**).

Ministry/Agency	SR Million
Ministry of Environment and Energy (MEE)	36.6
Seychelles National Park Authority (SNPA)	18.5
National Botanical Gardens Foundation (NBGF)	12.9
Ministry of Natural Resources and Industry (MNRI)	9.1
Seychelles Fishing Authority (SFA)	35.4
Seychelles Agricultural Agency (SAA)	31.2
Seychelles Fire and Rescue Services Agency (SFRSA)	20.3
Total	164
Total Government Budget	5,412
Proportion of Budget related to Biodiversity	3.03%

This however is a marked over-estimation of the actual investment because a significant proportion of these budget lines are not in fact related to the conservation and sustainable use of Biodiversity.

One of the key findings (as noted in **Section 3.2**) is that there is currently no established mechanism to mainstream biodiversity considerations into the national accounting and budgeting processes and this reflects the lack of a proper biodiversity evaluation baseline – this is addressed in **Project 23**. Barois (2013) also identifies key entry points into the annual national budgeting process whereby the NBSAP could be mainstreamed.

3.3.3 Public Sector Investment Programme (PSIP).

The Seychelles Government started the PSIP in 2013 with the objective of improving its medium term fiscal planning. The PSIP will be an important budget and planning tool available to the Government to outline its on-going and future development priorities. It is therefore recommended that government agencies with activities pertaining directly to the conservation and sustainable use of biodiversity develop a “pipeline” of priority projects to be submitted to the PSIP process.

3.3.4 Environment Trust Fund (ETF)

The Seychelles Government formed the ETF in 1994 (GoS 1994) as a special fund with the objectives:

- To prevent and reduce pollution.
- To promote the environment and to carry out programmes of education and research.
- To clean and beautify Seychelles
- To do other such things as may be necessary or conducive to the protection, preservation or improvement of the environment.

The ETF is managed by a board, co-chaired by the Ministries of Environment and Finance, composed of government and civil society representatives. The ETF is financed by a levies on water bills and the sale of sooty tern eggs from a sustainable harvesting programme, other fees collected by the Environment Department and by private donations. The ETF finances projects for a total annual budget of approximately SCR 8 million. NGOs, communities and government agencies can submit project proposals for consideration for funding.

3.3.5 Corporate Social Responsibility Tax

Government introduced a Corporate Social Responsibility Tax in January 2013 applicable at 0.5% rate for businesses with a turnover of SR 1 million or above. The tax revenue will finance community development and environmental projects. It is projected that the tax will generate SR 91 million in 2014 and SR 98 million in 2015 and is an excellent potential source of funds for NBSAP implementation.

3.3.6 Debt for Adaptation Swap

The Government of Seychelles, in partnership with the Nature Conservancy, is exploring an innovative approach to fund raising through a debt swap mechanism to finance adaptation to climate change in marine ecosystems and conservation and sustainable use of biodiversity.

It is proposed that a Seychelles’ Conservation and Climate Adaptation Trust (SCCAT) be established. This Trust will attempt to purchase all of the Government of Seychelles bilateral Paris Club debt of approximately US\$ 80 million through an upfront payment of US\$ 46.5 million (which is the Net Present Value of this debt at a 10% discount rate).

In exchange the government of Seychelles will pay SCCAT US\$ 20 million over a ten year period at an interest rate of 5% and US\$ 36 million over 20 years at an interest rate of 4%. Through the debt swap, the Government of Seychelles will receive a debt relief of up to US\$ 24 million and approximately US\$ 2.65 million per year during 20 years will be available. From which US\$ 1.7 million may be used for biodiversity conservation and sustainable use activities and US\$ 950,000 will be used to capitalise a climate change adaptation fund to an approximate value of US\$ 41.5 million by 2032. This funding mechanism could provide a potential long term substantial sources of funding for conservation and sustainable use of Biodiversity in Seychelles.

3.3.7 International Funding

Seychelles is relatively successful in accessing donor funds in particular the Global Environment Facility, European Union and World Bank funds and has a broad portfolio of funded projects (See Barois 2013). There are however capacity limitations in project drafting and management.

3.3.8 Recommendations

Barois (2013) makes numerous recommendations to enhance and better utilise the biodiversity funding scenario but salient points can be summarised as follows:

- Raise cross sectoral awareness of biodiversity issues and Seychelles' CBD obligations – these are covered by **Projects 22 & 23**.
- Undertake environmental economic valuation and integrate it into the national accounting and budgeting systems (see **Project 23**).
- Mainstream the NBSAP into national strategic planning (e.g. SSDS, MTNDS and PSIP) (see **Project 26**).
- Provide support to coordinate, inform and train biodiversity stakeholders to access and mobilise funding options (See **Project 31** and related NBPF mechanism).

3.4 Knowledge and Data Management.

Limited knowledge and understanding of biodiversity, its status and trends, species ecology and biology, functions and values constitutes a significant threat to conservation and sustainable use as it impedes informed decision-making. For example, lack of species based data in the management of fisheries has been a critical factor limiting the ability to develop effective plans for various components of the artisanal fishery. Lack of knowledge also undermines the efficacy of environmental impact assessment measures for example in protecting critical habitats from development pressures.

The lack of a national biodiversity database has been repeatedly identified as a barrier to the optimal national implementation of the CBD. Numerous species and habitat databases have been established, including usage databases (e.g. fishery databases), by various agencies (public and private) but in most cases data is not freely and fully available. An initial biodiversity metadatabase (Senterre *et al* 2010a) has been prepared as well as a priority gap analysis on Seychelles biodiversity data (Senterre *et al* 2010b), these documents represent the first systematic attempt to address these issues nationally and provide a valuable base from which to work.

In this domain the National Environmental Data & Information Portal (NEDIP) is being developed by MEE and a project is soon to commence to develop the national Biodiversity Clearing House Mechanism (CHM).

Project 14 addresses these information shortfalls by establishing national data gathering and management mechanisms to optimise the collection, management, utility and accessibility of national biodiversity datasets.

3.5 Biosafety

Seychelles ratified the Cartagena Protocol on Biosafety in May 2004 and it came into force nationally 6 months later. Seychelles developed its National Biosafety Framework (NBF) in 2003 through a consultative process with international review. The NBF however, was not operationalised and Seychelles therefore is not in proper compliance with the Cartagena Protocol more than 10 years after ratification. A review, updating and implementation of the NBF is therefore required to bring Seychelles into line with its International obligations and this is addressed in **Project 8: The Safe Management of LMOs and Biotechnology**.

3.6 Access and Benefit Sharing

Seychelles prepared an Access and Benefit Sharing (ABS) Bill in 2005 (Lewis-Lettingdon & Dogley 2006). The development of legislation however did not progress beyond this for various administrative reasons. In the interim however Seychelles moved ahead with its ratification of the Nagoya Protocol, becoming a party on the 12th October 2014. Seychelles has also commenced a comprehensive review of biodiversity related legislation and the continuation of this including the promulgation of ABS regulations are covered by **Project 25** in this document. Options to further support the implementation of the national Nagoya Protocol are being investigated under the auspices of a global project for capacity building in this respect.

3.7 Capacity Building

Seychelles as a geographically isolated SIDS with a very small population - 2014 mid-year population estimate 94,664 (NSB 2014) – faces the typical SIDS dilemma of high *per capita* skills requirement coupled with chronic “brain drain”. Building and maintaining capacity for biodiversity conservation and sustainable use is a particular problem. In recent years however Seychelles has made advances in the development of domestic capacity. A critical mass of high-level technical expertise is being attained, with PhDs in fisheries science, avian ecology, marine mega fauna conservation and botany all being completed and the expertise retained nationally. These, and with more theses in preparation, bode well for future research and technical capacity to advance the implementation of the CBD in Seychelles.

A major breakthrough is the 2009 establishment of the University of Seychelles (UniSey), with the objective of transforming Seychelles into a “knowledge-based society”. The establishment of UniSey provides the opportunity for quality tertiary level education to the local population with one of the first programmes to be established a BSc in Environmental Science.

Government capacity for active implementation of biodiversity projects and the conservation and sustainable use of biodiversity has declined significantly over the last 20 years in part due to a policy change moving towards coordination and facilitation, as opposed to implementation, but quite markedly since 2008 when a national financial crisis required a substantial and progressive year on year reduction in budget.

A biodiversity capacity assessment (Gonzalves 2013) undertaken in the lead up to the development of the NBSAP identified three core areas requiring capacity building:

- Strengthening the Institutional Framework for enhanced CBD implementation
- Mainstreaming the CBD into sectoral programmes
- Staffing and human development.

The first two points are addressed by the formation the NBSAP Implementation Unit (IU), with its duties and staff capacity as set out in **Project 31**, and nesting in in the broader national SSDS administration framework. It is also foreseen that many of the members of the proposed National Biodiversity Partnership Forum will also be members of the Seychelles Sustainable Development Inter-sectoral Steering Committee (SSDSC) and its various task forces and working committees, which will assist the IU in its role of mainstreaming biodiversity through the means of the Seychelles Sustainable Development strategy mechanism. It is further recommended that the IU be built around the CBD National Focal Point (which it recommends should be a full-time job in its own right) or assume that role in its functions.

For staffing and human development a series of training courses are proposed for sectoral CBD focal points. During the final workshop that elaborated the NBSAP projects stakeholders, however, decided that because of the project format of the NBSAP and the likely changes that projects will undergo (to meet funding criteria and changing circumstances) prior to implementation, capacity building should be a cross-cutting aspect in each project. As such capacity assessment and related development recommendations should be developed with the implementation of each project and coordinated by the IU to avoid duplication and foster synergies.

4. National Biodiversity Strategy and Action Plan

Vision

The NBSAP as the national means for implementation of the Convention on Biological Diversity represents a key component of the Seychelles' pursuit of Sustainable Development. It therefore adopts the same Vision as the Seychelles Sustainable Development Strategy (SSDS) 2012-2020:

"To contribute to the realisation of the nation's economic, social and cultural potential through an innovative, knowledge-led approach, being mindful of the need to conserve the integrity of the Seychelles natural environment and heritage for present and future generations."

Mission

"To effectively implement the Convention on Biological Diversity within the Seychelles context through the integrated conservation and sustainable use of biodiversity and the equitable sharing of benefits arising from the use of genetic resources."

Strategic Goals

- 1). Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.
- 2). Reduce the direct pressures on biodiversity and promote sustainable use.
- 3). Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
- 4). Enhance the benefits to all from biodiversity and ecosystem services.
- 5). Enhance implementation through participatory planning, knowledge management and capacity building.

Operational Principles

The implementation of the NBSAP should be realised within operating principles as enshrined in the text, key decisions and strategic plan of the CBD. Central tenets that are fundamental to sound implementation are:

The Precautionary Principle

Intrinsic Value

The Ecosystem Approach / Ecologically Sustainable Development

The Interdependence of Humans and Biodiversity

Objectives

The NBSAP's Objectives cascade logically from its Strategic Goals and reflect the Aichi Biodiversity Targets.

- 1.1. To make the Seychelles population aware of the values of biodiversity and the steps they can take to conserve it.
 - 1.2. To integrate and incorporate biodiversity values into the development cycle and into national accounting and reporting systems respectively.
 - 1.3. To phase out or reform incentives and subsidies harmful to biodiversity to minimise or avoid negative impacts, and to develop and apply positive incentives for the conservation and sustainable use of biodiversity in line with the CBD and national circumstances.
 - 1.4. To integrate sustainable production and consumption plans into all sectors in order to keep use of natural resources well within safe ecological limits.
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- 2.1. To at least halve, and where feasible bring close to zero, the rate of loss of all natural habitats and significantly reduce the rate of degradation and fragmentation
 - 2.2. To avoid overfishing by applying sustainable, legal, ecosystem-based harvesting of all fish, invertebrate stocks and aquatic plants such that fisheries have no significant adverse impacts on threatened and/or vulnerable biodiversity and the impacts on stocks, species and ecosystems are within safe ecological limits.
 - 2.3. To ensure that biodiversity is conserved by managing agriculture, aquaculture and forestry sustainably.
 - 2.4. To reduce pollution and nutrient enrichment to levels that are not detrimental to ecosystem function and biodiversity.
 - 2.5. To control or eradicate and priority Invasive Alien Species and prevent the introduction and spread of IAS.
 - 2.6. To minimise anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and function.
-
- 3.1. To protect through a network of viable, ecologically representative and effectively managed Protected Areas at least 50% of terrestrial areas, 17% of inland waters and 17% and 10 percent of coastal and marine areas.
 - 3.2. To prevent the extinction and improve the conservation status of known threatened species, particularly those most in decline.
 - 3.3. To maintain the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives.
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- 4.1. To restore and safeguard, in a socially equitable manner, ecosystems that provide essential services and contribute to human well-being.
 - 4.2. To enhance ecosystem resilience and the contribution of biodiversity to carbon stocks through ecosystem conservation and restoration, including restoration of at least 15% of degraded ecosystems.
 - 4.3. To operationalise the Nagoya Protocol on Access to Genetic resources in Seychelles (by 2015).
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- 5.1. To update, adopt as a policy instrument and have under effective implementation by 2015 NBSAP 2.
 - 5.2. To respect and protect traditional knowledge, innovations and practices of local communities relevant for the conservation and sustainable use of Biodiversity.
 - 5.3. To improve, share, transfer and apply the knowledge, science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss.
 - 5.4. To mobilise the necessary financial resources to effectively implement the NBSAP.

4.1 Duration, Monitoring and Review

The NBSAP is intended to have a 6-year duration, 2015-2020 – to coincide with the CBD Strategic Plan Aichi 2020 Biodiversity targets. Monitoring will be lead and coordinated by the NBSAP Implementation Unit (see **Implementation Mechanisms** below) and will assess attainment of objectives through means of structured projects with targets and objectively verifiable indicators that are elaborated from the project formats listed in the Action Plan. A Mid-term (3-year) review should also be undertaken to assess progress after 3 years, identify problems to be addressed and reconsider prioritisation for the second 3-year period.

Finally a regular mechanism for the elaboration, submission and approval of new projects is to be incorporated into the process (see section entitled **Living Document** below).

4.2 A living Document - Project Development

This document was developed during a particularly dynamic time in the national biodiversity management scenario with numerous projects ongoing or in the development stage which pertain directly to the above Strategic Goals and Objectives, which made updating the document in line with developments difficult. This situation was exacerbated by the Aichi alignment process the next year resulting in a hiatus and extensive re-write which further extended the period of time from the main stakeholder consultation process and production of the final document.

The Aichi realignment of the document identified certain gaps in project coverage relative to the Aichi Targets and whilst all targets are contributed to by at least one project (see the **Aichi Target – Project Matrix**) a re-assessment and re-focusing is required. However, stakeholders felt that this should not be done at that stage without starting the entire stakeholder process again. It was agreed therefore, that a mechanism to incorporate new projects to ensure full Aichi Target coverage, as appropriate, should be implemented at the end of 2015 following an NBSAP-IU assessment of Aichi Target coverage. Stakeholders also felt that as new knew knowledge is gained or circumstances change it may be appropriate to incorporate new projects, or alter existing ones and as such a process for the submission and approval of projects for inclusion into the NBSAP portfolio should be agreed and operated by the National Biodiversity Partnership Forum (see **Implementation Mechanisms** below).

4.3 Implementation Mechanisms

The Government Ministry with portfolio responsibility for Environment¹⁶ will be the lead agency for coordinating, promoting and facilitating implementation of the NBSAP. The Government and civil society organisations that are implementing agencies (i.e. agencies implementing NBSAP projects) will identify Focal points and each take responsibility for the implementation of their own projects or project components.

An **NBSAP Implementation Unit (IU)** is to be established under the Environment Department and integrated into the SSDS administration framework to facilitate the mainstreaming of biodiversity into and across the economic and development sectors. The establishment of the IU is fundamental to the overall success of NBSAP implementation. The detailed role and structure of the IU is described in **Project 31**.

¹⁶ Currently the Ministry of Environment and Energy (MEE).

A National Biodiversity Partnership Forum (NBPF) will be created where all entities that agree to become implementing partners of the NBSAP will meet to discuss issues pertinent to the attainment of its objectives and goals. Participation to the forum will entail sharing information, comments and projects/activities that contribute to the implementation of the NBSAP and specifically members will be required to report on implementation of their projects to the forum and submit periodic reports to the IU in an agreed standardised format to enable the full and proper monitoring and assessment of NBSAP implementation.

Forum members will:

- elaborate, agree and implement an equitable and transparent mechanism, criteria and format for the submission, discussion and approval of new projects for inclusion in the NBSAP,
- assist in aligning their projects and activities with CBD requirements and other global biodiversity conventions,
- share information on advances made through their biodiversity projects and initiatives,
- assist in aligning NBSAP activities to CBD objectives and programmes of work and other global biodiversity conventions.

4.4 Project format

A simplified logframe was utilised to elaborate projects from the stakeholder approved action points developed in the 2013 process. All the projects below were reviewed, refined and approved by a national stakeholder workshop held in October 2014. The project format lays out the core activities to be addressed. It is expected that implementing agencies will elaborate actual projects from these templates, whole or in part, to attain the desired results in a structure that meets their pragmatic circumstances and in a format to be determined by the NBPF with technical input from the IU.

The project template sets out the project title and its primary objective. It then sets out a brief situation analysis providing the context for the proposed activities. A list of Implementing Agencies are included in the Situation Analysis. Lead implementing agencies are generally considered to be the Government agency/agencies with the pertinent portfolio responsibility, the rest of the agencies list is open. Stakeholders strongly expressed the view that the NBSAP should be a means of encouraging and galvanising broad stakeholder input into the implementation of the CBD in Seychelles, and that defining all the implementation roles at this stage would be limiting to broader stakeholder participation and contribution. A timeline for implementation is suggested along with a priority scoring for the project relative to others listed in the Action Plan (See **Project Prioritisation** below for details on scoring interpretation).

Results and Activities are set out in order with OVIs where pertinent in standard logframe format.

A row is left for budget. In some cases this is already known and hence included, otherwise budget estimations will be elaborated by the ongoing BIOFIN project (see **Project 26**). In reality the projects that are ultimately developed and implemented from these project templates will often only implement elements of a project template or combine elements from different templates and then generate specific budgets in line with funding options and circumstance.

The notes and guidance section provides additional information and also lists the Aichi Targets (**AT**) to which the activities contribute.

Project		
Objective		
Situation analysis		
Timeline		Priority
	Description	OVI
Results		
Activities		
Budget		
Notes and Guidance	AT:	

4.5 Project Prioritisation

Projects are scored on a scale of 1 – 4 with 1 being the highest priority. The scoring also reflects logical order where certain projects are recognised as being necessary precursors to others.

Priority Scoring:

1: Fundamental/precursor activity

2: Priority cross cutting and/or enabling activity.

3: Priority activity– it may be that it requires various other activities to take place before it can be initiated or simply that the biodiversity benefits it yields are not as broad as those graded 2.

4: Secondary priority – projects that whilst individually or sectorally important do not yield broad or priority Biodiversity benefits.

Project 1	Revision and Consolidation of Protected Area Legislation.		
Objective	Development, finalisation and promulgation of new Protected Area legislation.		
Situation analysis	<p>Implementing Agencies: Environment Department, Seychelles National Parks Authority (SNPA), Attorney General's Office.</p> <p>NGOs managing PAs (SIF, ICS, NS etc.) PA users – Tour guides, DMCs, general public.</p> <p>Status: Work to draft new Bill ongoing under the GEF PA project. Framework draft expected by June 2015.</p>		
Timeline	2014-2019	Priority	1
	Description		OVI
Results	1/2). Revised Draft Bill		Draft Bill and stakeholder consultation report.
	3). Cabinet approves Memorandum. Bill debated and passed by National Assembly.		Cabinet decision. National Assembly vote.
	4). Public informed of scope, implications and timeline for coming into force of new PA legislation.		Media Coverage
	5). Legislation under enforcement.		Enforcement records.
Activities	1). Generate 1 st draft and review through stakeholder consultation.		Draft Bill circulated Consultation minutes.
	2). Finalise 2 nd draft for approval by stakeholders, Environment Department and AG's office, amend as necessary.		Revised Bill.
	3). Submit to executive and legislative approval mechanisms, amend as necessary.		Cabinet memorandum. National Assembly minutes.
	4). Commence PE&A campaign to advise public and stakeholders of the timeline for the coming into force of the legislation and its ramifications.		Media Coverage e.g. Newspaper Articles Public Education Programme or TV spots.
	5). Gazette legislation.		Official Gazette.
Budget	Funds already allocated under GEF PA Project.		
Notes and Guidance	AT: 11		

Project 2	Enabling Informed Extension of Protected Area Network		
Objective	To optimise the representative nature and viability of biodiversity covered by the PAN utilising best current information.		
Situation analysis	<p>Implementing Agencies: Environment Department, Seychelles National Parks Authority (SNPA), Attorney General's Office, Environmental NGOs, Biodiversity experts etc...</p> <p>Status: Project ongoing and informed by studies¹ such as Key Biodiversity Areas assessment (Senterre <i>et al</i> 2013) in the granitic islands and extensive stakeholder consultation. Systematic Conservation Planning utilising the MARXAN software is generating options for highest benefit, least cost best fit models for PA expansion and designation.</p> <p>The Marine Strategic Planning (MSP) process, part of a proposed debt for adaptation swap being coordinated in partnership with TNC, is further seeking to designate some 30% of the EEZ as protected. Half of which (i.e. 15% of the EEZ) to be strict no-take zones.</p> <p>There are however clear information shortfalls, though proxies are being utilised, in particular with regard to a Key Biodiversity Area analysis of the marine environment and outer islands. Aspects of the outer island analysis will be addressed by the GEF Outer islands project (2015-2019).</p>		
Timeline	2014-2015 (Outer Islands & MSP process 2015-2019)	Priority	2
	Description		OVI
Results	1/2). Report collating and mapping existing biodiversity data.		See Notes below
	3). Maps of priority areas for PA expansion.		See Notes below
	4). Stakeholder workshop proceedings and consultation records.		See Notes below
	5). Final report on national priority areas for PA expansion.		See Notes below
Activities	1). Desk review and collation of maps on current PAs		See Notes below
	2). Desk study of Seychelles Biodiversity and occurrence of endemic and threatened species.		See Notes below
	3). Collate information and mapping of spatial information on biodiversity.		See Notes below
	4). Present and amend information through iterative process of stakeholder consultation.		See Notes below
	5). Define targets and map priority areas for PA expansion using biodiversity conservation planning methodologies and MARXAN software package.		See Notes below
Budget	Funds already allocated under GEF PA Project.		
Notes and Guidance	<p>1). Additional key information sources include Carlstrom 1996a & b, Duncombe 1996 a & b, Rocamora & Skerrett 2001, Hill 2002, Gerlach 2008 etc...</p> <p>2). This project is already in progress and funded and will be completed in 2015, as a consequence only the deliverables (and not OVIs) are elaborated here. The results of this project should not be considered an endpoint. There are considerable gaps in knowledge regarding Seychelles biodiversity, its occurrence and distribution, particularly in the marine environment. Further work under the auspices of the GEF Outer Islands project, the Marine Spatial Planning process and of future research priorities will serve to inform and refine understanding of what is required for a full representative PAN.</p> <p>3). Seychelles' 4th and 5th national reports to the CBD have identified lowland inland waters as the most threatened ecosystem type. Special attention is therefore provided for them with regard to Protected Areas under the Project entitled "Protection and Rehabilitation of Freshwater Marshes" that should be implemented in tandem with the PA programme.</p> <p>4). The process of designation was not addressed in the first round of NBSAP consultations in 2013. The situation is further complicated by the updating of PA legislation in Project 1. This situation could not be adequately addressed in the October 2014 workshop. Consequently it was agreed to place this as a priority for inclusion in the NBSAP review if it had not been covered, by then, under the process to implement the PA policy.</p> <p>AT: 11</p>		

Project 3	Effective Protected Area Management		
Objective	PAs are managed effectively based on sound scientific research and management monitoring regimes that inform adaptive management cycles.		
Situation analysis	<p>Implementing Agencies: Environment Department (MEE), Seychelles National Parks Authority (SNPA), Attorney General's Office, Environmental NGOs, Biodiversity experts etc...</p> <p>Status: The GEF PA project is addressing this through various activities investigating innovative co-management options, developing institutional capacity, establishing standardised management plan formats and approaches that inculcate monitoring and review of management plan implementation so as to enable adaptive management procedures. The New National PA Policy was adopted in 2013 and now requires operationalisation.</p>		
Timeline	2015-2020	Priority	2
	Description		OVI
Results	1). National PA Policy under implementation.		Minutes of meetings. Implementation Reports.
	2/3). Management and administration priorities identified for all PAs.		Reports.
	4). Standardised PA Management Plan format.		Format.
	5). All PAs have updated or new Management plan under implementation by 2020.		Management Plans and implementation reports.
	6). Common training standards are in place for training of PA professionals.		Recognised training courses.
Activities	1). Establish a cooperative governance structure incorporating all PA stakeholders to steer the implementation of the National PA policy and development of standardised measures for the PA planning cycle (identification, justification, designation) review and assessment.		Agreed Modus Operandi for Policy Stakeholder Steering Committee.
	2). Review biodiversity status of each PA and assess specific contributions each can make to the national conservation and sustainable use of Biodiversity.		PA biodiversity status reports and national significance assessment with priority recommendations.
	3). Review existing PA management plans and their status of implementation.		PA management status reports
	4). Develop standardised format for PA management plans – including: - findings from PA Sustainable Financing project, - X-Referencing international commitments, - robust adaptive management procedures.		National formats for PA management planning and reporting.
	5). Develop through stakeholder consultation new management plans for all PAs.		Draft and final plans.
	6). Develop and implement a programme of PA staff training for management, administration of cooperative governance.		Proposal for training programmes.
Budget	Funds for certain aspects of this work already allocated under GEF PA and Outer Islands Projects.		
Notes and Guidance	AT: 11		

Project 5	Prioritised Management of Endemic Species, Threatened Species and Critical Habitats.		
Objective	Priority species and related critical habitats are identified and management/recovery plans developed and under implementation.		
Situation analysis	<p>Implementing Agencies: Environment Department, SNPA, Seychelles Fishing Authority (SFA), SIF, Environmental NGOs, Biodiversity experts etc...</p> <p>Status: Extensive listings of endemic and threatened species are now available for Seychelles but national priority species lists for further research or conservation action have not been established. Seychelles has had considerable success in certain species action plans – most notably amongst endemic landbirds – but also in some habitat restoration/rehabilitation projects – in particular for small island ecosystems. It is necessary however to identify and address new biodiversity conservation priorities (such as keystone species and critical habitats) to optimise resource allocation and better meet Seychelles' obligations under the CBD.</p>		
Timeline	2015-2020 (and open ended)	Priority	1
	Description		OVis
Results	1). National endemic and threatened species assessment produced and available on line.		Species Assessment Document.
	2). Top 20 species/taxa from each class identified.		Priority listings.
	3). Priority habitat report with 10 (5 terrestrial & 5 marine) specific priority habitats for management identified.		Priority listing.
	4). At least 10 new species plans developed and under implementation by 2020.		Taxa plans, implementation reports, site verification.
	5). At least six habitat plans under implementation by 2020.		Specific priority habitat plans, implementation reports, site verification.
Activities	1). Compile and review existing information and assessments on endemic and threatened species, for both marine and terrestrial ecosystems, in Seychelles.		Assessment report. Gaps for inclusion in national research agenda identified.
	2). Identify priority listings through stakeholder consultation for action to whatever taxonomic level is appropriate.		Priority species lists for each taxonomic class.
	3). Cross-reference these priority listings with habitats to identify key habitats.		Species/habitat analysis report.
	4). Identify priority taxa and habitats for action and develop action plans as part of a new national conservation programme ⁴ .		Species/taxa management plans.
	5). Undertake pilot projects to implement priorities and progressively refine and implement priority management and recovery plans.		Project Reports.
Budget			
Notes and Guidance	<p>1). This is a cross-cutting enabling project and delay in its implementation should not be used to prevent species/habitat initiatives being implemented in the meantime.</p> <p>2). The lists must be regularly reviewed by an appropriate committee to cater for changing circumstances and developing understanding.</p> <p>3). The lists should not be used to prevent agencies from seeking funds for other species/habitats that may meet sectoral or portfolio priorities, rather the purpose of the lists is to guide strategic activity and strengthen applications for funding of identified species.</p> <p>4). Some species and habitat prioritisation was undertaken by the GEF PA project (Dr. R. Klaus). AT 12, 5.</p>		

Project 6	Ex-situ Conservation Program in Support of Species and Habitat Recovery		
Objective	To identify and develop the required capacity for a structured and prioritised national ex-situ conservation programme.		
Situation analysis	<p>Implementing Agencies: National Botanical Gardens Foundation (NBGF), Private nurseries (e.g. Fregate and North Islands), Department of Environment (MEE), Environmental NGOs.</p> <p>Status: Seychelles has a limited history of ex-situ conservation initiatives, certain rare plant species have been propagated by the NBGF and its predecessors but most national ex-situ work, both state and private, has focused on providing plants for habitat rehabilitation projects. In recent years such efforts have been focused on habitat rehabilitation for endemic bird species re-introduction programmes. These programmes have also seen temporary captive management initiatives such as the capture and management of Seychelles magpie-robins and Seychelles fodies on Fregate island, and the establishment of ex-situ invertebrate populations from Fregate prior to rat eradication.</p>		
Timeline	2015 - open ended	Priority	2
	Description		OVI
Results	1). Pragmatic scope for application of ex-situ conservation in Seychelles identified.		
	2). Current ex-situ capacity assessed with recommendations for prioritisation and/or development as appropriate.		Ex-situ Conservation Action Plan.
	3a). Regulations promulgated		Official Gazette
	3b). National Policy approved and operational		National Ex-Situ Policy.
	4). Prioritised national ex-situ conservation agenda/plan.		Ex-situ Conservation Action Plan
	5). Implement Ex-situ capacity development (if appropriate) in line with plan and recommendations.		Implementation reports. Site verification.
Activities	1). Assess current and projected medium-term need for and feasibility of ex-situ programmes to support species conservation and habitat rehabilitation projects.		Ex-situ conservation needs assessment.
	2). Review current national ex-situ activities (nurseries, gene banks, captive breeding programmes) and related research capacity relative to identified feasible needs.		National ex-situ implementation and capacity assessment.
	3). Develop, refine and finalise through stakeholder consultation, and in line with international best practise, national policy and regulations for ex-situ conservation and captive breeding programmes.		Stakeholder approved National Ex-situ conservation policy
	4). Identify pragmatic ex-situ programme in line with and to support priorities identified under endemic/ threatened species and critical habitats project.		Ex-situ Conservation Action Plan
	5). Develop or re-align, as appropriate, national ex-situ capacity to meet national priority in-situ conservation needs.		Implementation reports. Site verification.
Budget			
Notes and Guidance	<p>1). The key focus of this project is to provide ex-situ support, where required, to the implementation of the project: "Identification and prioritised management of endemic species, threatened species and critical habitats."</p> <p>AT. 12, 5</p>		

Project 7	Prevention, Control, Mitigation and Eradication of Invasive Alien Species		
Objective	Effective implementation, monitoring, review and adaptive management of the National Invasive Alien Species (Biosecurity) Strategy for Seychelles.		
Situation analysis	<p>Implementing Agencies: Department of Environment (MEE), Ministry of Natural Resources (MNR), Seychelles Agricultural Agency (SAA), Customs Department, SNPA, NGOs.</p> <p>Status: IAS are considered to represent the primary current threat to Seychelles endemic biodiversity. The GEF Biosecurity mainstreaming project laid the foundations for a comprehensive and integrated national approach to IAS management with the production of: an IAS baseline database, a summary of national best practise, a manual for IAS management in Seychelles, a National IAS Strategy and the promulgation of the Biosecurity Act to support effective action.</p> <p>It has become apparent during the drafting process of this NBSAP that the IAS strategy has not been under effective implementation since its inception. Despite having a lead agency and prescribed National Committee steering process no reports on its implementation, progress and administration are available. As such a review of the implementation to date and consideration of revised administrative structure are required to regalanise this national approach.</p> <p>In positive progress the new Animal and Plant Biosecurity Act was passed on April 24th 2014 and the concordant National Biosecurity Committee appointed by the President providing the legal basis for the national implementation of biosecurity.</p>		
Timeline	2015 review (opened ended implementation)	Priority	1
	Description	OVis	
Results	1). Shortcomings identified and remedial actions proposed ¹ .	Implementation and Report.	
	2/3). New administration and/or steering structure and mechanism, as appropriate.	New admin and/or steering mechanism.	
	4). Revised IAS (Biosecurity) strategy ² under proficient implementation by 2016.	Implementation reports.	
Activities	1). Review implementation, oversight and administration of IAS strategy.	Implementation assessment and report.	
	2). Identify key shortcomings in implementation and recommend solutions.	Recommendations.	
	3). Review solutions with key agencies and/or stakeholders as appropriate to determine best way forward.	Consultation findings and conclusion/decisions.	
	4). Re-initiate implementation of National IAS Strategy, revised as appropriate, with required monitoring and review of implementation and report to NBSAP implementation Unit and SSDS process.	Implementation reports Administrative and steering structure.	
Budget			
Notes and Guidance	<p>1). Including Capacity Building programme as appropriate.</p> <p>2). Stakeholders in final workshop recommended, explicitly, that provision should be made in the new strategy for IAS assessment in freshwater and marine habitats.</p> <p>AT 9.</p>		

Project 8	The Safe Management of LMOs and Biotechnology.		
Objective	To ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health.		
Situation analysis	<p>Implementing Agencies: MEE, Ministry of Natural Resources, Seychelles Agricultural Agency, Ministry of Health, Attorney General's Office, Ministry of Finance, Seychelles Bureau of Standards, Farmers Associations etc...</p> <p>Status: Seychelles ratified the Cartagena Protocol on Biosafety in May 2004 and it came into force nationally 6 months later. Seychelles developed its National Biosafety Framework (NBF) in 2003 through a consultative process with international review. The NBF however, was not operationalised and Seychelles therefore is not in compliance with the Cartagena Protocol more than 10 years after ratification. A review, updating and implementation of the NBF is therefore required to bring Seychelles into line with its International obligations.</p>		
Timeline	2015 - open-ended	Priority	3
	Description	OVI	
Results	1/2). Designated Authority and NCC steering LMO management.	Biosafety Regulations	
	3). By 2017, Biosafety Bill/regulations ¹ passed by National Assembly and promulgated.	Official Gazette	
	3). By 2017, National Policy adopted	Cabinet decision	
	4). The importation, handling and use of LMOs is effectively governed as per the Cartagena Protocol	AIA documentation Biosafety reports	
	5). Law and policy under implementation by appropriately trained staff.	Black and white lists AIA documentation.	
	6). International expertise links established.	Correspondence	
	7). Stakeholder and Public awareness improved.	PE&A campaign. No. of applications.	
Activities	1). Reconstitute the National Coordinating Committee (NCC) and review and update 2004 the NBF.	NCC minutes Stakeholder process.	
	2). Identify and establish designated authority.	Designated Authority.	
	3). Develop, promulgate and implement policy and legislation ¹ in line with provisions of the Cartagena Protocol.	National Policy. Biosafety Bill/Regulations.	
	4). Manage and control the introduction and use of LMOs through the development of "black and white lists" and use of the Advanced Informed Agreement (AIA) process.	Documentation of import applications etc...	
	5). Assess and build national capacity, as appropriate, in the identification, safe handling and use of LMOs and their products.	Trained staff. Equipment.	
	6). Build partnerships with international centres of expertise, particularly those focused on SIDS.	Correspondence and inputs to AIA process.	
	7). Increase public awareness of the issues relating to the handling and use of LMOs.	Baseline knowledge assessment. PE&A campaign. Import applications.	
Budget			
Notes and Guidance	<p>1). It is intended that the Biosafety Regulations should fall under the auspices of the, to be developed, overarching Biodiversity Act.</p> <p>2). Cross-reference with project: "Review, Updating, Streamlining and Adoption of Biodiversity Related Legislation".</p> <p>3). It may be appropriate to cross-reference this project with Mariculture Master Plan in the project: Development of Sustainable Mariculture.</p> <p>AT: 7, 5</p>		

Project 9	Promotion of Ecologically Sustainable Tourism		
Objective	To mainstream ecologically sustainable tourism requirements and practises into the Tourism development and operational cycles.		
Situation analysis	<p>Implementing Agencies: MEE, Ministry of Tourism and Culture (MTC), Seychelles Tourism Board (STB), Ministry of Land Use and Housing (MLUH), Planning Authority, Seychelles Hospitality and Tourism Association (SHTA), Seychelles Chamber of Commerce (SCCI), Seychelles Investment Board, SNPA, NGOs.</p> <p>Status: Tourism is one of the two main pillars of the Seychelles economy and is the single largest employer. Tourism infrastructure and operations place considerable pressure on the natural environment by driving change in land use through direct conversion of natural habitat or by heightening the “coastal squeeze” and displacing other development activities. Tourism also exerts a disproportionality high per capita demand on environmental services such as water and food provision, waste assimilation etc.... Tourism development plans have been developed in the past but there is ongoing concern that they do not properly mainstream biodiversity issues. A Sustainable tourism label has been developed in recent years to encourage tourism operations to attain certain standards. This needs to be refined and upgraded and converted into minimum required industry standards.</p>		
Timeline	2014 - 2020	Priority	3
	Description	OVis	
Results	1). Tourism impacts quantified and mitigation measures proposed.	Assessment report.	
	2). Environmental considerations and costs properly integrated into strategic tourism planning and enforced during and after development.	Strategic Tourism EIA reports.	
	3). At least 3 Carbon neutral tourism Pilot projects under implementation by 2020.	Project implementation reports.	
	4). At least 5 new tourism-supported biodiversity projects under implementation by 2020.	Project implementation reports.	
	5). Environmental sustainability criteria are properly integrated into the tourism development cycle.	Development guidelines and implementation/monitoring reports. Adoption of environmentally sustainable practices by the tourism industry. Planning Authority decision-making criteria Building regulations, Investment regulations.	
Activities	1). Identify and assess the environmental impacts of tourism activities.	Quantified Impact Assessments	
	2). Undertake strategic Tourism carrying capacity studies incorporating consideration of biodiversity and environmental economic valuation ¹ .	Strategic Carrying Capacity Assessment document that mainstreams biodiversity concerns	
	3). Investigate the scope for development of carbon neutral tourism and design and implement pilot projects.	Identify criteria for different categories of Tourism development. Pilot project implementation reports.	
	4). Investigate scope for Tourism to support the conservation and sustainable use of Biodiversity.	Recommendations on site sponsoring, biodiversity/tourism synergies etc...	
	5). Mainstream sustainable tourism into development and investment standards.	National Tourism Development Guidelines Building regulations, Investment regulations.	
Budget			
Notes and Guidance	1). Cross-reference with the Project: Seychelles Biodiversity and Ecosystems Services Valuation AT: 2, 3, 5, 8, 10, 20.		

Project 10	Sustainable Water Use and Catchment Management		
Objective	To manage catchment areas for optimal water catchment/retention and biodiversity value.		
Situation analysis	<p>Implementing Agencies: Department of Environment, SNPA, Public Utilities Corporation, Seychelles Meteorological Services, Rivers Committee, Private land owners, TRASS.</p> <p>Status: Changing weather patterns in recent years have seen a trend to shorter periods of more heavy rain. Though much the same volume continues to fall annually the topography of the main island granitics islands means run off is very rapid and short bouts of heavy rain tend to result in reduced water retention in catchments and increased incidence of flooding. These trends have ramifications for biodiversity and the environmental service of water provision. The geographic boundaries of watersheds have already been broadly mapped using contour data. Management criteria and best practice guidelines for watershed and catchment have yet to be elaborated.</p>		
Timeline	2015 – open-ended.	Priority	2
	Description	OVI	
Results	1). Draft best practise guidelines developed.	Draft Guidelines.	
	2). Peak and mean flow indices cross-referenced with rainfall, catchment area, topography and vegetation type/cover.	Representative water catchment indices.	
	3a). Best practise guidelines tested, revised and finalised.	Best Practise Guidelines.	
	3b). At least 3 pilot projects on different catchment types under implementation by 2020.	Project reports Site verification.	
	4). Upstream IAS issues quantified.	Incorporated in IAS strategy.	
	5). Ambient water quality indices established and informing anti-pollution activities.	Water quality indices. Pollution incidences identified.	
	6). Enhanced management and biodiversity status of catchment areas and reduction of flooding risks.	Catchment Management reports. Biodiversity Indices.	
Activities	1). Investigate and model representative catchment systems to generate best practice guidelines for water management and the integration of biodiversity conservation.	Draft Guidelines.	
	2). Undertake, on a priority basis, surveys of water availability throughout key and representative water courses.	Peak and mean flow rates correlated with rainfall and vegetation.	
	3). Implement catchment Pilot projects to test and refine management guidelines.	Project reports.	
	4). Investigate aquatic IAS issues in catchments and watercourses ¹ .	Survey report.	
	5). Investigate water quality to identify point sources of pollution in key and representative water systems.	Water quality indices established. Pollution point sources identified.	
	6). Guidelines published, available digitally and under implementation in Forestry practise ² .	Implementation reports. Field verification.	
Budget			
Notes and Guidance	<p>1). Fresh water IAS issues have normally be considered in the context of lowland wetlands eg. <i>Eichornia crassipes</i>, <i>Pistia stratiotes</i> etc... investigation is required regarding the penetration upstream of IAS to identify key issues, if any. Cross reference with project: "Prevention of Introduction and Control of the Spread of Invasive Alien Species."</p> <p>2). This project should be implemented with close reference to the "Forestry management and restoration programme".</p> <p>3). X-ref with pilot projects under the UNEP Ecosystem Based Adaptation project.</p> <p>AT: 4, 5, 9, 14,</p>		

Project 11	Protection and Rehabilitation of Inland Waters (Freshwater Marshes)		
Objective	The conservation and restoration of lowland and highland wetlands.		
Situation analysis	<p>Implementing Agencies: MEE, MLUH, MNR, PUC, Rivers Committee, PA management agencies, private landowners, NGOs.</p> <p>Status: Seychelles 4th and 5th National reports to the CBD identified lowland wetlands as the most threatened national habitat type, with an estimated more than 90% decline in area over the last 200 years. Lowland wetlands therefore require urgent attention in order to save the remnant areas in a form that will optimise the conservation of their endemic biodiversity.</p> <p>“Highland” wetlands notably the Mare aux Cochons on both Mahe and Silhouette and La Plaine Hollandaise on Praslin are also very important biodiversity habitats and fresh water sources for the islands in question.</p> <p>This project must be undertaken in close liaison with or as a component of the project entitled: “Extension of Protected Area Network”.</p>		
Timeline	2014-2020	Priority	2
	Description		OVis
Results	1). Wetlands mapped and assessed for biodiversity interest and potential.		GIS database
	2). Wetland monitoring regimes established and under implementation.		Reports and datasets.
	3). Key wetlands are incorporated into the PAN.		See PAN extension project.
	4). Wetland rehabilitation programmes are initiated on at least 4 priority lowland wetlands and 2 highland wetlands. At least 3 wetland creation projects are initiated to meet conservation objectives by 2018.		Pilot project reports
	5). Wetland management guidelines revised following Pilot project findings and printed.		Indices show enhanced management status.
	6). National Wetlands Policy incorporating International commitments and best current practice.		Cabinet Decision. Approved National Policy.
Activities	1). Undertake comprehensive mapping and detailed biodiversity assessments of inland waters on the larger granitic islands.		GIS maps and biodiversity assessments.
	2). Establish long term monitoring regimes on wetlands on the 4 main islands.		Databases.
	3). Incorporate key wetlands not currently protected into the PAN to form a national network of representative managed and protected wetlands.		See PAN extension project outputs.
	4). Develop and undertake prioritised programme of wetland rehabilitation and where feasible creation to ensure the long term conservation of Seychelles’ wetland biodiversity.		Inland waters (Freshwater marshes) Management Strategy
	5). Research and develop guidelines for good practice in freshwater wetlands management including IAS management.		Guidelines manual, digital and hard copy.
	6). Review and upgrade Wetlands Policy through a process of stakeholder consultation in line with international commitments and best practice.		Policy review. Draft new Policy.
Budget			
Notes and Guidance	1). X-ref with Ecosystem Based Adaptation projects. AT: 5, 8, 9, 10, 11.		

Project 12	National Forest Policy, Management and Restoration Programme		
Objective	Establish economically viable and ecologically sustainable forestry management regimes.		
Situation analysis	<p>Implementing Agencies: SNPA, MEE, PUC, Private forestry contractors, private landowners, MLUH, NGOs.</p> <p>Status: National Forestry policy was altered in the late 1990's from production forestry to focus on biodiversity management. The transfer of the Forestry Section to the SNPA with its long term objective of financial self-sufficiency has returned focus to a balance between conservation and sustainable use. An assessment is currently being undertaken as to the area of land that is under plantation and the proportion actively managed, to assess scope for forestry production. There is interest to develop co-management and outsourcing arrangements to realise sustainable, cost-effective forestry production.</p>		
Timeline	2016-2020 and open-ended	Priority	4
	Description		OVis
Results	1a). Plantation area and proportion actively managed assessed. b). Standing stock, status of rotation and productivity timeline. c). Priority areas for management identified, including planting area and species required for viable and sustainable forestry production. d). Areas for forestry or environmental objectives identified. e). Economic analysis of area, rotation,	Forestry status report and recommendations.	
	2). Priority threats (incl. disease/vector issues), research and management measures identified.	Assessment Report ² .	
	3). Policy and guidelines sets out required standards and means for: a). the forestry management cycle to ensure sustainability, soil and water catchment management and biodiversity integration. b). Co-management, outsourcing and forestry lease options.	Policy Document. Models Co-management and forestry leasing agreements.	
	4). National forestry guidelines set out criteria for forestry management cycle, integrating technical standards for sustainable forestry, environmental concerns and restoration of degraded areas.	Management areas with guidelines under implementation.	
	5/6/7). Management plans under implementation for priority: forestry, catchment and restoration areas.	At least 3 pilot projects for each area category by 2020.	
	8). Capacity building requirements factored into sustainable financing plans for progressive expansion.		
Activities	1). Survey forestry lands (ongoing in part) to assess areas of forestry plantation and proportion of which is under active management.	Forestry status report and recommendations.	
	2). Undertake assessment of existing and new threats that are barriers to forest management objectives.	Assessment reports.	
	3). Develop and adopt a Sustainable Forestry Policy and guidelines.	Policy approved by Cabinet.	
	4). Develop and implement forest management guidelines.	Guidelines widely available.	
	5). Develop catchment area management plans for priority areas ¹ .	Catchment Management Plans	
	6). Develop management plans for priority forestry areas.	Management Plans.	
	7). Implement management plans through state and private sector means including forest rehabilitation pilot projects.	Implementation reports.	
	8). Assess SNPA capacity building requirements to administer and implement national policy, plans and co-management agreements.	Capacity Building plan.	
Budget			
Notes and Guidance	<p>1). Action undertaken in close liaison with the preparatory work set out in the project: "Sustainable water use and catchment management." 2). To feed into the National Research Agenda. 3). X-re with Ecosystem Based Adaptation projects, as appropriate. AT: 4, 7, 14,</p>		

Project 13	Seychelles Biodiversity Research Policy, Strategy and Management.		
Objective	Develop a national biodiversity research policy and strategy that encourages, fosters and facilitates research.		
Situation analysis	<p>Implementing Agencies: MEE, National Institute for Science, Technology and Innovation (NISTI), Seychelles Bureau of Standards (SBS), Research Agencies.</p> <p>Status: The National Research and Development Council (NRDC) was established in 1980 but after some years fell moribund. In 1997 research oversight responsibilities were transferred to the Seychelles Bureau of Standards (SBS Amendment Act, 1997). The functionality of SBS in this regard also waned with passing years. In 2014 the National Institute for Science, Technology and Innovation was formed (NISTI Act 2014) and at the time of writing remains in its formative stages of development.</p> <p>During the NBSAP development process stakeholders identified the need for the establishment of a multi-stakeholder national research committee and the development of a national biodiversity research policy and strategy to encourage, foster and facilitate research. A Biodiversity metadata base (Senterre <i>et al</i> 2010a) has been prepared as well as a priority gap analysis on Seychelles biodiversity data (Senterre <i>et al</i> 2010b) and provide a valuable base for aspects of this work.</p>		
Timeline	2015-2016	Priority	2
	Description	OVI	
Results	1). Research needs and data gaps in context of CBD implementation identified ¹ .	Research and data needs assessment.	
	2). Representative biodiversity indicators for Seychelles' habitats and ecosystems identified.	Indicator lists and parameters for each habitat type and ecosystem.	
	3). National Biodiversity Research Policy and Strategy that encourages, fosters and facilitates biodiversity research published.	Hard and digital copies. Downloadable from MEE or NBSAP website.	
	4). National Biodiversity Research Committee formed, empowered as appropriate, and operational, by end of 2016.	Minutes of NBRC meetings. Strategy implementation reports. Number of research projects through time.	
Activities	1). Review research undertaken and identify gaps in available data, in particular with regard to enabling national implementation of the CBD.	Review Report	
	2). Identify key national biodiversity indicators through stakeholder consultation and review of available literature.	Key biodiversity Indicator report.	
	3). Develop through stakeholder consultation and partnership with NISTI, a national biodiversity research policy and strategy that encourages and facilitates biodiversity research.	Approved policy.	
	4). Establish a representative multi-stakeholder national biodiversity research committee to oversee implementation of the Biodiversity Research Policy and Strategy.	Committee minutes.	
Budget			
Notes and Guidance	<p>1). Stakeholders emphasised that there should be a sound balance of terrestrial and marine research.</p> <p>2). This project must cross-reference and consider all research development initiatives indicated and or research priorities identified through the course of implementation of other projects in the NBSAP.</p> <p>AT: 19, 18,</p>		

Project 14	Seychelles Biodiversity Data Gathering and Management		
Objective	Establish national data gathering and management mechanisms to optimise the collection, management, utility and accessibility of national biodiversity datasets.		
Situation analysis	<p>Implementing Agencies: MEE, Research Agencies and individuals.</p> <p>Status: The lack of a national biodiversity database has been repeatedly identified as a barrier to the optimal national implementation of the CBD. Numerous species and habitat databases have been established, including usage databases (e.g. fishery databases), by various agencies (public and private) but in most cases data is not freely and fully available.</p> <p>An initial Biodiversity metadatabase (Senterre <i>et al</i> 2010a) has been prepared as well as a priority gap analysis on Seychelles biodiversity data (Senterre <i>et al</i> 2010b), these documents though not comprehensive represent the only systematic attempt to address these issues nationally and provide a valuable base from which to work.</p> <p>In this domain the National Environmental Data & Information Portal (NEDIP) is being developed by MEE and a project is soon to commence to develop the national Biodiversity Clearing House Mechanism (CHM).</p>		
Timeline	2017 - open-ended	Priority	2
	Description	OVI	
Results	1). Recommendations on developing data gathering protocols.		
	2). Standardised protocols and guidelines.	Protocol handbooks and guidelines.	
	3a). National Biodiversity database established	Database verification.	
	3b). National biodiversity monitoring programme	Handbook, guidelines and PE&A materials. Reports and updated databases.	
	4). Model data sharing agreements developed in accordance with national law.	Agreement model(s).	
	5). Metadata available from operational Biodiversity CHM by 2018.	CHM website.	
	6a). National biodiversity monitoring programme under implementation by 2019.	Monitoring reports and data. Updated databases.	
	6b). Databases managed and maintained.	Updated databases	
Activities	1). Review and assess existing datasets and data gathering protocols.	Assessment and compilation of existing protocols.	
	2). Develop, through stakeholder consultation, data collection protocols and guidelines building upon established protocols.	Records and results of stakeholder consultation.	
	3). Develop, where practical, common or harmonised biodiversity monitoring programmes and data management systems to form a national biodiversity database.	National biodiversity monitoring programme. Examination of national biodiversity database.	
	4). Review and develop as appropriate, through stakeholder consultation, model data sharing agreements.	Review of existing agreement models. Draft Agreements.	
	5). Link national biodiversity database to national biodiversity clearing-house mechanism and integrate with NEDIP.	Examination of CHM and NEDIP sites.	
	6). Train research agency staff in data collection, management and analysis, as appropriate.	Training programme and records. No. of trained staff from no. of agencies.	
Budget			
Notes and Guidance	AT: 19, 18		

Project 15	Promotion of Sustainable Agriculture		
Objective	Minimise the ecological footprint of Agriculture.		
Situation analysis	<p>Implementing Agencies: Department of Natural Resources, SAA, Farmers Associations.</p> <p>Status: Work has been ongoing since the first NBSAP to promote sustainable agricultural practices in Seychelles from the banning of use of chemicals classified as persistent organic pollutants under the Stockholm Convention to integrating micro – irrigation systems to agricultural development. The ecological footprint of farming is an issue in Seychelles where land is at a premium and a considerable component of farming takes place on hillside land. Aside from the direct conversion of land to agricultural purposes soil conservation, efficient use of water and prevention of pesticide and fertiliser pollution of water courses are all key issues.</p>		
Timeline	2015-2020	Priority	3
	Description	OVI	
Results	1). Best current information identified. Priorities for research identified ¹ .	Review report.	
	2). Sustainable soil management protocols integrated into agricultural guidelines.	Guidelines available in hard copy and digitally and distributed to farmers.	
	3). Usage of chemical fertilisers and pesticides reduced by 30% by 2020.	Imports of chemical fertilisers.	
	4a). Sustainable agricultural guidelines including sustainable soil management protocols integrated into agricultural practice.	SAA training programmes. Site verification.	
	4b). All registered farmers introduced to and trained in application of sustainable agriculture protocols by 2020.	Training records.	
	1-4). Reduction of detrimental environmental impacts (ecological footprint) of agriculture	Water usage, water quality, average soil quality and depth.	
Activities	1). Review current knowledge on soil biodiversity and ecosystem management in Seychelles.	Review report.	
	2). Develop and produce guidelines for agricultural sustainable soil management ² .	Guidelines based on best current information.	
	3). Promote organic farming methods including integrated pest management.	Decrease in chemical fertiliser usage. Increase in production of organic fertilisers.	
	4). Produce, distribute and provide training on guidelines and protocols for sustainable agriculture.	Guidelines and protocols. Training seminars.	
Budget			
Notes and Guidance	<p>1). To feed into National Biodiversity Research Agenda.</p> <p>2). Including identification of best practice and economies of scale.</p> <p>3). This project should be cross-referenced with the Seychelles National Agricultural Investment Plan (SNAIP).</p> <p>AT. 4, 7, 8, 10.</p>		

Project 16	Conservation and Sustainable Use of Agro-Biodiversity Including Key Pollinators.		
Objective	Preserve agricultural biodiversity.		
Situation analysis	<p>Implementing Agencies: Department of Natural Resources, SAA, Farmers Associations. Status: Seychelles is not a centre of agro-biodiversity and indeed not a single endemic or indigenous species is utilised in mainstream agriculture. Previous projects have focused on the preservation of agricultural varieties that are becoming rare in Seychelles in order to maintain the genetic stock of any local characteristics they may have developed. These efforts have been deemed successful but it may be timely to review the national status in this regard. One key issue that has not been assessed is the importance of indigenous pollinator species to agriculture and arboriculture in Seychelles.</p>		
Timeline	2019-2020	Priority	4
	Description	OVI	
Results	1). If required priority action plan for agro-biodiversity conservation drawn up and under implementation.	Plan, if required, under implementation by 2018.	
	2). Key pollinator species identified.	Assessment Report	
	3a). Pollinator species requiring further research identified.	National Biodiversity Research Agenda.	
	3b). Conservation action plans developed for key pollinators, if required.	Action Plans.	
Activities	1). Review the status of previous programmes to conserve Seychelles' agro-biodiversity. Identify and redress any key shortcomings.	Heritage and agricultural gardens and status of animal breeds report.	
	2). Assessment of the importance and economic value of pollinator species.	Assessment Report	
	3). Identify key pollinator species/populations for further research and/or conservation/restoration (if required).	Species Action Plans	
Budget			
Notes and Guidance	1). Implement with x-ref to SNAIP. AT: 13.		

Project 17	Integrating Biodiversity Conservation in National Emergency Plans		
Objective	To effectively integrate biodiversity conservation in to national emergency Planning.		
Situation analysis	<p>Implementing Agencies: Department of Environment (MEE) specifically the Division of Risk and Disaster Management (DRDM), Climate Change Division, Conservation section.</p> <p>Status: Natural disasters can have significant impacts upon biodiversity and in particular Key Biodiversity Areas. Likewise the measures undertaken in response to disasters can have unintended negative impacts upon biodiversity. An example of this is the widening of outlets and dredging of wetlands on the south east coast of Mahe in the late 1990s following flooding events. The same machinery was utilised from one marsh to the next resulting in the unintentional propagation of freshwater invasive species. Consequently the risk and vulnerability of areas to disaster and the likely preventive, mitigation and response measures need to factor in Biodiversity concerns.</p>		
Timeline	2018-2020	Priority	4
	Description		OVis
Results	1). Risk and Vulnerability maps incorporate biodiversity information and issues.	Updated maps.	
	2). Inter-departmental liaison built into operation procedures and information exchange enhanced.		
	3). Emergency plans, updated as appropriate.	Review reports. Updated plans etc...	
	4). Capacity to undertake environmental monitoring, vulnerability and risk assessments in key environment and socio-economic sectors enhanced.	Risk assessment reports. Staff exchange programmes, seminar records etc...	
Activities	1). Review and incorporate pertinent sectoral biodiversity data (e.g. fisheries, forestry, KBA, pest infestation) into risk and vulnerability maps.	Review reports. Revised Risk and Vulnerability maps and database.	
	2). Enhance information exchange and liaison between Climate Change, Risk and Disaster Management and Environment Departments including civil society Biodiversity agencies and expertise.	Correspondence, meeting minutes, reports, updated maps etc...	
	3). Review emergency plans in light of revised maps and amend where feasible to incorporate Biodiversity concerns into risk and disaster management.	Updated emergency plans (e.g. Forest fire contingency plan ¹ and Oil Spill Contingency Plans)	
	4). Build capacity to undertake environmental monitoring, vulnerability and risk assessments in key environment and socioeconomic sectors.	Workshops, seminars, staff exchange programmes. Revised risk assessment report formats etc...	
Budget			
Notes and Guidance	1). Cross reference with Project: "National Forest Policy, Management and Restoration Programme." AT 12, 14, 19.		

Project 18	Integration of Biodiversity into existing Climate Change Adaptation Programmes		
Objective	Climate change adaptation programmes are amended to integrate Biodiversity issues.		
Situation analysis	<p>Implementing Agencies: Department of Environment – Climate Affairs, Adaptation and Information Division, NBSAP Implementation Unit.</p> <p>Status: The existing National Climate Change Strategy has been identified as lacking sufficient integration of biodiversity issues as they pertain to vulnerabilities to and impacts of ongoing and projected climate change in Seychelles. The application for financial support for Seychelles' Third National Communication to the UNFCCC has already been made and it is anticipated funds will be received by early 2015. The Seychelles National Climate Change Strategy (2009) states that <i>"The development of the national communication necessitates the development of a country profile, GHG inventory, a vulnerability assessment and an adaptation and mitigation strategy."</i> It is anticipated therefore that the preparation of the 3rd Communication will allow for a review of the national Climate Change strategy and hence provide an opportunity for the better integration of biodiversity into Strategy.</p>		
Timeline	2015-2016	Priority	2
	Description	OVI's	
Results	1). Key biodiversity gaps in National Climate Change Strategy (NCCS) identified.		
	2). Biodiversity integrated into revised NCCS and new Ecosystem Based Adaptation Projects.	New National Climate Change Strategy.	
	3). Implementation Unit ensures proper integration of Biodiversity into NCCS and its implementation.	New National Climate Change Strategy Implementation Reports	
Activities	1). Analyse the National Climate Change Strategy and identify opportunities for integration of biodiversity adaptation programs.	Analysis report and recommendations.	
	2). Propose mechanisms for the inclusion of biodiversity issues into the main national adaptation program ¹ .	Analysis report and recommendations.	
	3). NBSAP Implementation Unit to follow up with CAAID (MEE) and the SSDS implementation administrative mechanism to ensure integration is optimised.	NBSAP Implementation Unit Reports.	
Budget			
Notes and Guidance	<p>1). This process should also be utilised to ensure that the new Ecosystem Based Adaptation projects appropriately integrate biodiversity issues and that adequate linkages are made with the NBSAP climate change projects.</p> <p>2). This is primarily a role for the NBSAP Implementation Unit to ensure that the process to review the national CC strategy mainstreams Biodiversity.</p> <p>AT: 10</p>		

Project 19	Baseline Assessment of Seychelles Terrestrial and Marine Carbon Stocks		
Objective	Calculate the Carbon stored and captured annually in Seychelles ecosystems.		
Situation analysis	<p>Implementing Agencies: Department of Environment, Research Agencies.</p> <p>Status: The role of habitats and ecosystems in the sequestration of carbon has not been assessed in Seychelles. There is particular interest with regard to forest cover, wetlands, mangroves and sea grass beds and how the management and in some cases rehabilitation of these ecosystems could enhance both biodiversity conservation and carbon sequestration.</p>		
Timeline	2015-2017	Priority	3
	Description		OVI
Results	1). Carbon stocks quantified.		
	2). Carbon fixation/sequestration audit.		
	3). Scope for optimisation of carbon fixation, in a biodiversity-friendly manner, including through rehabilitation of ecosystems, identified.		Green and Blue Carbon plan.
	4). Carbon fixation measures incorporated into ecosystem and habitat management regimes.		Management reports and plans, guidelines etc...
Activities	1). Assessment of existing carbon stocks in Seychelles.		Report.
	2). Assessment of annual carbon fixation/sequestration in existing Seychelles' ecosystems.		Ecosystem and carbon fixation assessment
	3). An objective assessment of the scope for increased fixation/sequestration rates in Seychelles' ecosystems.		Green and Blue Carbon plan.
	4). Integrate Green and Blue carbon objectives into ecosystem and habitat management regimes.		Revised Plans and protocols.
Budget			
Notes and Guidance	1). X-ref with carbon feasibility work being undertaken by the PA Finance project. AT: 15.		

Project 20	Climate Change Biodiversity Impact Profile Assessment for the Seychelles		
Objective	Identify the key threats posed to Seychelles biodiversity by projected Climate Change and initiate mitigation measures.		
Situation analysis	<p>Implementing Agencies: MEE, Seychelles National Meteorological Services, SNPA, Department of Natural Resources, SFA, Environmental NGOs, Research Agencies.</p> <p>Status: Successive IPCC reports have set and refined the projected parameters for change through time in atmospheric carbon concentration and its consequences in terms of mean global temperature, sea surface temperature and Sea level rise. Seychelles has already experienced major climate related environmental impacts such as the severe coral bleaching event of 1998 and extraordinary high tides related to thermal expansion. Seychelles meteorological records also suggest a shift in the normal seasonal patterns over time including changing rainfall patterns, with precipitation tending to occur in shorter heavier bouts.</p>		
Timeline	2016-2017 Assessment (2018 onwards pilot project implementation)	Priority	2
	Description	OVI	
Results	1). Baseline for developing Seychelles Biodiversity climate change adaptation programme.	Overview baseline report.	
	2). Key research programs on climate change and biodiversity identified and included in National Biodiversity Research Strategy.	National Biodiversity Research Strategy	
	3). National Climate Change Biodiversity Impact Profile produced.	Biodiversity Impact Profile Document	
	4a). Priority habitats for adaptation management identified and pilot projects proposed.	Biodiversity Impact Profile Document	
	4b). Pilot projects in at least three priority habitat types under implementation by 2019.	Implementation reports. Site verification.	
Activities	1). Undertake a preliminary overview of key climate change impacts for priority and/or major marine and terrestrial ecosystems.	Baseline report document. with priorities identified for	
	2). Assess key knowledge gaps in understanding of Climate Change impacts on biodiversity of Seychelles	Report and discussion paper identifying priority aspects of the climate change and biodiversity interface for research.	
	3). A national workshop of key knowledge needs for biodiversity response to climate change.	Workshop findings and participation. Key biodiversity professionals from GoS, NGOs and civil society included in review and assessment.	
	4). Identify priority habitats and key exemplars for pilot projects.	Pilot project sites proposed.	
Budget			
Notes and Guidance	AT: 10, 15.		

Project 21	Strengthening Seychelles' Ability to Deal with Existing Climate Threats to Biodiversity.		
Objective	Current primary Biodiversity threats of Climate Change are addressed.		
Situation analysis	<p>Implementing Agencies: MEE, SNPA, Nature Seychelles, NGOs, Research Agencies.</p> <p>Status: There are two primary current climate related threats to the biodiversity of Seychelles namely coral bleaching and increased incidence of forest fires and related land degradation. Forest fires have been a long standing concern particularly on the island of Praslin. Extensive planning in various iterations has gone into fire prevention and fighting plans, including various vegetation management programmes such as replanting schemes and fire breaks. The severe ENSO-related coral bleaching event in 1998 resulted in approximately 90% loss of living coral cover on the Mahe plateau. Subsequent research identified refugia on the Mahe plateau where good coral cover remained. It was proposed at the time that these be designated as protected areas and that larger no-take zones which would foster resilience by protecting larger and more diverse fish populations be declared. These recommendations were not acted upon however. More recently a coral restoration project, led by Nature Seychelles, has been initiated off the coast of Praslin, where 1000s of coral nubbins of more temperature resistant species have been propagated and planted out on suitable substrates in and outside of Projected areas. Initial results have been encouraging and there is interest to further examine and expand these trial projects.</p>		
Timeline	2016-onwards	Priority	2
	Description	OVis	
Results	1). At least 3 more projects of same or larger scale increasing area under Coral reef restoration by 400% by 2020.	Reports, maps, site verification.	
	2). National coral reef restoration programme initiated with funds and national lead agency.	Reports, site verification.	
	3). Land restoration programmes under implementation.	Reports, site verification. X-ref with forestry and catchment management projects	
	4/5/6). Key forest habitats at risk from trends in climate change identified and catered for in plans, e.g. Inselberg management plans etc...	Reports, site verification.	
Activities	1). Enhance and expand research on coral restoration projects ¹ .	Pilot project reports. Scientific papers.	
	2). Develop mechanisms (institutional, funding, etc.) for roll out of coral restoration techniques	Centre of expertise established, new and additional sources of funding accessed.	
	3). Review legislative mechanisms for land degradation rehabilitation ² .	Report with recommendations for legislation amendment if appropriate.	
	4). Investigate the long term impact of decline in dry season precipitation on the risk of fire outbreaks.	Desk review of weather patterns and fire occurrence.	
	5). Review and update, as appropriate, national forest fire contingency and prevention plans ² .	Updated plans – incl. new strategy for Praslin and management models for key inselbergs.	
	6). Implement appropriate firefighting strategies for Praslin and key inselberg communities ² .	Implementation reports. Site verifications. Inselberg plots projects.	
Budget			
Notes and Guidance	<p>1). The expanded coral reef restoration project should be developed in tandem with the ongoing Marine Spatial Planning project to optimise interaction of coral restoration and creation of large no-take zones. There is also scope for additional pilot projects under the UNDP-GEF EBA project.</p> <p>2). Cross-reference with forestry and catchment management projects.</p> <p>AT. 10, 14, 15</p>		

Project 22	Biodiversity Awareness and Education		
Objective	To promote the NBSAP and its activities as a means of galvanising and harnessing stakeholder activity for the conservation and sustainable use of biodiversity and the implementation of the CBD.		
Situation analysis	<p>Implementing Agencies: MEE, Division of Public Education and Community Outreach (PECO), NBSAP Implementation Unit, Ministry of Education, Agencies/NGOs implementing Biodiversity Projects.</p> <p>Status: Seychelles has undertaken extensive Biodiversity-related Public Education and Awareness (PE&A) over the years. MEE has a Division, Public Education and Community Outreach (PECO), dedicated to this objective and environmental issues are considered a cross-cutting topic in the national school curriculum. Education and Awareness is also a primary objective of the NGO Wildlife Clubs of Seychelles (WCS). It is standard practice for all biodiversity projects to incorporate a PE&A component. A national PE&A campaign is needed to promote the NBSAP as a means of galvanising and harnessing stakeholder activity for the conservation and sustainable use of biodiversity and the implementation of the CBD.</p> <p>One key flaw in most PE&A campaigns has been the lack of structure and benchmarks in terms of awareness raised etc... It is important therefore that baselines of awareness on target topics are ascertained prior to the design and launching of major national campaigns.</p>		
Timeline	2015- onwards	Priority	1
	Description	OVis	
Results	<p>National awareness of and utilisation of NBSAP by general public and stakeholder respectively is significantly increased.</p> <p>PE&A strategy is supportive of but does not duplicate activities under SSDS PE&A programmes.</p> <p>MEE administration of Biodiversity PE&A strategy is interactive with other biodiversity agencies.</p> <p>The interface between Biodiversity and Climate Change is covered for the general public, school children & the development/commercial sectors.</p> <p>Stakeholder and general public awareness of the importance of and contribution to the conservation and sustainable use of biodiversity (C&SU of BD) is measurably improved.</p>	<p>Awareness indices.</p> <p>Volunteer programmes.</p> <p>Civil society and private sector contribution to C&SU of BD is measurably increased in terms of: reduced negative impact, increased financial and in-kind contributions to NBSAP initiatives, National investment in conservation and sustainable use of biodiversity, improvement in Biodiversity and Sustainable Use indices etc...</p>	
Activities	Develop, through stakeholder consultation, a national biodiversity PE&A strategy with awareness plan and action programme.	<p>Strategy and Action Plan:</p> <p>i). Promotes the NBSAP and its implementation of the CBD as the primary mechanism for biodiversity management in Seychelles.</p> <p>ii). Is supportive of and integrates properly with the broader environmental education programme of the SSDS.</p> <p>iii). Seeks to interlocate with and provide a common platform for existing agency (e.g. NGO and UNDP) PE&A programmes.</p> <p>iv). Includes a programme on the interactions between Biodiversity and Climate Change.</p> <p>v). Include Knowledge/Attitudes/ Practice (KAP) surveys to assess efficacy</p>	
Budget			
Notes and Guidance	AT: 1.		

Project 23	Seychelles Biodiversity and Ecosystems Services Valuation		
Objective	Model and extrapolate biodiversity and ecosystem services value for the country, incorporate results into national accounting and establish basic valuation capacity within key agencies.		
Situation analysis	<p>Implementing Agencies: MEE, Ministry of Finance (MOF), NBSAP Implementation Unit, SNPA, SFA, SIF, Environmental NGOs, Research Agencies.</p> <p>Status: Environmental economics and the lack of national capacity in that regard has long been cited as an obstacle to the conservation and sustainable use of biodiversity. Projects to address this were accordingly included in the first NBSAP and the EMPS 2000-2010 but neither were implemented. This project consequently takes a more practical approach utilising international expertise to undertake key valuations to allow for Biodiversity value to be mainstreamed into national accounting whilst providing basic valuation training to staff members from several agencies.</p>		
Timeline	2015-2016	Priority	1
	Description	OVis	
Results	1a). No duplication of NBSAP and SSDS evaluation initiatives.	Project proposals.	
	1b). Key ecosystems and representative components identified for evaluation.	List of ecosystems study areas and key biodiversity components for evaluation.	
	2). Environment economic evaluation of key representative biodiversity components undertaken with values of and their inputs to key economic sectors assessed. Importance of Biodiversity to the national economy assessed.	Assessment reports.	
	3). Several agencies and key staff involved and trained in evaluation studies.	Assessment reports. Training workshops and field work.	
	4). Biodiversity values incorporated progressively into national accounting.	National accounting records.	
Activities	1). Harmonise valuation projects with those envisaged under the SSDS ¹ .	Project documents.	
	2). Undertake economic evaluations of key ecosystems, and where appropriate specific biodiversity components, and their contribution to economic sectors with particular emphasis on Fisheries, Tourism, water resources and Agriculture ² .	Ecosystems and biodiversity components pilot project assessments.	
	3). Build national capacity to carry out valuation studies.	At least 3 agencies and key staff play lead roles in evaluation studies.	
	4). Identify and implement means and mechanism for incorporation of the true value of biodiversity into national accounts and reports ¹ .	Correspondence with MoF. National accounting records.	
Budget			
Notes and Guidance	<p>1). NBSAP Implementation Unit should play a key role in coordinating and ensuring implementation of these activities.</p> <p>2). Cross-reference with pollinator survey in: "Conservation and sustainable use of agrobiodiversity including key pollinators" project.</p> <p>AT: 2</p>		

Project 24	Payment for Ecosystems Services		
Objective	Identify means of raising fees for ecosystems services currently treated as free.		
Situation analysis	<p>Implementing Agencies: Department of Environment, SNPA, SFA, Environmental NGOs, Research Agencies.</p> <p>Status: Currently most ecosystems services are not factored into national accounting and as such are treated as free resources. A prime example being the maintenance off soil and water cycles by the Mahe and Praslin National Parks; vital services which as yet do not directly result in funds being levied for the management of the PAs. Other ecosystems include carbon sequestration and waste assimilation that could be factored into national accounting and thereby enable informed development cycle decisions.</p>		
Timeline	2019 - onwards	Priority	4
	Description	OVI	
Results	1). Current means for realising payment for ecosystem services assessed (e.g. PA entrance fees, PUC water revenue etc...)	Assessment report.	
	2). Ecosystem services and contribution to existing commercial sectors evaluated.	Assessment report.	
	3). Potential sources of payment for ecosystem services from key ecosystems identified and evaluated e.g. catchment areas, carbon sequestration, waste assimilation, renewable resource production etc...	Cross-reference with the project: "Seychelles Biodiversity and Ecosystems Services Valuation."	
	4a). PA self-financing strategy developed in combination with Seychelles Protected Area Finance Project.	Developed in combination with "Seychelles Protected Area Finance Project."	
	4b). PA self-financing strategy mainstreamed with pertinent national strategic documents and initiatives.	PA revenue sources. Pertinent National strategic documents.	
Activities	1). Identify and assess current national initiatives related to payments for ecosystem services.	Assessment report.	
	2). Identify and assess ecosystem services and their economic contribution.	Assessment report.	
	3). Investigate, identify and document potential sources of payment for ecosystem services.	Report. Cross-reference with the project: "Seychelles Biodiversity and Ecosystems Services Valuation."	
	4). Develop and mainstream a self-sustaining financing strategy and action plan for protected areas.	Covered by: "Seychelles Protected Area Finance Project."	
Budget			
Notes and Guidance	AT: 2, 3, 4.		

Project 25	Review, Updating, Streamlining and Adoption of Biodiversity Related Legislation.		
Objective	Seychelles Biodiversity related legislation is updated in line with best current practise and harmonised.		
Situation analysis	<p>Implementing Agencies: Department of Environment (MEE), Ministry of Land Use and Housing (MLUH), SAA, SNPA,</p> <p>Status: Seychelles biodiversity, environmental and development legislation is largely outdated (e.g. NPNCA 1971, TCPA 1972, WABPA 1966, EPA 1994 (EIA Regs 1996) and requires updating and harmonisation. In addition other priority matters have come to the fore over the last 20 years such as Biosafety, Biosecurity and Access and Benefit Sharing.</p> <p>Considerable work has been undertaken in the last five years to address these issues including: the promulgation of the Animal and Plant Biosecurity Act in April 2014, including the establishment of a New National Biosecurity Committee, the approval of a new PA policy and the commencement drafting of a new PA Bill. The TCPA is under review though further efforts are required to ensure harmonisation with the EPA.</p>		
Timeline	2015-2020	Priority	2
	Description		
Results	<p>1). Nature Conservancy Act promulgated replacing NPNCA, Nature Reserve Regs of WABPA and Forestry Reserves Act.</p> <p>2/3/4). Harmonised new EPA and PPA promulgated with associated EIA regs and LUPs and planning regs respectively.</p> <p>5). Framework Biodiversity Act bringing together all pertinent biodiversity legislation and national commitments</p>		
	Description	Notes	
Activities	1). Preparation, review and approval of new Nature Conservancy Bill and promulgation of Act.	See Project: "Revision and Consolidation of Protected Area Legislation."	
	2). Development and adoption of new EPA including review and updating of EIA regs.	Ongoing and in later stages of development.	
	3). Development and adoption of new Physical Planning Act including National and District LUPs and associated Physical Planning Regulations.	New Bill with AG's office. 25 LUPs drafted – approved for Praslin and Anse Royale.	
	4). Harmonise EPA and new Physical Planning Act	An inter-ministerial group has been established to harmonise the two pieces of legislation.	
	5). Prepare through stakeholder consultation, draft review, amend and adopt Framework Biodiversity Act bringing together all pertinent biodiversity legislation including: a) Mandating the National Biosafety Framework and regulations b). Access and Benefit Sharing regulations. c). Obligation upon the Government to adopt, support the implementation of, review and regularly report upon the NBSAP. d). Requiring Government to provide public access to biodiversity information in its keeping.		
Budget			
Notes and Guidance	AT: 2, 16, 19.		

Project 26	NBSAP Financing Action Plan		
Objective	Develop a strategy and action plan to facilitate the funding of the NBSAP		
Situation analysis	Implementing Agencies: MEE, UNDP PCU, NBSAP Implementation Unit, BioFIN consultancy team. Status: The BioFin project addresses these activities and is already funded and under implementation.		
Timeline	2014-2015	Priority	1
	Description	OVI	
Results	Current biodiversity funding environment quantified.	BioFin Project	
	NBSAP Projects costed.	BioFin Project	
	Portfolio of potential funding options identified and quantified.	BioFin Project	
	NBSAP funding shortfall calculated.	BioFin Project	
	Current scenario of biodiversity incentives (perverse and positive) assessed and recommendations made.	BioFin Project	
	Development of new incentive regime.	BioFin Project	
	NBSAP financing integrated in Budget Planning Process, Medium Term Development Strategy and Public Sector Investment Program	BioFin Project	
Activities	Assess current funding.	BioFin Project	
	Undertake costing of priority projects	BioFin Project	
	Identify existing, new and additional financial sources.	BioFin Project	
	Assess the biodiversity financing gap	BioFin Project	
	Review and develop economic incentives for environmental protection and biodiversity conservation	BioFin Project	
	Mainstream NBSAP financing needs	BioFin Project	
Budget			
Notes and Guidance	AT: 20. BIOFIN Project also addresses: AT 3.		

Project 27	Review and Update Fishery Governance Structures, Mechanisms and Administration.		
Objective	To upgrade Seychelles fishery governance framework such that: i) legislation and policy reflect international best practise and ii). MCS and research capacities are enhanced.		
Situation analysis	<p>Implementing Agencies: SFA, Department of Natural Resources, MEE, Stakeholders: Fishers' Associations (FBOA, Praslin, Bel Ombre, ASFA), SSFC, MEE, Environmental NGOs (MCSS, SRFs). Status: The legislative and governance framework for fisheries in Seychelles is still based primarily upon structures established in the mid-1980s. Declining artisanal catches, problems regarding by-catch in industrial fisheries and the need to integrate international best current practise into national fisheries management mean an updating of governance structures is required. Considerable progress has been made in recent years: a new Fisheries Act has just been promulgated (2014). The new Act <i>inter alia</i> establishes the legal basis for co-management regimes. An initial review of Seychelles fisheries has been undertaken (Cantanzano & Nageon 2013) as the first stage in development of a new fisheries policy. The fishery data gathering methodology and related statistical system has been reviewed (Moreno 2013) and recommendations made for its updating and improvement. Finally, a High-level fisheries advisory body has also been formed to give technical advice to the Minister for Natural Resources.</p>		
Timeline	2014-2018	Priority	2
	Description	OVI's	
Results	1). New Fisheries Act promulgated and under implementation by 2015.	Official Gazette. SFA legal records.	
	2). New Fisheries Policy embodying best practise Adopted by 2017.	FAO endorsement Cabinet decision.	
	3). Fisheries Advisory body operational.	Minutes of meetings.	
	4). Monitoring and research is a requirement of management plans under implementation.	Reports, databases, scientific publications.	
	5). Entire fleet with operational VMS by 2018.	Site inspection. VMS maps and database.	
	6). International commitments e.g. FAO Code of Conduct, CITES, CMS, IOTC, Straddling fish stocks agreement etc... are effectively implemented.	National reports, MCS reports etc... On site verification.	
Activities	1). Adoption of new Fisheries Act.	Official Gazette	
	2). Develop new fisheries policy based on and promoting the best practice in terms of: science and research, fishery management, and stakeholder inclusion to realise sustainable fisheries and maintain the ecological integrity of marine ecosystems.	Stakeholder consultation records. Approved Policy Document.	
	3). Establish a high-level fisheries advisory body	Established 2014.	
	4). Promotion and development of co-management as a key policy tool ¹ .	See Project: Development of a Sustainable and Ecologically Sound Artisanal Fishery	
	5). Improved MCS (Monitoring Control Surveillance) system ¹ .	See Moreno 2013 recommendations.	
	6). Improve training and institutional development i.e. enhanced MCS system ¹ and management oriented research capacity.	See Project: Development of a Sustainable and Ecologically Sound Artisanal Fishery	
Budget			
Notes and Guidance	1). See Project: Development of a Sustainable and Ecologically Sound Artisanal Fishery AT: 4, 6, 12.		

Project 28	Development of a Sustainable and Ecologically Sound Artisanal Fishery¹		
Objective	Manage and rehabilitate as appropriate the Artisanal Fishery to ensure its ecologically sound and sustainable use.		
Situation analysis	<p>Implementing Agencies: SFA, Department of Natural Resources, Research Agencies, Fishers Associations.</p> <p>Status: Catches from the artisanal fishery peaked in 1991 and have shown a steady decline since then. Key commodity fisheries such as for Emperor red snapper and for Serranids also indicate significant declines and cause for concern. The low resolution of current monitoring regimes (typically at guild or multispecies groupings) is not designed to detect trends in individual species and there is significant anecdotal information to suggest that numerous species have become scarce relative to historical occurrence and abundance. There is also considerable concern over the sustainability of commodity fisheries such as sea cucumber, shark fin and lobster. Whilst management measures are in place for the lobster fishery proposed management measures for shark fin and sea cucumber fisheries have not been enforced.</p> <p>Some notable action has been undertaken to begin to address some of these concerns including research on the reproductive and aggregation behaviour of rabbit fish (<i>Siganus</i> sp) and two species of serranid. Most importantly the process has begun to develop an artisanal fishery plan for the Mahe Plateau and that is expected to be completed in February 2015, and will likely set extensive actions for the targeted research of fisheries and better MCS.</p>		
Timeline	2015 - onwards.	Priority	2
	Description	OVI's	
Results	1). Praslin co-management area and at least one more pilot project under implementation by 2018.	Administration Reports. Project reports	
	2). Important and vulnerable species identified.	Demersal Fishery plan project	
	3). Implementing Management plans by 2017.	Demersal Fishery plan project	
	4). MCS capacity built ² and catch data enhanced as necessary for adaptive management.	Demersal Fishery plan project	
	5). PA extended and effectively managed to enhance conservation and sustainable use objectives	PA biodiversity and biomass assessments. CPUE records.	
Activities	1). Promote and develop co-management as a key policy/management tool ³ .	Praslin co-management area reports. Proposal(s) for new co-management area(s).	
	2). Identify key fishery species on the basis economic and ecological importance and vulnerability to overfishing.	Species lists for prioritised research, catch monitoring and development of management measures.	
	3). Develop management plans for key species/guilds utilising the precautionary principle where current data is deficient.	Fishery plans incorporating management measures such as: catch quotas, gear restrictions, limits on fishing effort	
	4). Improve MCS ² and particularly catch records to ascertain age at maturity, average size at catch and other key data to enable informed adaptive management of plans and fisheries.	Improved training and institutional development as per Moreno (2013).	
	5). Assess the use of Protected Areas as fisheries management tools	Cross reference with PA Extension and Effective Management projects as well as MSP programme.	
Budget			
Notes and Guidance	<p>1). This project must cross-reference and be compatible with the NPOA sharks.</p> <p>2). Cross-reference with Project: Review and Update Fishery Governance Structures, Mechanisms and Administration.</p> <p>3). Praslin Co-management area already developed and operationalised following promulgation of new Fisheries Act.</p> <p>AT: 4, 6, 12.</p>		

Project 29	Development of a Sustainable and Ecologically Sound Semi-Industrial Fishery¹		
Objective	Manage the semi-Industrial Fishery to ensure its ecological integrity and sustainable use.		
Situation analysis	<p>Implementing Agencies: SFA, Department of Natural Resources, FBOA, MCSS, Research Agencies.</p> <p>Status: The local semi-industrial fishery was established in the mid-1990s and after a period of stagnation and problems with import requirements of the EU pertaining to the heavy metal content of fish is currently subject to new capital investment and expansion.</p>		
Timeline	2016- onwards.	Priority	2
	Description	OVIs	
Results	1). Key stocks assessed by 2018.	Stock assessment reports. Catch data.	
	2). Management plans and quotas in place for target species by 2019.	Surveillance reports and catch data. Catch and or effort limits identified and enforced.	
	3a). By-catch reduction programme, and associated regulations if required, in place by 2019.	Action plans and implementation reports.	
	3b). Depredation reduction programme in place	Action plans and implementation reports.	
	4). Improved MCS (Monitoring Control Surveillance) system by 2017.	Monitoring and catch data.	
	5). PA extended and effectively managed to enhance conservation and sustainable use objectives by 2020.	PA biodiversity and biomass assessments. CPUE records.	
Activities	1). Undertake stock assessment for key target species.	Assessment reports and data.	
	2). Identify precautionary quotas for target species and develop management plans to ensure sustainability of fishery.	Catch and/or effort limits determined.	
	3). Undertake studies of by-catch and depredation to identify means of minimising both.	Study reports and recommendations.	
	4). Enhance the monitoring of the fishery ²	Surveillance reports and catch data.	
	5). Assess the use of Protected Areas as fisheries management tools	Cross reference with PA Extension and Effective Management projects as well as MSP programme.	
Budget			
Notes and Guidance	<p>1). This project must cross-reference and be compatible with the NPOA sharks.</p> <p>2). Cross-reference with Project: Review and Update Fishery Governance Structures, Mechanisms and Administration.</p> <p>AT: 4,6,12.</p>		

Project 30	Development of Sustainable Mariculture		
Objective	To develop an ecologically-friendly and sustainable mariculture industry.		
Situation analysis	Implementing Agencies: MNR, SFA, MEE, Private Sector Investors. Status: Seychelles is in the process of a multi-phase development of a national Mariculture Master Plan.		
Timeline	2016-onwards	Priority	4
	Description	OVI	
Results	1/2). Mariculture sites and criteria including environmental/ecological parameters identified.	Master Plan.	
	3a). Mariculture Policy approved and operational.	Cabinet decision Mariculture development/operation reports.	
	3b). Mariculture guidelines approved and published and standards reflected in Fishery Act regulations.	Guidelines Official gazette.	
	4). Incentives regime enables highest environmental quality standards in the mariculture development cycle.	Environmental management reports. Environmental quality indices.	
	5). Mariculture Master Plan reflecting best current practise and standards adopted and supported by guidelines and regulations.	Mariculture Master Plan	
	6). Full monitoring and compliance of EIA requirements and EMPs throughout development and operational cycle.	EMP implementation reports. Site verification etc...	
	7). National mariculture capacity developed in tandem with industry.	Capacity Building plan. Trained technicians etc...	
Activities	1). Assess mariculture potential of the Mahe and Amirantes plateaux, including identification of potential mariculture development sites.	Already undertaken.	
	2). Undertake impact assessments of proposed operations in selected sites.	EIA reports.	
	3). Develop policy and guidelines for implementation of mariculture projects.	Draft Policy and guidelines reviewed by stakeholders.	
	4). Develop incentives for investors to utilise best environmental methods & technologies.	Cross reference with BioFin project.	
	5). Compile components to form, review and adopt Mariculture Master Plan.	Mariculture Master Plan	
	6). Ensure full and proper application of EIA regulations and implementation of resulting environmental management plans through the Mariculture development cycle.	EIA reports. EMP implementation reports. Site verification etc...	
	7). Integrate capacity building into all aspects of the mariculture operational cycle.	Capacity Building needs Assessment	
Budget			
Notes and Guidance	AT: 7, 8.		

Project 31	Establishment and Operation of NBSAP Implementation Unit.		
Objective	The NBSAP is administered, coordinated, effectively implemented and integrated into the broader environment governance framework.		
Situation analysis	<p>Implementing Agencies: MEE</p> <p>Status: An NBSAP Implementation Unit was written into the first NBSAP but never instituted. This was subsequently identified (Gos 2005, GoS 2011) as a key factor limiting the optimal implementation of the NBSAP.</p> <p>An Implementation Unit has again been written into the new NBSAP and it is imperative that Government resources are made available to enable the timely formation and effective functioning of this full-time NBSAP dedicated unit.</p> <p>It is not yet clear how the NBSAP IU will fit in and interact with the proposed SSDS administrative structure, but it is logical that it do so.</p> <p>As per GoS (2005) recommendations it may be an option to tender out the role of NBSAP IU to private sector expertise – if this is deemed a more efficient or cost effective option.</p>		
Timeline	2015-established, funded and operational, open-ended implementation.	Priority	1
	Description		
Structure	<p>Minimum of 4 full-time personnel consisting:</p> <p>Unit Manager (the equivalent or higher of a director's post)</p> <p>Project Coordinator (equivalent or higher than a Senior Project Officer post)</p> <p>Project Manager (equivalent or higher than a Project officer post)</p> <p>Technical Assistant (equivalent or higher of senior personal assistant or Assist project officer).</p> <p>Office space and operational budget.</p>		
Duties and responsibilities	a). Coordinate of the overall implementation of the NBSAP (including functioning as the secretariat for the National Biodiversity partnership forum).		
	b). Encourage the development and implementation of projects aligned to the objectives and targets of the NBSAP		
	c). Disseminate information on relevant donor funds and actively work with partners to mobilise new resources		
	d). Provide technical support to partners implementing projects contributing to the NBSAP		
	e). Provide technical support to the government and its partners in the general implementation of the CBD and preparations for CBD events such as Conferences of the Parties (COP) and Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), and other biodiversity related fora.		
	f). Assist the Focal Point to Disseminate information on CBD events and related decisions and outcomes (e.g. COP).		
	g). Convene an annual Symposium where members of the Biodiversity Partnership Forum will share information on advances made through their biodiversity projects and initiatives and identify new priority projects and activities		
	h). Document the different performance indicators of the NBSAP and produce an annual NBSAP implementation report, as well as other pertinent reports required by the government.		
	i). Maintain, once developed, a biodiversity Clearing-house mechanism including links to existing biodiversity-related databases.		
	j). Ensure that the Ecosystem Based Adaptation projects integrate biodiversity issues and that adequate linkages are made with the NBSAP climate change projects		
k). Ensure effective integration and coordination with the wider SSDS governance structure and projects.			
Budget			
Notes and Guidance	AT: Cross-cutting.		

NBSAP Prioritised Project Matrix

Projects		Implementation Timeline							
Number	Priority 1	Phase	2014	2015	2016	2017	2018	2019	2020
			31	Establishment and Operation of NBSAP Implementation Unit.	Established				
		Operational							
26	NBSAP Financing Action Plan								
23	Seychelles Biodiversity and Ecosystems Services Valuation								
22	Biodiversity Awareness and Education								
7	Prevention, Control, Mitigation and Eradication of Invasive Alien Species	Review							
		Implementation							
5	Prioritised Management of Endemic/Threatened Species & Critical Habitats.								
1	Revision and Consolidation of Protected Area Legislation.								
Priority 2									
2	Enabling Informed Extension of Protected Area Network	Inner Islands							
		Outer Islands							
3	Effective Protected Area Management								
4	Seychelles Protected Area Finance Project								
6	Ex-situ Conservation Program in Support of Species and Habitat Recovery								
10	Sustainable Water Use and Catchment Management								
11	Protection and Rehabilitation of Inland Waters (Freshwater Marshes)								
13	Seychelles Biodiversity Research Policy, Strategy and Management.								
14	Seychelles Biodiversity Data Gathering and Management								
18	Integration of Biodiv. into existing Climate Change Adaptation Programmes								
20	Climate Change Biodiversity Impact Profile Assessment for the Seychelles	Assessment							
		Implementation							
21	Strengthening Seychelles' Ability to Deal with Climate Threats to Biodiv.								
25	Review, Update, Streamline and Adopt Biodiversity Related Legislation.								
27	Review and Update Fishery Governance Mechanisms and Administration.								
28	Development of a Sustainable and Ecologically Sound Artisanal Fishery								
29	Development of a Sustainable and Ecologically Sound Semi-Industrial Fishery								

NBSAP Prioritised Project Matrix

Projects		Implementation Timellne						
Number	Phase	2014	2015	2016	2017	2018	2019	2020
Priority 3								
8	The Safe Management of LMOs and Biotechnology.							
9	Promotion of Sustainable Tourism							
15	Promotion of Sustainable Agriculture							
19	Baseline Assessment of Seychelles Terrestrial and Marine Carbon Stocks							
Priority 4								
12	National Forest Policy, Management and Restoration Programme							
16	Conservation and Sustainable Use of Agro-Biodiversity incl. Key Pollinators.							
17	Integrating Biodiversity Conservation in National Emergency Plans							
24	Payment for Ecosystems Services							
30	Development of Sustainable Mariculture							

Aichi Target – Project Matrix

Aichi Target	Project Number																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1																						X									X	
2								X															X	X	X						X	
3								X															X								X	
4									X	X	X	X		X									X				X	X	X		X	
5					X	X		X	X	X	X																				X	
6																												X	X	X		X
7							X					X		X																X	X	
8								X		X				X																X	X	
9							X		X	X																					X	
10									X	X				X			X	X	X												X	
11	X	X	X	X						X																					X	
12					X	X										X												X	X	X		X
13															X																X	
14										X	X				X							X									X	
15																	X	X	X												X	
16																										X					X	
17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18												X	X																		X	
19													X	X		X									X						X	
20			X						X																		X				X	

4.6 National Financing to Support NBSAP Implementation

Project 26 develops a Financing Action Plan for the NBSAP. This project is being addressed by the BioFin project which was running parallel to the process to the development of the NBSAP 2015 – 2020. This project sets out, *inter alia*, to:

- quantify the biodiversity funding environment
- develop costings for all the NBSAP projects
- provide a synthesis of funding options
- identify the NBSAP funding shortfall
- Assess current biodiversity incentives (perverse and positive) and develop a new incentive regime
- Integrate NBSAP financing into the national Budget planning process, Medium Term National Development Strategy (MTNDS) and Public Sector Investment Programme (PSIP).

This constitutes a very thorough approach to funding strategy and would be compatible for the national funding strategy established under the SSDS.

Annex 1: NBSAP Steering Committee Membership.

Mr. Flavien Joubert (Chairperson)	Director General (MEE)
Mr. Wills Agricole	Principal Secretary (MEE)
Ms. Marie-May Jeremie	CBD National Focal Point (MEE)
Mr. Ronley Fanchette	Director (MEE)
Mr. Justin Prosper	CAII (MEE)
Mrs. Begum Nageon	SSDS Coordinator (MEE)
Mr Alain Kilindo	Ministry of Land Use and Housing
Ms. Rebecca Lousteau-Lalanne	Ministry of Foreign Affairs
Mr. Hansel Confiance	Ministry of Foreign Affairs
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Ms. Annike Faure	PCU Project Manager (UNDP)
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