Republic of Seychelles

Fifth National Report
to the
Convention on Biological Diversity

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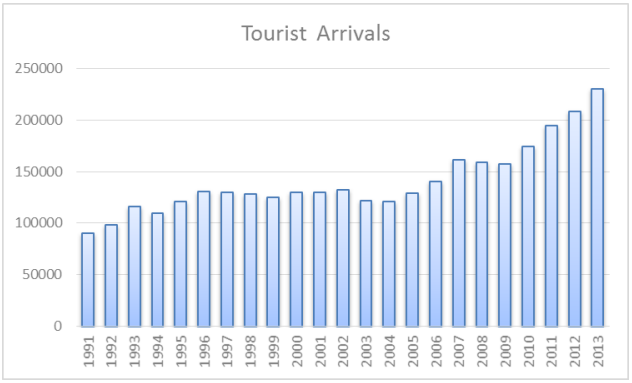
Executive Summary

Seychelles' Fifth Report to the Convention on Biological Biodiversity, in line with reporting criteria, builds upon and should be read in conjunction with the preceding Fourth National Report (GoS 2011). The report investigates and summarises the salient points of current knowledge on the importance, status and trends of and threats to Seychelles' biodiversity and the measures being undertaken to address these concerns and the gaps in current national implementation of the CBD and its Aichi Biodiversity targets. Seychelles has made extensive commitments to biodiversity conservation not least through the designation of nearly 50% of its landmass as Protected Areas. Indeed great progress has been made in addressing the priority concerns of the majority of terrestrial ecosystems. On land the primary threat to endemic biodiversity remains the ongoing spread of invasive alien species (IAS). The significant advances Seychelles has made in IAS eradication and management and ecosystem restoration, however, offer hope for the future, though the challenges posed by the difficult terrain and dense vegetation of key areas of endemism still exceed national capacities. In the marine environment much work remains to be done with very worrying trends evident in artisanal fishery catches and clear evidence of fishing down the marine food web giving substantive cause for concern.

Importance of Biodiversity. Seychelles depends on its tourism and fishing industries to support the country's social services and drive its socioeconomic development. Attempts have been made to further diversify the economy with offshore banking and international business zones but tourism and fisheries remain far and away the two main components of the national economy.
Fisheries, both artisanal and industrial, are directly dependent upon the sound management of marine resources, whilst tourism in Seychelles is based upon the aesthetic beauty of the islands with their tropical flora and fauna, white sand beaches and clear blue waters. All of these characteristics are derived from a healthy, clean and productive environment.

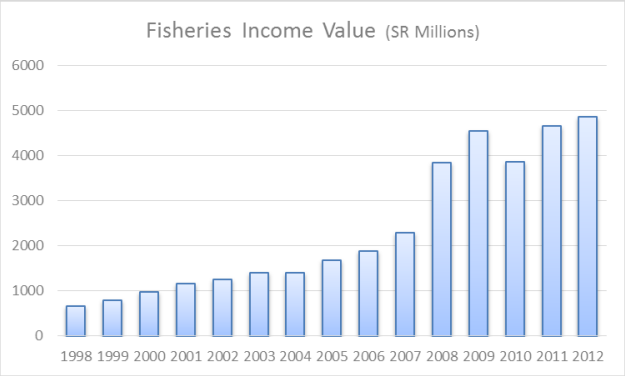
Tourism is the largest sector of the Seychelles economy accounting for 26% of GDP and employing over one third of the country's workforce in 2008. A record total of 230,272 tourists visited the country in 2013.

Tourism Arrivals 1991-2013.



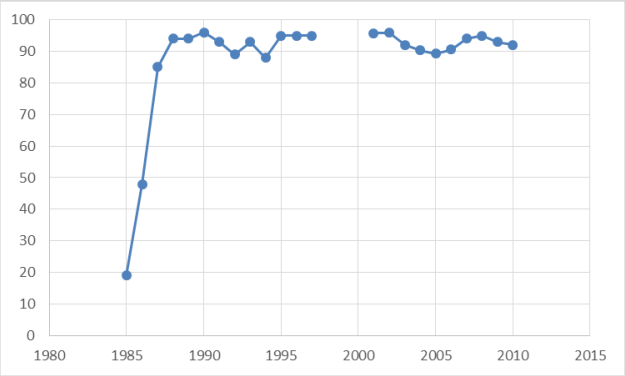
Fishing is a vital economic sector for Seychelles and central to national food security. In 2012 approximately 5,500 people were employed directly or indirectly in the fisheries sector constituting 12% of total formal employment. Fisheries revenue has risen steadily over the last 20 years (see fig below), the revenue upsurge in 2008 being due to the devaluation of the Seychelles rupee.

Fisheries Income 1998-2012.



Fisheries have consistently been the main national earner of foreign exchange. Fisheries are the dominant visible export accounting for an average of 92.6% of visible exports from 1987 to 2010.

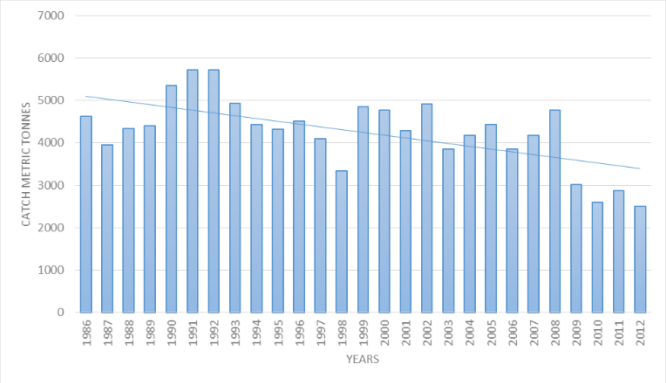
Fisheries as a Percentage of National Exports



The sector faces multiple challenges however as there is significant evidence that the demersal stocks of the Seychelles banks are over fished whilst the regional industrial fishery has yet to effectively address issues of by-catch and illegal, unreported and unregulated fishing.

Status and Trends of Biodiversity. The 4th National report to the CBD (GoS 2011) described at length the status and trends of Seychelles Biodiversity. In the subsequent years (2011-2013 inclusive) there has not been significant change in that overall assessment. Understanding of various aspects of biodiversity and their specific status and trends has progressed however and the salient points are covered in sections 2 and 7 of this report. Of key concern is the decline in artisanal fishery catches since 1991 and the marked decline of certain high value and ecologically important groups within that fishery.

Artisanal Catch 1986-2012



Fishing effort is not yet effectively managed and there is cause for concern in various high value target fisheries such as for the Emperor Red Snapper, Sea cucumber, Groupers and elasmobranchs.

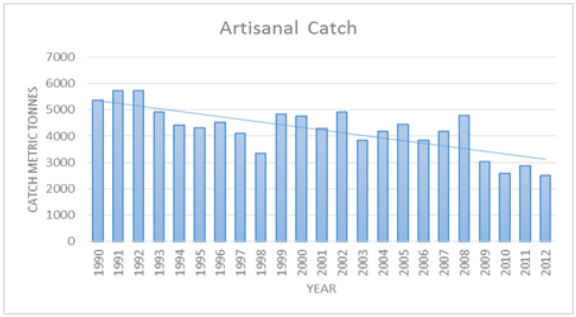
Addressing downward trends in the artisanal fishery is difficult because of the multispecies, multi-gear and patchy resource distribution of the fishery. This coupled with traditional open access fishing rights, numerous landing sites and the limited human and financial resources of the Fishing Authority make the conceptualisation, design and implementation of effective management regimes very problematic. The Seychelles Government and the Seychelles Fishing Authority in partnership with stakeholders have taken substantial steps to address these issues in the last three years as described in Section 7 of this report.

The management of terrestrial biodiversity has been far more successful with stable and even positive trends apparent in some habitat types. The exception is that of lowland inland waters, the most threatened of native habitat types due to historical and ongoing reclamation, drainage, siltation and pollution.

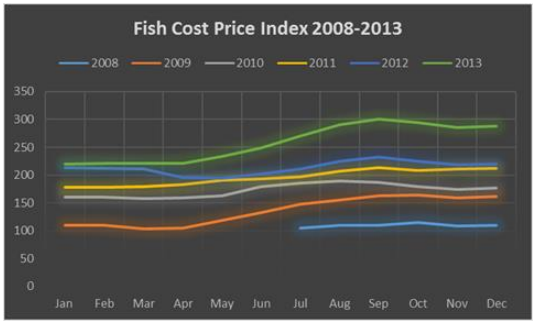
Main Threats to Biodiversity. The key issue affecting terrestrial biodiversity and in particular endemic biodiversity is that of invasive alien species (IAS). This is most relevant on the islands of Mahe and Silhouette whose hills and mountains with altitude above 200m are endemic biodiversity hotspots but where the terrain and dense vegetation make effective IAS management beyond current national resource's and capacity. Lowland wetlands are probably the most threatened habitat type in Seychelles due to the limited land area and the consequent development driven "coastal squeeze" making habitat loss through change in land use the primary threat and ongoing driver of biodiversity loss in this habitat type. The marine and coastal ecosystem is highly diverse and consequently faces a variety threats, the primary and most immediate threat being the unsustainable use of fishery resources. Climate change represents a pervasive threat to all of Seychelles' progress in the conservation and sustainable use of biodiversity and is perhaps constitutes the single greatest medium to long term threat to Seychelles' biodiversity and related socioeconomic well-being.
Knowledge and related data management is a key limiting factor to Seychelles' conservation and sustainable use of biodiversity. The complexity of tropical ecosystems coupled with the classic SIDS human resource constraints make adequate research and effective data management an ongoing challenge; this is particularly true *inter alia* in the domain of environmental economics. Cross-cutting this issue is the pressing need to properly integrate biodiversity data and values throughout the decision-making and development cycles.

Impacts of Negative Changes in Biodiversity. Quantitative and qualitative data are generally lacking in Seychelles regarding the impacts of declines in and degradation of biodiversity and its service provision. Good data is however available for the fishery sector and here biodiversity decline as evidenced by declining catch in the demersal fishery shows a distinct positive correlation with the cost price index for fish and was conserved the main driver of inflation in Seychelles in 2013.

Artisanal Catch 1990-2012



Cost Price Index for Fish 2008-2013



National Biodiversity Strategy and Action Plan (NBSAP). The implementation of the Seychelles NBSAP was reported on in detail in Seychelles previous (fourth) national report to the CBD (GoS 2011). A new NBSAP has recently been drafted and is reviewed here in terms of its contribution to the CBD Strategic Plan and specifically the Aichi Biodiversity Targets. This review shows that the current document does not properly integrate the Aichi Targets into its format, structure or priority actions and a review and re-drafting is consequently recommended.

Implementation of the Convention since 2010. Since 2010 the Seychelles government and stakeholders lead by the Seychelles Fishing Authority have taken significant and substantive steps to address the issues faced in the conservation and sustainable use of marine biodiversity including: the development of a new fisheries bill bringing fisheries governance in line with best current practise, the piloting of a new fisheries co-management model with the artisanal fishers of the second largest island of Praslin, the ongoing development of new monitoring and fishery management regimes - these matters are covered in detail in Section 7.1 of this document.

Seychelles has customarily addressed the conservation and sustainable use of terrestrial biodiversity through the establishment of protected areas and the implementation of IAS eradication and control programmes complemented by ecosystem rehabilitation projects and species re-introductions. These approaches have been refined over the last 3 years with: a detailed Key Biodiversity Assessment undertaken in the main granitic islands to provide a new basis for protected area and land use planning, the advancement of IAS management and eradication techniques expanding to new species and pre-emptive approaches realising additional benefits in endangered species conservation these are summarised in section 7.2 and expanded upon in case studies on IAS programmes and special focus sections on Aldabra and threatened endemic bird species.

Part III of the report includes an assessment of Seychelles implementation to date, of the 2020 Aichi Biodiversity Targets in tabulated format finding in most cases an encouraging level achievement and highlighting certain shortcomings such as in environmental economics and the mainstreaming of biodiversity values into national accounting models and highlighting issues as they pertain to lowland inland waters and problems of demersal fisheries stock depletion.

Lessons from Implementation of the CBD. The report concludes with a summary of key lessons learned from the national implementation of the CBD to date:

a). The majority of Seychelles endemic biodiversity resides at altitudes above 200 metres in the hills and mountains of Mahe and Silhouette. The key threat to this biodiversity is IAS but the steep terrain and dense vegetation make effective management of these areas beyond current or envisaged future capacity of the country. Seychelles primary biodiversity sustainable use issues are marine based over tens

of thousands of square kilometres of plateau and banks and hundreds of thousands of square miles of ocean making effective management and enforcement of sustainable use plans, policies and measures beyond institutional capacities. These are circumstances that are not likely to change and as such Seychelles will be dependent upon international assistance for its effective implementation of the CBD for the foreseeable future.

b). Conservation objectives have been identified, effectively communicated to stakeholders and the general public and implemented with significant success. Species extinction and its prevention is a message that has been effectively communicated and results have been positive, to date, in many instances.

c). Sustainable Use Objectives however are proving far more difficult to address and in particular in the marine domain and fisheries. The lure of short term financial gain and the traditional open access approach to what is often still perceived as a "free and inexhaustible" resource base are currently proving to be barriers too difficult to surmount. A new approach is required and the Seychelles Government has commenced the international pioneering of the Blue Economy Concept (GoS 2014a) most recently culminating in the Blue Economy Summit held in Abu Dhabi in January 2014. With international momentum galvanised focus is now also turning to development of the national governance mechanisms required to establish the Blue Economy nationally as the new economic paradigm. This phase shift in development policy offers hope to negotiate many of the challenges the country faces in terms of the conservation and sustainable use of marine biodiversity. If all goes well the blue economy should form a major component of activities covered in Seychelles 6th national report to the CBD.

d). The mainstreaming of pertinent CBD commitments into national strategic documents, polices and plans remains a key administrative weakness by limiting the national capacity to appropriately prioritise activities, target resources and assess and report upon progress in implementation of the CBD. It is thus very important that the current opportunity to revise the draft NBSAP be utilised to the full.

e). Climate change threatens the national progress realised to date in the conservation and sustainable use of biodiversity and poses perhaps now the single greatest threat to Seychelles' biodiversity and related socioeconomic well-being. Effective international cooperation is more imperative now than ever if the objectives of the CBD are to be realised.

Part I: Biodiversity Status and Trends

1. Importance of Biodiversity

The first European explorers to Seychelles found the islands uninhabited by man and the main islands of the granitic archipelago rich with sources of water, food and materials with which to revictual and repair their ships. The accounts of the first settlers make clear their total dependence upon the biodiversity resources not only for their subsistence but also as the basis for all economic activity. As the economy developed and evolved through the subsequent decades and centuries other activities were incorporated that were not directly dependent upon the biodiversity resource base. Despite this diversification it was not until the latter half of the 20th century that significant components of economic activity evolved - such as tourism, the broader services industry and some elements of light industry - that were not directly related to utilisation of the biodiversity resource base.

The building of the international airport in 1971 provided the basis for the development of the tourism industry as well as providing access to potential overseas fresh fish markets to the artisanal fishery. In the 1980s, following Seychelles' declaration of its Exclusive Economic Zone (EEZ) and the subsequent development of a tuna canning facility in Port Victoria; the industrial tuna fishery rapidly became a major source of national income.

Today the Seychelles depends on its tourism and fishing industries to support the country's social services and drive its socioeconomic development. Attempts have been made to further diversify the economy with offshore banking and international business zones but tourism and fisheries remain far and away the two main components of the national economy.

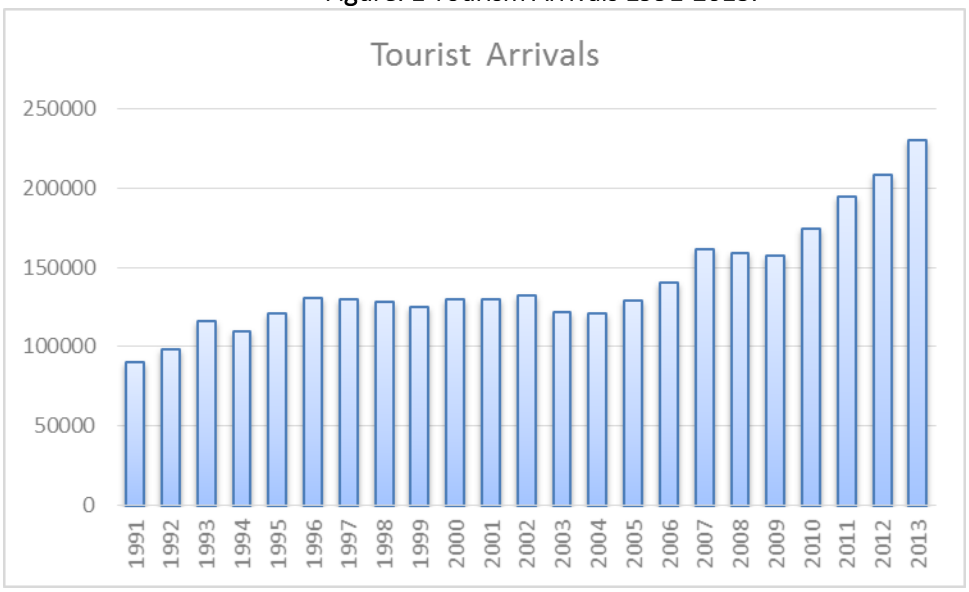
Fisheries, both artisanal and industrial, are directly dependent upon the sound management of marine resources, whilst tourism in Seychelles is based upon the aesthetic beauty of the islands with their tropical flora and fauna, white sand beaches and clear blue waters. All of these characteristics are derived from a healthy, clean and productive environment. Nature-based tourism and ecotourism activities represent the fastest growing component of the international tourism trade and Seychelles has maximised the marketing of its healthy and beautiful environment and endemic species of flora and fauna. The private sector in particular has shown strong recognition of the importance of biodiversity as a key factor in attracting the high revenue clientele it seeks. This has been embodied in the ecological rehabilitation of several islands in the central archipelago with the removal of invasive alien species (IAS) and the (re)introduction of threatened endemic species as part of national conservation programmes in tandem with the marketing of said islands as exclusive hotel ecotourism resorts. This trend seems set to continue in the Amirantes archipelago with several island foundations being registered as a partnership between tourism operations and/or tenants and the Islands Development Company[1] with the objective of supporting and enhancing the environmental and biodiversity management of the islands.

[1] The Islands Development Company is a parastatal organisation whose main role is the sustainable management and development of the outer islands; encompassing tourism and infrastructural development.

1.1. Tourism industry

Tourism is the largest sector of the Seychelles economy accounting for 26% of GDP and employing over one third of the country's workforce in 2008. A record total of 230,272 tourists visited the country in 2013.

Figure. 1 Tourism Arrivals 1991-2013.



Compiled from NBS 2008, 2013a, 2013b

Tourism has proved to be a resilient economic sector which continued to grow despite global impacts from both Gulf Wars and the global economic crisis that commenced in 2008. Despite the ongoing fragility of international money markets and poor economic growth in Seychelles' main tourism markets, visitor numbers soon returned to growth and indeed at an escalated rate. This was likely fostered by the significant devaluation of the Seychelles currency at that time but also coincided with the implementation of a reinvigorated national marketing campaign. Revenue however has not grown at the same rate as visitor numbers reflecting in part the new exchange rate equilibrium.

Environmental and biodiversity attractions form the primary basis for international marketing with Seychelles being in particular renowned for:

- the endemic Coco-de-mer palm (*Lodoicea maldivica*) which amongst various notable characteristics sports the largest seed of any plant in the world,
- the Giant tortoise (*Aldabrachelys gigantea*).

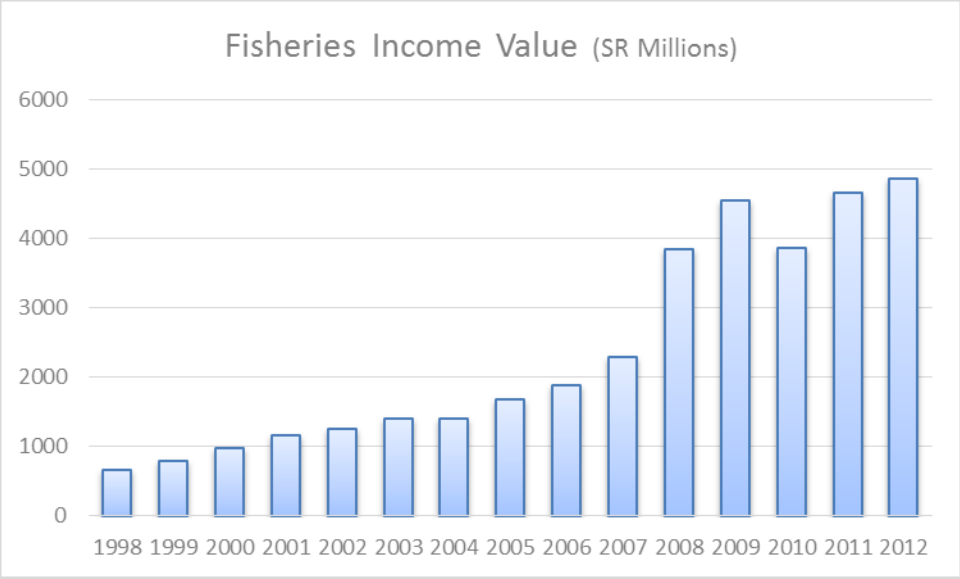
In recent times however other attractions have also come to the fore such as the central archipelago's rare endemic birds, the unique palm forest of Praslin and the rich and diverse attraction of the near shore marine environment with turtles, marine life and including seasonal aggregations of the largest fish in the world, the whale shark (*Rhincodon typus*), developing their own tourism markets.

1.2. Fisheries

Fishing is a vital economic sector for Seychelles and central to national food security. In 2012 approximately 5,500 people were employed directly or indirectly in the fisheries sector constituting 12% of total formal employment. Approximately 70% of the workforce are employed in the industrial tuna fishery and ancillary services, the artisanal fishery constitutes between 1,300-1,400 fishers depending on seasonal variations in activity, the sea cucumber fishing industry employed 150 people in 2011 with another 120 employed in fishery management, administration and research under the auspices of the Seychelles Fishing Authority.

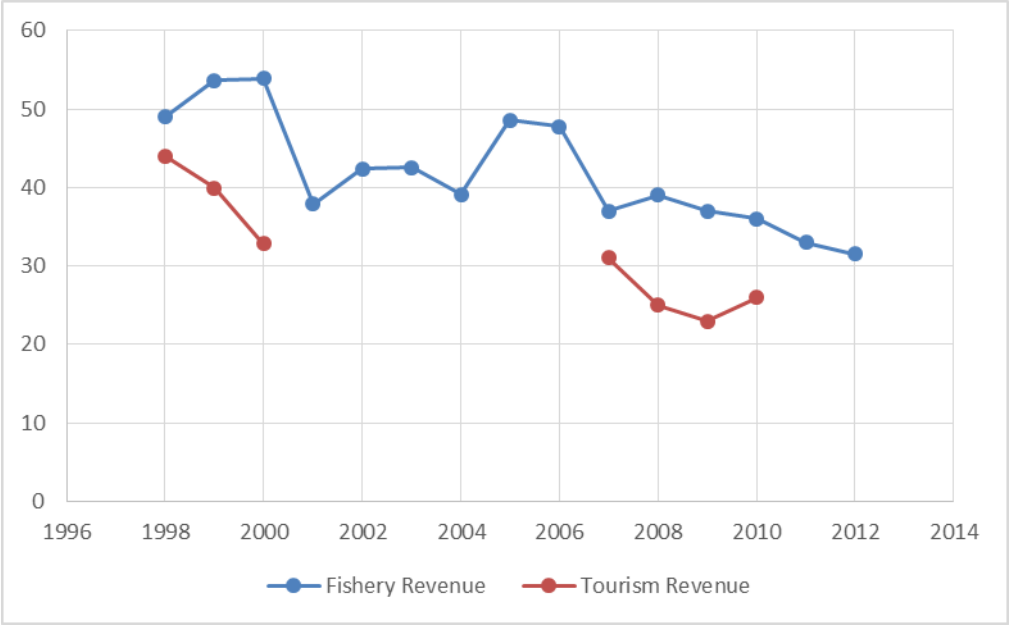
Fisheries revenue has risen steadily over the last 20 years (see **Fig 2**), the revenue upsurge in 2008 being due to the devaluation of the Seychelles rupee.

Figure 2: Fisheries Income 1998-2012.



Fisheries have consistently been the main national earner of foreign exchange (**See fig 3**). Official figures from the Central Bank Annual Report indicate that in 2012, tourism earnings amounted to SR4.247 billion or 27% of current account receipts whilst the earning from fisheries and related activities accounted for 31% of current account receipts (**SFA 2012**).

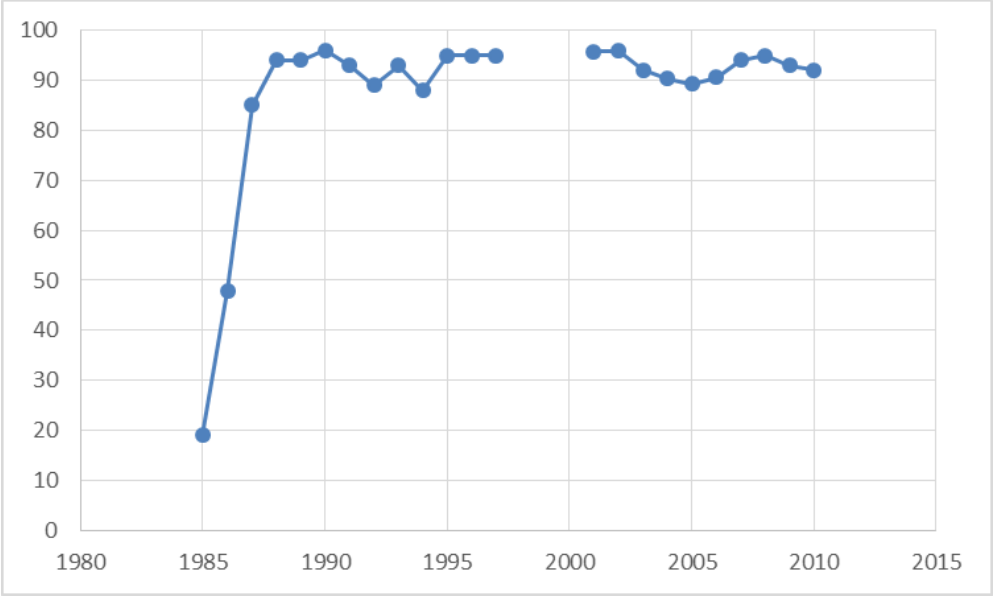
Figure 3: Fisheries and Tourism Revenues as Percentage of Foreign Exchange Income.



(Compiled from various NBS, SFA and CBS Reports)

Fisheries are the dominant visible export accounting for an average of 92.6% of visible exports from 1987 to 2010 (See fig 4).

Figure 4: Fisheries as a Percentage of National Exports



(Compiled from various NBS, SFA and CBS Reports)

The sector faces multiple challenges however as there is extensive evidence that the demersal stocks of the Mahé plateau are over fished (See Section 2.1) and consequently issues of overcapacity in the domestic fleet need to be addressed. The industrial fishery faces similar problems with the Indian Ocean Tuna

Commission clearly lacking the capacity to effectively address issues of by-catch and illegal, unreported and unregulated fishing (IUU)[2]. Data regarding key by-catch species of the fishery, in particular, is chronically deficient and a key barrier to the informed and adaptive management of by-catch issues.

1.3. Biodiversity Values

Biodiversity of course offers more than just direct consumptive use values to the economy and society (**See Table 1**). 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. Human and 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 applications for 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 1: Values of Seychelles Biological Resources

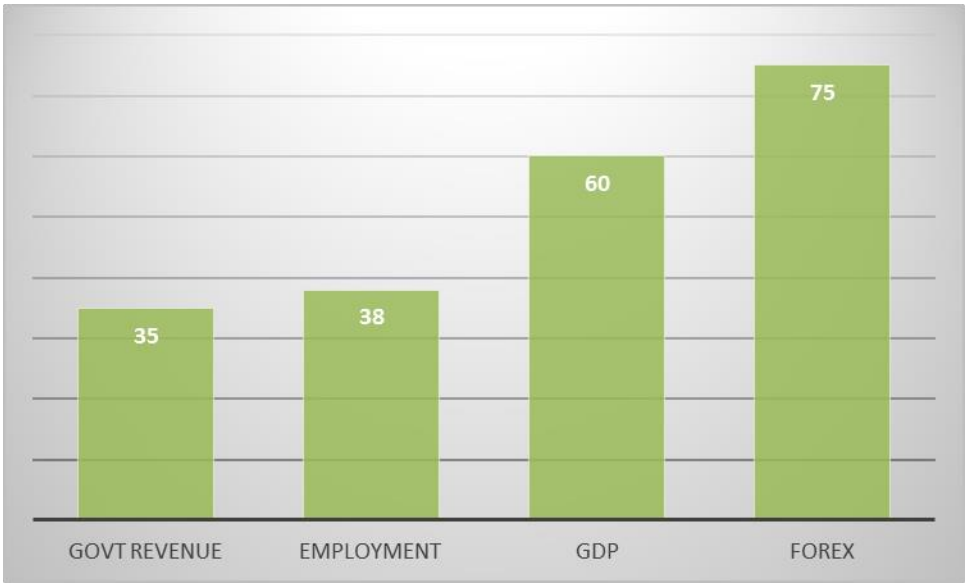
Use Values				Non-Use Values
Direct		Indirect	Option	Existence
Consumptive	Non-consumptive	Ecological service provision such as Water and soil cycle maintenance. Or support of populations with direct consumptive value.	Future value of biodiversity maintained in healthy, diverse, productive state for future, perhaps as yet unknown, consumptive and non-consumptive modes of use.	Intrinsic value. Additional existence values such as cultural, spiritual and bequest values.
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...			

Economic assessments of the value of Seychelles' biodiversity are somewhat limited. A basic assessment was undertaken in 1997 (**Emmerton 1997**) as part of the process to develop the first national biodiversity strategy and action plan. Subsequent basic studies have been undertaken on: the socioeconomic impacts of marine ecosystem degradation with a focus on the impacts of the 1998 severe coral bleaching event (**Cesar *et al* 2004**), a travel cost analysis of 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)** was undertaken as part of the preparatory process for the development of a GEF full-size project entitled "Mainstreaming biodiversity in production landscapes and sectors". This study calculated that the contribution of biodiversity to the Seychelles economy was very significant (**See Fig 5**), constituting 35% of

[2] Seychelles is a founding country member of the FISH-I Africa partnership launched. This Southeast African partnership to help stop illegal fishing in the Western Indian Ocean was launched in December 2012 and has already yielded notable successes.

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 5: 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. Social activities revolve around the coast and the interface of land and sea. The leisure time of the vast majority of Seychellois is coastally oriented and based upon activities such as fishing, swimming, water sports, beach games and socialising (picnics, barbecues, family fun days and dances) including national events such as the annual Regatta. This entrenches the environment, natural outdoors experience and interests as a unifying bond at the core of the nation's cultural identity centred upon a close interaction and affinity with nature and the natural world. This is prominently reflected in Seychellois musical and visual arts.

The cultural importance of such interaction has become more prominent in recent years with former communal areas being lost or open access to them restricted – beach access in particular is a growing problem. Broader concerns about the existence value of biodiversity have recently manifested in widespread public objections to the proposed development of the last physically intact mountain to coastline catchment and watershed system, with associated wetlands and important turtle rookeries, on the main island of Mahe.

Successive stakeholder biodiversity/environment strategic planning processes have identified the lack/absence of trained environmental economists in the country and the need to mainstream environmental evaluation into the decision-making process. Despite this the action plans to establish domestic environmental economics capacity have not been realised and as such this shortcoming is still in need of redress.

2. Changes in Status and Trends of Biodiversity

Seychelles' Fourth National Report to the CBD, submitted in March 2011, included a lengthy assessment of the status and trends of the country's biodiversity. In the three years since that report, as one might expect, there have been no major changes in said status and trends. Trends that were in general negative at that time remain so today and likewise with the habitat types and species that were considered stable or exhibiting positive trends.

There has however been significant progress made in the understanding of the status of elements of Seychelles' biodiversity both terrestrially and marine through targeted, management oriented research, particularly in the domain of fisheries and terrestrially in terms of the assessment of Key Biodiversity Areas. There have also been some excellent direct management interventions that have yielded rapid benefits in terms of the status of certain threatened biodiversity. The broader issues will be covered in synthesis here and some of the specific notable findings and interventions are elaborated upon in case studies in **Section 7** of this report.

2.1. Marine Biodiversity

The marine and coastal biodiversity of Seychelles has been fundamental to socioeconomic development since human colonisation in the late 18th century. Man's early resource exploitation saw the demise of certain key mega fauna from the marine and coastal ecosystem, notably the salt water crocodile and two species of seal, and the dramatic decline of others such as sharks and marine turtle populations. Since the 1950s these declines have continued and spread down the food chain to mesoconsumers. Both the "fishing down" of the food chain and the lowering of the catch trophic index are notorious portents of declining resources, reduced revenue and degradation of broader ecosystem function and service provision. Urgent action is needed in the form of a significant restructuring of fishery governance and management approaches to address these negative trends. A key precursor to informed action is improved gathering, management and analysis of data on species, habitats and ecosystems. Significant targeted progress has been made in these regards in the last three years and is expanded upon in **Section 7**.

Table 2: Marine Biodiversity Overview

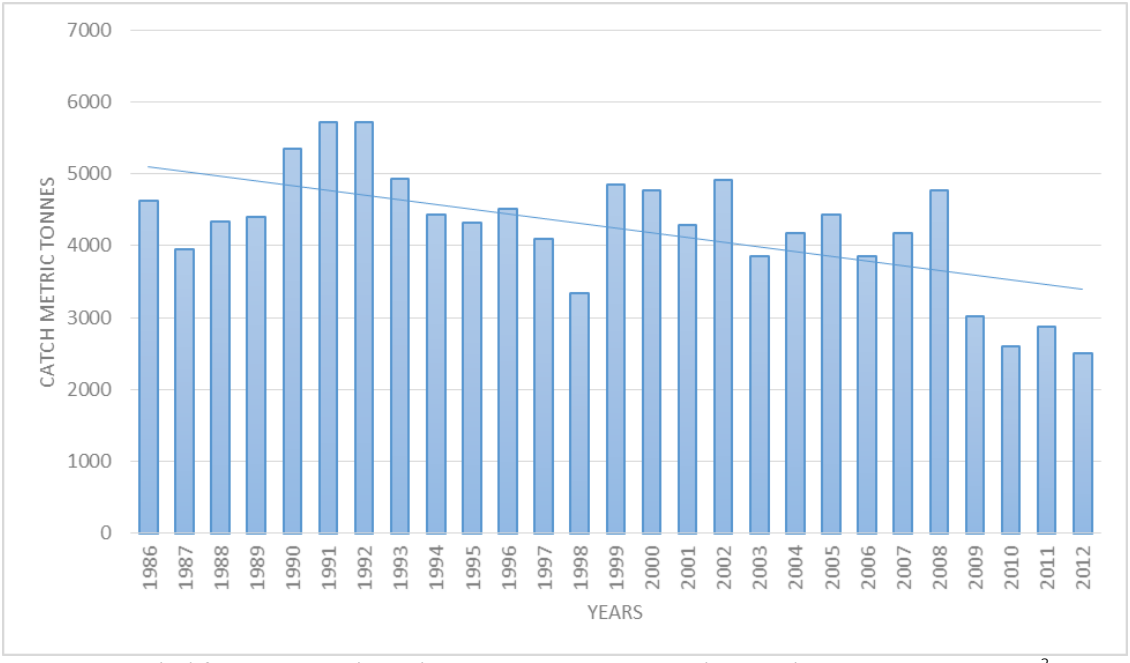
Taxonomic Group	Species	Notes
Macroalgae	approx. 330	Rich species composition at most islands. Domination of red and green algae and poor development of brown algae around the coral islands. Occurs in high density in nutrient rich waters such as off Port Victoria and certain seabird colony islands. Commercially exploitable stocks of Sargassum and Gracilaria have been recorded around the granitic islands (**Kalugina-Gutnik *et al* 1992**).
Alismatales (Sea grasses)	8 species	Commercially exploitable stocks of sea grass (*Thalassodendron ciliatum*) with biomass of 1-4 kg/m^2 have been recorded in the coral islands (**Kalugina-Gutnik *et al* 1992**).
Porifera (Sponges)	➢ 350	351 species recorded (**Van Soest 1994**). Populations around the granitics are more diverse 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	Species data not available.
Scleratinian corals	➢ 200	Diversity much greater around the coral than the granite islands. Includes at least 39 species of free living scleratinians (Latypov 2007). At least 34 species are classified as Vulnerable or endangered under IUCN criteria.
Octocorallian corals	➢ 70	
Molluscs Gastropods	500	(Jarret 2000)
Bivalves	➢ 100	(Jarret 2000)
Crustacea Shrimps	➢ 165	At least 5 endemic species: *Eupontonia noctalba, Jocaste platysoma, Periclimenaeus manihinei, Periclimenes compressus, Periclimenes difficilis* (Bruce 1971, Fransen 1994).
Macrura (Lobster & crayfish) Palinuridae Scyllaridae	 4 3	Fishery managed by periodic closures to allow stocks to recover. (Bautil 1991). *Panulirus penicillatus, P. longipes, P. versicolor* and *P. ornatus* *Thenus orientalis, Parribacus antarticus, Scyllarides elisabethae*
Echinoderms Crinoids	 10	(Sloan *et al* 1979)
Asteroidea	32	
Ophiuroidea	44	(Clark 1980)
Echinoidea	33	
Holothuroidea (Sea cucumbers)	43	43 species recorded (Clark 1984, Conand 2008). More than 20 commercial species have been identified in Seychelles waters, with some 15 currently making up the fishery with 6 species constituting the vast bulk of the catch (See Case Study 1)
Fish Osteichthyes	➢ 1,150	More than 400 of these species are coral reef associated species. Some 150 species makes up the artisanal fishery several of which are threatened. Endemism is low considered to be at about 1%.
Chondrichthyes Selachii (sharks) Batoidea (rays) Rhinobatidae (Guitarfish)	79 (60) (16) (3)	A review of species undertaken for this report suggests there are 79 confirmed species of Chondrichthyan in Seychelles waters 60 shark, 16 ray and 3 guitarfish species. Of the 71 species that have been identified to species level 30 are considered threatened (i.e. Vulnerable or Endangered), 15 species are Data Deficient and 1 species has not been evaluated. (See Sections 2.2c & 7.1 for further details).
Chelonii	5	The critically endangered Hawksbill turtle (*Eretmochelys imbricata)* and the endangered Green turtle (*Chelonia mydas)* nest in Seychelles though much reduced from historical numbers. The critically endangered Leatherback (*Dermochelys coriacea),* the endangered *Loggerhead* (*Caretta caretta)* and the Vulnerable Olive Ridley turtle (*Lepidochelys olivacea)* utilise Seychelles waters but do not nest there.
Mammals Cetaceans Sirenia	 27 1	Including the Endangered Sei, Blue and Fin Whales (*Balaenoptera borealis*, *B. musculus* & *B.physalus*), and the Vulnerable Sperm Whale (*Physeter macrocephalus*) and eight species of dolphin. There is a small but apparently increasing population (approx. 20-25) of the Dugong (Dugong dugong) at Aldabra atoll. (Kiska *et al* 2009, Dalebout *et al* 2014).

It has been recognised since the late 1980s that the inshore demersal fishing grounds around the central archipelago were over-exploited (**Lablache *et al* 1988**). The strategic response to this was to encourage exploitation of the outer banks of the Mahe plateau which was assessed to have scope for further exploitation (**e.g. Kunzel *et al* 1983**). The 1998 national inshore fisheries management strategy (**Mees *et al* 1998**) maintained this assumption but, noting that the catch had declined since 1991, cautioned that the outer banks of the Mahe plateau may have been sequentially depleted by the expanding geographic action of the fleet through time, giving the impression of sustainably maintained catch rates, and that if this was indeed the case, a fundamental change in fisheries management tactics may be necessary.

Another 15 years on, 1991 does appear to have marked a peak in the artisanal fishery with a steady trend of decline in catch since that time (**See Fig 6**).

Figure 6: Artisanal Catch

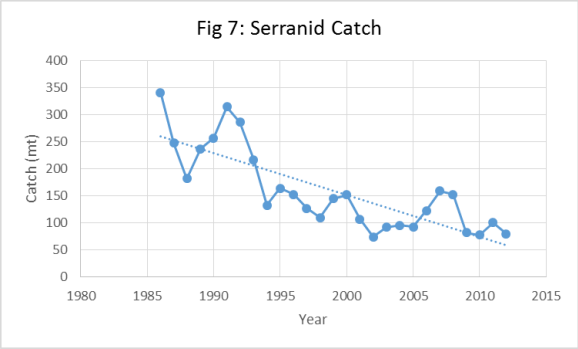


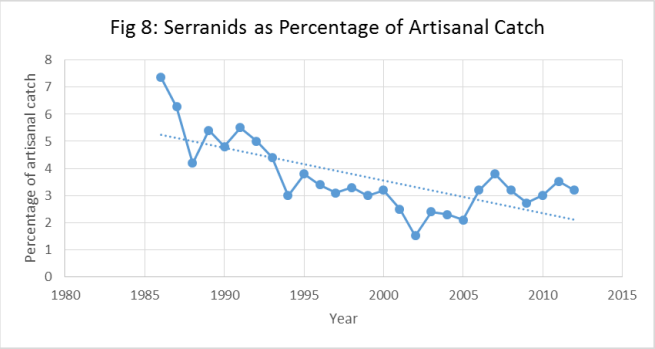
[Compiled from SFA Technical Reports 1986-2009 and Annual Reports 1986-2012][3].

Trends in various guilds of the fishery also give rise for concern; not surprisingly, due to life history traits and high commercial value, this is most evident in the Serranids (**See Fig 7**) which have not only declined in total catch but also as a proportion of the overall artisanal catch (**See Fig 8**). The recent small increase in catch of Serranids apparently reflects the targeting of large groupers in the more distant and less fished, but also much smaller, Amirantes plateau which is unlikely to be able to sustain such catches for long.

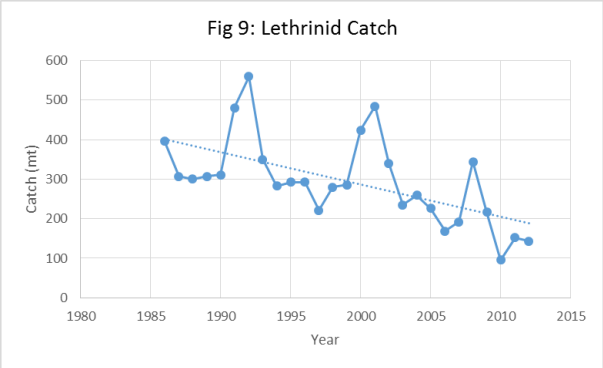
[3] It is important to note that the additional drop in catch from 2009 may also reflect the impacts of piracy on the range of activity of the artisanal fleet.

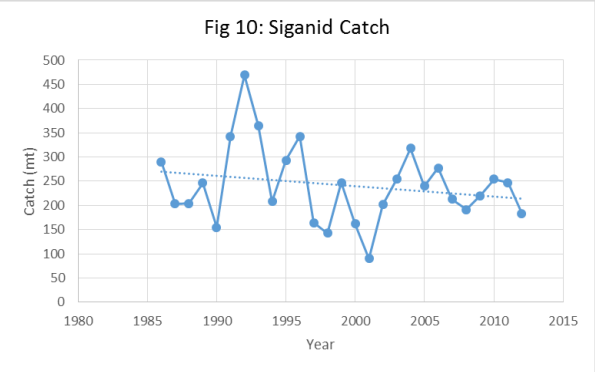
Declining trends are also apparent however in the Lethrinid catch (See Fig 9) and to a much lesser degree in the Siganid trap fishery (See Fig 10).





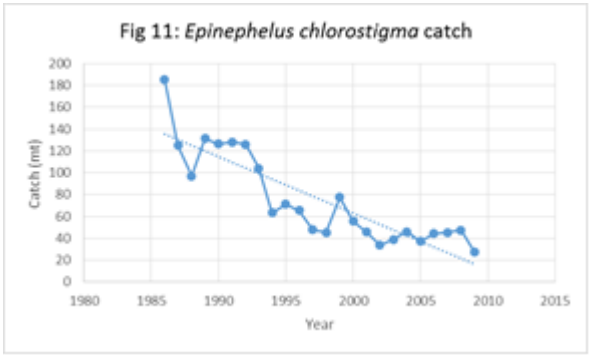
[Figs 7 & 8: Developed from SFA Technical Reports 1986-2009 and Annual Reports 1986-2012]

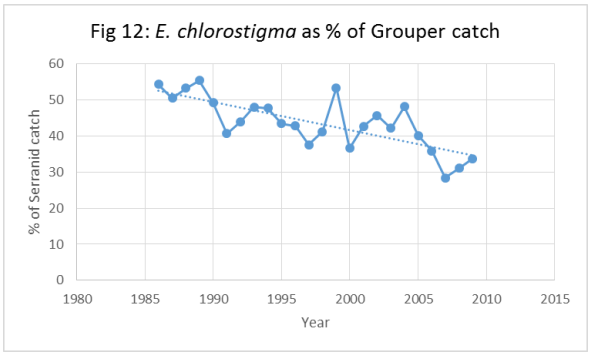




[Figs 9 & 10: Developed from SFA Technical Reports 1986-2009 and Annual Reports 1986-2012].

Of further concern is the decline of the most common grouper the Brown marbled grouper (*Epinephelus chlorostigma*), known locally as "Makonde" not only in terms of catch (See Fig 11) but also as a component of the overall grouper catch. The Makonde is a smaller faster growing species, making it more resilient to fishing pressure in terms of life-cycle characteristics than larger serranids, and by far the most abundant making it a very important component of the artisanal catch. It would appear however that targeted fishing pressure on it is such that it is being depleted faster than the overall Serranid fishery (See Fig 12).



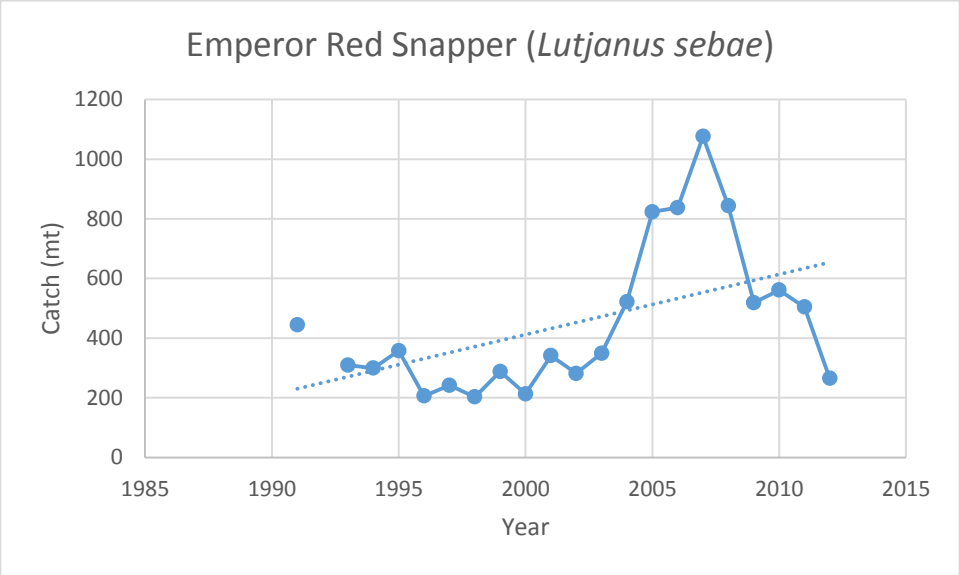


[Figs 11 & 12: Developed from SFA Technical reports 1986-2009 and Annual Reports 1986-2012].

One segment of the artisanal fishery that has shown a strong positive trend is the Emperor red snapper (*Lutjanus sebae*) but unfortunately, in light of the findings of previous studies this also gives rise to concern that the resource is being unsustainably exploited due to its high and rising commodity value.

Focus on the Emperor Red Snapper (*Lutjanus sebae*) Fishery

Figure 13: Emperor Red Snapper catch



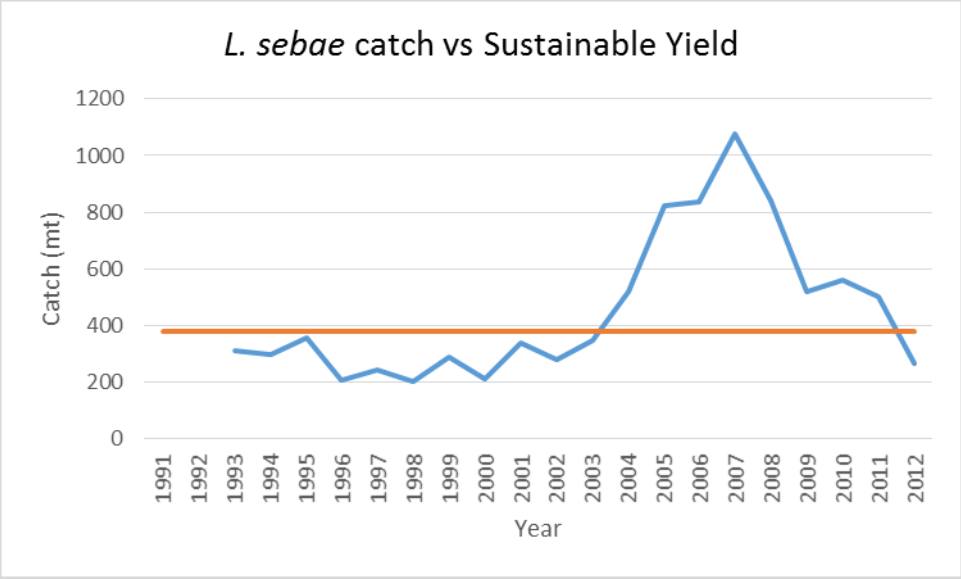
(Developed from SFA Technical reports 1991-2012)

The Life history characteristics of *Lutjanus sebae*, long lifespan, slow growth rate and late age at sexual maturity make it vulnerable to overfishing. A previous study (**Grandcourt *et al* 2008**) undertook a retrospective, 1977-2006, stock assessment of *Lutjanus sebae* that found the fish became vulnerable to the fishing gear of the hand line fishery at a mean age of 3.1 years significantly before the mean age of sexual maturity of 9 years and that as a consequence immature fish made up more than 50% of the catch. This leaves the population vulnerable to unsustainable recruitment overfishing. The study found that in most years the fishery was close to the recruitment overfishing threshold and likely surpassed it in 1990 and 2004. The paper concluded that the dramatic increase in recent yields is cause for significant concern and further evidence that management of the fishery requires urgent attention. **Figure 13** above shows that catch increased significantly again the next year before falling dramatically in 2009. The impacts of piracy on fishing activity, from 2008 onwards, complicate assessment of the scenario as do, with *L. sebae* being a coral reef species, potential lag effects on fish recruitment caused by the 1998 severe coral bleaching event (**Graham *et al* 2007**) but the downward trend continued in 2011 and 2012, and in light of the parameters set above and in particular the potential lag effects of recruitment overfishing there is legitimate concern that that the standing stock for the species has been significantly undermined.

This concern is amplified when the catch figures are see in light of a previous *L. sebae* stock assessment on the Seychelles plateau (**Lablache & Carrara 1988**). Using length cohort analysis the

biomass of *L. sebae* on the offshore banks of the Seychelles plateau was estimated at 2,360 metric tonnes (or 0.36 mt/km2) producing an estimated sustainable annual yield of 380 mt (**See fig. 14**). There are admittedly shortcomings with these estimates not least the limited, 2-year, dataset upon which it is based. Offshore banks have always been considered the primary demersal fishing grounds, and *L. sebae* as the single most important commercially exploited demersal species is known to be caught mainly offshore on these banks. *L. sebae* is also caught in the coastal trap fishery and has been found in lower abundance on the sand bottom central areas of the plateau. Recent VMS (vessel monitoring system) data indicate much more fishing activity in the central plateau than had previously been thought, meaning the standing biomass and yield of the fishery need reassessment. Nevertheless, without other information and in light of significant increases in catch from 2001 the 380 mt guideline is a good precautionary measure for sustainability (**fig 14 below**) and provides significant cause for concern

Figure 14: Catch versus Sustainable Yield Estimate.



Series 1: Catch Series 2: Estimated Sustainable Yield

(Developed from SFA Technical reports 1991-2012 and **Lablache & Carrara 1988**)

There is strong evidence therefore to show that Emperor red snapper (*Lutjanus sebae*) is over-exploited in Seychelles and to date there is no management/recovery plan in place for the species or measures to reduce the fishing pressure upon it. These problems are recognised internationally with the Blue Ocean Institutes' sustainable seafood choices programme allotting a score of just 2.05 and an amber warning code to the Seychelles Emperor red snapper fishery (**BOI 2014**).

Addressing downward trends in the artisanal fishery, however, is difficult because of the multispecies, multi-gear and patchy resource distribution of the fishery. This coupled with traditional open access fishing rights, the numerous landing and sale sites throughout the islands, the independent nature of artisanal fishers and the limited human and financial resources of the Fishing Authority make the conceptualisation, design and implementation of effective management regimes very problematic.

Sound, representative data collection is key to the development of sustainable management regimes and a review and updating of management modalities is required if the demersal component of the artisanal fishery is to be placed on a sustainable footing. The Seychelles Government and the Seychelles Fishing Authority in partnership with stakeholders have taken substantial steps to address these issues in the last three years as described in Section 7.

Another high value commodity fishery that has been shown to be prone to overfishing and collapse throughout the tropics is that of the sea cucumber, this has received significant attention in Seychelles but is nevertheless showing many of the classic warning signs of unsustainable exploitation see the case study below.

Case Study 1: The Seychelles Sea Cucumber Fishery

The Sea Cucumber Fishery is a high value commodity fishery which has come to the fore nationally in the last 17-18 years. Sea cucumber has been gathered and prepared for export in Seychelles since the late 19th century. The scale of the fishery however was always limited with annual exports of dried product rarely exceeding 10 tonnes. Sea cucumbers were collected from shallow lagoon waters and reef flats at low tides by skin divers or fishers on foot respectively. In the late 1990's the fishery experienced rapid development due to the growing demand and higher prices for dried sea cucumber on the international market (Aumeeruddy & Payet 2004, Aumeeruddy & Conand 2007). Near shore and shallow water stocks were rapidly depleted leading the Seychelles Government to regulate the fishery (GoS 1999) by initiating a licensing system for fishing and processing sea cucumbers, a quota on the number of fishing licenses allocated each year, and a limit of four divers for each fishing license (Aumeeruddy & Conand 2007). The Government also initiated detailed data collection for the fishery and with the help of the FAO undertook a stock assessment in 2004-2005.

43 species of sea cucumber (*Holothuroidea*) have been identified in Seychelles waters to date (see Table 1 and Section 2.2.b. for more information) with more than 20 species having commercial potential. The vast bulk of the current catch however focuses on the six most profitable species (see Table below). Of these species: 3 are classified as Endangered and 2 as Vulnerable under the IUCN red List criteria which reflects their declines globally due to exploitation to supply the international Beche-de-Mer (dried sea cucumber) market. The sixth species known locally as Pentard and the most valuable of all, is a species of Flower teatfish (*Holothuria sp.*) that has not yet been taxonomically classified and therefore has not yet been evaluated under IUCN criteria.

The 2004 stock assessment (Aumeeruddy *et al* 2005) identified densities of occurrence of the various species throughut the Seychelles and Amirantes banks and drew conclusions about stock status (see table below) and made recommendations for future Total Allowable Catch (TAC) per species.

Common name	Scientific name	IUCN Red List status	Status (Aumeeruddy *et al* 2005)	Commercial value (Conand 2008)
"Pentard" Flower teatfish	*Holothuria* sp.	Not Evaluated	Fully exploited	1 High
White teatfish	*Holothuria fuscogilva*	Vulnerable	Fully exploited	1 high
Prickly redfish	*Thelenota ananas*	Endangered	Fully exploited	1 high
Black teatfish	*Holothuria nobilis*	Endangered	Underexploited	1 high
Sandfish	*Holothuria scabra*	Endangered	Overexploited	1 high
Blackfish	*Actinopyga miliaris*	Vulnerable	Underexploited	2 medium

The Sandfish (*H.scabra)* was identified as being already overexploited and heavily depleted and it was

recommended that a moratorium be placed on the fishing of this species. Three other species were identified as fully exploited *H. fuscogilva*, *T. ananas* and "Pentard". Aumeeruddy *et al* 2005 also recommened the institution of minimum size limits for the fishery. Unfortunately neither the TACs or size limit measures were applied. In recent years the TACs have been exceeded for 3 high value species (**See Fig. 15 & 16**) and in particular for Pentard which has been the primary catch species for the fishery since 2006.

Figure 15: Pentard Catch vs TAC

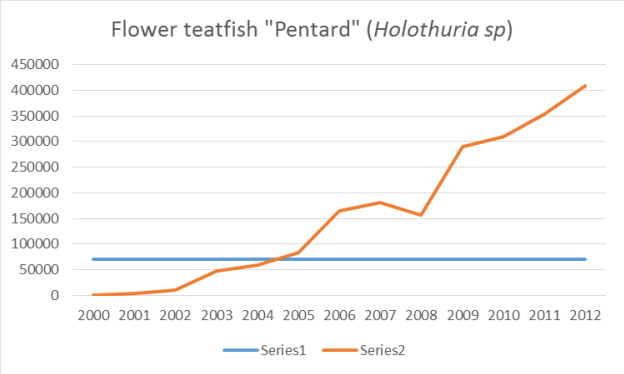
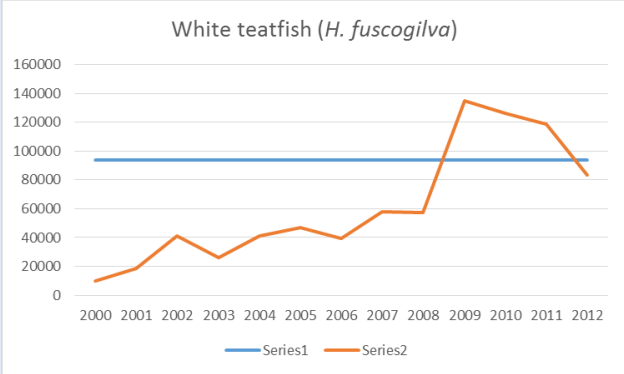


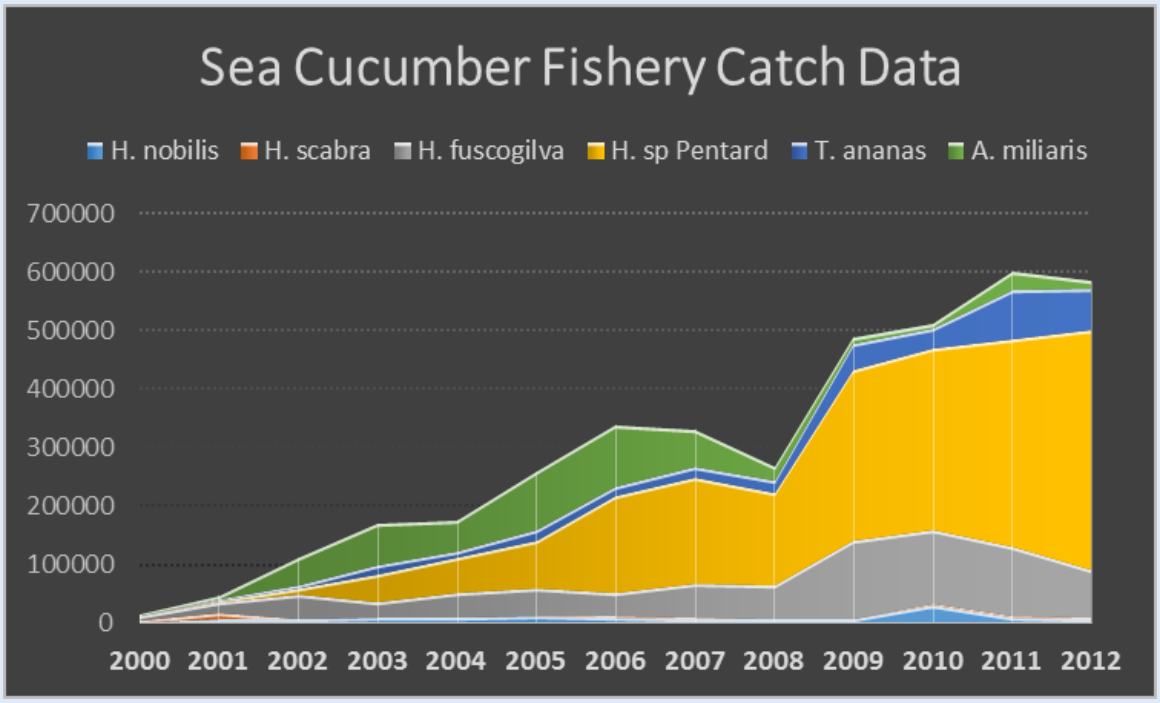
Figure 16: *H. fuscogilva* catch vs TAC



Series 1: Recommended TAC Series 2: Catch.

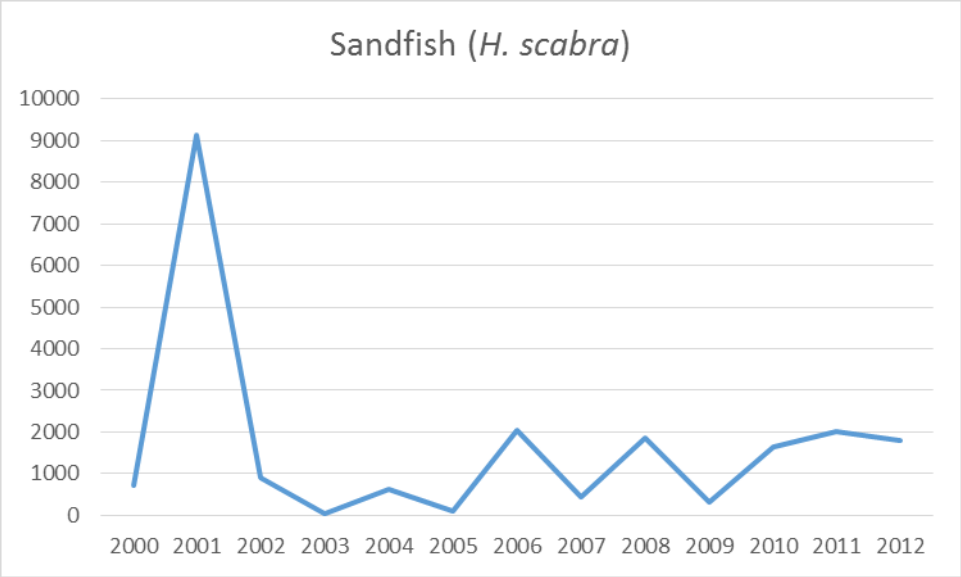
The overall catch for the fishery has continued to rise (**See Fig. 17**) but this is due to the increasing targeted catch of the most valuable species "Pentard" with catches now running at 5 times the recommended TAC.

Figure 17: Sea Cucumber Fishery Catch Data



One of the primary concerns is that the catches may be being maintained by a process of serial depletion where once an area is exhausted of its viable sea cucumber populations the fishing effort moves on to new grounds, giving the impression of sustained catches but atually effecting the systematic depletion of stocks. There is some evidence of this phenomenon in the catch data for the Sandfish (*H. scabra*) which formerly abundant is now scarce and was recommended for a zero TAC in 2005. Figure 18 below shows the zigzag of the catch for *H. scabra* effectively "bumping along the bottom" which is symptomatic of the process of serial depletion.

Figure 18: *H. scabra* Catch Data



What is apparent from these figures is that the current effort and capacity control measures in place are insuffcient to control species-specific catches. A recent review (MRAG 2012) supported this conclusion and recommended the imposition of TACs and minimum size limits in line with the recommendations of Aumeeruddy *et al* 2005. In the meantime more data needs to be gathered in particular with regard to size at maturity for the main species to assist in refining future size and TAC limits. The MRAG review also suggested that a temporary moratorium on the catch of Pentard might be advisable in light of the catch being well above recommended levels in recent years.

To date however none of the above recommended meaures have been applied and the US$ 7 million per annum fishery (TRC 2013), with the livelihoods of some 120 households estimated to be involved in at least one stage of the fishery process (Marguerite 2005), is continuing on a business as usual basis.

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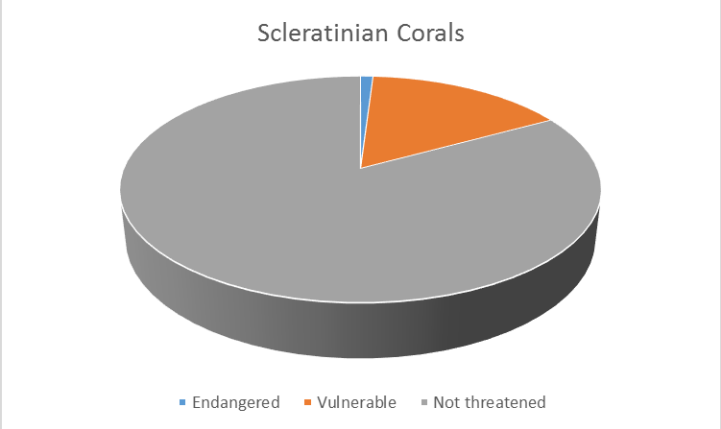
2.2. Threatened Status Analyses

a). Scleratinian corals

Figure 19: Scleratinian Coral Species Threatened Status Analysis

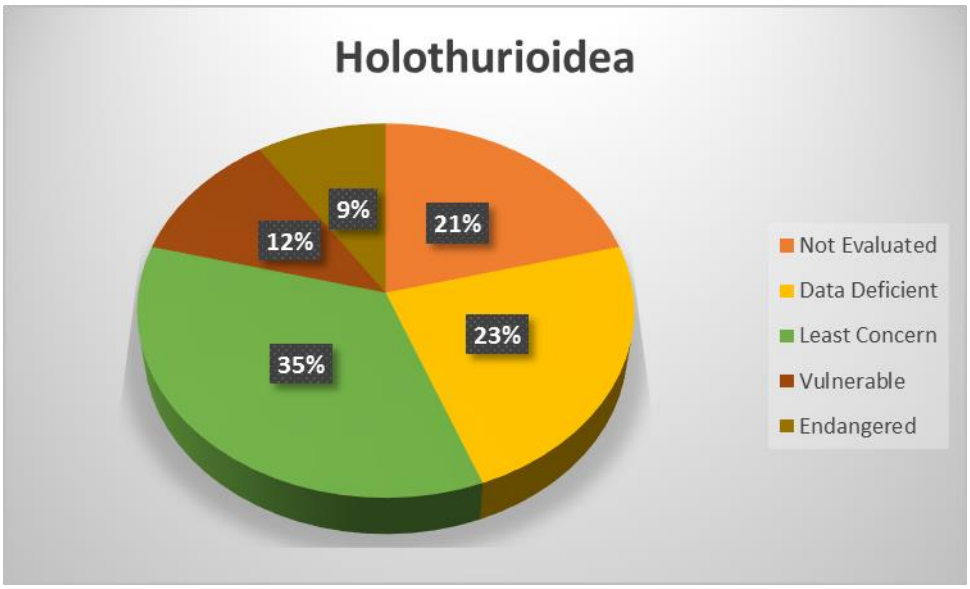


Of the some 200 species of Scleratinian corals identified to date in Seychelles waters 34 are classified as threatened under IUCN criteria – 2 species as endangered and 32 as Vulnerable.

b). Holothurioidea – Sea cucumbers

43 species of Sea cucumber have been recorded in Seychelles waters (Clark 1984, Condon 2008, MRAG 2012). Of these 9 have not been evaluated for IUCN Red List status, 10 are Data Deficient, 15 have been classified as Least Concern and 9 species or 21% are considered threatened - 5 being classifed as Vulnerable and 4 as Endangered. For information on the fishery see Case Study 1. More than 20 of the locally occurring species have commercial potential, 15 species currently make up the catch, but the vast bulk is composed of just 6 species.

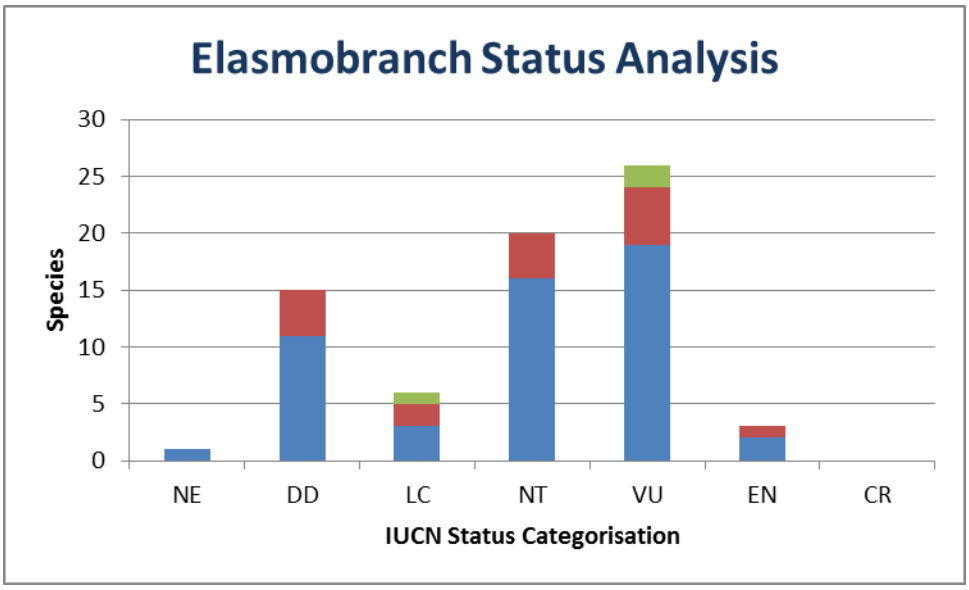
Figure 20: Holothurioidea Species Threatened Status Analysis



c). Elasmobranchs

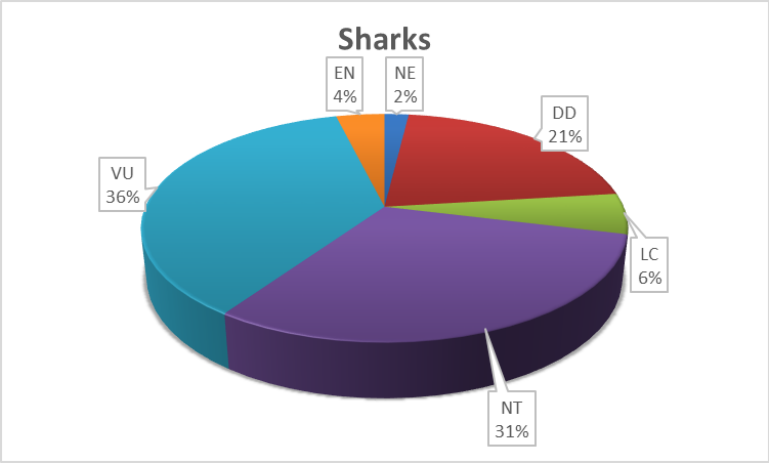
71 species of elasmobranch (52 sharks, 16 rays and 3 batoids) have been confirmed to occur and indentified to species level in Seychelles waters. 29 species are considered threatened (26 Vulnerable and 3 Endangered) whilst 16 more species are classified as Data deficent or Not Evaluated (**Nevill 2014**). (**See Section 7** for fishery information).

Figure 21: Elasmobranch Species Threatened Status Analysis



Series 1: Sharks Series 2: Rays Series 3: Batoids.

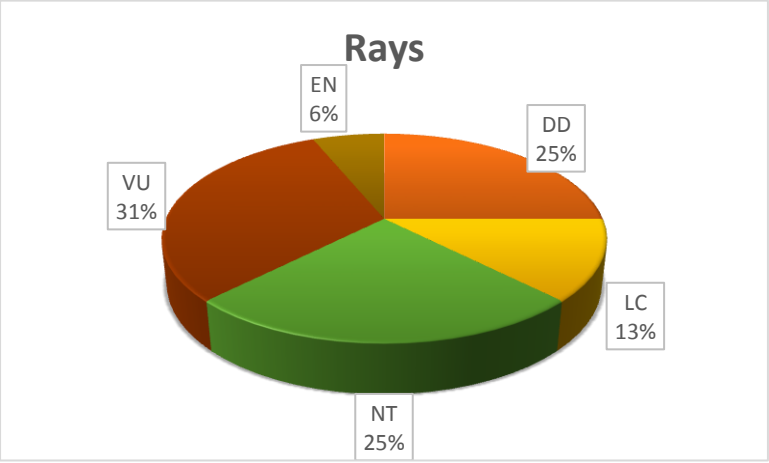
Figure 22: Shark Species Threatened Status Analysis



Of the 52 shark taxa identified to species level: 2 species are classified as endangered, 19 as Vulnerable, meaning 40% of shark species are classified as Threatened under IUCN criteria. 16 species are listed as Near Threatened and 3 as Least Concern. 11 species are considered as Data Deficient and 1 as Not Evaluated.

Figure 23: Ray Species Threatened Status Analysis

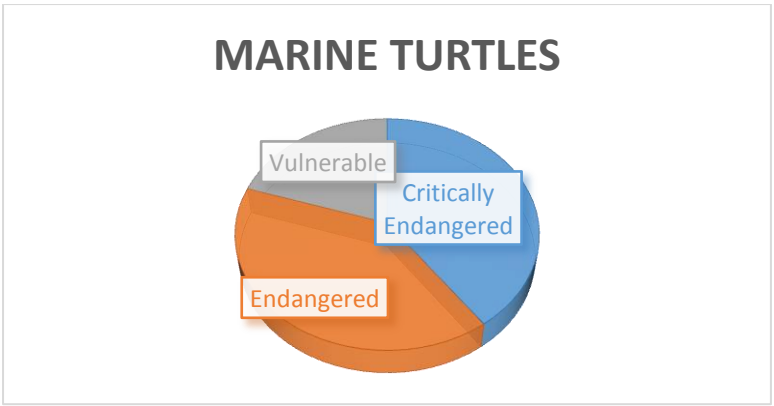
Of the 16 species of Ray recorded in Seychelles waters: 1 is endangered, 5 are vulnerable meaning 38% are classified as Threatened. 4 species are listed as Near Threatened, 2 as Least Concern and 4 as Data Deficient.



d). Sea Turtles

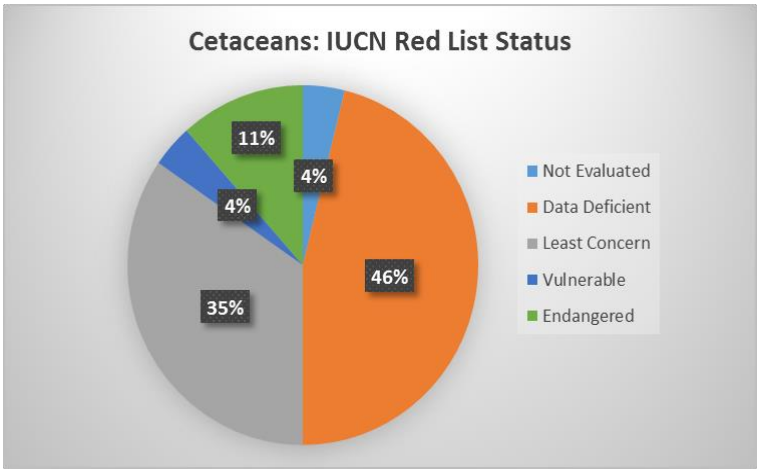
Five species of marine turtle have been recorded in Seychelles waters. Two species, the Green turtle (*Chelonia mydas*) and Hawksbill turtle (*Eretmochelys imbricata*) historically had large breeding colonies in the islands but these were drastically reduced by unsustainable exploitation in the 19th and 20th centuries. All marine turtles were fully proetcted by law in 1994 (**GoS 1994**) but illegal exploitation and ongoing loss of nesting habitat to coastal development and human activity mean that the numbers nesting outside of certain key protected areas continue to decline. Certain protected rookeries have shown excellent recovery in the number of nesting females as covered in Case Study 3 (**Nevill 2011**) of the Seychelles 4th national report to the CBD. The other three species do not nest in Seychelles' territory but two of them the Leatherback (*Dermochelys coriacea*) and the Loggerhead (*Caretta caretta*) must occur/must have occurred quite frequently as they both have local creole names. All five species are classified as threatened on the IUCN redlist: the Hawksbill and Leatherback turtles are Critically Endangered, the Loggerhead and Green turtles are classified as Endangered and the Olive Ridley (*Lepidochelys olivacea*) as Vulnerable.

Figure 24: Marine Turtles Species Threatened Status Analysis



e). Cetaceans

Figure 25: Cetacean Species Threatened Status Analysis

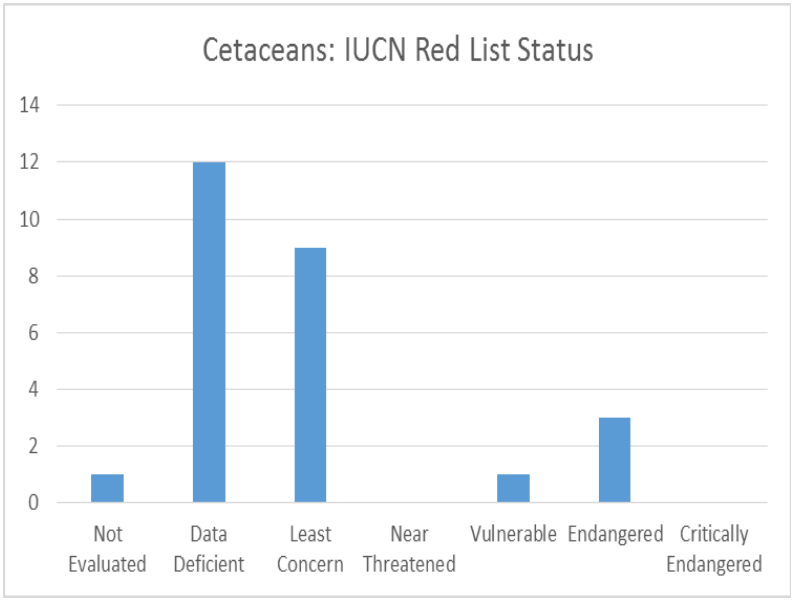


Seychelles was the lead proponent country for the designation of the Indian Ocean Whale Sanctuary declared in 1979. The first sanctuary of its kind, it provides total protection for the great whales comprising all waters north of 55°S from the east coast of Africa to 100°E including the Red and Arabian Seas and the Gulf of Oman.

In addition all species of marine mammal have received full protection under Seychelles law since 1986 (GoS 1986).

Figure 26: Cetacean Species Threatened Status Analysis

27 taxa of cetacean have been recorded to date in Seychelles waters (Kiszka *et al* 2009) (Dalebout *et al* 2014). Of the 26 taxa that have been identified to species level (Fig 26): 1 has not been evaluated, 12 are classified as Data Deficient, 9 as Least Concern, 1 as Vulnerable and 3 as Endangered - meaning 15% are classified as Threatened.



2.3. Terrestrial and Inland Water Biodiversity

For much of the first 180 years of Seychelles human history, limited fishing technology and capacity meant that terrestrial ecosystems bore the brunt of development and production pressure. Giant tortoises were extirpated on many islands to provide meat to revictual ships. The hardwood forests were felled for timber for construction, shipbuilding and as an export commodity. Low-lying forest was subsequently clear felled to make way for coconut plantations whilst higher altitude forests in the main granitic islands were felled to provide fuel for the cinnamon oil distilleries (see Fourth National report for details). The decline of the copra and cinnamon markets, coupled with the rise of tourism and industrial fisheries saw the Seychelles economy shift from its agrarian base changing the pressures of land use. The agricultural (1.9% GDP - **GFM 2014**) and forestry (<0.4% GDP - **Vielle 2001**) sectors are now of very limited significance and in chronic decline in terms of contribution to GDP. As a consequence the area of land under (secondary) forest cover has increased markedly over the last 40 years. Land use pressure now fits the typical Small Island Developing State "coastal squeeze" scenario where the vast majority of infrastructure, human habitation and commercial activities vie for space on the thin coastal strip of land. This has resulted in ever growing pressure on coastal habitats and manifested itself in various phases of coastal reclamation around the three main populated islands. Notable habitat types under pressure include lowland forest and beach crest habitats in the granitic islands but most significantly lowland inland waters which are the most threatened of native habitat types due to historical and ongoing reclamation, drainage, siltation and pollution.

Table 3: Terrestrial and Inland Water Biodiversity Overview

Taxonomic Group	Species	Notes
Fungi	Unknown	Fungal diversity is poorly known in the Seychelles with the predominant focus being on the study of crop and forestry pests. A 2004 survey (**Watling & Seaward 2004**) recorded 17 taxa, mostly macromycetes, all of widespread i.e. regional or pan tropical nature. Some work has been undertaken on ectomycorrhizal fungi with 37 species being identified from just 6 species of tree 30 species associated with just two native species (**Tedersoo 2007, Suvi 2011**). But overall species richness is considered low due to long term isolation and also extensive removal of natural vegetation. 16 species of lichens and lichenicolous fungi have been recorded (**Seaward & Soest 2013**).
Bryophytes Mosses Liverworts	**218** (110) (108)	110 species of moss have been identified (**O'Shea 2006**) and 108 species of liverworts (**Wigginton 2009**). The bryophyte flora is still insufficiently known with each survey making new discoveries and a mid-90s estimate of 15 endemic species being reduced to 4 and 4 endemic varieties (**Frahm & Ho 2009**) with increasing study in this domain throughout the African region.
Pteridophytes (Ferns & allies)	72	90 species of ferns recorded – 12 endemic, 60 indigenous and 20 probably introduced. (**Awmack 1997**, **Senterre *et al* 2014**)
Vascular plants	707	136 endemic and 571 indigenous species (plus 913 introduced species) (**Soquet *et al* 2014**).
Diptera (Flies)	589	295 endemic, 294 indigenous (plus 41 introduced). (**Gerlach [ed], 2009**)
Arachnida	347	204 endemic, 128 indigenous, 15 uncertain origin (plus 15

		introduced). (Gerlach & Marusik 2010)
Myriapoda	76	34 endemic, 34 indigenous, 8 uncertain origin (plus 3 introduced) main diversity and endemism in granitic islands (Aldabra has 6 species only 1 of which is endemic) (Gerlach & Marusik 2010)
Coleoptera	825	506 endemic, 319 indigenous, (plus 35 introduced species). Highest diversity found on large granitic islands (Aldabra has 122 species, 40 endemic). (Gerlach, J. [ed] 2009a).
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 (Gerlach & Hass 2008).
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. (Plus 6 migrant records) (Gerlach & Matyot 2006).
Mollusca (Terrestrial and freshwater snails)	76	69 terrestrial species – 50 endemic, 19 indigenous (plus 8 introduced) (Gerlach 2006). 7 freshwater species – 1 endemic, 6 indigenous (plus 5 introduced)
Vertebrata		
Fish	15	15 indigenous species, 2 endemic. (Gerlach [ed] 2007) (Senterre *et al* 2013) Several introduced species.
Amphibia	11	11 endemic (4 frogs, 7 caecilians), (plus 1 Introduced) species. Scope for further speciation within currently recognised endemic frog species under investigation.
Reptilia snakes	2	Both endemic (plus 1 introduced species).
Lizards	19 species	12 endemic (plus 3 introduced). (Gerlach [ed] 2007). Assessment complicated by various endemic subspecies classifications.
Tortoise		1 endemic species the Aldabra giant tortoise (*Aldabrachelys gigantea*). (Gerlach [ed] 2007)
Birds Seabirds landbirds	65 (18) (47)	65 species of bird are resident in the seychelles – 18 breeding seabird species, 47 land and water birds of which 13[4] are endemic. (plus 13 introduced species). (Gerlach [ed] 2007)
Mammals	6	All indigenous mammals are bats, 4 endemic. (Plus 11 introduced species (Nevill 2009))

Research has changed the understanding of the status and trends of terrestrial and inland waters biodiversity over the last three years with some important findings. Perhaps most notable have been the changes in understanding of the status of terrapin species and sub-species in Seychelles. Mitochondrial DNA analysis of the lectotype of *Pelusios seychellensis* has shown that this species, formerly considered an endemic and now extinct species of terrapin, is actually the West African species *Pelusios castaneus*. This finding therefore removes the species from the extinct list and the list of Seychelles endemic fauna. The research undertaken also compiled a sound argument to show that the species was in fact never present in Seychelles but rather its supposed records are a result of mis-labelling of museum specimens (Stukas *et al* 2013). Further research (Fritz *et al* 2012) has also lead to a change in status for the, formerly considered, critically endangered endemic subspecies of *Pelusios subniger.* The complete lack of

[4] This does not include the Aldabra rail (*Dryolimnas (cuvieri) aldabranus*) which has yet to receive mainstream recognition as distinct species but work is in progress to determine this.

mitochondrial DNA differentiation shows that the Seychelles' *P. subniger* does not represent a genetically distinct sub-species but rather must have been introduced by humans from Southeastern Africa. There consequently remains only one species of terrapin on the Seychelles fauna listing, *Pelusios castanoides,* and this also is now questionable as the weak mitochondrial DNA differentiation identified, rather than evidence of endemism, may well be due to incomplete sampling from the species range in continental Africa. If this is found to be the case then *P. castanoides* would also need to be reclassified as an introduced species.
These findings significantly change our understanding of inland water ecosystems. Terrapins have been the subject of significant conservation research and action over the years including the restoration of wetlands on small islands and the (re)introduction of terrapins. The presence or absence of terrapins has been a significant factor in assessing the conservation value of a wetland. The approach to wetland conservation must be reviewed in light of these findings and *P. subniger* now viewed as an introduced and possibly invasive species rather than a conservation priority, with consideration given to changing its legal status and reversing past island introduction initiatives.

Research is ongoing on a recently discovered new island population of the endangered sooglossid frog (*Sooglossus sechellensis*). Previously thought to occur only on the islands of Mahe and Silhouette a new population was discovered on the island of Praslin in 2009. Subsequent genetic analysis (Taylor *et al* 2012) has elucidated the relationship between the three island populations, suggesting that the Praslin population is most closely related to the *S. sechellensis* from Silhouette and identifies these as two separate clades distinct from the population on Mahe. The study suggests substantial evolutionary divergence between the three populations and indicates that each should be managed as distinct evolutionary significant units for conservation purposes.

Excellent work has been undertaken in the assessment of Key Biodiversity Areas in the central archipelago, under the auspices of the GEF full-size Mainstreaming Biodiversity project, extending our knowledge of the occurrence and distribution of diverse species. Findings included 17 new records for the native flora, amongst which two new species of fern have been described (Senterre *et al* 2014), and the rediscovery of 15 species not seen for a century or more (Senterre *et al* 2013). At least 4 new species have been added to the list of indigenous fauna including one new species of land/freshwater crab new to science (Senterre *et al* 2013).

Inland waters and specifically lowland inland waters, that were classified as the most threatened habitat type in Seychelles in the 4th national report to the CBD, remain a habitat of key concern. The decline of this habitat type due to enhanced drainage (a process that will be escalated following flooding events in 2013 and 2014), reclamation and conversion is ongoing as development continues. Public concern has been raised regarding this ongoing degradation in particular with regard to recent and proposed hotel resort developments on the main island of Mahe.

2.4. Threatened Status Analyses

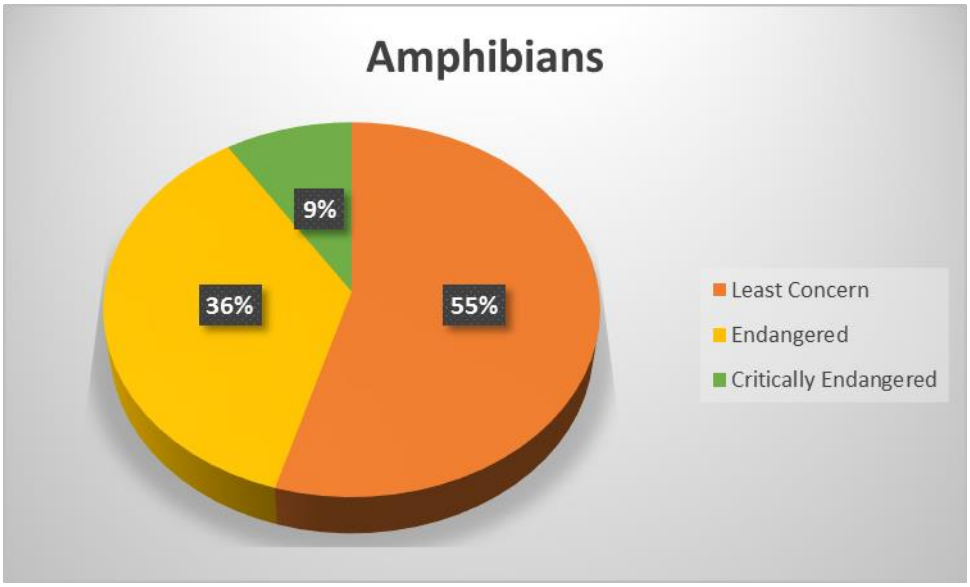
a). Freshwater Fish

15 species considered indigenous have been recorded to date. 5 species, including the 2 endemic species, have not thus far been evaluated for IUCN status whilst the other 10 species are classified as Least Concern.

b). Amphibians

11 indigenous species of amphibian, all endemic, have been recorded to date in Seychelles consisting of 5 frog species and 6 caecilians. 6 species are classified as Least Concern, 4 Endangered and 1 Critically endangered meaning that 45% of Seychelles indigenous amphibians are considered threatened.

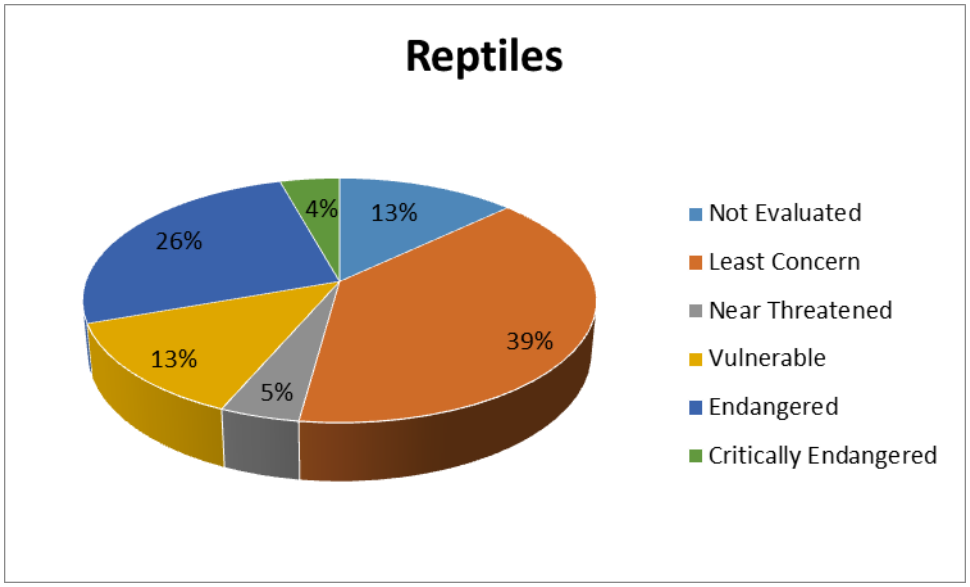
Figure 27: Amphibian Species Threatened Status Analysis



c). Reptiles (Fig 28)

Seychelles has 23 recognised species of indigenous terrestrial reptile – 2 species of snake, 19 species of lizard, 1 species of Giant tortoise and 1 terrapin. There is some debate on these figures in particular due to the status of some lizard taxa currently recognised as endemic sub-species. Previous claims about multiple species of endemic giant tortoise (Gerlach & Canning 1998) have not been supported by genetic analyses (Austin *et al* 2003, Palkovacs *et al* 2003) and have been strongly questioned by peers (Frazier 2006, Shah 2003) as such only one species is recognised here. One terrapin, *Pelusios subniger*, previoulsy considered an endemic sub-species has recently been shown to be an introduced species whilst the other *Pelusios castanoides* may also later prove to be an introduction. Of the 23 species: 3 have not been evaluated, 9 are classifed as Least Concern, 1 as Near Threatened and 10 or 44% as Threatened (3 Vulnerable, 6 Endangered and 1, P. castanoides sub-species, as Critically Endangered).

Figure 28: Reptilian Species Threatened Status Analysis

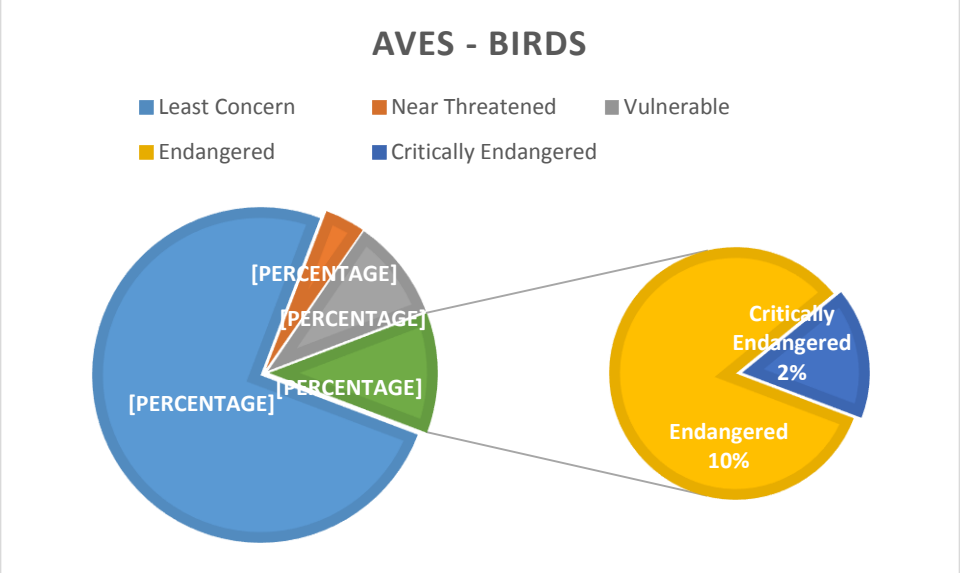


d). Aves – Birds

52 species of bird are considered indigenous to Seychelles – 18 seabirds and 47 landbirds – 14[5] species of which are considered endemic. 13 resident species are introduced . Another 25 species are classified as annual migrants whilst approximately 150 additional species have been recorded as vagrants. Of the 52 indigenous species 39 are classified as Least Concern, 2 as Near Threatened and 11 species, or 21% of bird species, as threatened (including 5 classified as Vulnerable, 5 as Endangered and 1 as Critically Endangered).

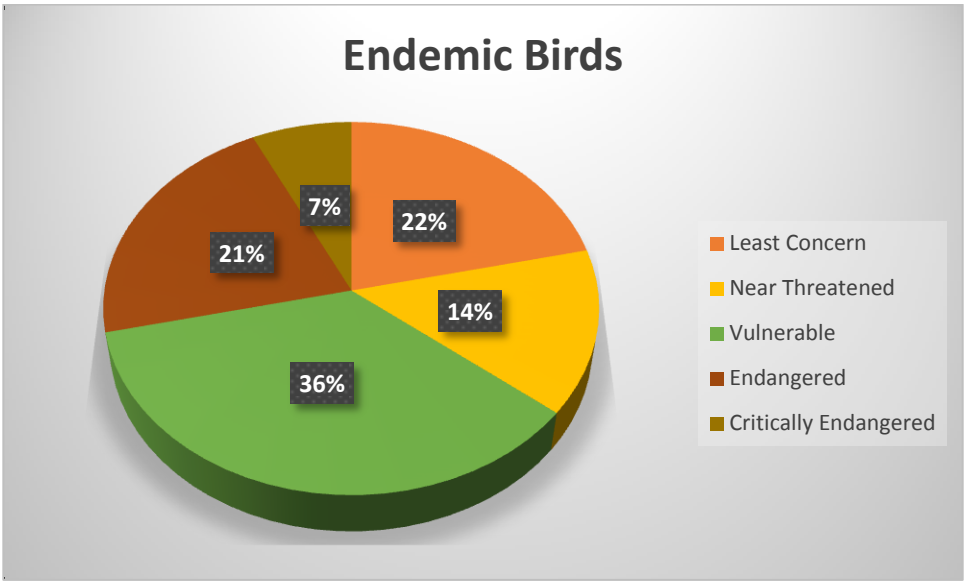
Figure 29: Bird Species Threatened Status Analysis

[5] Including recognition of *Coracopsis barklyi* (**Reuleaux *et al* 2013**) and *Dryolimnas aldabranus* (**Wanless 2003, Wanless & Hockey 2008**) as full species. Several other species are considered to be represented by endemic sub-species in Seychelles.



Consideration of the 14 endemic species gives another perspective. 3 species are considered of Least Concern, 2 Near Threatened and 9 species, or 64% of the endemic species, are considered Threatened – 5 species Vulnerable, 3 species Endangered and 1 species Critically Endangered.

Figure 30: Endemic Bird Species Threatened Status Analysis



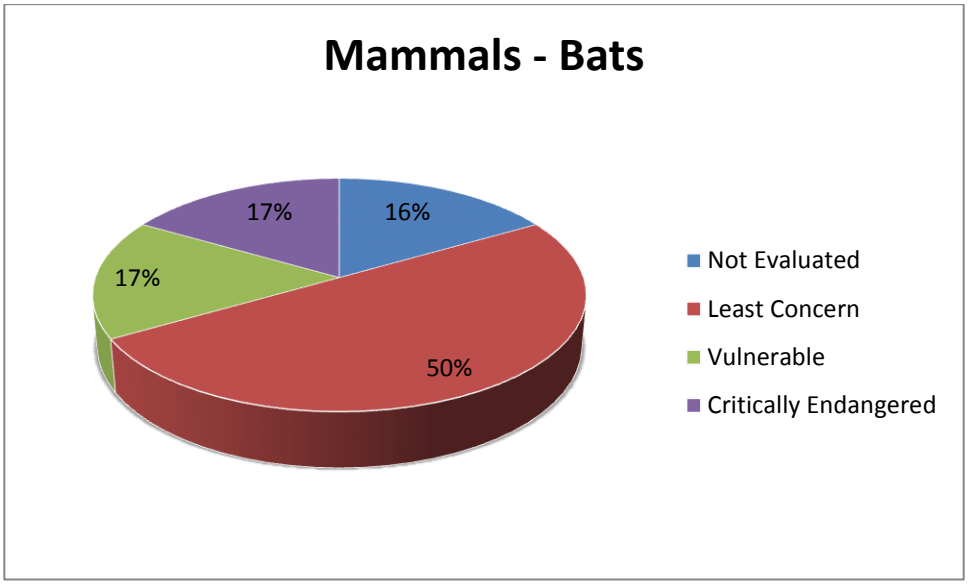
These rather gloomy figures however do not reflect the overall improvement in the status of endemic bird species over the last 20 years, where a combination of invasive species eradications, ecosystem rehabilitation and species (re)introductions have seen several species' populations increase and the threatened status of some downgraded[6]. The Critically Endangered Seychelles Paradise Flycatcher (*Terpsiphone corvina*) was reassesed in 2012 following its introduction to Denis island in 2008 and provided both populations are self-sustaining in 2017 it also will be downgraded to Endangered.

[6] See Case Study 6 (**Nevill 2011**) in Seychelles 4th National Report to the CBD; and see **Section 7.2.2 Table 5** and Case Study 2 in this report, for further details.

e). Mammals

There are 6 species of indigenous land mammals in Seychelles and they are all bats. 4 of the species are endemic including the recently discovered *Triaenops pauliani* (Goodman & Ranivo 2008). 3 of the species are classified as Least Concern, 2 are classified as Threatened – 1 Vulnerable and 1 Critically Endangered. The newly discovered *T. pauliani* has not yet been evaluated but will likely be considered threatened due to its very restricted range on an island of Aldabra atoll. The Seychelles Sheath-tailed bat (*Coleura seychellensis*) is Critically Endangered numbering less than 100 and apparently extirpated now on all but the islands of Mahe and Silhouette. It is one of the world's rarest mammals with the main cause of its demise being degradation of its coastal habitats - including a roosting site degraded by a recent tourism development (EDGE 2014).

Figure 31: Mammalian Species Threatened Status Analysis



3. Main Threats to Biodiversity

Seychelles' fourth national report to the CBD recognised that national biodiversity could be described through the lens of three Convention Programmes of work namely: Forest, Inland waters and Marine and coastal biodiversity. The main threats to those ecosystems types and their component habitat categories remain unchanged in the subsequent three years.

3.1. Forest Biodiversity.

The overriding threat to forest biodiversity is the ongoing incursion of Invasive Alien Species. The vast majority of forest cover in Seychelles is secondary and already highly invaded by introduced species which

often form the primary canopy species. Status and trends of IAS invasion of forest ecosystems in key biodiversity areas and refuges are not well understood. The current full-size GEF project on Biosecurity has been focusing on the strengthening of controls to prevent introductions of new IAS, with a new focus on eradication and control of IAS to follow in the next CBD reporting period.

A secondary concern is that of forest fire in particular with regard to the threat it poses to dry endemic palm woodland areas.

3.2. Marine and Coastal Biodiversity.

This ecosystem type is highly diverse, and indeed was divided into eight habitat categories in the 4th national report. This diversity in turn means that the categories often face different threats. However the main threat, in terms of biodiversity conservation and socioeconomic wellbeing, is unsustainable use of fishery resources with secondary factors for coastal habitats of habitat loss, through change in land use, and pollution.

Coastal development has greatly reduced natural vegetation cover impacting upon key habitats such as lowland woodlands and beach crest vegetation - including impacting severely upon nesting habitat for endangered turtle species. There is also strong anecdotal evidence to suggest that the land reclamation programme on the east coast of Mahe has destroyed critical habitat causing the collapse of two fisheries: the White-streaked grouper (*Epinephelus ongus)* and the Marbled parrotfish (*Leptoscarus vaigiensis).* It has likely also had significant impact upon the key shark nursery area for several species, but this is hard to quantify as no pre-reclamation baseline was established.

3.3. Inland Waters Biodiversity.

The extraordinary geographic and evolutionary isolation of the inland waters of Seychelles' granitic islands, surrounded in all directions by a 1000 miles of ocean and separated from continental landmasses for 70 million years, makes them of particular biodiversity interest. Lowland wetlands are probably the most threatened habitat type in Seychelles due to the limited land area and the consequent development driven "coastal squeeze" making habitat loss through change in land use the primary threat and ongoing driver of biodiversity loss in this habitat type. It is estimated that more 90% of the lowland wetland habitats of the central archipelago have been lost in the last 200 years (Gerlach 2002).

In addition to the above there are cross-cutting threats to biodiversity and drivers of its degradation primary amongst these is climate change but also it is important to recognise the limitations in national human capacity to research, understand and manage biodiversity optimally.

3.4. Climate Change.

The complexity of ecosystems and the diverse nature of the stresses upon them often makes it difficult to isolate the specific impacts of climate change, it is however without question a contributing and confounding factor to stressors on biodiversity and biodiversity degradation.

For Forest biodiversity, change in ambient temperature and rainfall patterns can affect habitat structure enhancing IAS action, or make species more stressed and prone to disease, which may have been a factor in the spread of Takamaka wilt disease (Vielle 1999). The correlation between weather patterns and forest fire occurrence is of course well understood.

For marine and coastal biodiversity, climate change is a key driver of biodiversity loss the prime example in Seychelles being the extreme coral bleaching event experienced in 1998 that caused 80-90% live coral loss on the Seychelles plateau. This has ongoing ramifications for fish populations and related fisheries (Graham 2007). Water temperature likewise affects the movement and distribution of pelagic stocks that have vital economic importance. Water temperature may have other physiological affects upon biodiversity affecting breeding cycles, seasonality and productivity – for example the temperature of incubating turtles' nests is known to influence the sex ratio of offspring.

Climate change fuels more severe weather events such as storm surges and changes prevailing weather patterns effecting the normal seasonal cycles of erosion and accretion both of which can have significant impact upon the physical and biotic components of the coastal environment.

3.5. Knowledge and Data Management.

Limited knowledge and understanding of biodiversity, its status and trends, species ecology and biology, functions and values constitutes a critical 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 e.g. the EIA process for the phase 3 east coast reclamation made no reference to the potential loss of key habitats for certain fisheries – the subsequent collapse of fisheries for the White-streaked grouper (*Epinephelus ongus)* and the Marbled parrotfish (*Leptoscarus vaigiensis*) have been directly connected with habitat lost to the reclamation.

3.6. Mainstreaming of Environmental Economics.

There is a significant lack of national capacity in this domain with no qualified practitioners in the country at this time. This shortfall has been noted in previous strategic documents (e.g. first NBSAP and EMPS) but has not been successfully addressed. There is a real concern that the true value of biodiversity is not incorporated into decision making processes and specifically development planning whether it be pertaining to drainage/reclamation of lowland wetlands or in specific species-based cases such as the hotel developments that impacted key Sheath-tailed bat (*Coleura seychellensis*) and Hawksbill turtle (*Eretmochelys imbricata*) habitats in recent years.

4. Impact of Negative Changes in Biodiversity status

Natural resources have driven economic activity since the first colonisation of the islands. The first colonists in the central archipelago depended to a great extent on the direct exploitation of the island hardwood forests for timber for ship building, ship repair and for export as a raw material. The hardwood forests were in this way rapidly cleared with many species becoming scarce and the Seychelles Ironwood

(*Vateriopsis seychellarum*) being driven to near extinction. The only species of its genus the *V. seychellarum,* once a co-dominant canopy species, remains classified as Critically Endangered today with less than 50 mature individuals known. Giant tortoises (*Aldabrachelys gigantea*) were utilised and traded as a source of meat, in particular for revictualling ships due to their hardiness and ability to live without food or water for long periods, and also driven to the brink of extinction being extirpated from the majority of their former range.

The Green (*Chelonia mydas*) and Hawksbill (*Eretmochelys imbricata*) turtles supported significant export industries through the 19th and the better part of the 20th century until populations collapsed and legislation was introduced to protect the remnant populations. The complete protection of marine turtles was instituted by the Wild Animals (Turtles) Protection Regulations 1994 (GoS 1994). The shark fishery constituted the main fishery export for the country in the 1950s exporting dried shark meat to East African markets, but this market declined along with the stocks at the end of the decade before winding up in 1964.

In most cases however there is no data or analysis to provide a contemporary costing of the revenue lost by the over exploitation of a particular resource. This holds true today in the artisanal fishery where several species have collapsed (e.g. *Epinephelus tukula, E. ongus, Plectropomus laevis, Carcharhinus melanopterus* & *C. plumbeus*) but their value in a multiple species fishery was not calculated and their place has been taken in the catch by secondary species. The fishing down of the food web by the artisanal fishery is nevertheless a real concern and represents significant loss in revenue.

The removal of key species must also have impacted the ecological balance and components parts of the ecosystem. The removal of the key herbivore, the giant tortoise, and largest predator from, the saltwater crocodile, from terrestrial and inland water systems must have had profound effects on the ecological balance. Likewise the ecological extinction of key predators (seals, crocodiles and sharks) and grazers (green turtles) must have had knock-on the balance of marine and coastal ecosystems. However the other ongoing broader, rapid and near ubiquitous anthropogenic impacts upon the same systems make it impossible to tease out specific interactions of cause and effect from the "background noise" of disturbance and thus evaluate the costs of decline or loss of specific elements biodiversity from the ecosystems.

There is a counter side to the decline in biodiversity, in some cases rarity imbues and enables the realisation of value that would not be accessible if some species remained common. This is particularly the case for ecotourism where one might argue certain protected areas are profitable and provide

Cousin Island Special Reserve and the Vallee-de-Mai World Heritage Site

Cousin Special Reserve's allure as a small island adjacent to the second island of Praslin is largely due to its bird populations both seabird colonies and rare endemic species of land bird such as the Seychelles warbler (*Acrocephalus sechellensis*), Seychelles fody (*Foudia sechellarum*) and (re)introduced Seychelles magpie-robin (*Copsychus sechellarum*). Cousin is also, thanks to 45 years of dedicated protection, the largest and most dense nesting colony for the endangered Hawksbill turtle (*Eretmochelys imbricata*) in the Seychelles. This species which nests during the day in Seychelles provides a significant opportunity for island visitors to actually see the animal on land during peak nesting season.

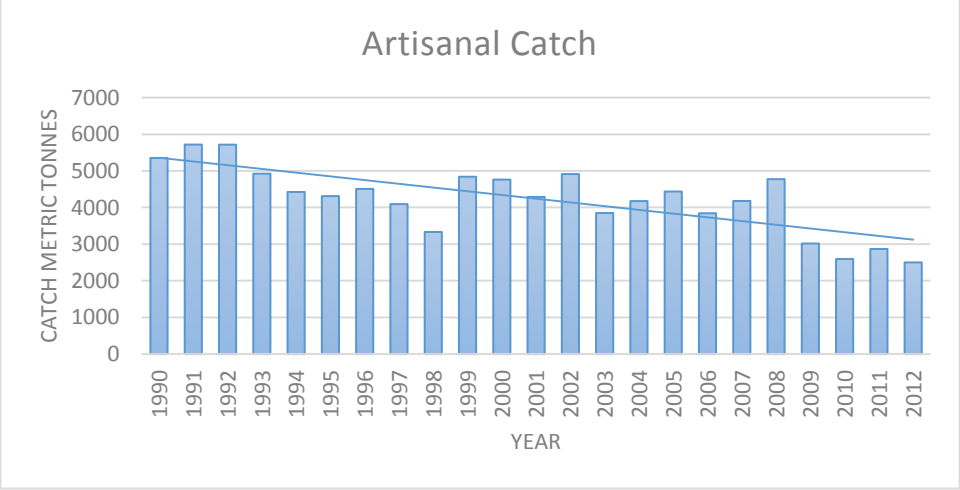
The Vallee-de-Mai Nature Reserve and UNESCO World (Biodiversity) Heritage site hosts an outstanding example of native palm forest in near pristine condition. The site hosts all 6 species of endemic palm including the famed Coco-de-mer palm (*Lodoicea maldivica*) which produces the largest seed in the world. This forest of endemic palms constitutes a vital habitat for endemic species of flowering plant, invertebrates, herpetofauna (frogs, caecilians, snakes & chameleons) and birds.

employment due to

the rarity of the formerly common species they harbour. Cousin Island and Vallee-de-Mai are two of the most prominent and successfully operated protected areas in the country, both provide employment to onsite staff and significant income to the local community through other related service providers (boats, taxis, hire vehicles, tour guides etc…). Both are self-sufficient, and in fact highly profitable, with revenues going to fund additional biodiversity research, conservation and sustainable use initiatives.

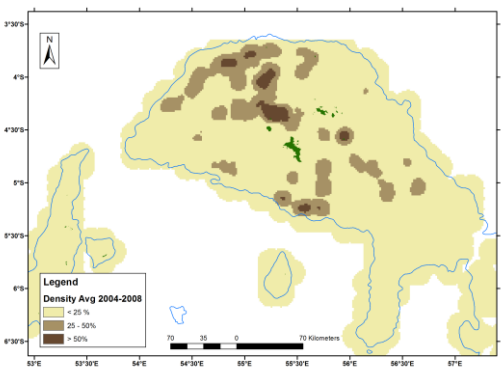
There is however one current and quite stark example of the impact of negative change in Biodiversity and that is the economic impact of declining catches in the artisanal fishery. The artisanal fishery is a vitally important economic sector in terms of employment and provision of quality protein to the domestic and tourist population. There is therefore good data available with regard to catch over time and the cost of fish on the domestic market. Artisanal catch rose significantly through the 20th century, reflecting increased effort, improved technologies and the demand from the growing domestic and tourist population. Catches peaked, however, in 1991 and have shown a steady decline in the subsequent years (See Fig 32).

Figure 32: Artisanal Catch 1990-2012



The additional decline evident from 2009 may be in part due to the activities of the artisanal fleet being impacted by the threat of piracy.

Figure 33: Mean Fishing Effort 2004-2008 Figure 34: Fishing Effort 2009



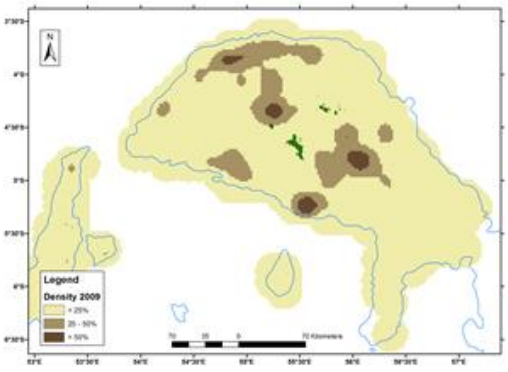
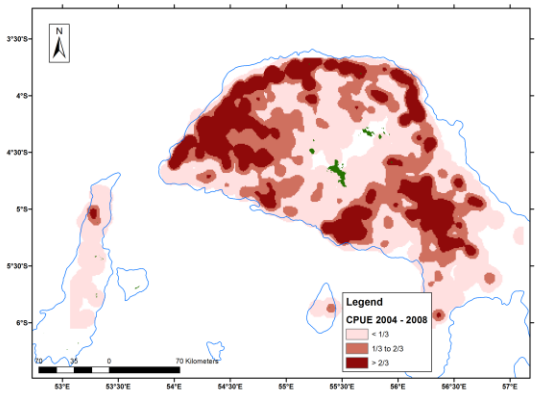
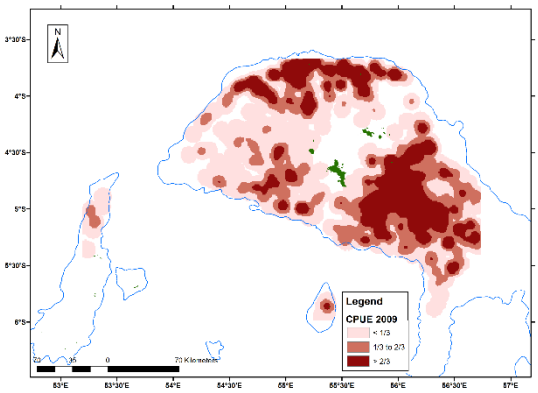


Figure 33 shows the mean density of fishing effort over the Seychelles and Amirantes banks 2004-2008. **Figure 34** shows the displacement of fishing effort in 2009. **Figures 35 & 36** below show the relative productivity of the different fishing areas or Catch Per Unit Effort (CPUE) for 2004-2008 and 2009 respectively – the darker the shade the higher the CPUE. (**Data Courtesy of Seychelles Fishing Authority**)

Figure 35: CPUE 2004-2008

Figure 36: CPUE 2009



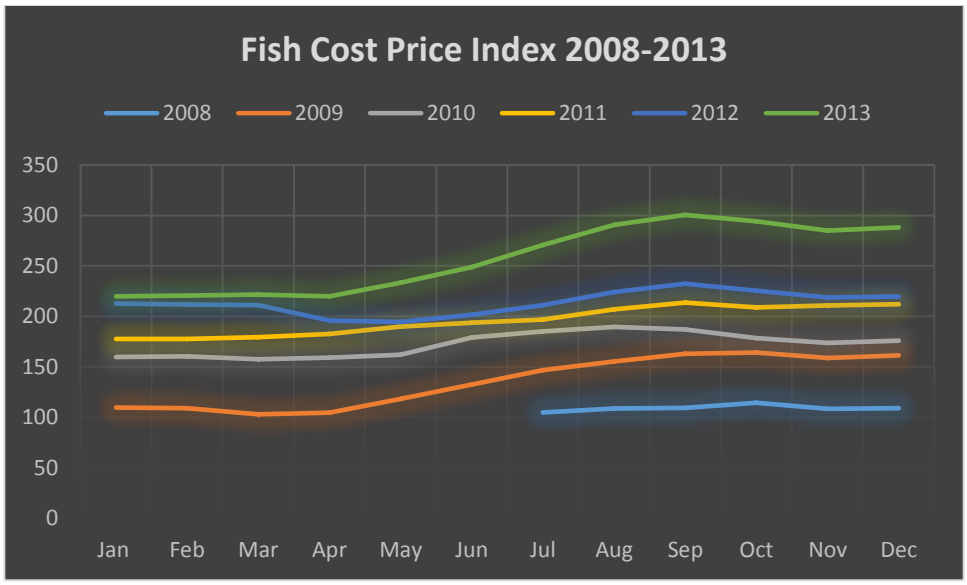


The figures show a partial shift in effort from the north westerly banks where piracy pressure was considered greatest to grounds further south east with a consequent reduction in catch per unit effort.

The 2009 additional drop may also, however, in part reflect the delayed impact of the severe 1998 coral bleaching event predicted by studies that showed recruitment of various reef fish species had been affected and would likely result in subsequent delayed fishery impacts (**Graham *et al* 2007**). It is notable that the trend of decline has continued over the last 4 years of data showing that the overall catch trend is down regardless of area fished.

This decline in catch has fuelled a marked price increase with the Cost Price Index for fish showing a near threefold increase in the last 5 years (**See Fig 37**).

Fig 37: Cost Price Index for Fish 2008-2013



(Compiled from NSB 2011, 2012 & 2014).

These figures are complicated by strong fuel prices and growing demand in line with increasing tourism numbers but the correlation between declining artisanal catch and rising fish prices on the local market is sufficiently strong for the Seychelles Fishing Authority to include the following statement in its 2012 Annual Report:

"*The artisanal catch in 2012 decreased by 13.0% over the previous year... This indicates a decrease in the amount of fish available for domestic consumption and export, which was reflected in the significant decrease of quantity of fish exported and the rise in the price index of fish in 2012.*" (SFA 2012)

The impact of rising fish prices was such that it was cited as the primary driver of inflation in the national economy for 2013. The 12-month average rate of inflation for 2013 was 4.3% whilst fish prices rose 31% in 2013 compared to 2012 (CBS 2014). This therefore shows a very strong correlation between declining fish stocks and the standard of living for Seychellois nationals.

Part II: The National Biodiversity Strategy and Action Plan, its Implementation, and the Mainstreaming of Biodiversity

5. National Biodiversity Targets

National environmental and biodiversity objectives are set out in various national documents and in Presidential declarations.

Article 38 of the Constitution of the third Republic of Seychelles (GoS 2010) recognises the right to a safe environment:

> *"The State recognises the right of every person to live in and enjoy a clean, healthy and ecologically balanced environment and with a view to ensuring the effective realization of this right the State undertakes–*
> *(a) to take measures to promote the protection, preservation and improvement of the environment*
> *(b) to ensure a sustainable socio-economic development of Seychelles by a judicious use and management of the resources of Seychelles;*
> *(c) to promote public awareness of the need to protect, preserve and improve the environment. "*

The constitutional text was used as the basis, supplemented by elements of the pre-independence National Parks and Nature Conservancy Act, for the Seychelles Vision for Biodiversity Conservation as embodied in the first Seychelles NBSAP (Shah *et al* [eds] 1997):

> *"The Republic of Seychelles recognises the right of every person to live in and enjoy an ecologically sound natural environment and undertakes to take necessary measures to maintain essential ecological services and life support systems, to promote the protection, preservation and in certain cases the improvement of its indigenous biological diversity, and to judiciously use and manage species and ecosystems so as to ensure a sustainable socio-economic development of the country."*

The Seychelles Environmental Management Plan (EMPS) 2000-2010 succeeded the NBSAP as the primary strategic document for Biodiversity management with the NBSAP being updated and reformatted to constitute the Biodiversity, Forestry and Agriculture thematic area and components of the Fisheries and Marine Resources/Processes thematic area. The EMPS constituted the first national strategic document for sustainable development; the Vision for the document states:

> *"At the dawn of the 21st Century it is the vision of the people of Seychelles that this second generation Environment Management Plan, the EMPS 2000-2010, will serve as a flexible, yet robust, vehicle for continued improvement of proactive environmental management excellence, so that by the year 2010 the Seychelles will be firmly established globally as a committed leader in sustainable development."*

This vision statement was contextualised with a supporting Overall Goal statement:

> *"The overall goal of the EMPS 2000-2010 is: the promotion, coordination and integration of sustainable development programmes that cut across all sectors of society in the Seychelles in order to attain the above mission [sic]."*

These documents guided national biodiversity actions from 1997 to 2010. One shortcoming that has been identified in the documents by various assessments (Nevill *et al* 2002, GoS 2005, GoS 2005a, TEMATEA 2007, GoS 2011) however, is the lack of integration of specific CBD targets and pertinent commitments of CBD Programmes of work into the action plans making the targeting of CBD implementation and assessment of progress difficult. There has likewise been a lack of strategic measureable targets in documents – with most targets being confined to technical documents such as species action plans.

Two prominent exceptions to this have been the national objectives pertaining to terrestrial and marine protected areas. Seychelles has a proud history of protected area establishment. Some 47% of Seychelles land area is designated as protected areas for environmental and biodiversity purposes. In 2010 President Michel announced that Seychelles had, as part of its commitment to be a global leader in environmental conservation, set itself the target of protecting more than 50% of its land area. Work is ongoing under the GEF Full-size Protected Areas Project to identify and prioritise areas for inclusion in the expanded terrestrial protected area network.
In the marine domain Seychelles was the first country in East Africa to establish a network of Marine Protected Areas (MPAs). The total area though was too small, at less than 1% of the Seychelles Exclusive Economic Zone (EEZ), to meet biodiversity conservation and sustainable use objectives. Consequently in 2012 Vice-President Faure announced, at the Rio +20 UNCSD, Seychelles' intention to declare, through a debt for adaptation financing mechanism, 30% of its EEZ as protected, half of which will be strict no-take zones. This process is now well under way in partnership with The Nature Conservancy.

Since the conclusion of the EMPS 2000-2010 the Seychelles has been without a functional strategic environmental document. The third generation EMPS 2011-2020 re-named the Seychelles Sustainable Development Strategy (SSDS) (GoS 2012, Gos 2012a) was delayed in its development and the document was launched as the SSDS 2012-2020. While the document has been launched, the three-tiered institutional framework (council, steering committee and secretariat) has yet to be instituted and as such the SSDS is not at the time of writing (April 2014) operational.

A process was undertaken in 2013 to review and update the NBSAP. A document entitled "Seychelles National Biodiversity Strategy and Action Plan to 2020" (Prescott, J. *et al* [Eds] 2013) which at the time of writing (April 2014) remains in a late draft form. Remarkably, though the text of this draft recognises the shortcomings of previous strategic documents in not cross-referencing the CBD thematic programmes of work and their pertinent commitments, it also neglects to do so. The Aichi Biodiversity Targets are also not effectively incorporated (see Section 6 for details) seriously undermining the purpose and functionality of the document.

The draft NBSAP and the SSDS share the same Vision Statement:

"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."

6. The New 2014 National Biodiversity Strategy and Action Plan.

The new "Seychelles NBSAP to 2020" is a framework document for Biodiversity management in Seychelles. It is less detailed than its predecessor which set the CBD in the Seychelles context and went so far as to elaborate fully-detailed, budgeted and prioritised projects. The new NBSAP sets out a framework of broad objectives for later elaboration into more detailed projects for stakeholder implementation. The later development of the NBSAP is to be overseen by an NBSAP Implementation Unit to be established under the Ministry of Environment and Energy and "nested" within the proposed SSDS framework. The NBSAP is to be implemented by a proposed stakeholder forum termed "The National Biodiversity Partnership Forum".

Unfortunately, the new NBSAP document lacks sufficient detail and grounding in either the CBD, its thematic programmes or its Strategic Plan 2011-2020 to properly fulfil its intended task.

The NBSAP's strategic goals do not reflect those of CBD Strategic Plan, it does not incorporate the Aichi Targets, either directly or modified to meet local circumstances[7], and its thematic areas diverge from those of the Convention in ways that are likely to pose additional difficulties in terms of assessing and reporting upon national implementation of the Convention.

The new NBSAP utilises confused terminology by referring, for example, to "freshwater marshes and wetlands" rather than the internationally agreed "inland waters". It even uses the term Genetically Modified Organism (GMO) as opposed to Living Modified Organism (LMO) which is the term legally recognised under the Cartagena Protocol to which Seychelles is party – this is done without explaining whether this reflects a national intent to address the much broader issue of GMOs not currently governed by international law.

Finally the new NBSAP does not provide guidance or criteria on aligning projects with CBD requirements, or identify targets and benchmarks (except in the most generic terms) for subsequent monitoring of implementation, neither does it set out a monitoring programme. Rather all these aspects are left for the proposed Implementation Unit and Stakeholder Forum to determine. Previous assessments of strategic plan implementation in Seychelles (GoS 2005, GoS 2005a, GoS 2011), i.e. the first NBSAP and the EMPS 2000-2010, have identified administration/coordination as a key weakness in implementation and hence recommended the proper and explicit integration and cross-referencing of international commitments into national programmes to mitigate this.

Consequently an independent review was undertaken during the final stages of the preparation of this report and it has been decided to revise the NBSAP with particular attention to aligning its format and content with the Aichi Biodiversity Targets, properly integrating these commitments

[7] An attempt to retrofit the Aichi Targets to the document by appending a cross-referencing matrix fails to bridge the gap as the examination is not complete and cross-references to the thematic area texts as opposed to the Priority Actions identified later which would be much more appropriate for the determination of linkages between the outputs of the NBSAP and the Aichi Targets.

such that the Implementation Unit and Stakeholder Forum will have sound guidance for their later development and elaboration of NBSAP projects. This revision is scheduled to take place in the 3rd quarter of 2014.

Table 4: Contribution of Second NBSAP (2014 - 2020) to the Aichi Biodiversity Targets	
Aichi Targets	Addressed/Supported/Not Supported by NBSAP Actions
Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.	
Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Priority Action 4.1: Biodiversity awareness, education and training. **Notes:** This action relates to the general topic but does not address or make reference to Aichi Target1 (AT1). The Action proposes the development of a "Multi-stakeholder public awareness plan and action programme" which could fulfil the role but no criteria are stated that it should address AT1.
Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and planning processes, and are being incorporated into national accounting, as appropriate, and reporting systems.	Priority Action 4.2 Biodiversity Valuation: Project "*Seychelles biodiversity and ecosystems services valuation*" **Notes:** This project effectively addresses AT 2 and proposes a much more ambitious time frame 2014-2015, which will likely have to be reconsidered in light of delays in implementation of the SSDS and approval of the NBSAP.
Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention, relevant international obligations and national socio economic conditions.	Priority Action 4.3 Legal and institutional framework: Project "NBSAP financing action plan" Pt.5 – "Review and development of economic incentives for environmental protection and biodiversity conservation." **Notes:** This activity point provides the foundation to address AT3, but the subject of perverse incentives is not specifically addressed and should be emphasised in the development of projects for these activities.
Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	Priority Action 1.5 Marine, wildlife and fisheries: Project "Development of sustainable fisheries" -Pt 8 Adoption and implementation of management plans (e.g. Shark NPOA) -Pt 10 Sustainable catch rates and landings -Pt 11 Studies of by-catch/depredation conducted & programmes implemented for reduction of by-catch Project "Development of sustainable mariculture Priority Action 1.6 Forestry: Project "National forest policy, management and restoration programme." -Pt 1 Development and adoption of a sustainable forestry policy and management plans including linkages to biodiversity conservation

	-Pt 4 Development and implementation of practical guidelines for forest management practices Priority Action 1.7 Agriculture: Project "Development of Sustainable agriculture" -Pt 9 Reduction of detrimental environmental impacts (ecological footprint) of agriculture -Pt 10 Production of sustainable agriculture guidelines and protocols Priority Action 1.9 Tourism: Project "Promotion of sustainable tourism." -Pt1 Adoption of environmentally sustainable practices by the tourism industry -Pt6 Mainstreaming sustainable tourism into development, marketing, standard and investment P. A: 1.10 Land development & inland waters: Project "Sustainable water & watershed management." Pt1 Integration of biodiversity conservation in water use and watershed management plans Pt3 Enhanced management and biodiversity status of watersheds
Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use	
Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	Priority Action 1.1 Protected Areas: Project "Effective management and sustainable financing of PAs". Pt3 - Extension and effective management of protected areas that are representative of Seychelles' ecosystems and habitat. Priority Action 1.2 Endemic species and species at risk – in general supports AT5. Priority Action 1.5 Marine wildlife and fisheries: Project "Development of sustainable mariculture". Pt6 - EIAs produced and followed for all new proposals Project "Integrating biodiversity concerns into oil and mineral exploitation program in Seychelles waters". **Priority Action 1.6.** Forestry: Project **"**National Forest Policy, Management and Restoration Programme" Pt6 - Restoration and sustainable management of degraded forest areas Priority Action 1.7 Agriculture: "Development of sustainable agriculture". Pt2- Sustainable land management Pt3 - Promotion of organic farming methods Pt8 - Integration of knowledge of soil biodiversity and ecosystem management into land use and soil management practices Priority Action 1.9 Tourism: Pt 3- Carrying capacity studies, environmental economic valuation and risk assessment of project proposals Pt 4 - Adoption and funding of sites of high ecological value by tourism operators Priority Action 1.10 ***Land development and inland waters: Project "***Sustainable water use and watershed management" Pt2 Protection of water catchment areas Pt3 Enhanced management and biodiversity status of watersheds Project "Protection and rehabilitation of freshwater marshes and wetlands" **Notes:** With no targets linked to the specific target of 50% or more reduction in the rate of loss of

	Biodiversity a real opportunity to galvanise national focus and action towards a substantive objective has been lost.
Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	Priority Action 1.2 Endemic species and species at risk. Pt 1- Identification of marine endemic and threatened species. Priority Action 1.5 Marine wildlife and fisheries: Project "Development of sustainable fisheries" Pt5- Promote better coordination amongst stakeholders for increased sustainability Pt7- Stock assessments of key species Pt8- Adoption and implementation of management plans (e.g. Shark NPOA) Pt9- Quotas for species determined (e.g. Tuna) Pt11- Studies of by-catch/depredation conducted and programmes implemented for reduction of by-catch Pt15- Implementation of international commitments (e.g. FAO code of conduct, CITES, CMS) and provision of by-catch data to IOTC
	Notes: No provision for the required recovery plans and species rehabilitation.
Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Priority Action 1.5 Marine wildlife and fisheries: Project "Development of sustainable mariculture" – addresses the marine aquaculture component. Priority Action 1.6 Forestry – addresses the forestry component. Priority Action 1.7 Agriculture – addresses the agriculture component.
	Notes: Freshwater aquaculture as a development option is not expressly addressed in the NBSAP.
Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Priority Action 1.5 Marine wildlife and fisheries: Project "Integrating biodiversity concerns into oil and mineral exploitation program in Seychelles waters". Priority Action 1.6 National Forest Policy, Management and Restoration Programme. Pt6 - Restoration and sustainable management of degraded forest areas Priority Action 1.7 Agriculture: Project "Development of sustainable agriculture". Pt3- Promotion of organic farming methods Pt9- Reduction of detrimental environmental impacts of agriculture Priority ACTION 1.9 Tourism: Project "Promotion of sustainable tourism". Pt3 - Carrying capacity studies, environmental economic valuation and risk assessment of project proposals. Priority Action 1.10 Land development and inland waters: Project "Sustainable water use and watershed management". Pt6 - Prevention and management of pollution
	Notes: The above activities are generically support of AT8 but in the Seychelles context issues of pollution are primarily addressed by physical development sectors covered under the Sustainable Development Strategy as such the key point here is to integrate this Target into those sectoral policies.
Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority	Priority Action 1.4 Biosecurity and invasive alien species. Project "Prevention of introduction and control of the spread of invasive alien species".

species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	Priority Action 4.3 Legal and institutional framework: Project "Review and adoption of biodiversity related legislation." PT3- Adoption of the new Biosecurity Act and associated regulations **Note:** Priority Action 1.4 addresses AT9, the majority of activities however having already been undertaken prior to the development of the new NBSAP.
Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	Priority Action 3.2 Climate-related biodiversity adaptation and mitigation: Project "Integration of biodiversity into existing adaptation programmes". Project "Climate Variability and Climate Change Biodiversity Impact Profile Assessment for the Seychelles." Pt1- complete a preliminary overview of key climate change impacts for major marine and terrestrial ecosystems. Pt2- Assessment of key knowledge gaps in understanding of CC impacts on biodiversity of Seychelles. Pt3- Discussion paper of key research programs on climate change and biodiversity for Seychelles. **Notes:** The above activities seek to provide the baseline information that could be used to support actions to address this target, but no specific reference to the objective of reducing other anthropogenic stresses on such identified ecosystems is stated, so the focus and purpose of the actions is realised.
Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.	
Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.	Section 5.1.1 Protected Areas refers in broad terms to strengthening PA network and integration into broader land and seascapes. It also specifically mentions the conservation of viable, representative samples of Inland water ecosystems (thereby reflecting a known national habitat priority). The key target of this section is to "Create conditions to effectively conserve and manage 50% of national terrestrial areas and 30% of marine area" Priority Action 1.1 Protected Areas: Project "Effective management & sustainable financing of PAs". Pt3- Extension and effective management of protected areas that are representative of Seychelles' ecosystems and habitat Pt5- Conserve and manage representative examples of terrestrial and aquatic biodiversity Pt6- Extension and effective management based on sound science (monitoring) Priority Action 1.2 Endemic species and species at risk: "Identification and protection of endemic and threatened species and critical habitats" **Notes:** The key points from section 5.1.1 listed above are not translated into targets in the priority actions area. Likewise the Aichi Target percentages are not referred to in the priority actions. Finally and perhaps most critically no means or intermediate targets are identified for the effective management of said areas.
Target 12: By 2020 the extinction of known	Priority Action 1.2 Endemic species and species at risk. Project "Identification and protection of endemic

threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	and threatened species and critical habitats" Pt1- Identification of terrestrial, coastal and marine endemic and threatened species, biodiversity hotspots (KBAs, IBAs, etc.) and critical habitats Pt2- Management and recovery plans for endemic and endangered species Pt3- Restoration and rehabilitation of key habitats Pt4- Biodiversity surveys and assessments Priority Action 1.5. Marine wildlife and fisheries. Project "Development of sustainable fisheries ". Pt11- Studies of by-catch conducted and programmes implemented for its reduction. Pt15- Implementation of international commitments (e.g. FAO code of conduct, CITES, CMS) and provision of by-catch data to IOTC
	Notes: These points cover Target 12 well – though again no direct linkage to the Aichi Target is made in the document.
Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	Section 5.1.7 has the following Objective: "Identify and conserve the diversity of local agricultural varieties and breeds" and Target: "Local agricultural varieties and breeds are identified and protected" Priority Action 1.2. Endemic species and species at risk (including agro-biodiversity)
	Notes. The objective and Target of Section 5.1.7 are not translated into priority actions. Priority Action 1.2 mentions agro-biodiversity in the heading but has not activities specific to it and noting that Seychelles is not a centre for agro-biodiversity indeed all legal food plants are introduced. It should be noted however that this Target has been well implemented under previous programmes
Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.	
Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	Section 5.1.1. Protected Areas and Section 5.1.10 Land Development and Inland waters both support this target, implicitly and explicitly respectively, but neither is supported by pertinent Priority Actions.
	Notes: Section 5.1.1 Protected Areas does implicitly contribute to this Target but makes no explicit reference to this target or its objective. Section 5.1.10 Land development & inland waters has both an objective & target which support Target 14: Objective: Restore and safeguard ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being Target: A Water Use Management Plan is developed to protect and improve the management of watershed ecosystems But gain in neither case are these texts supported by Priority Actions.
Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing	Priority Action 1.10 Land development and inland waters. Project "Protection and rehabilitation of freshwater marshes and wetlands." Pt2- National network of managed and protected wetlands established. Pt4- Rehabilitation, protection and creation of wetlands. Priority Action 3.2 Climate-related biodiversity adaptation and mitigation. Project "Integration of

to climate change mitigation and adaptation and to combating desertification.	biodiversity into existing adaptation programs." Pt2- Ensure that the Ecosystem Based Adaptation to Climate Change in Seychelles AT 15 project appropriately considers biodiversity issues. There are various other priority actions listed for the gathering of further knowledge, development of capacities and plans to address climate change and related adaptation in Seychelles, which can be considered to be enabling activities to support of this target.
	Notes: However detailed Priority Actions with appropriate and incremental benchmarks are not incorporated and also the Priority Actions do not explicitly support the target or make reference to the percentage targets for restoration.
Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	Priority Action 4.3 Legal & institutional framework. Project Review & adoption of biodiversity related legislation Pt7- Incorporation of National Access and Benefit Sharing Regulations into the Biodiversity Act
	Notes: Recognises that the legislation has already been prepared – but does not address related capacity and public awareness needs for effective implementation.
Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building	
Target 17: By 2015 each Party has developed, adopted & has commenced implementing an effective participatory & updated NBSAP.	The Draft has been prepared but, as this assessment suggests, significant revision and amendment would appear to be required.
Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	Section 8 of the NBSAP describes a solid basis for stakeholder involvement in the approval, steering, implementation and review of the NBSAP. This implicitly supports the implementation of Target 18 – assuming the stakeholder participation is informed and equitable.
	Notes: Section 8 does not however explicitly address the Target objectives.
Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	Section 5.2.1 states supporting objectives: • Improve collection and sharing of local biodiversity data and related information within a collaborative multi-stakeholder knowledge platform • Strengthen research and improve our understanding of changes in biodiversity and its implications for ecosystem function. It also sets out supporting targets:

	• A biodiversity research policy and strategy is developed • A platform to promote collaboration and exchange is established through a National Clearing House Mechanism linked to the National Environmental Data & Information Portal (NEDIP) • Biodiversity monitoring and data management systems are developed including a national species database, integrated with NEDIP and capacities of key partners are strengthened and hardware and software harmonised. • Information and knowledge management capacity for biodiversity mainstreaming is developed. These are supported by Priority Action 2.1. Project "Seychelles biodiversity research, monitoring and data management program": Pt1- Setting up a multi-stakeholder national research committee. Pt2- Develop common biodiversity monitoring and data management systems including a national biodiversity database system which includes strengthening of capacities of all the key partners and harmonisation of hardware and software Pt3- Development of data collection protocols and guidelines Pt4- Management of a national species and ecosystem metadatabase linked to the National biodiversity clearing-house mechanism to be integrated with the broader National Environmental Data & Information Portal (NEDIP), being developed by the Department of Environment Pt5- Identification and documentation of biodiversity indicators Pt6- Identification of gaps in available data Pt6- Staff training in data collection, management and analysis Pt7- Development and implementation of a national biodiversity research strategy to encourage, foster and facilitate research Section 8: Implementation, Monitoring and Evaluation in sub-section 4 Includes "Maintaining a biodiversity information portal with links to the national Clearing House Mechanism and existing biodiversity-related databases".
	Notes: The above objectives, targets and activities are strongly supportive of the Aichi Target 19's implementation but they do not address in any detail the key issues necessary for its successful implementation – such as what means can be used to encourage stakeholders (agencies and individuals) to share their the data and how can matters of Intellectual Property Rights be properly addressed.
Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels.	Section 7 lists various suggestions for the accessing of new and additional funds for the implementation of the NBSAP
	Notes: Targets and priority actions are lacking however and the list is not explicitly linked to Aichi Target 20

7. Implementation of the Convention in Seychelles since 2010[8]

7.1 Marine and Coastal biodiversity

Seychelles has traditionally implemented the CBD in the marine domain through species protection legislation - e.g. marine mammals (GoS 1986), turtles (GoS 1994, 1998) and Whale shark (GoS 2003) - and protected areas for the purposes of conservation (i.e. GoS 1966, 1969)[9]. Sustainable use considerations have been addressed through management plans and policies (e.g. Mees *et al* 1998, GoS 2005b, Nevill 2007), fishery legislation controlling gear (GoS 1986) and licensing regimes for vessels and governing certain fisheries e.g. Sea cucumber (GoS 1999).

The key direct threat to the conservation and sustainable use of marine biodiversity is unsustainable fishing pressure. Limitations in Seychelles' ability to properly manage fishing activities relate to traditional open access to fisheries, inadequate data collection and management, and inability to enforce regulations due to limited resources and lack of stakeholder cooperation/compliance (see section 2.1).

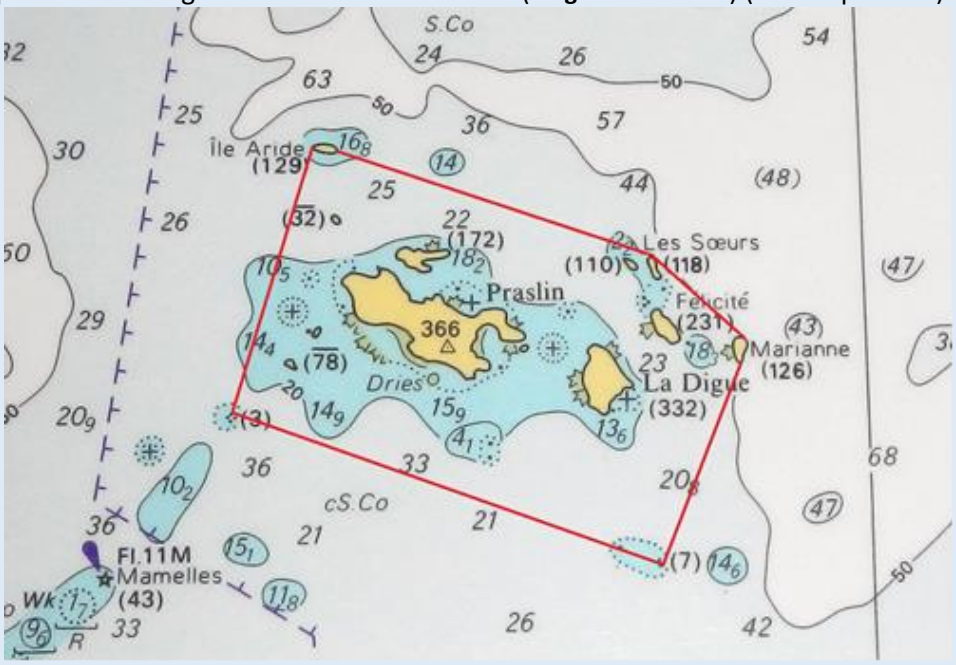
Since submission of the fourth national report to the CBD, however, the Seychelles government and stakeholders lead by the Seychelles Fishing Authority have taken significant and substantive steps to address aspects of these shortcomings. Primary amongst these has been the stakeholder-driven development of a fishery co-management proposal for the artisanal fishery around the Praslin group of islands. This co-management area has been approved by Government and will come into force with the promulgation of the new Fisheries Act (See **"Focus on Fisheries Legislation"** later in this section).

[8] This section in the report guidelines explicitly seeks feedback upon implementation of the Programme of Work on Island Biodiversity however, despite recommendations to utilise this programme as a primary tool in the revised NBSAP (GoS 2011) for the implementation of the CBD in Seychelles, this Programme has not been integrated into the new NBSAP or mainstreamed in other biodiversity initiatives and hence is not reported on here.

[9] For a detailed account of the designation of Protected Areas through time see Nevill 2010.

Focus On The Praslin Artisanal Trap and Line Fishery Co-management Plan

The proposed Co-management area covers 612km^2 (**King & Lucas 2013**) (See map below).



The four marine protected areas that fall within the management area: Curieuse Marine National Park, Aride Island Special Reserve, Cousin Island Special Reserve and Ile Cocos - Ile Fouche - Ile Platte Marine National Park retain their status and are excluded from the management provisions but contribute to the balance of conservation and sustainable use. The boundaries were determined by islands and rock formations to allow clear visual reference points when at sea. The area is to be overseen by the Praslin Fisheries Co-management Coordinating Committee (PFCCC) a stakeholder committee – with weighted representation from the artisanal fishing community, the Protected Area management agencies, private islands, tourism industry, Seychelles Fishing Authority and the Ministry of Environment. The Co-management plan sets out various measures that address fishery licensing and access, fishing effort and fishery size and catch limits on key commercial species *inter alia*:

- A limit on the number of fishing traps per registered vessel.
- Catch limit for non-licensed and recreational fishers pertaining to 68 species.
- A limit on the number and time of day that traps may be used on listed rabbitfish (*Siganus sp*) aggregation sites during the spawning season.
- A complete year-round ban on net use at listed rabbitfish spawning sites.
- Minimum catch size: Rabbitfish (*Siganus sp*) 10cm Total Length, Emperor red snapper (*Lutjanus sebae*) 20cm TL, Green jobfish (*Aprion virescens*) 30.5cm TL
- Octopus minimum weight 1kg. Unlicensed and recreational fishers allowed a bag limit of 2 in any 24 hour period.

A key element for the future success of the Co-management area is effective data gathering. To that end a monitoring protocol has been developed for the fishery (Guttierrez 2011) and fishers trained and equipped to undertake monitoring of their own catch to provide a fishery baseline and basis for future adaptive management of the area. To assist a fishery ID guide for the trap and hand line fishery has been developed incorporating local nomenclature (Nevill 2013).

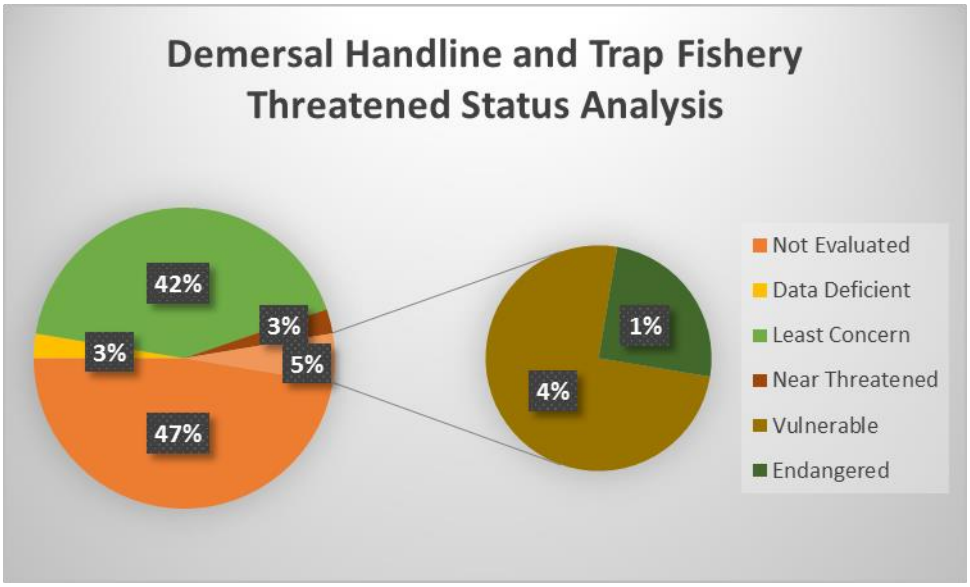
One of the key obstacles to developing a viable near shore fisheries management regime is the complex multi-species and multi-habitat nature of the fishery. This coupled with a lack of knowledge on basic stock biology, and the selectivity of the various gear types utilised, constitutes a complex fishery monitoring scenario beyond the limited human and financial resources of the local authorities. Attention has consequently turned to the development of a Community-based Data Collection Programme (CDCP) approach of stakeholder catch assessment (Guttierrez 2011). The existing demersal fishery monitoring regime is restricted primarily to certain guilds of fishes e.g. Siganids, Serranids, Lethrinids (See section 2.1) and selected, more specific classifications such as red snappers (*Lutjanus sanguineus*, *L. sebae* & *L. gibbus*) and "Vyey Platte" a creole name that covers three species of grouper (*Epinephelus Flavocaeruleus, E. multinotatus & E. coeruleopunctatus)* - down to single species records for the Brown-marbled grouper (*Epinephelus chlorostigma*), Green jobfish (*Aprion virescens*) and Emperor red snapper (*Lutjanus sebae*) all significant because of catch share and commodity value.

This broad classification of data gathering, however, can be limiting to effective fishery management as certain species, as has been the case in the Serranid guild, can become scarce without it being reflected in and therefore ascertainable from the overall guild figures. To enable more detailed data gathering under the CDCP a species identification guide incorporating Creole species nomenclature has been developed (Nevill 2013). Some 135 species, including various pelagic species, go to make up the artisanal trap and line fishery. The purpose, in this instance, is the management of demersal fishery resources. The guide is not intended as a comprehensive reference to the demersal artisanal fishery but rather focuses upon species of particular utility for developing a fishery monitoring baseline for the trap and line fishery. The list of species included was elaborated in consultation with SFA technical staff with the objective of incorporating sufficient appropriate species to enable pragmatic monitoring regimes sufficient to inform future management measures. Priority has been given to species of particular economic importance and/or known vulnerability to overfishing in addition to which have been added species of particular interest such as certain iconic species.

The guide covers 75 species including 13 species of Lethrinid, 14 species of Lutjanid and 21 species of Serranid which will enable much more detailed data gathering and analysis than the previous monitoring regime catered for and hence more refined adaptive management measures in the future. It also provides a good indicator set to undertake a threatened species status analysis for the fishery (See Fig 38).

Of the 75 indicator species covered in the guide 35 have not been evaluated, 2 are Data Deficient and 32 are classified as Least Concern and 2 as Near Threatened. The remaining 4 species, or 5% of the fishery, are considered Threatened - 3 being classified as Vulnerable and 1 as Endangered. There are currently no species based measures in place to protect any of the species in question.

Figure 38: Demersal Handline and Trap Fishery Species Threatened Status Analysis

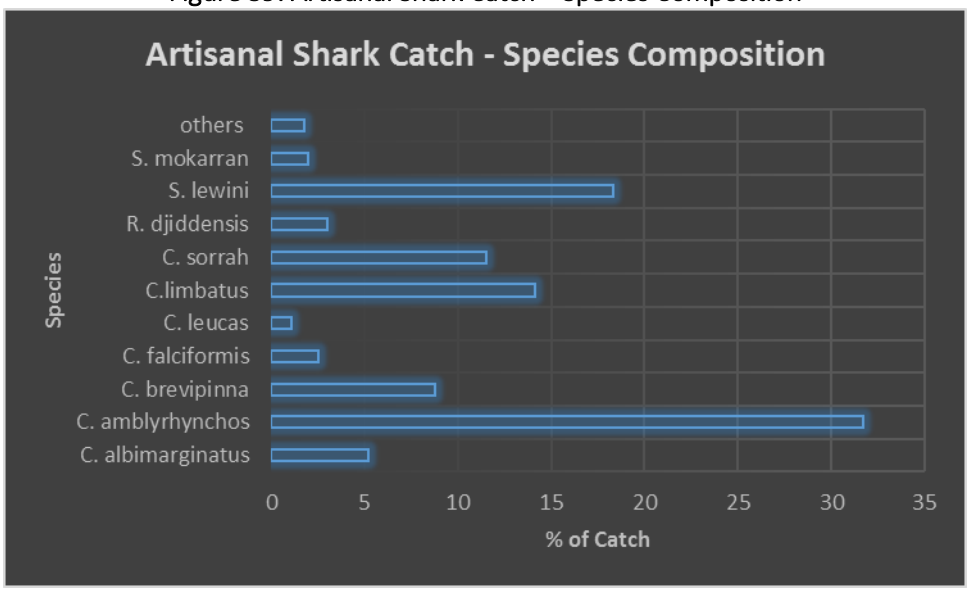


In parallel to work on the demersal trap and line fishery attention has also been focused upon the artisanal shark fishery. The Seychelles was amongst the first 10 countries in the world to develop a National Plan of Action for the Conservation and Management of Sharks (NPOA). The NPOA (Nevill 2007) identifies the lack of species based data as one of the primary obstacles to the sound management of shark resources in Seychelles waters. During 2013 the Artisanal Shark Fishers Association in partnership with the Seychelles Fishing Authority undertook an intensive survey of the artisanal shark fishery in order to establish the first species-based dataset for the fishery.

24 species of shark, including 2 species of guitarfish[10], were recorded in the artisanal catch in 2013 with the Grey reef shark (*Carcharhinus amblyrhynchos*) being by far the most abundant species constituting more than 30% (numerically) of the overall catch and the 10 most common species making up 97.5% (numerically) of the catch (See Fig 39).

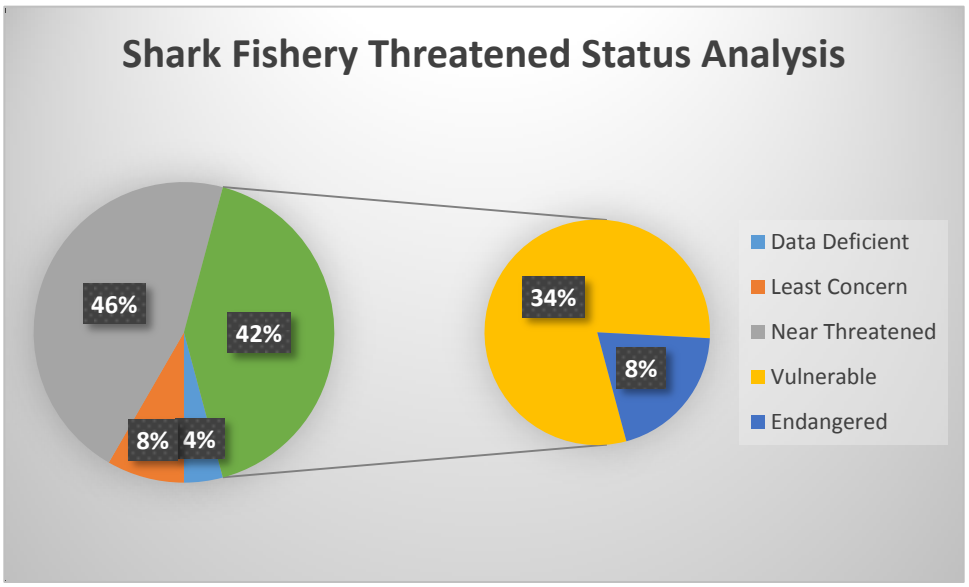
[10] Guitarfish though strictly rays are included in the shark fishery because, due to the nature of their fins and meat, they are subject to the same commercial fishing pressures as true sharks.

Figure 39: Artisanal Shark Catch – Species Composition



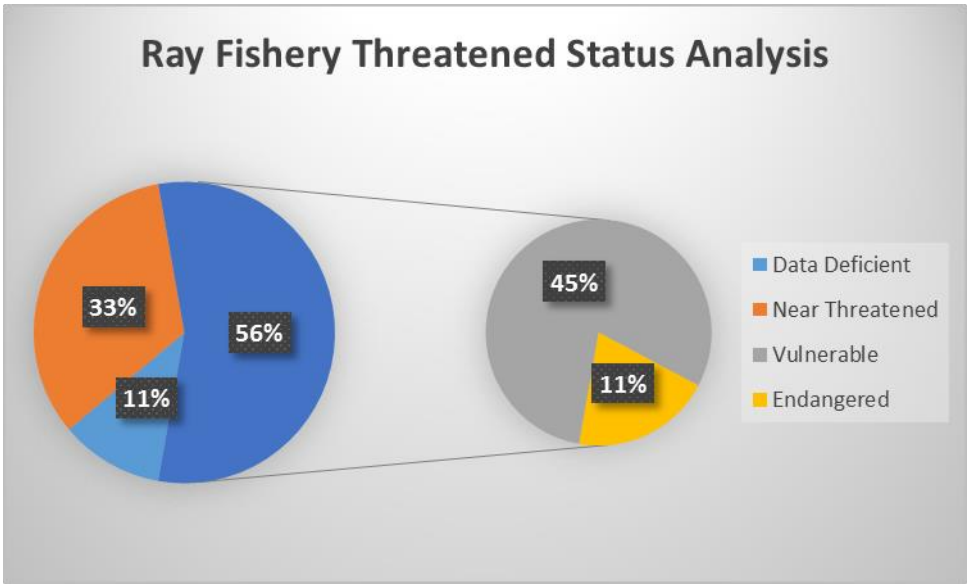
Application of the IUCN species status criteria to the shark fishery provides a very different view to the trap and hand line demersal fishery (**Fig 40**). Of the 24 species recorded in the artisanal shark fishery: 1 species is data deficient, 2 are classified as Least Concern, 11 species are listed as Near Threatened and 10 species, or 42% of the fishery, are classified as threatened – 8 species being cited as Vulnerable and 2 species as Endangered.

Figure 40: Shark Fishery Threatened Status Analysis



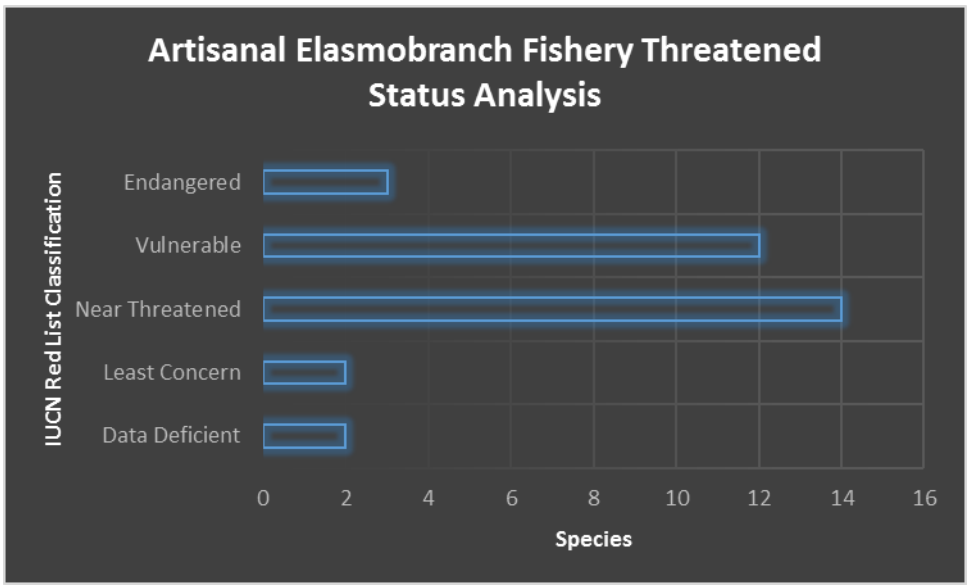
The Ray fishery (**Fig 41**), not including the two species of guitarfish (*Rhynchobatus djiddensis & Rhina ancylostoma*) that are treated with the shark fishery, consists of 9 species; of these 1 is Data Deficient, 3 are Near Threatened and 5 (or 56%) are listed as Threatened – 4 being classified as Vulnerable and 1 as Endangered.

Figure 41: Ray Fishery Species Threatened Status Analysis



The high percentage of threatened species in the overall elasmobranch fishery reflects the vulnerability of their typical lifecycle characteristics (slow growth, late maturation and low fecundity) to fishing pressure. It does not necessarily reflect the actual status of each species population in Seychelles. Particularly when for many species the populations on the Seychelles plateau and the banks of the outer islands are geographically and possibly genetically isolated from the wider stocks in the Western Indian Ocean. Further genetic analysis and tracking projects are required to gain a better understanding of the species population's status in Seychelles waters. The Seychelles NPOA (Nevill 2007) however states that the shark fishery in general is overexploited and the international status of the species in question underlines their vulnerability to fishing pressure; highlighting the need for higher resolution research and adaptive management of the fishery (Fig 42).

Figure 42: Artisanal Elasmobranch Fishery Species Threatened Status Analysis

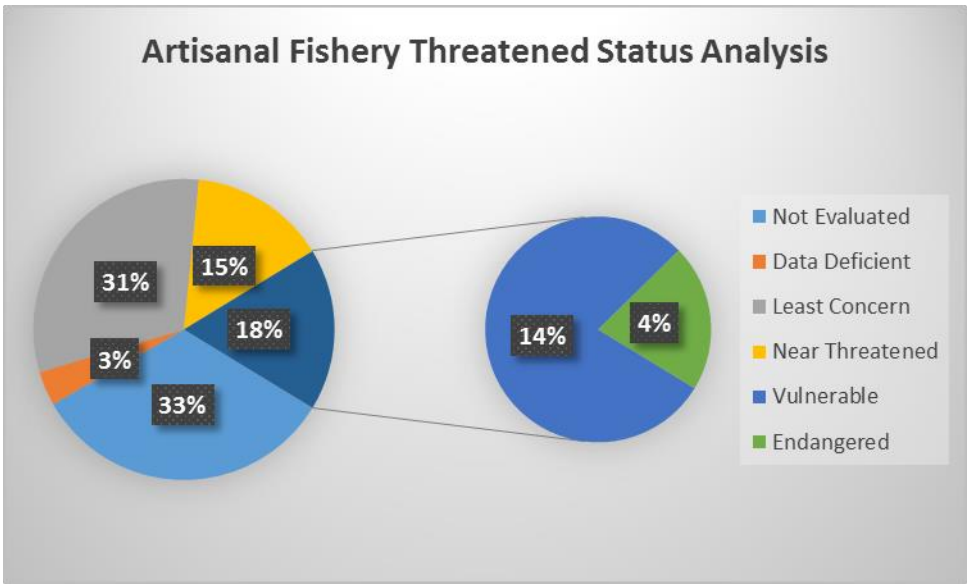


In addition to the data gathered in terms of species make-up of the catch more detailed records of population demographics, age at maturity and breeding season were recorded for the 9 species of shark that constitute 95% of the artisanal sharp fishery. This will provide a baseline by which change through time in particular with regard to the proportion of mature adults in the catch (mean size of catch, mean size at maturity comparisons etc…) can be assessed and management options considered and informed. To address the need for enhanced data gathering the 2013 survey also established morphological models for the 9 most common species allowing for the development of a simple, pragmatic, cost-effective, standardised data gathering protocol (Nevill 2014) for the fishery whereby a single measurement can now be taken for each specimen, whether intact or a dressed carcass, and used to generate the requisite size and catch data.

Overall Artisanal Fishery

The trap and hand line fishery coupled with the elasmobranch fishery constitute an overview of the demersal fishery in Seychelles (Fig 43).

Figure 43: Artisanal Demersal Fishery Species Threatened Status Analysis



Consideration of the threatened status and economic importance of different species and fishery guilds can assist in targeting fishery research and management measures. The bulk of threatened species are elasmobranchs, but the negative trends in catch recorded across the guilds (see section 2.1) and the large proportion of species (33%) that are yet to be evaluated in the trap and line fishery provide causes for concern for conservation and sustainable use respectively. During the period since the fourth National report to the CBD significant local effort and resources have been focused on aspects of the demersal fishery in particular with regard to research upon the aggregation behaviour of Siganids (Bijoux *et al* 2013, Robinson *et al* 2011) and certain species of Serranid (Bijoux *et al* 2013a).

The work on the Siganid fishery has been parallel to and complementary with the development of the Praslin co-management area concept. Research has shown high site fidelity to spawning aggregation sites and high turnover of visitation giving a better understanding of the likely population dynamics of spawning sites (Bijoux *et al* 2013). This information is crucial to elucidating

management regimes for the effective sustainable utility of this important coastal fishery for both its significant economic value and important ecological role as key herbivores in coastal coral reef ecosystems.

The Serranid fishery in Seychelles, as shown by catch statistics in Section 2.1, is in worrying decline. In addition to the downward trend in catch however, there is strong anecdotal evidence of various, typically the larger slower growing species, becoming increasingly rare (*Epinephelus fuscoguttatus, and Plectropomus spp*) and even disappearing (e.g. *Epinephelus tukula*) from the catch in large parts of their former range. It is for example quite easy to ascertain whether a vessel has been fishing on the Seychelles plateau or the more distant less-fished banks looking at the species composition of its Serranid catch. Recent increases in grouper catch from the outer islands have raised concern about demersal long lining and the targeting of spawning aggregations. Serranids are an important and highly valued component of the fishery and this is particularly true for the larger groupers and coral groupers. Two of the most valued species are the Camouflage and Brown marbled groupers (*Epinephelus polyphekadion* & *E. fuscoguttatus*) these species are known to aggregate for spawning, often favouring reef passes for this activity. Previous research in an outer island group (Robinson, J. *et al* 2008, 2008a) had shown spawning seasons last between 2 and 3 months between November and February, with aggregations lasting 2-3 weeks peaking a few days before new moon. Spawning seasons of both species were found to overlap spatially and temporally. Interviews of fishers further showed that aggregations are known to fishers and are actively commercially exploited (Robinson *et al* 2004, 2008). Research undertaken at Farquhar atoll, 2010-2012, (Bijoux *et al* 2013a) confirmed these previous findings but also elucidated a high degree of intra- and inter-seasonal spawning site fidelity (91.7% *E. fuscoguttatus* and 89.5% *E. polyphekadion*) and high repetitive spawning by both species with over 80% or more of fish recorded at a site during at least 2 spawning months in a season. These findings underline the high vulnerability of these long-lived, slow growing species to overfishing by the targeting of their spawning sites and should inform future fishery management measures.

Focus on Fisheries Legislation – The New Seychelles Fisheries Bill (GoS 2012)
Work has been ongoing for several years to develop a new Fisheries Act – now in the final stages of approval - which, in repealing the existing 1986 Fisheries Act, will update the legislative framework for the management of Seychelles fisheries. This will be attained by the enhanced integration of the ecosystem approach through the legal framework of management and by enabling stronger stakeholder participation. The objects of the Bill are to provide for a comprehensive and modern fisheries regime to enable the Seychelles Fisheries Authority to implement and fulfil her obligations locally and internationally. The resulting Act will provide for *inter alia* more efficient and effective provisions for the management and sustainable development of fisheries in accordance with international recognised norms, standards and best practice and an ecosystem approach to fisheries. The legal Framework of Fishery management has been overhauled and updated in line with best current international practice strengthening the requirement for management plans for each fishery and setting out the criteria for consideration under a management plan including: - Current state of the fishery - The fishery's biological, ecological and socio-economic objectives, indicators and reference points. - The management measures by which the objectives and strategy are to be attained, including harvest control rules; - The amount of fish or fishing effort to be allocated, if the measures include quota

systems, between individuals or fishing fleets;
- Measures to mitigate ecosystem impacts in accordance with best practice for adoption of an ecosystem approach to fisheries, including by-catch and habitat damage;
- The role of stakeholders in decision making relating to the plan of management; and performance criteria and time lines by which to assess implementation.

Stakeholder empowerment for the equitable access to and sharing of benefits from fisheries is enshrined in clauses 5(3) and 5(4) respectively:

*"**5(3)** In the preparation or review of each plan for the management of a fishery, the SFA shall consult with the fisheries industry, local fishermen and such other persons engaged in fishing and fishing related activities …"*

*"**5(4)** In the management of a fishery, the SFA may when practical and desirable enter into a co-management arrangement."*

It is this second clause [5(4)] that will empower the Praslin Co-management Fishery Area and make its management measures legally binding regulations – and empowering the stakeholder committee as the legal guardians of the area.

In addition to legally embodying the rights of fishers and other related stakeholders the law also clarifies responsibilities and in particular the key aspect of fishery data provision to the Seychelles Fishing Authority (SFA) which will in turn enable it to fulfil its mandate. Paragraph 7: Duty of SFA regarding statistics and information states:

"7(1) The SFA shall collect and analyse statistical and other information on fisheries, fishing related activities and aquaculture.

7(2) Every person engaged in fishing, fishing related activities or aquaculture shall supply information regarding such activities in such form as may be prescribed by the Minister."

Seychelles has realised major breakthroughs in the rehabilitation and restoration of small island ecosystems over the last 20 years, but aside from a Crown-of-thorns starfish (*Acanthaster planci*) control programme and some small scale attempts at beach crest management and mangrove re-planting very little has been done with respect to the rehabilitation of marine and coastal ecosystems.

This all changed over the last few years with a coral reef restoration initiative by the local NGO Nature Seychelles with funds from USAID and GEF. In 1998 the central Seychelles experienced some 90% loss of living coral cover due to extended raised sea water temperature due to the El Nino Southern Oscillation (ENSO) event. Subsequent research under the GEF funded Seychelles Marine Ecosystem Project (SEYMEMP) identified areas, termed refugia, where coral had survived either because of cooler currents or greater genetic temperature tolerance, but also concluded that coral recovery may be slow simply because the "seed source" of the planktonic stage of coral had been so widely and extensively destroyed (Engelhardt 2004). Subsequent recovery in the central archipelago has been patchy and generally poor and also further hindered by subsequent less severe bleaching events. Consequently Nature Seychelles has taken on the challenge of pioneering coral reef restoration by the "gardening" of coral nubbins for out planting in two trial areas one within the boundaries of the Cousin Island Special Reserve and the other off the nearby island of Praslin (See Focus on Coral Reef Restoration below).

Focus on Coral Reef Restoration

Designer Reefs: Restoring marine ecosystem services

The marine environment is under severe threat from climate change, identified as the single most palpable threat to marine ecosystems. Its impact on coral reefs has been devastating. Corals in the Seychelles and the region have been destroyed by ocean warming and coral bleaching events, threatening the livelihoods of millions of coastal peoples in Eastern Africa and the Western Indian Ocean islands.

The "***Reef Rescuers: Restoring Coral Reefs in the Face of Climate Change***" is a ground-breaking project initiated by Nature Seychelles in 2010 and is financially supported by the United States Agency for International Development (USAID) and the UNDP/Government of Seychelles' GEF-funded Protected Areas project. The aim is not to restore coral reefs as they were before the bleaching ("turning back the clock") but to plant climate-resilient species so as to restore ecosystem services ("designer reefs"). The project is based on Praslin Island, Seychelles' second largest island, and restoration is taking place around the Cousin Island Special Reserve.

An internationally accepted method called coral gardening is being used. Using this method, small, healthy coral fragments (nubbins) are collected from sites that have survived, or recovered from, bleaching. The fragments are raised in mid-water ocean nurseries made up of ropes. Larger pieces of different species are collected for net nurseries. These are continuously monitored and tended until they grow to suitable sizes. The nursery corals are then transplanted onto reefs degraded by bleaching. Until this project no large scale restoration project using the coral gardening method had been attempted anywhere in the world.

About 30,000 corals (9 species from rope nurseries and 36 species from net nurseries, of which 7 are encrusting species, 10 branching, and 19 massive) have already been successful raised and transplanted, while 8,000 more corals are awaiting transplantation.

The US Ambassador to Seychelles Shari Villarosa said recently: "I am impressed by what I saw, it's growing, and I hope it continues to thrive. This is a very important project for the entire world." The project will end in September 2014 as no further funding has been secured.

Author: Dr Nirmal Shah, Nature Seychelles www.natureseychelles.org

7.2 Terrestrial Biodiversity – Forest and Inland Waters Biodiversity

Seychelles has "traditionally" sought to realise terrestrial biodiversity conservation objectives through the establishment of Protected Areas (Procter 1970, 1973, Nevill 2010), the implementation of IAS eradication and control programmes (Beaver & Mougal 2009, Merton *et al* 2002, Millet *et al* 2001, Parr *et al* 2000, Nevill & Ikin 2010) complemented by ecosystem rehabilitation (Hill 2002, Hill *et al* 2003) projects and species re-introductions (Shah & Nevill 2001, Rocamora & Henriette 2009).

7.2.1. Protected Areas (PAs). The Seychelles 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, that are remnants of the former supercontinent Gondwanaland and which broke away from any continental landmass more than 70 million years ago. Endemic biodiversity is concentrated on the larger islands primarily from 200 metres elevation upwards. 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 stakeholder endorsed 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 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.
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.

Declaring 50% of the national landmass protected is one thing, effectively managing said area to realise its conservation and sustainable use objectives is another. The problem of "paper parks" i.e. areas designated and regulated but not effectively managed is a recognised problem in Seychelles. Small PAs such Cousin Island Special Reserve and Vallee-de-Mai world heritage site/Nature Reserve are managed very effectively and recognised internationally as model PAs. Their size, high level of interest and proximity to national infrastructure and tourism centres all work in their favour. Morne Seychellois National Park, however, 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. It is also not profitable, despite being at the hub of the national tourism industry it offers little to the average tourist beyond scenic hikes and as yet has failed to realise revenue from its assets.
The importance of Protected Areas to Seychelles' implementation of the CBD has been recognised by and reflected in the awarding and implementation of a Full-Size GEF project that addresses the gamut 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.

Focus on Aldabra

Aldabra Special Reserve and World Heritage Site is the most isolated of Seychelles' Protected Areas being some 1,100 km southwest of Mahe. Aldabra is the largest raised coral atoll in the world and also the largest PA in Seychelles and indeed, at 153.8 $km^{2,}$ constitutes over a third of the country's terrestrial surface area. Aldabra is managed by the Seychelles Islands Foundation (SIF) a Public Trust established in 1979 by Presidential Decree for the express purpose of managing the Atoll[11]. Aldabra is widely recognized as one of the most remarkable and least disturbed oceanic islands on Earth. The height of the Atoll, with two platforms at 4m and 8m above sea level means its last submergence took place some 125,000 years ago (Skerrett 1999). This antiquity, relative to other coral islands in the Seychelles, coupled with its size means the island boasts a high degree of endemism – of 176 flowering plants some 40 species (22%) are endemic, some 38% of the estimated 1,000 species of insect on the atoll are also endemic (See Section 2.3 Table 3 for more information).

Aldabra is recognised as an Important and Endemic Bird Area (IBA & EBA) by Birdlife International (Rocamora & Skerrett 2001). There is currently only one extant species recognised as endemic, the Aldabra Drongo (*Dicrurus aldabranus*). There are various other taxa however, currently classed as endemic sub-species, some of whose status is unclear (see table below) and as such Aldabra awaits a genetic study of its avifauna. The most obvious candidate for species status being the Aldabran rail (*Dryolimnas cuvieri aldabranus*) which is the only surviving flightless bird of the Indian Ocean region. Aldabra also *inter alia* hosts: a small breeding population of the endangered Madagascar Pond-heron (*Ardeola idae*) (Bunbury 2014, Gerlach 2007), and the world's second largest colony of Frigate birds (both *Fregata minor* and *F. ariel*) (Rocamora & Skerret 2001, Sur *et al* 2013).

Endemic Birds of Aldabra	
Species	
Aldabra drongo	*Dicrurus aldabranus*
Sub-Species	
White-throated Rail	*Dryolimnas cuvieri aldabranus*
Sacred ibis	*Threskiornis aethiopica abbotti*
Comores Blue pigeon	*Alectroenas sganzini minor*
Madagascar Turtle dove	*Streptopelia picturata coppingeri*
Madagascar Coucal	*Centropus toulou insularis*
Madagascar Nightjar	*Caprimulgus madagascariensis rostratus*
Souimanga Sunbird	*Nectarinia sovimanga aldabrensis*
Madagascar White-eye	*Zosterops maderaspatana aldabrensis*
Forest Fody	*Foudia eminentissima aldabranus*
Madagascar Bulbul	*Hypisipetes madagascariensis*

Aldabra is perhaps most famous for its population of the endemic Aldabra giant tortoise (*Aldabrachelys gigantea*) with a population of some 100,000 animals (ERGO 1997). Over the last 15 years it has become evident (Hamylton *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*) as well as a breeding population of the critically endangered Hawksbill turtle (*Eretmochelys imbricata*).

[11] SIF's mandate was latterly expanded in 1989 when it took over the management of Seychelles second World Heritage Site the Vallee-de-Mai on Praslin.

Aldabra consists of four main islands, Grande Terre, Malabar, Picard and Polymnie, surrounding a central lagoon with many smaller islands and islets. The land area comprises 15,380 ha, the lagoon 22,400 ha, and the sea for a kilometre offshore forms part of the Special Reserve.

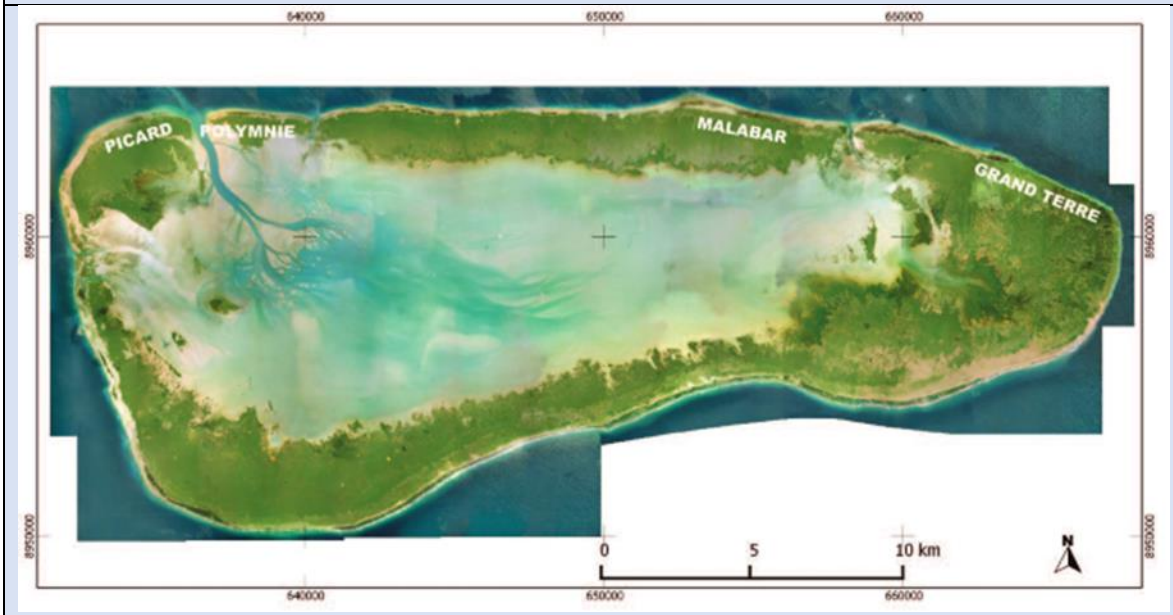


Photo-map of Aldabra © Seychelles Islands Foundation

Aldabra represents in many respects a microcosm of the Seychelles implementation of the CBD and the difficulties it lacks in terms of direct human population and development pressures it more than compensates for with its size and isolation. In recent years however, a re-structured SIF management and administration have taken impressive steps to address the particular issues faced by Seychelles' two world heritage sites (see also Case Study 3); bringing the organisation and its work to the fore during the period covered by this report. For on Aldabra, as nationally, invasive species, habitat rehabilitation and species re-introductions remain the immediate pressing issues and outstanding progress has been made:

Goat eradication. On 3rd August 2012, after a 25-year campaign and a 5-year intensive programme the last feral goat (*Capra hircus*) on Aldabra was shot (Bunbury *et al* 2013). Goats were introduced to Aldabra in the mid-19th century and by the 1920s were reported as present in their thousands. In the 1960s they present on all four main islands and the lagoon island of Ile Esprit (Stoddart 1981). Work in the 1980s (Coblentz *et al* 1990) confirmed that goats were altering plant species composition, slowing the regeneration of natural vegetation, reducing food availability and even vital shade cover for the Aldabra giant tortoise. The eradication campaign went through several phases culminating in an intensive 5 year programme utilising the hormone-supplemented sterile Judas-goat technique, pioneered in the Hawaiian islands (Taylor & Katahira 1988). The landmark achievement of goat-free status has been confirmed by independent agency. A total of 2,344 goats were shot over the 25-year period.

Following this achievement work has commenced on other IAS projects including the eradication of introduced Madagascar fodies (*Foudia madagascariensis*), Red-whiskered bulbuls (*Pycnonotus jocosus*) and Sisal (*Agave sisalana*) from the Atoll and the initial trialling of baits and methodologies as part of the feasibility assessment for the eradication of rats (*Rattus rattus*) – an enormous undertaking for a land area of that size and with difficult habitat types such as inter-tidal mangrove forests.

An eradication of two introduced species of bird (Red-whiskered bulbuls and Madagascar fodies) is also being carried out by SIF on the nearby island of Assumption to ensure that these species cannot re-invade Aldabra (See Case Study 3).

Re-introduction of the flightless Aldabra rail to Picard island. In 1998 the Aldabra White-throated rail was restricted to just three islands of Aldabra. It had been extirpated from the islands of Grand Terre and Picard by the early 20th century due to human interference and introduced feral cats. Following the eradication of cats, 18 rails were re-introduced to Picard in 1999. A 2011 survey of Ile Picard revealed the 18 introduced birds had spawned a new population of some 3,000 birds, including 1,000 breeding pairs (Sur *et al* 2013a). This phenomenal success story increasing the global population of the Aldabra rail by 30-40%.

Scientific Programmes. The research being undertaken on Aldabra has blossomed in recent years. The lagoon has been mapped and ecologically modelled to enable more targeted conservation and enhanced resource management in the future (Hamylton *et al* 2012). An in depth ecological study of the Giant tortoise population has been initiated including extensive GPS tracking of individuals, and exclusion plots, to better understand the population's use of and effect upon the atoll's ecosystem. Advancing technology has been embraced with data loggers being attached to Red-tailed tropicbirds (*Phaethon rubricauda*) to assess the links between foraging and breeding areas. One bird tagged in May 2012 flew more than 2000 km east to the Chagos Islands area where it stayed from October to December 2012, before returning to Aldabra in early 2013, a round trip of some 5700 km (SIF 2014). Satellite transmitters attached to nesting Green turtles have so far revealed that this population utilises the waters of at least six different Western Indian Ocean countries to forage. A GEF funded marine research programme has been initiated utilising baited and un-baited remote underwater video systems (BRUVs/RUVs). The data collected will be used to create a baseline of fish communities at various points around the atoll. The video footage collected continues to show a high density of predators including sharks, groupers and rays for which Aldabra is famous.

7.2.2. Invasive Alien Species (IAS). The CBD recognises the particular threat IAS pose to 'geographically and evolutionarily isolated ecosystems" (CBD 2000). Seychelles epitomises that definition and indeed IAS are recognised as the primary threat to Seychelles biodiversity (GoS 2011). IAS therefore has been a key aspect of Seychelles implementation of the CBD and this was covered in detail in the 4th National report in Case Study 6 on Ecosystem rehabilitation (Nevill 2011a). The benefits of the eradication of invasive mammals (rats and cats) from island ecosystems are still being realised today with endemic bird species in particular reaping the benefits. Of the eight recognised Threatened Species of endemic landbird in 1997, 3 species have had their threatened status downgraded and 2 other species population and/or distribution status has improved markedly due to the rehabilitation of small island ecosystems including the eradication of mammalian predators (See Table 5 below).

Table 5: Globally Threatened Endemic Bird Species			
Species	IUCN status		Notes
	1997	2014	
Seychelles Magpie Robin (*Copsychus sechellarum*)	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 (*Zosterops modestus*)	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 (*Terpsiphone corvina*)	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 Scops Owl (*Otus insularis*)	Critically Endangered	Endangered	Restricted to the mountains of the main island of Mahe. Down listed to Endangered in 2006 as latest research (**Currie *et al* 2004**) indicated population may be as high as 250-284 mature individuals and apparently stable (**IUCN 2012b**).
Seychelles Warbler (*Acrocephalus sechellensis*)	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 2012c**). 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 (*Foudia sechellarum*)	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 2012d**).
Seychelles Kestrel (*Falco araea*)	Vulnerable	Vulnerable	A very interesting species that appears to have undergone a severe population collapse 1940-1960s, to an effective population size of 8 individuals (**Groombridge et al 2009**), likely due to the use of organochlorine pesticides and rebounded effectively on the main island of Mahe but has not resumed its historical range on smaller throughout the central archipelago – where other factors, such as habitat loss and persecution also possibly play a role. Population estimated at 420-430 pairs in 2008 mostly on Mahe and satellites, 40-50 pairs on Silhouette and a few pairs on Praslin and Ile du Nord (**IUCN 2012e**).
Seychelles Swiftlet (*Collocalia elaphra*)	Vulnerable	Vulnerable	Total population estimated between 2,500-3,000 birds (**Rocamora 1997**). Listed as Vulnerable as it nests in three sites with some 95% of all breeding birds concentrated at one cave. Nesting caves are vulnerable to disturbance (2 sites have historically been lost) coupled with ongoing decline in (lowland) wetland feeding habitats may require the species to be listed as Endangered (**IUCN 2012f, Gerlach 2007**).

The eradication of introduced mammalian predators from small islands has been highly beneficial but has also served to highlight the impact of introduced bird species on endemic biodiversity in particular as highlighted by the Indian mynah bird (*Acridotheres tristis*) – see Case Study 2. A national framework for IAS management has been developed, under the auspices of the GEF Full-size project "*Mainstreaming Prevention and Control Measures for Invasive Alien Species into Trade, Transport and Travel Across the Production Landscape*", including: a National IAS Strategy (Nevill & Ikin 2010), a National IAS Baseline (Nevill 2009), a comprehensive review IAS control and eradication programmes in Seychelles (Beaver & Mougal 2009) and development (in process) of a Best Practice Handbook for IAS Management in Seychelles (Rocamora & Henriette 2014).
As progress has been made in the domain of IAS eradication and management greater challenges such as the trialling of eradication methods on larger landmasses (see focus on Aldabra) and pre-emptive IAS management measures (See Case Study 3) have been addressed, demonstrating the national recognition of the importance of ongoing establishment of national capacity for effective IAS management.

Case Study 2: Indian Mynah Management

The Common or Indian Mynah (*Acridotheres tristis*) is believed to have been introduced to the main island of Mahe in the late 18th Century. It subsequently spread readily through the central archipelago where it established itself successfully on all but the smallest of the islands. This omnivorous, intelligent and highly adaptable bird, nominated amongst "100 of the world's worst invaders" by the Global Invasive Species Database, has long been recognised as a damaging invasive species in Seychelles in particular with regard to its potential for competition with endemic species and predation of their eggs and chicks (Komdeur 1996, Millet 2004, Nevill 2009).

It is however, only following the successful eradication of invasive alien mammalian species from certain islands that the true impact of Mynah birds on endemic biodiversity has become apparent in particular through data gathered on Denis Island.
The great breakthrough in biodiversity conservation in Seychelles over the last 20 years has been the eradication of cats and rats from various islands. These eradications have been key to the rehabilitation of these ecosystems and an essential precursor to the (re)introduction of endemic biodiversity, in particular endangered endemic bird species[12]. The islands of Fregate (219 ha), Denis (143 ha) North (201 ha) underwent successful rat eradications in 2000, 2002 and 2005 respectively and each has subsequently attempted mynah eradications with varied success. Mynahs have previously been successfully eradicated from the islands of Cousin (28 ha), Cousine (26 ha) and Aride (68 ha) but the populations on these islands were small due to a combination of their size and relatively natural state – Mynah birds prosper best in disturbed secondary habitats (Feare & Craig 1998). Also the proximity of these islands to large source populations on the Praslin group of islands means that open-ended management programmes are required to prevent re-establishment of the species.

<u>Evidence of Mynah Impact – Denis Island.</u>
Following the eradication of cats in 2001 and rats in 2002, coupled with target habitat rehabilitation whereby exotic species were removed and indigenous broadleaf woodland propagated, four threatened endemic species were introduced to Denis Island: the Seychelles warbler (*Acrocephalus sechellensis*) and Seychelles fody (*Foudia sechellarum*) in 2004 and the

[12] These developments were detailed in Seychelles 4th National Report to the CBD, Case Study 6: Ecosystem Rehabilitation.

Seychelles magpie-robin (*Copsychus sechellarum*) and Black paradise flycatcher (*Terpsiphone corvina*) in 2008.
Monitoring of the introduced endemic populations and in particular the Seychelles magpie-robin and Seychelles warbler soon provided indications of the negative impact of the Indian Mynah on these rare species. The mynah was recorded as the cause of Magpie-robin failed breeding attempts through nest destruction and attacking nestlings (Nevill 2009a). The attacks accounted for the loss of several chicks and were considered the main reason for the population numbering 20 (i.e. no increase) a year after introduction.
Work by researchers from Groningen University monitoring the introduced Seychelles warbler population, also recorded the negative impact of the Mynah. 58 Warblers were introduced to Denis Island in 2004 and surveys showed a steady expansion of the warbler population, such that it almost doubled in the first three years. Data from the 2006 survey however indicated that that warbler population was exhibiting a skewed sex ratio with significantly more males than females (Brouwer *et al* 2007). A 2009 follow up investigation found scars and head wounds on 5% of the population (Van der Woude & Wolfs 2009) giving rise to the hypothesis that females were being attacked during incubation by mynahs. Denis Island warblers were the first population to show a sex bias after translocation and were also the only population co-existing with Indian mynahs. This hypothesis was tested using dummy warblers in artificial nests in the 2010 survey and video evidence showed a mynah attacking the model and resulting in similar head wounds to those being observed in the warbler population (Van der Woude & Neddermeijer 2010).

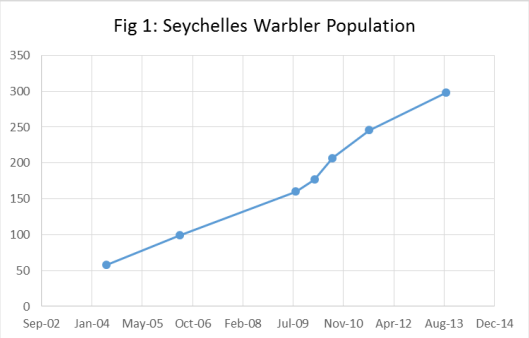
These findings made it clear that the mynah population on Denis posed a threat to the introduced endemic bird populations and the overall conservation objectives of the island. Findings subsequent to the initiation of a mynah eradication programme on Denis were to show that if anything observations had underestimated the negative impact of the Indian mynah.

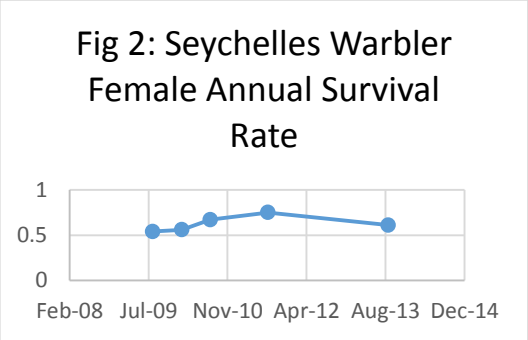
Eradication attempt and benefits – Denis Island

A standardised survey method was utilised to assess the Mynah population giving a population estimate of 1012 birds in January 2010 (Van der Woude & Neddermeijer 2010). An avian specialist Prof Chris Feare was employed to design and test control measures and the eradication attempt was initiated in late May 2010. A variety of methods were trialled. Two types of trap were constructed and tested: funnel traps which rely on food bait to lure Mynahs into the traps, and decoy traps, which use a live decoy mynah in a central compartment to attract mynahs. Mist nets were also used in initial trials where flocks of mynahs concentrated, as were fine nylon snares placed on the ground among bait (Feare 2010b). Only decoy trapping proved effective and subsequent efforts concentrated on this method.
After 13 weeks 592 birds had been caught constituting over half the islands population (Feare 2010, 2010b) and giving reason to believe that eradication was feasible. Unfortunately after the consultant led phase of the programme ended the catch rate declined reflecting a reduction in effort by the volunteer staff in place to continue the work. After a four month break in the eradication project, two replacement volunteers successfully revived the trapping programme and by July 2011 the mynah population on the island was estimated to be just 78 birds (Van der Woude & Ploegaert 2011), equivalent to a 94% reduction over the preceding 14 months. By 2013, following the cessation of trapping activities the population of Mynahs was on the rebound and estimated to be 198 birds by September 2013 (Van der Woude *et al* 2013).The decline in mynah population however produced a truly remarkable response in the populations of the endemic bird species.

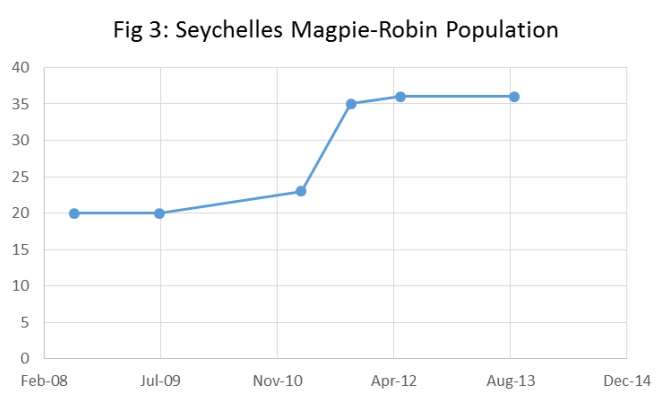
The warbler population showed an increase in the rate of population growth (Fig 1) and critically a

marked improvement in female annual survival from 0.54 to 0.75 (**Fig 2**) (**Van der & Wolfs 2009**, **Van der Woude et al 2013**).

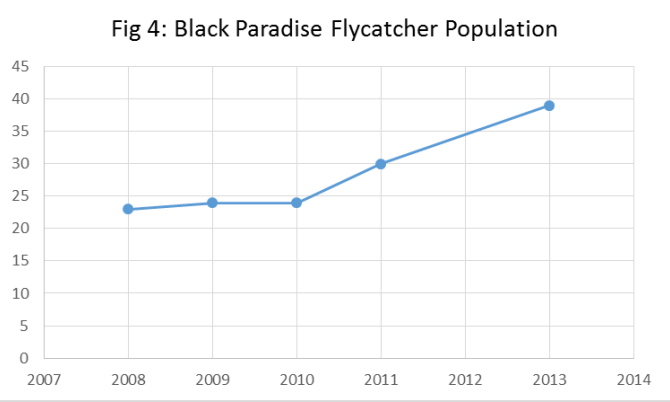




The Magpie-robin population jumped more than 50%, from 23 to 35, in 8 months (**GIF 2013**) the first marked population growth since its introduction in 2008 (**Fig 3**).

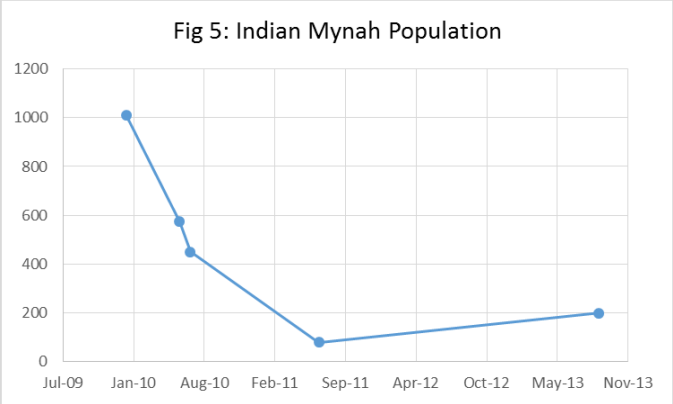


The Flycatcher population likewise showed its first population growth spurt (Fig 4) increasing by 25% in space of a year (**Henriette & Laboudallon 2011**) (**GIF 2013**).



Unfortunately with cessation of mynah trapping and the gradual recovery of the population female survivorship in warblers has again dropped, and the population of the Magpie-robin plateaued at 36 (**Apperloo *et al* 2013**) (**GIF 2013**). Population growth in the Flycatcher, however, has

continued (**Bristol 2013**) indicating that a higher density of mynahs is required to impact their breeding success.



This stark negative correlation between Mynah population and the breeding success of the introduced endemics, coupled with direct observation mynah attacks on nests, demonstrate that mynahs are the primary impediment to reproductive success of the introduced endemics, playing, in the absence of invasive mammalian predators a much larger role than had been previously realised. This factor should be incorporated into any future planning for (re)introductions of endemic birds to small islands.

The Mynah eradication programme on Denis Island, in light of these stark findings, is scheduled for re-commencement in May 2014 with a strong commitment by the island management to see the programme through to completion.

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Case Study 3: Pre-emptive action to eliminate threats posed by invasive alien birds to Seychelles World Heritage Sites

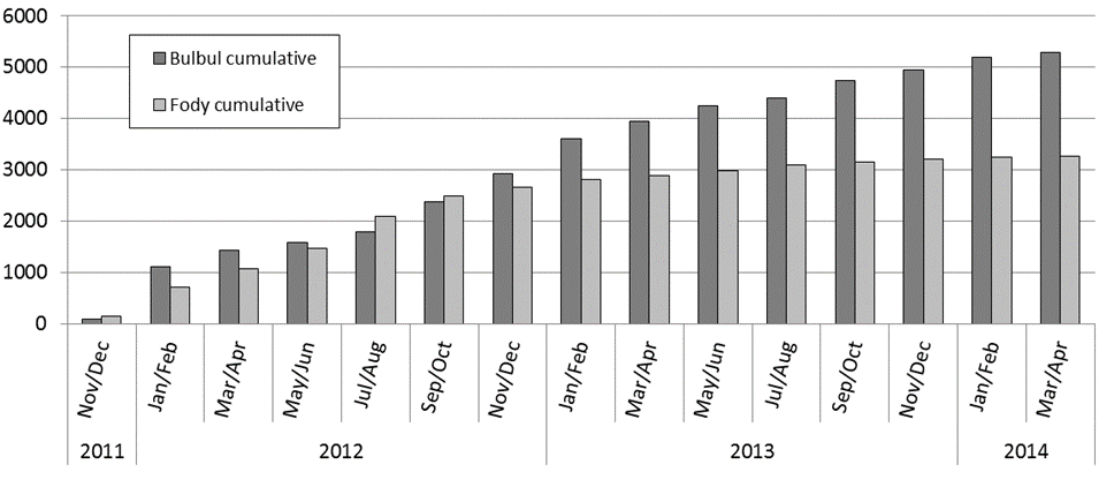
Recent pioneering invasive bird management in Seychelles aims to eradicate introduced bird populations *before* they spread to sites of exceptionally high biodiversity and conservation value. Unlike introduced mammals, the impacts of invasive birds are poorly understood and the science underlying avian eradications is still in its infancy, making this pre-emptive action a bold approach to prevention measures for invasive species.

There are two UNESCO World Heritage Sites in Seychelles; Aldabra Atoll, a vast and remote raised atoll in the far south of the archipelago, and the Vallée de Mai, a remnant area of unique ancient palm forest on the island of Praslin. Both sites are under the management and protection of a public trust, the Seychelles Islands Foundation (SIF). The sites are internationally renowned for their relatively pristine state and their endemic and endangered biodiversity. One of the main threats to the outstanding universal values of both sites, as identified by UNESCO, IUCN, and SIF, is the presence of invasive alien species (IAS) at the sites or on nearby islands. SIF secured European Union funding in 2010 to research and address these threats and the project started in 2011, including activities to research and manage introduced birds occurring on islands close to

the UNESCO sites.

The Vallée de Mai hosts the stronghold population of the endemic Seychelles black parrot *Coracopsis barklyi*, which has a global population of only 520–900 birds and occurs only on the island of Praslin. Praslin is *ca.* 40km from the main Seychelles island of Mahé, where a population of ring-necked parakeets *Psittacula krameri*, was growing at a rate of 25–30% per year and was predicted to number in the thousands within 20 years. The parakeet population was restricted to Mahé but, with the increasing population size and the relatively short flight distance to Praslin, it was considered highly likely that a parakeet population would establish on Praslin before long, where they would be in direct competition with the Seychelles black parrot for food and nesting sites (both have a catholic frugivorous diet and are cavity nesters) and potentially transmit diseases which could cause catastrophic declines in the endemic parrots. This threat to the national bird was considered too great and an eradication of ring-necked parakeets was launched on Mahé in July 2013 and is ongoing with approximately 50% of the parakeet population having been culled at the time of writing.

Until recently, Aldabra was one of the largest atolls in the world with no introduced avian species. One of the main threats to its biodiversity, particularly its native avifauna, was the presence of two introduced bird species on the neighbouring island of Assumption, 27 km to the south-east. A handful each of red-whiskered bulbuls *Pycnonotus jocosus* and Madagascar fodies *Foudia madagascariensis* were introduced to Assumption from Mauritius in the mid-1970s and their populations quickly increased to several thousands. In 1988 researchers highlighted these birds as an alarming threat to Aldabra's biodiversity and called for urgent action to remove them. In the 1990s, the Invasive Species Specialist Group of the IUCN Species Survival Commission reported that it was only a matter of time before one of Assumption's introduced bird species arrived on Aldabra and highlighted the importance of an eradication programme for these species on Assumption before they reached the atoll. SIF launched an eradication programme for both species in October 2011 which, to date, has removed more than 95% of these introduced bird populations from Assumption (see Figure below).



Cumulative number of introduced red-whiskered bulbuls and Madagascar fodies eradicated from Assumption: Nov 2011–Apr 2014.

In early 2012, however, small numbers of both of these introduced birds were discovered in one of the remotest parts of Aldabra Atoll. Madagascar Fodies were found to be breeding and so had presumably been on the atoll for some time but had remained undiscovered. Steps were

immediately taken to start eradicating these birds and the (single) red-whiskered bulbul was eradicated in July 2013. The Madagascar fody, which was present in larger numbers on Aldabra, is still in the process of being eradicated but is suspected to be hybridizing with the endemic Aldabra forest fody (currently in the process of being confirmed by genetic analysis). The continued presence of both species on Assumption presents a threat of repeated invasion unless the double eradication is successful. The discovery of both bird species on Aldabra and the subsequent likely hybridization between endemic and invasive fodies not only indicates that the concern of invasion from Assumption was justified, but confirms the threat of introduced birds to Aldabra's avifauna and underlines the importance of these eradications on Assumption.

An integral component of all of the projects has been capacity building of local staff. Intensive on-the-job training in all techniques (e.g. mist-netting, trapping, use of firearms, humane culling, bird handling and processing) by experts equipped several local members of staff to continue and subsequently lead the eradication programmes. The Assumption and ring-necked parakeet eradications have been led by a local member of staff for ~75% of their duration. For the Aldabra eradication, trained staff from the Assumption programme were recruited. Many of the staff working on these programmes are now in a position to effectively transfer their knowledge and skills to other islands with similar avian IAS problems or apply them other avian conservation and research work.

The results of all of these eradication activities will yield important lessons for avian IAS management and control. All three target species in these eradications are invasive and considered a threat to native wildlife elsewhere, and the ring-necked parakeet is the most successful invasive parrot in the world. If the eradications are successful, there will be substantial scope for replication of pre-emptive IAS eradication actions, and applications for other islands facing problems with the same and other avian invasive species.

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www.sif.sc

7.2.3. Ecosystem Rehabilitation

Ecosystem rehabilitation of small islands in the central archipelago has been a national strong suit commencing with Cousin and Aride Island Special Reserves in the early 1970s. Progress in this domain however took a major step forward with mainstreaming of private sector tourism related investment in the late 1990's (Henri *et al* 2004, Nevill 2004). This new stream of financing enabled eradication of key mammalian predators, the rehabilitation of habitats and the subsequent (re)introduction of endemic species. These initiatives in the central archipelago, largely focused upon but not restricted to granite island ecosystems, have been well documented (Henri *et al* 2004, Hill 2002, Hill *et al* 2003, Merton *et al* 2002, Millet *et al* 2001, Parr *et al* 2000, Nevill 2004 & 2011, Shah 2001). In recent years island ecosystem rehabilitation initiatives, built upon Private sector/NGO/ Government partnerships (e.g. ICS 2014), have commenced in the Amirantes archipelago, showing the strength of mainstreaming biodiversity into tourism in Seychelles (See Section 8). Lessons on best practise have been learned here and also recently documented to provide for replication and application elsewhere (von Brandis 2012, von Brandis & Mortimer 2014).

7.2.4. Capacity Building.

Seychelles being geographically isolated and having a very small population - 2010 population census: 83,147 (NSB 2013) – faces the typical SIDS dilemma of high *per capita* skills requirement coupled with brain drain. Building and maintaining capacity for biodiversity conservation and sustainable use is a particular problem. In recent years however Seychelles has made great strides in the development of domestic capacity. A critical mass of high-level technical expertise is being attained, with PhDs in fisheries science, avian ecology (in this case two: one on the Seychelles white-eye and one on the Seychelles Paradise Flycatcher), marine mega fauna conservation (Whale shark) and botany (Coco-de-mer) all being completed and the expertise retained nationally. These developments with more theses in the pipeline bode well for future research and technical capacity to advance the implementation of the CBD in Seychelles.

Likewise a major breakthrough in recent years is the establishment of the University of Seychelles (UniSey) in 2009, 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.

8. Mainstreaming of Biodiversity

Seychelles has a good and long standing strategic, legal and institutional framework for the mainstreaming of biodiversity into the country's development sectors. The key point of interaction is the juncture of two pieces of legislation the Environment Protection Act (EPA) (1994), with its 1996 Environmental Impact Assessment (EIA) Regulations, and the 1972 Town and Country Planning Act (TCPA). 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 the sensitive area atlas. A previous ruling of the Attorney General also established the equal yet distinct and mutually supportive powers of the two pieces of legislation. In principle this establishes a balanced development assessment process reflecting the norms of international best practice. There is however a clause under the TCPA that allows the Minister responsible for land use and development to overrule decisions of the Planning Authority and indeed the Authority has been overruled in some high profile development projects. There is a perception amongst environmental stakeholders 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 such concerns and the undertaking of such a review by an independent agency addressing areas of priority concern, such as development of lowland wetlands, would be most useful in assessing how effective the checks and balances in the development planning cycle really are. 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 taken the logical step and seeks to address the sustainable development of Seychelles through the balanced management of its three societal, economy and environment pillars. 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 SSDS however has yet to be initiated with no administration or coordination body yet in place at the time of writing (April 2014).

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. This is a contributing factor for example in the ongoing decline of lowland wetlands and the loss of nesting habitat for critically endangered marine turtles. 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 formerly funded and maintained the operation of the former Marine Parks Authority (MPA) and may in the future provide revenues to an independent Seychelles National Parks Authority (SNPA)[13].

In smaller private islands there is no doubt that tourism and ecotourism value has been a key driver in the rehabilitation of island ecosystems and investment of significant funds dedicated to IAS eradication programmes (Nevill 2004) that has been the key driver of biodiversity conservation breakthroughs over the last 15 years in Seychelles (Merton *et al* 2002, Millet *et al* 2001, Parr *et al* 2000). Furthermore this trend is continuing and expanding with Foundations being established in

[13] Following national macro-economic restructuring the SNPA is once more funded from the central governmental budget and does not receive the profits derived from the operation of its two main marine parks as was the case for the former MPA. It is likely in the future however that attempts will again be made to make management of the national parks a self-sufficient, self-financing operation in which case the tourism revenues from these two parks will be of vital importance. Indeed the issue is soon to be revisited in a new project on PA Financing.

several outer 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, the other main pillar of the national economy, unfortunately has a much more chequered history, as covered in Sections 2.1, 2.2 & 4. There are major 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 with data still highly limiting to their informed adaptive management. With regard to species conservation there is also considerable concern. The significant component of threatened species in the artisanal fishery, the threatened status of the elasmobranch by-catch of the industrial fisheries and also the guild nature of data gathering is allowing various species populations (e.g. in the serranids) to be reduced without it being evident in fishery data. Of course the nature of the ecosystem, the large areas involved and the traditional open access status of fisheries make effective management or enforcement very problematic. Section 7 sets out the new measures being undertaken to try and address many of the above mentioned shortcomings. It is notable however, that unlike in tourism there are, as yet, no substantive examples of ecosystem restoration or stock recovery in the fishery sector following management intervention. This coupled with a long history of fishing down the food web does not bode well for future prospects. The Government has however stated its desire to designate 30% of Seychelles' waters as protected, half of which (i.e. 15%) as strict no take zones, and funding mechanisms to enable this are being investigated.

9. Implementation of the National Biodiversity Strategy and Action Plan

The new NBSAP to 2020 has yet to be finalised and put under implementation. The implementation of the 1997 NBSAP was fairly successful in particular with regard to implementation of its Strategic Goals. It also served to successfully engender civil society support with the blossoming of environmental NGOs and community based action traceable to that period. Implementation of the 1997 NBSAP is reviewed and analysed at length in Seychelles' Fourth National report to the CBD (GoS 2011).

Part III: Progress towards the 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 Targets of the Millennium Development Goals

10. Progress towards the implementation of the Aichi Biodiversity Targets

Table 6: Progress Towards the 2020 Aichi Biodiversity Targets

Target	Progress and Key Shortcomings
	Key: Scale of 1-5. 1 being high degree of implementation 5 being minimal implementation. 1 2 3 4 5
1). By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Overall Progress: Seychelles has an excellent history of public education and awareness in the biodiversity domain with long standing sections in the Ministry of Environment and Ministry of Education dedicated to that role. There is a very active national NGO Wildlife Clubs of Seychelles (WCS) with clubs in schools throughout the country. Environment has a high profile in the national media. National programmes dedicated to raising awareness on issues pertaining to the conservation and sustainable use of biodiversity are a regular component of national TV and radio programming and with limited channels the messages have very high penetration to the national audience (**Nevill 2001**). There are broad indications of a good and increasing awareness of these issues as embodied by the flourishing environmental NGO sector and the content of national press/media and social media. The government has recently instituted a "corporate social responsibility" tax on medium to large businesses a significant proportion of funds are expected to be directed to environmental programmes at the behest of the tax payers, further reflecting the growing societal; awareness of biodiversity issues. Key elements not (yet) undertaken: 1). Baselines in public in awareness and attitudes to biodiversity have not been established and as such trends cannot be assessed. 2). Likewise no standardised baseline has been established for public engagement with biodiversity – though in this case the proliferation of environmental NGOs and community action groups in recent years indicates a positive trend.
2). By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being	Overall Progress: Poor to date with economic analysis beyond direct monetary consumptive value of resources, such as fisheries, limited. Key elements not (yet) undertaken: 1). The national accounting system does not incorporate natural resource, biodiversity, and ecosystem service values beyond direct monetary consumptive value for certain commodities. For example the value of water production by catchment areas is not factored into protected area management budgets.

incorporated into national accounting, as appropriate, and reporting systems.	Without incorporation of this additional natural resource/biodiversity/ecosystem service values into national accounting the following key trends cannot be reported on: • Trends in number of assessments of biodiversity values, in accordance with the Convention • Trends in guidelines and applications of economic appraisal tools • Trends in integration of biodiversity and ecosystem service values into sectoral and development policies • Trends in policies considering biodiversity and ecosystem services in EIAs and strategic environmental assessments.
3). By 2020, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts. Positive incentives for the C&SU of BD are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	Overall Progress: Very limited. There is some awareness that certain existing incentives, for example in the fishing and tourism industry, may have negative ramifications for biodiversity status by for example maintaining otherwise uneconomical fishing capacity, but no detailed assessment has been undertaken as yet. The Government's Blue Economy documentation (**GoS 2014**) does recognise the need to address this aspect in marine and coastal economic activities. Key elements not (yet) undertaken: 1). The programme of work on Economics, Trade and Incentive measures has not been applied in the national context. 2). The basic review to identify subsidies harmful to biodiversity has not been undertaken.
4). By 2020, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of natural resource use within ecological limits.	Overall Progress: Seychelles is a net importing country, for both raw material and finished products, with a very limited production base beyond the export of fish and related products. In many respects therefore this target applies primarily to the fishery sector. In that regard there are various strategies and specific fishery plans in place (see **Sections 2.1 & 7.1**) and further measures including a major paradigm shift, the Blue Economy Concept, envisaged by Government. Key elements not (yet) undertaken: 1). Assessment of main national production sectors and their impact upon natural resources. Data is available for the key sector of fisheries and suggest current effort and harvesting levels are not sustainable.
5). By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	Overall Progress: This is difficult to assess as in general the data is not available either quantitatively or qualitatively for the different habitat types. National databases are however in the process of formulation that will help in assessing and addressing these issues in the second half of this decade. A major complicating factor is Climate Change the extent of its impact upon the rate of biodiversity loss being unknown and in many respects unpredictable given the complexity of the ecosystems in question. Key elements not (yet) undertaken: 1). The establishment of the national habitat/ecosystem databases such that trends in ecosystem quantity/quality can be established.
	For marine and coastal biodiversity there is a definite downward trend but for the fisheries where there are data the rate of loss appears steady. The extreme coral bleaching event of 1998 significantly degraded coral reefs - 90% and 50% loss of live coral cover in the central and outer islands respectively (**Engelhardt 2004**). Subsequent coral recovery has been limited, patchy and further set back by subsequent smaller bleaching events. It is considered probable that there will be ongoing biodiversity decline as the impacts of coral death and consequent reef structure degradation works its way through the ecosystem dynamics (**Graham et al 2007**). There are however real and

	substantive measures (polices, plans and legislation) in place or under formulation to address many of these issues (see **Sections 2.1 & 7.1**) in particular as they pertain to fisheries, couple this with the national pioneering of the Blue Economy Concept (**GoS 2014a**) and there is some scope for optimism about moving in the right direction within the specified timeline.
	Forest Biodiversity: It is known that forest cover has expanded significantly in Seychelles in the last 50 years as the economy transitioned from agricultural and forest-related products to tourism and fisheries, such that today forest cover is 85-90%. The vast bulk of forest area has a high invasive species component and the IAS incursion is continuing. So Seychelles has good forest cover with real benefits for fundamental ecosystem services such as maintenance of the soil and water cycles but with lesser benefits in terms of endemic biodiversity. The general trend for forest biodiversity is however considered stable (**GoS 2011**).
	For Inland Waters there is an important positive trend in the biodiversity rich highland wetlands and mid and high altitude streams are considered to be in stable condition. Lowland wetlands however are under extreme pressure and constitute the most endangered habitat type in the country.
6). By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	Overall Progress: The key issues are recognised nationally and the importance is paramount to the national economy which assists in crystallising political will. Various strategies and plans are in place with others under development, including a major paradigm shift to a Blue Economy model (**GoS 2014, 2014a**), to address the sustainable use aspects. Enforcement and technical capacity remain key limiting factors in realising positive change however, IUU remains a significant problem. Addressing fishery impacts upon threatened species will be far more problematic in particular with regard to unintentional/by-catch issues.
7). By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Changes to forestry policy and practice over the last 20 years, coupled with the reduced scale of agriculture and improvement of practise (banning and safe disposal of POPs) and technological advances mean that this target is well on the way to realisation. Mariculture has been attempted, ultimately unsuccessfully, in Seychelles but growing international demand and market values make it highly likely that private investors will seek to pursue this industry in Seychelles in the near future. A policy is in place to address this as well as a preliminary survey of suitable sites for such activities including EIA considerations.
8). By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	The small population of Seychelles (**NBS 2013**) and very small industrial base mean that pollution levels are not high. They are however problematic in certain areas of concentrated habitation or human activity – such as around the capital and Port Victoria and the North of Mahe. Integrated water treatment systems are being progressively rolled out to address some of these issues though the topography of the granite islands is a limiting factor in that regard. Port Victoria requires the installation of proper waste treatment facilities for shipping as required under MARPOL.
	The discovery of viable oil reserves could potentially change the current scenario considerably.

9). By 2020, IAS and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	IAS represent the greatest threat to Seychelles' terrestrial biodiversity and have received significant attention and investment. A new IAS strategy is in place (**Nevill & Ikin 2010**), a baseline has been established (**Nevill 2009**), methodologies have been reviewed (**Beaver & Mougal 2009**) and a manual of best practise is being finalised (**Rocamora & Henriette 2014**. Priority species have been identified (**Beaver & Mougal 2009**) and measures are in place to better manage pathways and prevent introduction. The new legislation needs to be promulgated and capacity needs to be built and maintained in terms of border controls but significant progress towards the desired target has been made, including pioneering work in eradication programmes (**Merton *et al* 2002, Millet *et al* 2001, Parr *et al* 2000).**
10). By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	General Progress: Inshore reefs around the main populated islands are exposed to intensive anthropogenic pressure, from nutrient enrichment, siltation, reclamation and physical damage to overfishing. Fishery data also suggests that reefs throughout the Mahe Plateau are overfished. Whilst measures are in place and under development to better manage fisheries the motivating factor has not been to improve coral reef health. Data is lacking with regard to the status of other pertinent marine ecosystems such as sea grass beds and the large areas of soft sediment on the Mahe plateau.
11). By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	General Progress: Some 47% of Seychelles' landmass, representing a huge national commitment, is protected by law for environmental reasons. In the marine domain however less than 0.03% of Seychelles marine area (Exclusive Economic Zone) is currently protected. Marine biodiversity: Currently severely underrepresented in this ecosystem type, the Government has recently stated intentions to declare 30% of its marine area protected in the coming years, half of which i.e. 15% to be strict no-take zones. These designations are however contingent on the receipt of funding through a proposed debt for adaptation/nature swap which the Government of Seychelles is developing with the assistance of The Nature Conservancy. Forest and Inland Waters Biodiversity. A recent Key Biodiversity Areas assessment was undertaken on the main granitic islands which provides new data to assist in enhancing the representative nature of Seychelles Protected Area Network (PAN). The degree to which the current terrestrial PAN is effectively managed to meet its biodiversity objectives is another matter; no proper assessment has been undertaken but it recognised that a large proportion is not currently effectively managed. Data is not available as to what proportion of remaining Lowland Wetlands lie within protected areas.
12). By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	General Progress: Good progress has been made terrestrially. In the marine ecosystem various species are of concern particularly species that are by-catch in fishery activities or rare components of multi-species fisheries. Marine and Coastal Biodiversity. Extinctions are relatively rare in this domain. It is clear however that fishing pressure is impacting various threatened species (**See Sections 2.1, 2.2 & 7.1**) in particular with regard to apex and secondary predators, such as sharks and groupers, and intensively harvested species such as Sea cucumbers (**Case Study 1**).Trends are currently negative and capacity to redress the issues has yet to be demonstrated. Forest and Inland Waters Biodiversity. Seychelles has had significant success with the conservation and improvement of threatened status of endemic bird species [See **Table 5** and **GoS 2011**: Case Study 2 **(Rocamora & Henriette 2011**) and Case Study 6 (**Nevill 2011a**)] and it is believed that the extensive Protected areas created in the hills of Mahe, Silhouette and Praslin have gone a long way to securing

	the medium-term future of many threatened endemic species. Likewise recent developments in the management of Aldabra, the country's largest terrestrial protected area (**See Case Study 4 & Section 7.2.1 "Focus on Aldabra"**) also provide grounds for optimism that extinctions can be prevented and the status of terrestrial species in most severe decline improved. Perhaps one stark counter example is the status and prospects for the Critically Endangered Seychelles Sheath-tailed bat (*Coleura seychellensis*) (**Gerlach *et al* 2008**) with downward population trends in 2 out of 3 roosts, feeding habitat (lowland wetlands) in decline and one known roost not effectively protected from a recent tourism development. Finally a conservation programme on Silhouette which was yielding positive population results has recently ceased due to a change of conservation agency.
13). By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	General Progress: Seychelles is not a centre of agro-biodiversity endemism, with all food species having been introduced except for the palm hearts of endemic palm species and the kernel of immature Coco-de-mer nuts, the consumption of which is now illegal. It also appears likely from historical accounts and genetic studies that the *Cocos nucifera* was also introduced to the islands by man. There is interest however in the preservation of local varieties of introduced food plants that may have developed, through human and natural selection, attributes making them particularly suited to Seychelles' environment. To this end there have been various projects in recent years to gather together local varieties in national gardens and to propagate them through a network of farms and home gardens. Some varieties require such maintenance because they are no longer popular in broader production and these programmes appear to have been effective.
14). By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	General Progress: Progress in this target varies significantly from one ecosystem type to another. Terrestrially in general there is a long-standing positive trend with the exception of Lowland wetlands. In the marine domain however, and in particular with regard to coral reefs and related fisheries, systems have been significantly degraded and as yet positive trends and or the prospect of positive trends are not in evidence.
	Forest Biodiversity. The extensive reforestation of the main islands of Seychelles that has taken place since the 1960's has gone a long way to securing the key water and soil cycles.
	Inland Waters Biodiversity. The important role of lowland wetlands in terms of water purification, sedimentation and flood mitigation have been severely degraded with no real likelihood of restoration and an ongoing trend of drainage and reclamation.
	Marine Biodiversity. Coral reef ecosystems which support the primary protein provision to the local population are in a degraded state from a combination of factors, climate change and over-fishing being the primary issues. Trends in fishing pressure (a factor that can be managed nationally) and water temperature (a factor which cannot be managed nationally) do not currently bode well for the future. A pilot project has been initiated to investigate the feasibility of reef restoration through the re-planting of coral nubbins (**See Section 7: Focus on Coral Reef Restoration**)
15). By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to	General Progress: Some good progress in terrestrial ecosystems and small island ecosystems in particular. The scale of Seychelles marine ecosystems relative to human and financial resources coupled with extent of degradation from the 1998 ENSO event mean restoration of 15% target infeasible. Key elements not (yet) undertaken: 1). Assessment of ecosystem degradation against historical baseline. 2) Assessment of opportunities, constraints and priorities for ecosystem restoration and associated costs.
	Marine Biodiversity. First small scale attempt at coral farming and propagation is currently being undertaken off the island of Praslin.

climate change mitigation and adaptation and to combating desertification.	Forest Biodiversity. Significant successes have been realised in the restoration of small island ecosystems and in particular for the lowland forest habitat classification (in qualitative but not quantitative terms) realised by eradication of IAS, replanting of native vegetation and (re)introduction of associated rare endemic species. Secondary reforestation has occurred naturally in extensive areas of the Seychelles (most notably on the hills of the main island of Mahe, but also in the abandoned coconut plantations of many smaller islands) due to the transformation of Seychelles economy from agrarian and forestry production to tourism and fisheries. Inland Waters Biodiversity. Some progress has been realised in upland and mid-altitude inland water ecosystems but the trend in Lowland inland waters, the most endangered habitat type nationally, continues to be negative and scope for restoration appears limited.
16). By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	General Progress. Seychelles ratified the Nagoya Protocol in 2012 and legislation has been developed in line with its requirements. Some training of key stakeholder agencies and technicians has been undertaken in order to build capacity to implement the protocol.
17). By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated NBSAP.	General Progress. Revised NBSAP has been drafted but, as the main national mechanism through which the Strategic Plan will be implemented and Aichi targets attained, it has yet to properly integrate the Aichi targets or the key Programmes of Work into the National context. A review is underway.
18). By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	Seychelles as a country with no indigenous people and less than 250 years of human occupation has had a limited period of time to develop traditional knowledge, innovations and practice in terms of biodiversity. Indeed various "traditional practices" of biodiversity utilisation are now illegal as they were found to be unsustainable. In the Seychelles context these concerns are best reflected by ensuring representative and equitable inclusion of stakeholders in the development of biodiversity policies, plans and legislation. This stakeholder driven approach is being increasingly embraced by a country that is still in political transition, having returned to a multi-party democratic system only 21 years ago. To that end sound stakeholder processes are increasingly the norm and increasingly founded in law such as the co-management clauses incorporated into the new Fisheries Bill.
19). By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning,	General Progress. A biodiversity metadatabase project has been undertaken (Senterre *et al* 2010) which provides a basis for the further identification, gathering and mainstreaming of biodiversity data. Seychelles has and is undertaking steps to enable access to and the exchange of information relating to Biodiversity by the development of national databases, information sharing agreements and the

status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	fostering, facilitation and encouragement of scientific research and publication. The sharing of information between agencies however remains problematic. Various agencies do make their data publicly available such as the Seychelles Fishing Authority, the National Statistics Bureau, and to a lesser degree the Ministry of Environment through documentation centres. It was apparent however during the preparation of this report that there remain substantial barriers to the free exchange of information relating to competition between agencies and/or individuals *inter alia* for grant funds or academic purposes. Outside of documentation centres, scientific publications and annual reports of various agencies it is not clear whether there are other effective information exchange mechanisms in place – the National Sea Turtle database established in 2003 appears to be moribund and many other species databases are not open to public perusal. Outside of direct conservation management and the development of fishery policy and plans it is not apparent that biodiversity information is yet properly integrated into decision making (**See Section 8**).
20). By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	General Progress: The overall impression of stakeholders is that Seychelles has been successful in accessing international funding mechanisms such as the GEF, including its Small Grants Programme, Mangroves For the Future (MFF) initiative, EU funds etc… However quantitative analyses of trends in funds going to Biodiversity are not available and the international guidelines and indicators have not been utilised or established. Key elements not (yet) undertaken: 1). COP Decision X/3 (**UNEP/CBD 2010**), essential to the national implementation of Target 20, has not yet been applied or implemented in the national context.

11. Contribution of CBD Implementation to the Pertinent Millennium Development Goals (MDGs)

The MDG Target 7A is to:

"Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources."

The Seychelles 2013 Millennium Development Goals Status Report (GoS 2013a) in reference to this target states:

"Sustainable development well integrated in national development priorities and objectives through National Sustainable Development Strategies, with need for greater coordination at national and local levels."

This report concurs with conclusion and provides more details in Section 8. There is a specific reference to forests and forest cover in the supporting text to MDG 7A and the trends for forest cover and to lesser extent indigenous forest biodiversity are encouraging (See Table 6: Aichi Targets 5, 11, 12, 14, 15).

MDG Target 7B:

"Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss"

Biodiversity status and trends by 2010 are covered in detail in Seychelles fourth National report to the CBD (GoS 2011). Further information on status and trends are provided in Sections 2 & 7 of this document. To summarise on the specific pertinent aspects of the sub-text to this target:

- Protected Areas. Seychelles implementation of the CBD has seen an enormous national commitment of, to date, 47% of its land mass designated as Protected Area. Whilst having the oldest network of Marine Protected Areas in East Africa, the area they cover is very small constituting only some 0.03% of Seychelles' waters (GoS 2014). This shortfall has however been recognised and the Government of Seychelles announced its intention to protect 30% of its waters, half or which (or 15%) to be strict no-take zones. The debt of mitigation/swap mechanism envisaged to enable this designation is under formulation.
- Proportion of land area covered by forest. This is covered under target 7A above

12. Lessons from Implementation of the Convention on Biological Diversity in Seychelles

Seychelles as a Small Island Developing State (SIDS) with a very small population (less than 90,000, NBS 2013), a land area of approximately 450 km^2 and a marine area of some 1.4 million km^2 faces the typical SIDS restrictions of limited human skills base and limited resources. The majority of Seychelles endemic biodiversity resides at altitudes above 200 metres in hills and mountains typified by steep rugged terrain and dense vegetation. The key threat to this biodiversity is IAS but the terrain and vegetation make effective management of the area beyond current or envisaged future capacity of the country[14]. Seychelles primary biodiversity sustainable use issues are marine based over tens of thousands of square kilometres of plateau and banks and hundreds of thousands of square miles of ocean making effective management and enforcement of sustainable use plans, policies and measures far beyond institutional capacities. These are circumstances that are not likely to change and as such Seychelles will be dependent upon international assistance for its effective implementation of the CBD for the foreseeable future. Advances in techniques and technology may assist in the future with IAS problems threatening endemic biodiversity. A transition to full-stakeholder inclusion in plan development and the enabling of fishery co-management is being trialled as an attempt to address a slew of fishery issues – but the fact remains that human capacity and resources remain the primary obstacles to the comprehensive implementation of the Convention on Biological Diversity in Seychelles.

Seychelles has realised major successes in species conservation most notably in terms of threatened endemic bird species and small island ecosystems; pioneering IAS techniques in particular the eradication of invasive mammal species from tropical island ecosystems. Conservation objectives have been identified, effectively communicated to stakeholders and the general public and implemented with significant success. Species extinction and its prevention is a message that has been effectively communicated and results have been positive in particular when the species in question do not have direct consumptive value[15]. Sustainable Use Objectives however are proving far more difficult to address and in particular in the marine domain and fisheries. The lure of short term financial gain and the traditional open access approach to what is often still perceived as a "free and inexhaustible" resource base are currently proving to be barriers too difficult to surmount. The fishery data presented in Section 2 of this report for demersal fisheries and in the fourth national report on pelagic fisheries (GoS 2011: Table 3 and Section 1.3.11) do not bode well for fisheries and the balance of our marine ecosystems. A new approach is required and it is to be hoped that the Seychelles Government's pushing of the Blue Economy Concept internationally (GoS 2014a) and its establishment as new economic paradigm nationally (GoS 2014) will constitute a successful model.

Considerable progress has been made in national research and monitoring capacity with more targeted data being gathered and more locally authored scientific papers being published. Further investment is required in this domain however to meet Seychelles' high per capita skills

[14] The other notable centre of endemism is Aldabra atoll (See Section 7.2: Focus on Aldabra) is extremely isolated with very high logistical costs associated with management initiatives there.

[15] The protection of marine turtles, outside of certain key protected area rookeries (See Case Study 3 in GoS 2011) has proven much more difficult in terms of bringing an intend to poaching or protection of their nesting habitats from development pressures.

requirement. Government policy is focusing more on such capacities seeking to build a "knowledge-based society". The proper integration of biodiversity data into the decision-making process remains a much greater challenge with the stakeholder perception being short term investment/revenue typically outweighs other considerations, though there has been no independent assessment of the core planning process. It is clear however, that environmental economics have not yet been mainstreamed into decision-making process as the appropriate: studies have not been undertaken, data gathered or capacities built. This capacity shortfall was highlighted in the first NBSAP (Shah *et al* 1997) and restated in the second EMPS 2000-2010) (GoS 2000) and now represents a critical obstacle to Seychelles implementation of the CBD and needs to be addressed accordingly.

Mainstreaming international commitments has previously been identified as a key shortfall in Seychelles' approach (Nevill *et al* 2002, GoS 2005a, TEMATEA 2007, GoS 2011) but has still not been addressed in strategic documents including the revised National Biodiversity Strategy and Action Plan (See Section 6, including Table 4, and Table 6 Target 17). The failure to set Seychelles CBD commitments (including the Aichi Biodiversity Targets) in the context of national strategic documents and to use them as a template for the development of the NBSAP represents a key limiting factor in the national: prioritisation of activities, targeting of resources, assessment of and reporting on progress and overall implementation of the CBD.

Climate Change is the Sword of Damocles hanging over all of Seychelles' progress realised to date in the conservation and sustainable use of biodiversity. Climate Change, over the causes of which Seychelles has no control and to which it has made negligible contribution, poses perhaps now the single greatest threat to Seychelles' biodiversity and related socioeconomic well-being. Effective international cooperation is more imperative now than ever if the objectives of the CBD are to be realised.

Appendices

Appendix I: Process to Prepare the Fifth National Report

The preparation of the fifth national report was financed under the GOS/UNDP/GEF project entitled: *National Biodiversity Planning to Support the Implementation of the CBD 2011-2020 Strategic Plan in Seychelles.* This project is overseen by the UNDP Programme Coordination Unit, in the person of Project Manager Ms. Annike Faure, and guided by a Steering Committee comprised of representatives of the stakeholder agencies that are project implementing agencies.

Following national advertising a local consultant was selected to undertake the preparation of the report. Following review of the CBD Guidelines and Manual for the fifth national report and preparation of a stakeholder analysis, consultation with stakeholders was initiated. This was undertaken by individual meetings and interviews with personnel from key stakeholder agencies. Standard questions reflecting the parameters and focus of the 5th National report in the Seychelles context were asked of all interviewed. Table 7 below summarizes the interviews undertaken.

Table 7: Stakeholder Consultation

Agency	Personnel
Green Islands Foundation	Mr. Arjan de Groene (General Manager)
Island Conservation Society	Mr. Pierre-Andre Adam (Scientific Officer)
Marine Conservation Society, Seychelles	Dr. David Rowatt (Chairman)
Ministry of Environment and Energy	Mr. Flavien Joubert (Director General) Mr. Justin Prosper (Principal GIS Officer)
National Botanical Gardens Foundation	Mr. Patrick Brioche (Chief Executive Officer)
Nature Seychelles	Dr. NIrmal Shah (Chief Executive Officer)
Seychelles Fishing Authority	Mr. Vincent Lucas (Chief Fisheries Officer) Dr. Jude Bijoux (Fisheries Consultant)
Seychelles Islands Foundation	Dr. Frauke Dogley (Chief Executive Officer) Dr. Nancy Bunbury (Science and Projects Programme Coordinator)
Seychelles National Parks Authority	Mr. Denis Matatiken (CEO) & CBD Focal Point Mr. Allen Cedras (Manager)
UNDP Programme Coordination Unit	Ms. Annike Faure (BPS Project Manager) Ms. Betty Seraphine (BDM Project Manager)

An extensive literature review was then undertaken (see Appendix II) within the criteria and parameters of the Report format – utilising national (Seychelles Fishing Authority, National Statistics Bureau and Ministry of Environment and Energy) and private documentation centres and sourcing information from stakeholder agencies (e.g. Seychelles Islands Foundation, Green Islands Foundation etc…). A mixed format was utilised presenting information in text, tables and figures. Three case studies was utilised to highlight certain aspects and text boxes to focus on particular topics. Additional liaison with stakeholders was required for Case Study 2 (i.e. Jildou Van de Woude, Prof. Chris Feare & Arjan de Groene) and the "Focus on Aldabra" Section (Dr

Nancy Bunbury) whereby background data was obtained and draft texts circulated for comment and approval. Case Study 3 and the "Focus on Coral Reef Restoration" were authored by representatives of the Seychelles Islands Foundation (Drs Dogley & Bunbury) and Nature Seychelles (Dr Shah) respectively.

It had been intended to include a stakeholder workshop in the process to present the draft report and develop Table 6 in Part III: *Progress Towards the 2020 Aichi Biodiversity Targets* – but the late commencement of the reporting process and an abundance of other national workshop processes at that time meant the meeting was not held.

Instead, a review committee was established by the Project Steering Committee which reviewed and commented upon progressive drafts of the report in an iterative process until finalized.

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Appendix III: Implementation of CBD Programmes of Work and Plans

There is currently no national assessment of implementation of the various programmes of work (PoW) and plans under the Convention. The last assessment of PoW implementation was undertaken in 2005 under the auspices of the National Capacity Self-Assessment (NCSA) project and then only for certain programmes. This is largely because the international commitments under PoWs, cross-cutting issues and plans have not been integrated into national strategic documents and programmes (See Section 12: "Mainstreaming international commitments").

The substantial lengthy analysis of national initiatives in the context of PoWs and cross-cutting issues that would be required therefore to complete this Appendix falls beyond the scope of reporting process and associated consultancy contract.