

COASTAL LIVELIHOODS IN THE REPUBLIC OF SEYCHELLES

GENERAL INTRODUCTION

The Agulhas and Somali Current Large Marine Ecosystems (ASCLME) project is focused on the two large marine ecosystems of the Western Indian Ocean (WIO) region, covering nine countries that are directly influenced by these current systems. It is estimated that at least fifty-six million people are reliant either directly or indirectly on the goods and services provided by these two current systems. The ASCLME project aims to support these countries in their efforts to collectively manage the marine resources on which their people and economies depend. Fisheries and other key coastal activities, including various forms of tourism, aquaculture, shipping and coastal transport, the energy sector, agriculture and forestry, and mining are very important contributors to the economies of the countries of the WIO. In recognition of the complexity and importance of these activities, a Coastal Livelihoods Assessment (CLA) component was developed for the ASCLME project.

The CLA component had three main objectives:

- to collect as much existing information as possible about the main coastal activities in the nine participating countries as a contribution to the national Marine Ecosystem Diagnostic Analyses (MEDAs);
- to make input into ensuring that this information is stored and organised in a manner that will allow easy access and maximum utility to multiple stakeholders, both during and after the lifetime of the ASCLME Project;
- to review and synthesise the information collected in order to provide useful inputs to the TDA and SAP processes.

In order to achieve these objectives, the CLA component was separated into three distinct phases, with the first phase kicking off in May 2009. During phase one, a “desktop” review of available data was conducted by the regional project coordinators, input was made into the design of a literature management tool to facilitate the storage of information, and preparations were made for the in-country data gathering process. Planning meetings were held between the core CLA team and the in-country Data and Information (D+I) Coordinators in August 2009. The processes involved in the in-country component of recruitment and data gathering was discussed and confirmed at this stage.

Phase two involved in-country personnel having been identified and recruited through a regionally inclusive recruitment process. Nominations were invited and received from country focal points and D+I Coordinators. Twenty three consultants were recruited to assist with the project. For some sectors international experts (drawn from the region where possible) were asked to provide information for all countries in the region while in others, where good local capacity existed, in-country consultants were recruited. This group of consultants collected information from existing resources, such as published articles, government reports, regional reviews, project reports and outputs, policy documents as well as a range of other grey literature that was likely to be useful.

Phase three involved the organisation of the information into country Coastal Livelihood Reports where individual sector reports have been assessed and the key elements from each sector extracted and presented in a summarised format. These country reports will be reviewed by project representatives in each country and once accepted, will be incorporated as a separate Coastal Livelihoods chapter in the overall country MEDA documents. It is anticipated that the

information collated in these reports will allow examples of best-practice to be identified for application in other parts of the region. The objective is to build on approaches that work rather than to duplicate efforts. Information gaps will be identified and addressed in subsequent phases of the ASCLME, including during a Cost/Benefit Analysis (CBA) exercise designed to weigh up the costs and benefits of various development options. Key information from these reports will feed into the CBA and hopefully provide useful guidelines for the Transboundary Diagnostic Analysis (TDA) and the development of Strategic Action Plans (SAP) for the overall ASCLME project.

The following country report begins with an overview of coastal livelihoods in Seychelles, which provides a concise overview of the seven sector reports and the findings of the in-country and regional consultants. This overview ends with a conclusion which summarizes the collected information as it relates to the coastal zone in Seychelles in general. This overview is followed by the more detailed sector reports, which represent the original contributions by the in-country and regional consultants. The sectors are organized in the following order: Small-scale Fisheries, Tourism, Mariculture, Agriculture and Forestry, Energy, Ports and Coastal Transport and Coastal Mining.

Each sector report has been prepared by specialists in that particular sector drawn either from the country or internationally. Sector reports have been prepared according to a pre-determined template to ensure that the relevant aspects of that sector were captured by the consultants. Reports include descriptive sections on the biophysical environment, human environment, policy and governance, planning and management, and development, trade and projects related to that sector. Each report is concluded with a SWOT analysis which provides a summary of the Strengths, Weaknesses, Opportunities and Threats facing that sector. It is the outputs of these SWOT analyses that are of particular importance to the strategic planning aspects of the overall ASCLME project. These reports were initially submitted to the regional coordinators for review and have subsequently been corrected and updated by the consultants themselves.

Finally, each sector report has a bibliography containing key references and links to relevant information. Full details of the information resources collected during compilation of each sector report, as well as electronic copies of literature (where available), are included in the overall ASCLME reference management system.

OVERVIEW OF COASTAL LIVELIHOODS IN SEYCHELLES

I. Small-Scale Fisheries

The small-scale fishery in Seychelles, which includes the artisanal and semi-industrial sub-sectors, contributes between 1% and 2% to GDP annually, while the fisheries sector, as a whole, contributed 7.7% in 2008, an increase of 1.3% from 2004. Seychelles has very limited land-based opportunities, thus, the fishery is a vital source of income, employment, food security and foreign exchange in the country. This reliance on the sector is most evident in the fact that 17% of the total population is employed in the fishery, 30% of which are active in the small-scale sector, while 10% of the population is directly dependent on the small-scale sector.

Despite the dominance of the small-scale sector in coastal livelihoods, numerous challenges continue to constrain the sector. For example, high operating and investment costs have made it difficult for the sector to meet quality standards set by the EU, which has both blocked the sector's access to the European market and also made its products less competitive in the global

market. A lack of development in value-added products, poor marketing, as well as a limited number of processing companies, also continues to constrain growth in the sector. The government has, however, recognized the importance of infrastructure and finance in the sector, particularly as a means to stay competitive. For example, the Youth Enterprise Scheme not only provided fuel vouchers to registered fishers, but it also distributed loans to purchase new equipment. Likewise, the Investment Promotion Act has provided numerous tax breaks and concessions to local companies in the semi-industrial sub-sector, while infrastructure upgrades, such as reef clearing and improved port facilities, continue to be implemented by the state.

As a whole, there are clearly strengths and opportunities apparent through which the small-scale fishery can grow. The country's close proximity and easy access to the migratory path of tuna in the Western Indian Ocean, and its stable investment environment highlight the great strengths prevalent in the sector. Because of these strengths, there is also an opportunity in the sector to begin grading products, expand processing facilities, develop more efficient marketing strategies and further exploit resources offshore. Nevertheless, over-reliance on government subsidies as well as the threat of over-exploitation in high-value species, are risks that need to be mitigated in the future.

II. Tourism

Tourism contributed a massive 25.6% to GDP in 2010, an increase of 2.2% from 2007, directly employing 25% of the labor force and generating an estimated SR 2437 million in foreign exchange in 2008. Despite reaching its peak in 1996, revenue increased from SR 938 million to SR 2437 million between 2004 and 2008, while bed occupancy increased from 44% to 57% between 2005 and 2008. The European market accounts for an overwhelming 76% of total visitors, with France, Germany, Italy and the UK being the most predominant.

Numerous challenges have been highlighted in the sector, despite the expected increases in activity. For example, environmental constraints, such as climate change, conflicts over land use between agriculture and tourism, as well as water shortages, have all been identified as problems surrounding tourism. The carrying capacity of communities to handle increases in activity, as well as the capacity of government to monitor development in the sector, has also been highlighted as threat in the sector. Likewise, foreign investors and developers often tend to design projects around sensitive areas (often also the most attractive areas) to gain an advantage over competitors, which inevitably has a great environmental impact. Communities and local operators also remain limited in their understanding of, and engagement with, sustainable tourism, which means many of the aforementioned environmental problems continue to be perpetuated.

While the environmental impacts of the sector have been brought to question, the opportunity to develop a sustainability label for the sector is clearly available. The private sector is also firmly entrenched in tourist activity with clear links to the Seychelles Tourism Board, which should facilitate the implementation of nature-based tourism. The Department of Environment is also well respected, and working in conjunction with increasing public awareness around the importance of the environment should accentuate the implementation of its sustainability mandate. In all cases, the overwhelming importance of tourism for economic activity and employment in the country, both directly and indirectly, makes evident the importance of sustainable tourism, particularly as a means of preserving the entire Seychelles economy.

III. Mariculture

Few mariculture activities are currently operational in Seychelles, with only prawn, giant clam and pearl oysters being produced in small-scale commercial operations. Prawn and clam production has also been decreasing in recent years, with clam production falling from 1,960 tons in 1996 to 585 tons in 2006 due to weak demand, while prawn production fell from 1175 tons in 2004 to 704 tons in 2006. Farming of clam and pearl oysters are not labor intensive practices, thus, little employment has been generated around the sub-sectors, and while the prawn farm on Coetivy Island employs 350 people, only 18% are actually native Seychellois.

Little policy, planning or comprehensive assessment of opportunities has been established for the sector to date. Bio-technical mariculture capacity is still developing in the country which makes any recommendations for sectoral development relatively premature. The government has, however, commissioned a development plan for the sector with funding from the African Development Bank, which should provide further comprehensive analysis into bio-technical and economic prospects inherent in the sector. The Seychelles Fishing Authority also has numerous international links, particularly in research, which should certainly benefit the planning process moving forward.

While there are currently few activities associated with mariculture in the islands, there are numerous strengths and opportunities apparent that could potentially be utilized moving forward. For example, high-quality seawater, strong investment incentives, as well as recognition from the private-sector of mariculture's potential in the country, could all facilitate development in the sector. There is also great potential for farming of sea cucumber and crustaceans, both holding export potential, while fin-fish cage culture is likely to receive approval in the government's sector development plan. Expansion of pearl culture has also been highlighted as an opportunity. Thus, while awareness with regards to the vulnerability of wild caught fish stocks needs to be generally raised, the mariculture development plan should provide an objective basis upon which to take the mariculture sector forward.

IV. Agriculture and Forestry

There are few land-based opportunities in Seychelles, thus, agriculture and forestry naturally contributes far less, economically, than the more dominant tourism sector. Subsistence agriculture, forestry and fishing does, however, contribute 6% to GDP and agriculture alone employed nearly 6% of the labor force in 1995. Traditional exports of cinnamon and copra have also recently been revived, as the government continues to provide incentives to the sector to increase productivity. Food security does, however, remain an issue due to a heavy reliance on staple imports, despite the country becoming relatively self-sufficient in eggs, poultry and pork in the late 1990's.

Many of the problems in agriculture are of natural origin, as difficult mountainous terrain and low soil fertility severely constrain productivity in the sector. There is also a lack of data and resources available to make any concrete assessment of the forestry sector, which obviously affects the policy and planning process. The country's complex ecosystems, particularly coral reefs, are also very vulnerable to the threats of climate change, which threatens both the tourism sector and long term economic growth. The government is, however, currently implementing its second Environment Management Plan of Seychelles, which aims to improve capacity and policy, as well as highlight the vulnerability of the country to climate change. A mangrove initiative has also been established by the IUCN with the objective of strengthening sustainable

practices in coastal zone development, which should empower local communities and strengthen coordination and governance along the coast.

Perhaps the greatest strength of the sector, as a whole, is its ability to accentuate tourism and support tourist activity with a strong natural resource base. Tourism also has the potential to support the development of community capacity, particularly in terms of improving natural resource management at the local level. At least 45% of the country's land is also protected, which highlights the fact that there is clearly awareness amongst decision makers of the importance of the country's resources for future generations. Nevertheless, climate change and the possibility of further El Nino activity does have potential to severely hamper the agriculture and forestry sector, which would inevitably have a significant impact on tourism and the overall economy.

V. Energy

The downstream oil sector is a vital component of the Seychelles economy, with fuel and LPG accounting for over 25% of total imports in the country. Upstream activities, while currently nominal, have also grown in importance, as the country has recently begun a new data gathering series, with results expected sometime in 2011. The parastatal Seychelles Petroleum Company (Seypec) is responsible for both upstream and downstream activities, including the importation and distribution of refined oil and LPG, as well as the procurement, storage and marketing of petroleum products. The company also has international activities, including marine bunkering, aviation refueling, bulk storage and transshipment and transportation of petroleum products by tankers. Seypec has also merged with the Seychelles National Oil Company, which has allowed the company to both increase its number of tankers, as well as secure its logistics of supply. In relevance to biofuels, no activities or records were identified in the report.

Some constraints have been identified in the sector, many of which are indirectly related to energy activities. For example, the country continues to face a serious human resources shortage due to out migration, while public participation in environmental assessment processes remains quite weak. Despite a relatively strong economy in comparison to other African states, GDP growth per capita also remains sluggish, which could facilitate the trends in out migration. Weak EIA capacity, as well as mediocre EIA compliance rates, have also been identified as weaknesses, while the spatial separation of the country's islands has been documented as a challenge for governance. The potential side-effects of offshore oil exploration, particularly on marine ecosystems, has also been highlighted as a threat in the future.

A number of strengths and opportunities have, however, been highlighted in the report. For example, a strong commitment from government to develop upstream activities is certainly a positive for the sector, which should be fruitful when accentuated by the country's investment facilitator and the transparency of government. The country's implementation of the ICZM program, along with its willingness to protect the environment, are also strong points that should ensure that proper measures are taken to protect coastal resources when developing the sector. This commitment to protecting the environment is also important considering the country's dependence on tourism, which is directly dependent on the country's natural environment. Thus, while activities are limited in the sector at present, the commitment of Seypec to further develop upstream activities and pursue offshore exploration should not only be beneficial in terms of creating employment and mitigating the human resource shortage in the future, but it could also be very positive for the overall economy of Seychelles.

VI. Ports and Coastal Transport

Seychelles has only one port in Port Victoria which is relatively limited in throughput. The port is, however, the central point of economic activity in the country, being vital for the fishery and the country's bulk imports, particularly fuel, which is the most significant sector of general cargo. The fishery is also a large component of port activity, as it generates demand for processing and transshipment facilities, as well as fuel, supplies and associated commodities. Cruise ships and leisure vessels have also been documented as important contributors to activity. The port is managed by the Seychelles Port Authority, however, the government has shown a willingness to facilitate greater private sector activity in recent years.

The most prevalent constraints documented in ports and coastal transport are largely external to the sector. For example, the country's proximity to Somalia, as well as increased piracy activity, has negatively affected cruise vessel activity, with the number of cruise calls falling from 62 to 38 between 2004 and 2007. Likewise, reduced spending by tourists, as well as the country's low GDP, have both been identified as significant challenges in the sector. Fishing activity, tourism and imports of goods and services all, however, remain prevalent, which means commercial activity in Port Victoria should remain relatively strong.

A clear positive in the sector is identified in the plans to modify and diversify port operations to keep pace with demand and stay competitive in the region. There are also plans to expand operations to meet shipping requirements and handle increasing volumes from cruise and leisure vessels, while a recently commissioned report has identified the potential for private-capital to modernize container-handling operations. The fishery has, however, largely matured with little increases in activity expected in the future, thus, the government has identified the need to maximize current operations and maintain processing facilities, particularly as a means to stay competitive with ports in Mauritius and Comoros. Nevertheless, while accommodating the fishery remains a predominant issue, there is clearly a need to increase tourist activity in Port Victoria, particularly as other sectors begin to decline.

VII. Coastal Mining

Mining activity in Seychelles is very limited, with production concentrated in construction materials such as clay, coral, sand and stone. All production is informal, hence, no companies have been identified in the report. Coastal sand and coral mining was widely practiced until the 1990's, however, both activities were widely reduced due to coastal erosion, as well as the passing of the Removal of Sand and Gravel Act and the Environment Protection Act. Experimental granite quarrying was also attempted in the 1980's, however, environmental opposition led to the termination of activity.

Due to the exceptionally low volume in mining activity, few plans or policies, other than the Removal of Sand and Gravel Act, have been designed around the sector. Informal sand and coral mining does, however, produce extensive erosion, as well as the loss of reef habitat and natural breakwaters, which inevitably affects adjacent ecosystems. Given the importance of the country's natural landscape for tourism, the Removal of Sand and Gravel Act and the Environment Protection Act were clearly proactive policies to implement. The implementation of Integrated Coastal Zone Management should serve to accentuate these aforementioned policies, as should the UNESCO sand monitoring project, which trains students and youth to assess beaches and gather data for community management.

Overall, with no onshore potential for mineral production and special regulations for sand mining already in place, mining will clearly not play an important role in the lives of Seychellois in the future. The sand and coral mining that does take place is also heavily regulated, thus, environment damage around the country's beaches should not be problematic in the future.

Conclusions

The report on coastal livelihoods in Seychelles has clearly identified a number of strengths and opportunities prevalent across sectors. Despite these prospects, there are many documented constraints that could restrict sustainable socio-economic development in the country.

One clear conclusion identified in the report is the absolute importance of tourism as a means of generating employment, foreign exchange and economic activity in the country. This reliance on tourism has also spread across sectors, with resources in agriculture and forestry largely being seen as a means to generate activity in tourism, while further growth in ports and coastal transport now directly hinges on increased activity from cruise and leisure vessels. For the most part, there does not appear to be any sign that this reliance on tourism will subside. Thus, coastal communities are clearly vulnerable to fluctuations in tourist activity, which could become problematic in the future.

Outside of tourism, economic activity also appears highly concentrated in the fishery. The small-scale fishery does, however, face a number of obstacles, which is problematic considering the pre-dominance of fishing and tourism as the sole generators of economic development. High-investment costs, low returns and limited value-added development are obstacles in the sector, which has had a negative impact on the ability of producers to compete internationally. A slow down in the small-scale fishery would also be detrimental to Port Victoria, which is heavily reliant on the spillovers of demand generated by small-scale activity. The sector has also recently seen an influx of government subsidies and support, which, while helpful in incentivizing production in the present, could, however, lead to overcapacity in the future.

Despite this dependence on mainly two sectors, there are clearly strengths and opportunities apparent in Seychelles that could be utilized to diversify the economy and subsequently strengthen livelihoods in the coastal zone. For example, the potential for sea cucumber and fin-fish farming highlight the opportunities available in mariculture, a sector which could be developed as a substitute to the small-scale fishery. Likewise, exports of cinnamon and copra have also recently been revived in agriculture and forestry, which does highlight the potential for growth in those land-based practices. If current exploration for offshore oil and gas reserves is successful, and if this sector is developed in a responsible manner, the nation could benefit substantially and become less dependant on energy imports. In relevance to the economy as a whole, the government has also recognized the necessity of increasing private-sector activity in the future, which, along with a stable and strong investment climate, should promote growth in foreign investment.

Seychelles' comparative advantage is, however, clearly found in its natural environment. For example, the country's proximity to the migratory path of tuna in the Western Indian Ocean, along with its rich source of other pelagic and demersal fish, both highlight the great strengths in the small-scale fishery. The country's extraordinary bio-diversity and conserved habitats have also been identified as key factors in facilitating activity in the tourism sector. This is, however, why issues of sustainability should not be undervalued, particularly in relation to the country's economy in the long run. Most, if not all, economic activity clearly depends on the country's

coastal resources, thus, all measures to sustainably manage the use of these resources should be taken by both government and the private sector.

As a whole, despite the government's strong environmental track record, the realities of climate change, as well as the country's natural dependence on imports, both inevitably present great challenges moving forward. Nevertheless, the opportunities outlined in each of the sectors do make evident the prevalent prospects for sustainable socio-economic development.

DETAILED SECTOR REPORTS

I. Small-Scale Fisheries – Prepared by Mr. Vincent Lucas, E-mail: vlucas@sfa.sc

1. Introduction

1.1 General description

Seychelles is a Small Island Developing State (SIDS), spread between 04°S to 10°S and 46°E to 54°E in the South-Western Indian Ocean. It has a total landmass of 455 km² spread across an Exclusive Economic Zone (EEZ) of around 1,374,000 km² (see figure 1, Appendix I). There are 155 islands (listed in the Constitution of Seychelles¹) which are divided into 2 distinct groups: the mostly granitic islands (the ‘inner islands’), centred around Mahé and Praslin, and the outer coralline islands (the ‘outer islands’), lying west and south-west of the granitic group.

Apart from tourism, the country has limited opportunities for land-based development. As a result, the fisheries sector is critically important for both food security and for the generation of national income from fish and fish product exports, and revenue from the industrial tuna fishing activities. Seychelles has one of the highest levels of fish consumption per capita with most recent figures standing at approximately 57 kg per annum (FAO, 2005). The local supply of fish comes mainly from the small-scale sector (artisanal and semi-industrial sub-sector).

In 2008, the National Statistic Bureau (NSB) estimated the “direct” contribution of fisheries activities to the total Gross Domestic Product (GDP). This new method of calculating GDP was applied to previous years’ data and this showed that since 2004, the percentage of fisheries contribution to the total GDP has been increasing from 6.4 % of the total GDP at current market prices to 7.7 % in 2008 (NSB report, May 2010). The contribution from the small-scale fishing sector is on average between 1 and 2% of the annual GDP.

1.2 Seychelles Fisheries Sectors

Seychelles has a well-developed fishing sector that is a vital part of the social and economic development of the country. Three main types of fisheries are recognised: artisanal fisheries targeting demersal and semi-pelagic species, semi-industrial fisheries targeting swordfish, tuna and other large pelagic species, and industrial fisheries targeting tuna and tuna-like species. The definition of inshore fisheries is subject to various interpretations. For the purpose of this report, we define inshore fisheries as a continuum of fisheries conducted from the shore, to fisheries operating on the shallow continental shelves and their surrounding continental drop off. This definition encompasses only the artisanal fishery. The inshore fishery in Seychelles is characterized by its vast diversity, employing a wide range of fishing methods and gear to target species as varied as sea cucumbers and lobsters, demersal and semi-pelagic as well as pelagic fish.

Definitions of small-scale fisheries are often ambiguous and are not used consistently (FAO, 2005). Fisheries-related policies and legislation do not provide any definition for small-scale fisheries. Small-scale fisheries in Seychelles are of an artisanal nature requiring lower skills and

¹ In many documents a number of 115, or “over 115” islands is quoted. This number is determined by the grouping of some proximate islands / islets (e.g. the African Banks, Cosmoledo and Farquhar atolls)

capital investments. From a scientist's point of view, small-scale fisheries can be defined as a continuum of fisheries operated by individuals on a part- or full-time basis, from the shore to waters beyond the continental drop-off, and with the use of diverse gears, ranging from hand spears to longlines and a range of vessels from man-powered traditional dugouts (pirogue) to sophisticated longline vessels of up to 23 m in length. From the above definition, it is evident that there are no clear distinctions between the artisanal, recreational, commercial, and the subsistence sectors. Instead, they are all pooled within the small-scale fisheries continuum. The small-scale fisheries sector (artisanal and semi-industrial) has grown considerably over the past years. Historically, people used to fish in small traditional wooden boats that were man-powered with the use of wooden oars. As a result, fishing effort was mostly concentrated along the coastal waters, while the offshore resources were under-utilized. With the introduction of sail-powered pirogues and whaler boats in the 1980's, fishermen were able to venture further offshore and stay out longer, exploiting the shallow bank resources. As the human population increased, the demand for fish on both the domestic and global market increased. The implementation of a series of development projects to develop the small-scale fisheries in the 1970's saw the introduction of larger boats (schooners), the construction of facilities for ice storage and the development of fish export. Fisheries development has resulted in an increase in the different types of small-scale fisheries. Approximately 450 to 500 vessels and 1700 to 1800 fishermen are known to be engaged in small-scale fishing. A total of 27 different types of small-scale fisheries have been identified and classed according to the gear and boat type employed (WIOFISH 2008). Appendix III describes the main small-scale fisheries, and the varied types of small-scale fishing vessels are depicted in Appendix V.

The artisanal fishery is operated solely by Seychellois fishers. The fishery is comprised of different boat types, which employ a number of different fishing gears and are used in a subset of 15 different types of fisheries. The fishing grounds are dispersed widely across the EEZ. Smaller boats with limited autonomy and storage capacity operate in the shallow inshore fishing grounds. In contrast, larger boats such as whalers and schooners fish the offshore banks and on the drop-off of the Mahé Plateau. Some boats even venture further offshore to the Amirantes groups. Over the last decade, the average annual catch from this sector ranges between 4000 – 5000 Mt. In 2008, the total catch from the artisanal fishery was 4777.1 Mt. In general, the major species groups targeted are the Carangidae, Lutjanidae, Lethrinidae and Serranidae.

Alongside the artisanal fishery, the sport fishery and the recreational fishery exist. The former is a relatively small fishery made up of licensed super ski boats primarily used for taking tourists out for big game fishing activities. The main gear type used is trolling, however, some handline fishing is also conducted. The contribution of this fishery to the coastal livelihood is largely unknown, as there are few data collected for this fishery, even though a logbook system is in place. In Seychelles, fishing is considered as a fundamental right of every Seychellois citizen and therefore no license is required for recreational fishing. Since anyone can fish for leisure or as a hobby, the monitoring of this sub-sector is virtually impossible. The semi-industrial fishery is comprised of the monofilament longline fishery and is operated solely by Seychellois fishers. The fleet is comprised of 8 longliner vessels which vary in size from 13 – 23 m. The vessels are operated around the Mahé plateaux with efforts concentrated in the North Eastern section of the Seychelles EEZ (Wendling and Lucas, 2003). The fishery targets large pelagic fish, mainly swordfish and tuna.

2. Biophysical

Seychelles is characterized by a series of continental shelves with a total surface area of almost 50,000 km². A wide range of marine habitats including shallow water fringing reefs, granitic reefs, banks, plateaux, shelves and drop-offs, atolls, lagoons, seamounts and pelagic habitats can be found within the Seychelles waters (Jennings et al., 1999). These waters are relatively rich in fishing resources, demersals as well as pelagic species (Sweenarain and Cayré, 1988).

Seychelles has a tropical, humid climate modified by monsoonal winds. The period from May to October is characterized by steady South East trade winds with a monthly average wind speed of 10.3 knots. The North West monsoon winds between December and March bring a much higher rainfall to Seychelles and have a lower monthly average wind speed of 6.1 knots. The average rainfall is 2238.8 mm and mean maximum and mean minimum temperatures are 31.4 °C and 24.0 °C respectively. The hydrology of the Seychelles is affected by the eastward flowing Equatorial Counter Current and the westward flowing currents to the north and south. These are modified to a certain extent by the onset of the different monsoon periods. The southern islands lie in the westward flowing South Equatorial Current, the northern in the eastward flowing Equatorial Counter Current (Tarbit, 1980). Small-scale fishing activities are greatly influence by the monsoons.

Inshore fishing activities are mostly associated with the Seychelles Bank, also known as the Mahé Plateau (see Figure 2, Appendix II), which is located in the SW Indian Ocean at 4 °S 56 °E. The plateau has a surface area of 41 338 km² and is steep-sided, rising rapidly from around 1000 m. The Mahé Plateau is encompassed by an incomplete shallow rim at around 10 - 20 m which surrounds a central area of about 50 - 65 m with subsurface granite and coral outcrops forming small banks (MRAG, 1996). Small-scale artisanal fisheries have developed to exploit a high diversity of species and habitats. This has resulted in a wide array of boat / gear combinations and strategies. Nearly 60 % of artisanal fishers are employed in the demersal line fishery that exploits the waters of the Mahé and Amirantes Plateaux using the “whaler, and Schooner” category of boats (Appendix V). This fishery targets the Lutjanids (snappers), Serranids (groupers), Lethrinids (capitaines) and Carangidae (carangues). The resources of the near-shore reef ecosystems are exploited primarily by the trap fishery using small boats (Mini-Mahés) and traps fabricated out of local materials. The artisanal net fishery targets non-sedentary fish, mostly mackerel and sardines, using Mini-Mahés. The octopus, lobster and crab giraffe fisheries employ relatively small numbers of people. The octopus fishery in Seychelles is almost totally an artisanal effort (skin divers). The lobster fishery operates around the inner granitic islands and is regulated through limited entry and open/closed season. The sea cucumber fishery is the first to have a participatory management plan, which was developed in 2005 – the number of boats licensed for this fishery has been limited to 25. The recreational / sport fishery operates mainly on the Mahé plateau, trolling for big game fishes such as wahoos, dolphin fish, sailfish, tunas and marlins. In contrast the semi-industrial longline fishery operates in deeper waters beyond the continental plateau targeting large pelagic species like swordfish and tunas. Figure 2 (Appendix II) shows the different sectors on the Mahé plateau and surrounding banks, where small-scale fishing activities concentrate.

3. Human Environment

Fishing has traditionally played an important part in the life of Seychellois people and the fisheries sector has a major role in the socio-economic development of the country. This economic importance is derived from its role as a source of employment, contribution to

production and income generation, trade and foreign exchange generation, revenue for the government and most importantly as a major source of animal protein. Small-scale fishing activities are a major source of employment, not only for fishermen but also for other individuals in sectors that are directly or indirectly linked to the fishing industry. Such activities include boat building and maintenance work, the building of traditional traps, marine equipment services, marine mechanics, ice plants, post-harvest fish processing and a wide range of other services.

The National Statistic Bureau keeps a record of the number of people that are formally employed in the fishing sector; this includes the private sector, principally in fish processing and export activities, and the parastatal sector which is principally the number of people employed by the Seychelles Fishing Authority. In addition, a record of the number of registered fishers, boat owners and commercial fishing boats are kept by the Seychelles Fishing Authority. However, there are no statistical data nor any Employment Chain Analyses conducted to quantify the number of people employed directly and indirectly in the small-scale fisheries activities. Nevertheless, the total employment by the fishing sector and related activities is estimated at around 6,000 people, which constitutes about 17 % of all formal employment. Persons directly involved in fishing activities, mainly in the small-scale fisheries, represent around 30 % of the total employment in the fishing sector. It is estimated that the number of full- and part-time fishermen varies between 1,700 and 1,800 (SFA Annual report, 2006). Employment varies during a year due to the seasonality, with greater levels of employment occurring between November and May when conditions are favourable for fishing. Despite considerable employment variability, it is reasonable to assume that around 2,500 persons are directly or indirectly employed in the small-scale fisheries activities. Around 10 % of households in Seychelles are to some extent dependent on small-scale fisheries, which provide livelihoods to 11 % of the population (MISD, 2002). The small-scale fishery in Seychelles plays a minor role in terms of importance of exports of fish and fish products. However the importance of exports varies depending on the type of fishery. A small percentage (< 10 %) of demersal fish caught is exported to the European Union (EU) and countries in the Indian Ocean region. In contrast, for the sea cucumber fishery, almost 99 % of the catches is exported to Asian countries.

Fisheries are often variable in their social and economic importance, between fisheries and on spatial and temporal scales. The economic viability and the social background of fisheries has an important impact on sustainable use and response to management. At present, socio-economic information is not well integrated in fisheries monitoring. Although fisheries- specific socio-economic surveys are conducted when the need arises (for example for the study by Wakeford in 2000), basic parameters should be assessed routinely, to identify management concerns and to determine management impacts. Moreover, expertise and practice at SFA tends to veer towards the economic aspects of fisheries, and social systems and dynamics are poorly understood or studied. Good, efficient fisheries socio-economic data management and dissemination are crucial not only for fisheries management purposes, but even more so for the monitoring of the performance of the sector. Training will be required for resource managers to identify appropriate parameters for monitoring and suitable tools for analyses and reporting.

The biological productivity supporting fisheries varies spatially and temporally and is linked to environmental parameters which are influenced by global warming and climate variability. During the first half of 1998, the coral reefs of the inner granitic islands of the Seychelles were affected by the worst mass coral bleaching event in the Indo-Pacific region to date, caused by a mass of warm water spreading over the entire Indian Ocean. Coral mortality due to bleaching was on average 85-90 % (SEYMEMP Final Report, 2004). The reefs were again impacted in 2002, 2003 and 2010 by other smaller scale bleaching events. Current trends suggest that raised sea

water temperature events will reoccur with increasing frequency in the future and coral bleaching will undoubtedly be repeated. Although the impacts of climate change on terrestrial and marine ecosystems have yet to be adequately assessed in Seychelles, the 1998 coral bleaching event clearly demonstrated its ability to cause major habitat perturbations, with potential to cause changes in fish diversity and abundance and severe socio-economic impacts. Habitat perturbations are also directly caused by human actions. In Seychelles there is an extreme scarcity of land for development purposes. As a consequence, major land reclamation works have been carried out since the early 1980s on Mahé and Praslin to provide much needed land for economic development. These have also had significant impacts on the coral reefs and the productivity of the coastal zone (SEYMEMP Final Report, 2004). Land reclamation has resulted in loss of potential fishing grounds, and hence the loss of fishing opportunities for many small-scale fishers, particularly the trap fishermen. Consequently, to compensate for this loss, some fishers resort to illegal activities such as poaching in Marine Protected Areas.

Overall, monitoring control and surveillance systems have greatly improved over the last decade. VMS was introduced in 2003, mainly for industrial vessels fishing for tuna and tuna-like species. However, the systems are also slowly being implemented on small-scale fishing vessels. The vastness of the Seychelles EEZ and coastline, compounded by a lack of resources, both human and infrastructural, makes it difficult to prevent activities such as poaching (turtles, dolphin, sea cucumber, lobsters) and illegal fishing practices (illegal shark nets, spear guns etc.) which are common occurrence in the small-scale fishing sector. Furthermore, there are the occasional reports from fishers of illegal activities by foreign fishing vessels in the Seychelles waters. Unfortunately, the competent authorities cannot act on every single report. Despite this, a number of arrests and convictions have resulted from such reports.

Being a Small Island Developing State (SIDS) with a population of about 87,122 as of 31 December 2009 (NSB, 2010), Seychelles has a very limited workforce. Over the years the small-scale fishing sector has faced a constant problem of an ageing workforce and poor recruitment. A situation which could be aggravated by other treats such as HIV/AIDS and other infectious and communicable disease affecting mostly the section of the population that is in prime working ages. The HIV prevalence for the year 2010 is 20 per 10,000, a figure, which has increased over the years from 10.9 in 2001 and 0.44 in 1987.

Tourism and fishing industries are the two main pillars of the Seychelles economy and both sectors are constantly evolving. Subsequently, conflicts between those two powerhouses have arisen from time to time. For example, some tourists looking for a pristine and eco-friendly environment perceive fishing traps as not belonging in such environment and interfere with those gears. Another such example is the conflict between the inshore shark fishers and dive operators. Both parties rely on sharks for their livelihood. Dive operators often have special sites where they take clients to observe sharks in their natural environment. However, with the increasing fishing pressure, it has become increasingly difficult and rare to observe this. Shark fishermen claim that dive operators and tourists interfere with their fishing gears.

To improve the socio-economic status of fishermen, it is the government's policy to provide appropriate training for young people and to encourage them to join the fishing industry. Furthermore, the government strives to improve working conditions and the income-earning capacity of artisanal fisher-folk, particularly those involved in small-scale fishing activities. In the past, social objectives took a high priority, where creation of the maximum amount of work opportunities was important. Over the years the Seychelles government has introduced various

incentives and concessions that have made it possible for many fishers to make a living from fishing activities. These are elaborated further in section 4.2.

3.1 Pre- and Post Harvest

Pre-harvest activities undertaken in relation to the small-scale fishing activities mainly include boat-building and repairs, engine repairs, electronic repairs, net repairs, construction of traditional bamboo traps and metal work for construction of fishing gears.

Most of the fish caught by the small-scale fishery, particularly the artisanal fishery, is consumed fresh and sold in the district markets, the most important market of which is found in the capital, Victoria. High-value species (Serranidae and Lutjanidae) are bought by fish-processing companies to be sold to hotels or exported fresh. Only in times of glut are fish frozen, subsequently to be distributed predominantly to the lower end of the market. Some vessels fishing in the southern groups of islands undertake longer trips and produce salted seasonal fish that are sold on the main islands. There is also a small-scale shark fishery with vessels targeting sharks mostly for their fins, which are usually dried and exported to the Far East for a premium price. About 99 % of the sea cucumbers harvested are processed locally by small-scale processors and are exported in dried form to the Asian market. Swordfish and tuna caught by the semi-industrial sector are mostly destined to the export markets and are therefore processed as loins and packed on ice.

In 1994 there were five local processing/export companies exporting their products to the European Union (EU) markets. Today only two (Oceana fisheries and Sea Harvest Ltd.) remain. This is mainly because others were unable to support the investment costs needed to comply with EU hygiene regulations and did not have the necessary know-how to carry on a regular export-oriented business. The remaining two certified EU processors and exporters employ approximately 70 employees between them.

Another two of the original five fish processing companies focus on the domestic market, mostly producing fish fillets, and chilled and frozen fish to be sold locally to hotels, restaurants and even to the other two export-oriented processing factories. Between them, these two fish-processing plants employ an average of 10 permanent employees and up to 8 casual workers. They also provide fish to the hospital and other social institutions as well as to local consumers. At least four other processors are involved in the processing of sea-cucumbers and shark fins for the export market, each employing an average of four workers. These are licensed processors/exporters; sometimes owning their fishing vessels but the majority of the raw material is purchased directly from local fishermen.

There is limited production of value added products such as smoked fish, fish burgers, fish sausages etc., however, the demand for such products, both on the local and international market has been on the rise in recent years. The Government is promoting value added products as a means to increase the revenues generated from the fisheries sector.

The Seychelles government has, in the past, left value added product development and marketing with the private sector. However, in realizing that there is still much to be done in this area, the government through the SFA has recently embarked on developing and promoting value added fish products. A product development laboratory has been built with the assistance from the Overseas Fisheries Cooperation Foundation (OFCF) of Japan. Furthermore, fish processing facilities are to be built on a new fishing port opened in 2010 and will be leased to entrepreneurs

willing to venture into value added product development. SFA has already started work in collaboration with IDMER (a French Company) to produce samples of 5 value added products namely fish pulp, marinated seafood with vegetables, fresh or frozen fish kebab, “rillettes” and “soupes et bisque”. The entrepreneurs will be encouraged to develop these tested products, however, consideration will be given to additional products that they may wish to develop.

Seychelles has always been recognised for high quality fish and seafood products. This should serve as a platform for the development of exotic and inventive brand names to market the country’s products on the global seafood markets. Complementing the Seychelles’ brand name with international certification and eco-labelling will enable local businesses to increase sales revenue and penetrate niche and demanding markets. However, to date, there have been only a handful of initiatives in this area. In 2009, the FBOA initiated a programme to brand fish caught from the Seychelles Hook and Line Fishing. This initiative promotes sustainable and responsible fishing and good post harvest practices, as well as optimizing revenues for the fishermen. At present 27 members of the FBOA are participating in the programme.

3.2 Voice of Fishing Communities

There are no distinct fishermen communities in Seychelles and no fishing village as such. The fishermen are dispersed throughout the three main granitic islands. The first attempt in recent years to create a fishermen’s association was a worldwide Catholic support movement called “Apostolat de la Mer”. The organisation nominated a secretary and held meetings with fishermen at district level to allow them to air their grievances and it also published a newsletter with the aim of transmitting their problems to higher authorities. Unfortunately the organization did not have enough political and financial support to be credible and although it still exists today, it is largely ineffective. The “Apostolat de la Mer” opened the door to independent fisheries-related associations, which marked a turning point in fishermen’s perception of such associations.

In November 2003, a new association, the Fishing Boat-Owners Association (FBOA), was created. A chairman was elected and the association was given an office and secretary. The association currently has 27 members and is expanding. Monthly meetings are held with the Fishing Authorities (SFA and MINRI) where issues of concern are discussed. In general there is good cooperation between the association and the fishing authority.

Conventionally, government agencies (Fisheries Authorities, Departments, or Ministries) in many countries of the world have had the sole responsibility for managing fisheries (King and Nageon de Lestang 2009). However, it is now generally recognised that there are advantages in sharing fisheries management responsibilities with those involved in the use of the resource. This sharing of management responsibilities has been referred to as collaborative management, participatory management and cooperative management (or co-management).

In this regard, a pilot project under the framework of the UNDP – GEF, *Mainstreaming Biodiversity Management Programme*, is being implemented to test and develop co-management systems for artisanal fisheries that are deemed appropriate for a participatory, rights-based management approach and that are compatible with larger biodiversity conservation objectives. This resulted in the establishment of the Praslin Fishermen Association (PFA) in 2009. Monthly meetings for active dialogue between the SFA and the FPA have been initiated.

In early 2010, boat owners, fishers and processors involved in the sea cucumber fishery set up the Seychelles Sea Cucumber Committee (SSCC). The SFA has met with the SSCC on two occasions to discuss issues regarding the sea cucumber fishery.

With regards to the Government, the Seychelles Fishing Authority is also moving away from the traditional top-down management approach and adopting a more participatory approach. This is evident in the number of committees (including key stakeholders) that have been set up over recent years. A NPOA shark committee was set up in 2007 to guide the implementation of the Seychelles National Plan of Action for the Conservation and Management of Sharks (2007). A line-fishing committee was set up in 2010 to steer the implementation of the line-fishing management plan and is getting financial support from the EAF-Nansen programme.

In its efforts towards better fisheries governance, the Government is supporting the initiatives from fishers and key stakeholders in becoming more organised, and their participation in the discussion on fisheries matters.

4. Policy and Governance

4.1 Fisheries Policy and Legislation

The responsibility of formulation of fisheries policies lies with the Ministry for Investment, Natural Resources and Industries (MINRI), replacing the Ministry of Environment, Natural Resources and Transport (MENRT) in 2010 - the executive arm of the Ministry with respect to fisheries is the Seychelles Fishing Authority (SFA). The Organisation Structure of the SFA is shown in Figure 3 of Appendix VI. The functions of the SFA as defined in article (5) of the Seychelles Fishing Authority (Establishment) Act are:

- To promote, organise and develop fishing, fishing industries and fishing resources in Seychelles.
- To assist in the formulation of the national policy with respect to fishing, fishing industries and fishing resources and in the implementation of that policy.
- To conduct negotiations, or engage in meetings, seminars or discussions, with regard to fishing or fisheries or the establishment or operation of fishing industries, whether at a national or international level, on behalf of the Republic or otherwise.
- To identify the manpower training requirements of Seychelles with regard to fishing and fishing industries

A number of organizations are also involved in fisheries matters which include the Seychelles Tourism Board, the Department of Environment (DOE), the Seychelles National Park Authority (SNPA), the Seychelles Port Authority and the recently formed Seychelles Maritime Safety Administration. Other important organisations are the Seychelles Licensing Authority, the Coast Guard, the Police, and the Attorney General's Office. Non governmental organisations also are involved in fisheries.

The Seychelles Licensing Authority (SLA) is the central Government's office in Seychelles for the issuing of all licences (fishing or otherwise). In issuing fishing licenses, consultation is made with the appropriate consulting body which in this case is the SFA to ensure compliance with the Fisheries Act, 1986. It has been recommended by Freewhelling *et al.*, 1992, that the responsibility for issuing licenses be transferred from SLA to SFA. Figure 4 of Appendix VI shows the decision making process in Seychelles for fisheries policy.

The principal legal instruments for the control of fishing are the Fisheries Act 1986, the fisheries regulation 1987, and the subsequent amendments, the Licensing Act 1986, and the Licensing (Fisheries) Regulations 1987. Other relevant regulations are the Maritime Zone Act 1977 and the

subsequent amendments, the Seychelles Fishing Authority (Establishment) Act and the manufacture and Export of Produce (Regulation) Act.

Fisheries management as covered by law is based on management plans implemented through regulations. The Act requires the SFA to collect and analyse statistical and other information on fisheries and to prepare and keep plans for the development and management of the fishing industry under review. In preparing these plans, the SFA shall consult with fishermen and others affected by the plan, and where practical with regional bodies. Currently management plans exist only for the lobster fishery. A sea cucumber management plan was prepared in 2005 with the assistance of the FAO Technical Cooperation Programme. However its recommendations were rebuffed by the fishermen hence the management plan is not being implemented.

The legislation allows the Minister responsible for fisheries to prescribe management measures including: closed seasons, closed areas, gear specifications, fishing methods or gear types, specification of species sizes or other characteristics of aquatic organisms that are permitted or forbidden to catch, and schemes for limited entry into the fishery.

Fisheries regulations (1987 and amended in 1998) currently exist for the management of net fisheries, the protection of certain shell fisheries, mesh sizes for fish traps, prohibition of the use of spear guns, and closed seasons for the lobster and sea cucumber fisheries.

Seychelles has signed or ratified a number of international conventions and also abides to the various voluntary codes of the FAO. These relate both to the domestic and the industrial fisheries.

5. Planning and Management

In the early nineties, increasingly high levels of exploitation within the inshore fishing grounds (Mees *et al.*, (1998) along with declining catch rates, (Kawaley, 1998) raised concerns over the status of resources within coastal zones. Mees *et al.*, 1998 claimed that beyond the coastal fisheries, potential for further development exists in Seychelles. It was therefore necessary for the Seychelles government through the Seychelles Fishing Authority to identify new areas of fisheries development to reduce the fishing pressure on the heavily exploited coastal zones.

During the last 10 years the Seychelles fishing industry particularly the small-scale fishing sector has witnessed significant development especially in the introduction of new fishing techniques and new generation of fishing vessels. The government has been more involved in development of the sector through the provision of investment capital and by offering a wide range of incentives and concessions. Over the last decade the Seychelles Fishing Authority has conducted fishing trials with the introduction of new technology and gears, which has been successfully transferred to the artisanal/ small-scale fishing sector. These include the introduction of electric reels, drop-lines, echo sounders and GPS devices that have facilitated the work of fishermen and at the same time helped to improve catch rates. The SFA has also introduced the monofilament long-line technique for tuna and swordfish. Small-scale commercial fishing operations started in the early 1990s with new vessels being imported (mostly from Sri Lanka) and to-date there are 8 vessels involved in this fishery. The SFA has also implemented a fleet replacement programme, which has resulted in the construction of new artisanal fishing boats of various sizes and designs. New types of vessels were imported from the UK and Japan (with the assistance of the Japanese Government Aid from JICA), the African Development Bank (ADB) and the European Union (EU). The introduction of these new, larger and more comfortable vessels had the objective of enabling fishing vessels to have more autonomy, thereby allowing efficient exploitation of

offshore resources. The programmes have encountered various constraints mainly due to high investment costs, unreliable crew, lack of managerial skills and poor rates of return on investment. These projects have led to the introduction of a number of new vessel designs, but their widespread acceptance has not been recorded in the industry. Indeed, the majority of investments in large vessels have been concentrated on the traditional whaler-class, which is also capable of exploiting the inshore resources (Wakeford, 2000).

The Government also embarked on numerous programmes to improve existing infrastructure and facilities (such as fishing port facilities and quays), including the clearance of reef passes for safer navigation. New projects were implemented to build artisanal fishing quays for improved berthing facilities for local vessels and to provide improved and more hygienic conditions for landing fish. Ice-making plants were also constructed outside Victoria, namely at Anse-La Mouche and Anse Royale, and very recently Providence and Bel-ombre to provide ice for fishermen in these districts.

Registered fishers benefit from the provision of soft-term loans from the Development Bank of Seychelles (DBS) to purchase new fishing boats and engines. Since 1995, interest free loans have been available to fishermen under the Youth Enterprise Scheme (YES), for the purchasing of their own boats and engines up to a value of SR 50,000.00. From the beginning of the year 2000, the commercial banks increased their credit facilities to fishermen for this same purpose. Indeed, in the course of the year 2003, lending to the fishing sector by commercial bank surpassed lending by both the Youth Enterprise Scheme and the DBS. Licensed fishers also benefit from cheaper fuel through the fuel voucher scheme where a rebate is offered on every litre of fuel (diesel or benzene) purchased for commercial fishing operations. Local fishing companies involved in the semi-industrial fishery targeting tuna and swordfish, also benefit from various concessions under the Investment Promotion Act (IPA) such as duty-free fuel, import of bait and fishing material with trades tax exemption. In early 2005 the IPA was replaced by the Agriculture and Fisheries Incentives Act, 2005 which provides further duty exemption/rebate for fuel, import of bait and fishing material and equipment as well as exemption on Business Tax for boat owners with a profit of SR240, 000 or less (and 15% for above that sum). The provision of incentives has made it possible for many fishers to make a living from fishing activities. However, the government also realizes that uncontrolled investment and subsidies may lead to overcapitalization and excess capacity in the fisheries industry and that this may have adverse impacts on the fisheries resources. It is therefore necessary to take appropriate measures to ensure that new investments in the fishing industry do not threaten the sustainability of the resources.

As a means of diversifying the fishing sector, the Government has encouraged investment in aquaculture with the potential to generate foreign exchange. The Coëtivy Prawn Farm for tiger prawns (*P. monodon*), stopped its operation in 2008. Hence there are currently only 2 remaining small-scale aquaculture facilities: a farm producing black pearls from black lip oyster (*P. margaritifera*) and another rearing giant clams (*T. maxima*) for the aquarium trade. In 2009 a scoping exercise to assess the potential for mariculture development was conducted and one of the recommendations from this exercise was the need for the Seychelles to develop a Masterplan to drive such initiative. The AfDB (African Development Bank) has committed financial assistance for the development of the Masterplan.

As it has been mentioned previously, one major constraint facing the small-scale fishing sector is the ageing workforce and poor recruitment. In this respect, the Maritime Training Centre (MTC) must play a major role in the future to help resolve this problem and more emphasis should be placed on the training of young people for a career in the fishing industry.

From a development perspective the fishing industry needs to become competitive. The necessary skills and manpower requirement must be identified to allow a progressive growth. For the small-scale domestic fishery, the objective is to continue to provide the basic facilities in the key fishing areas around Mahé, Praslin and La Digue, and to ensure sustainable growth. For the next 5 year period, the Government's focus will shift from the harvesting aspect of fisheries development to a more proactive approach to post-harvest and marketing in line with the policy of promoting value addition and maximizing benefit from the sector. In line with this, the government's role will be to consolidate funding that is already in place for various development initiatives and also introduce new funding mechanisms in order to promote and develop other important aspects of the Seychelles' fisheries. A number of new initiatives are planned and include; a seafood grant which will be used to promote pilot projects for seafood products value addition and a fund for aquaculture development.

6. SWOT Analysis

The fisheries strategy of the government of Seychelles is to increase the financial benefit of fisheries to Seychelles through maximising domestic processing, promoting export and increasing Seychellois stake holding in the industry. While striving towards this goal, it is important that all the issues pertaining to the development of the fisheries sector be considered carefully and taken into consideration, most importantly the promotion of sustainable exploitation of the marine living resources.

<p>Strengths</p> <ul style="list-style-type: none"> • The geographical location of Seychelles in the migratory path of tuna in the Western Indian Ocean • Quick access to and from all major tuna fishing grounds • Large continental plateaux rich with demersal and pelagic fishery resources • Well developed infrastructures • Located outside the cyclonic belts for almost all- year- round fishing • Well connected by major airlines for export market • Stable economic/investment environment • Marine living resources are being managed in a sustainable manner 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Involve high capital investment and relatively high operating costs • Low economic return in some sectorsLack of experienced and reliable labour force • Low recruitment factor and aging workforce • Wrong perception of fishermen as a low status job • Low level of education of most fishers hence inability to properly manage their business • Occasional lack of materials • Lack of initiatives with regard to value added products development • Lack of effective marketing strategies • Limited processing and exporting companies
<p>Opportunities</p> <ul style="list-style-type: none"> • Potential for further exploitation of resources in deeper waters and offshore banks • Good potential to venture into resources of small pelagic currently underexploited • Great potential to develop anchored FAD fishery for medium and large pelagic • Potential to develop more vigorous marketing strategies • Great potential to expand fish processing facilities (value added products) • Potential to tap into grading and labelling of Seychelles fish products 	<p>Threats</p> <ul style="list-style-type: none"> • Over exploitation of high value species • Increasing competition from other countries for the export market • Piracy in the WIO (Somalian pirates) • Climate variability • Oil spills, (Seychelles lies close to a major shipping channel in the WIO) • Increase in oil prices • Reduce investment in the sector as government subsidies and incentives erode

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APPENDIX I

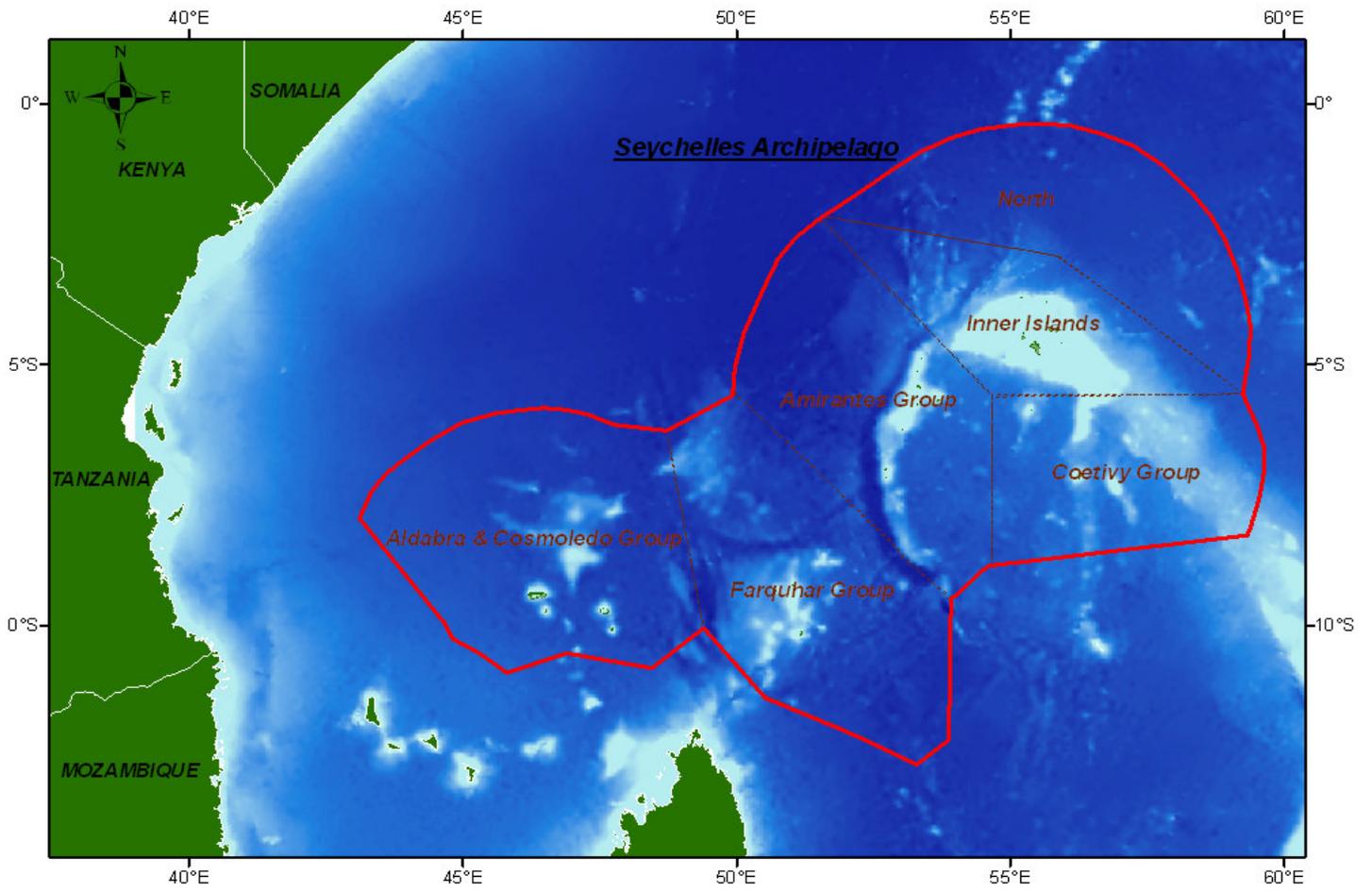


Figure 1. Republic of Seychelles EEZ (© SFA)

APPENDIX II

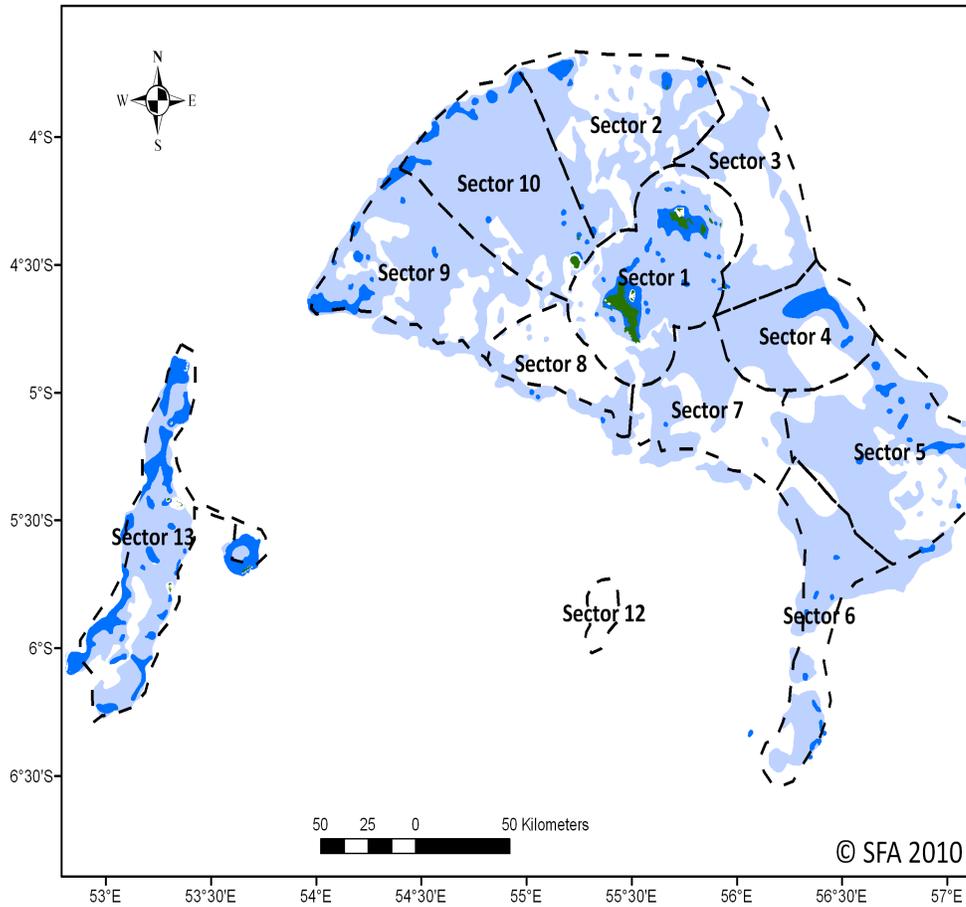


Figure 2. Main Fishing sectors for small-scale fishing activities.

APPENDIX III

Description of Seychelles Small-scale Fisheries

The artisanal fishery is the principal domain of local fishermen operating small-motorized boats targeting mainly demersal resources such as (snappers, green job fish, groupers and capitaines), semi-demersal like (trevally) and pelagic species found mostly on the Mahé and Amirantes plateaux. The total landings for the artisanal fishery have remained rather constant for the last 20 years with approximately 4000 – 5000 Mt of fish landed annually. In addition to that, the semi-industrial sector lands between 250 – 500 Mt of swordfish and tuna annually.

The handline fishery is by far the most important type of fishing technique, accounting for more than 73 % of total fish landings. All types of fishing vessels are involved in this fishery and these include the following:

- Mini Mahé type vessels, powered by 25-40 hp outboard engines.
- Lekonomi type vessels, which are 6.5 m fiberglass vessels equipped with an icebox and a one to two cylinder inboard engine.
- Whaler type vessels, which are traditional clinker- constructed vessels 9-12 meters with inboard engines, which are now mostly partially decked and can accommodate a crew of 6 to 7 persons. Most whalers are now equipped with iceboxes and doing 3 to 6 days trips.
- Schooner type vessels, which are wooden-hull, decked vessels usually between 10 to 13 meters and equipped with a 3 to 4 cylinder diesel inboard engine and an icebox of 2,500 to 3,000kg capacity. Schooners do trips averaging 8 days on the edge of the Mahé and Amirantes Plateaux.

The other main type of fishery is the trap fishery accounting for 15 % of total landings. This fishery mostly targets species associated with reef and shallow coral banks. The fishery shows a strong seasonal nature when adverse weather conditions force fishermen to operate in inshore areas (sometimes inside the reefs).

The next important fishery is the net fishery, which mainly targets mackerel using encircling nets. All nets are licensed and small outboard powered vessels carry out the operation with a crew of 3-4 persons.

A potentially important small seine fishery for small pelagic stocks in particular horse mackerel was identified on the Mahé plateau in the late 1970's and early 1980's with a total biomass of 150,000Mt with an MSY of 45,000 Mt suggested (Tarbit,1980). In early 2009 experimental fishing was conducted and subsequently commercial fishing started in late 2009.

The snapper crab (*Ranina ranina*) fishery introduced in the 1980's is a limited fishery utilizing scoop nets on the flat sandy bottom of the Mahé plateau. The fishery involves occasional fishing trips with annual landings averaging between 10Mt in the last 10 years.

The lobster fishery is a seasonal fishery with an open season from the beginning of November to the end of January. Lobsters are harvested at night by skin divers using underwater lights. This fishery, however, remained closed for the 2003 and 2004 seasons. The fishery was re-opened between December 2005 and January 2006.

The sea cucumber fishery has seen a rapid development in the last 8 years and is carried out mostly by scuba divers. This is a limited entry fishery with only 25 licenses granted to fishermen.

A shark fishery mostly by long lines has increased in importance in the last 5 years. In view of the high demand for shark fins from Far East markets, the fishery has shifted from a purely by-catch fishery to a target one with most fishermen keeping only the fins and discarding the carcass at sea. A shark action plan for the management of the species has been prepared and will be implemented in the near future.

The sports fishery targeting large pelagic species (tuna, billfish, kingfish, etc.) mainly for tourists has the potential for expansion in particular on the outlying islands with hotels. These islands have the prospects to develop this lucrative business on a much wider scale than for charter vessels based on Mahé. To date there are over 50 vessels engaged in the recreational fishery.

The semi-industrial fishery consists of small (14 to 23 metres) locally-owned long-liners targeting pelagic species (mainly tuna and swordfish) found outside the Mahé plateau but mostly within the Seychelles EEZ. The fishery started in the mid 1990's and now involves 10 vessels with an average crew of 6 per vessel. The peak landing of the semi-industrial fleet was approximately 575MT in 1999 with swordfish being the predominant species (60% of the catch) followed by yellowfin and big-eye tuna. The catches are sold to the two local processing companies and are exported mostly to the EU (UK, France and Italy).

APPENDIX IV

Type of Small-scale fishing vessels



Pirogue



Mini Mahé



Whaler



Lekonomie



Lavenir



Schooners



Semi-industrial longliner



Semi-industrial longliner

APPENDIX V

Fisheries Resources Targeted by Small-scale Fishery

Species/Complexes/Groups	Fishing Grounds	Average Catch (t)	Stock status	Management Measure(s)
Spiny and rock lobsters - <i>Panulirus longipes</i>, <i>P. versicolor</i>, <i>P. penicillatus</i>, <i>P. Ornaius</i>	Inner Granitic Islands	3.7	F-O	Limited entry, seasonal closure, minimum size, berried females prohibited
<p><i>Note: The spiny lobster fishery is a seasonal fishery . Catches for the 2007/2008 was 3.7t. It has actually gone down by 40%. The 2007 catches was below the MSY of 4.7t. However overfishing has occurred in previous seasons. So the stock is still considered as Fully to over exploited.</i></p>				
Coastal tunas and related species	Mahé Plateau	83.8	See IOTC	IOTC
<p><i>Note: Coastal tunas are a minor target of artisanal handline fisheries and catches are low. Species groups included from artisanal catch assessment survey are yellowfin tuna, dogtooth tuna and bonito. No quantitative stock assessment has been carried out for bonito and other neritic tunas managed by IOTC.</i></p>				
Offshore tunas and tuna-like species				
<i>Xiphias gladius</i>	Indian Ocean	111	F-O	IOTC
<i>Thunnus albacares</i>	Indian Ocean	70	F-O	IOTC
<i>Thunnus obesus</i>	Indian Ocean	55.3	F-O	IOTC
<p><i>Note: Offshore tunas and related species are target of the semi-industrial fishery. Stock status based on IOTC stock assessment; Swordfish; Overall IO stock probably not overfished, however localised overfishing may be occurring: there is a need to control and/or reduce fishing effort. Yellowfin tuna; possible overexploitation. Catch should be decrease to pre- 2003 level and no further increase in fishing effort. Bigeye tuna; fully exploited to overexploited, and fishing effort should not increase further from the 2004 level.</i></p>				
Inshore Sharks	Mahé Plateau, Amirantes, Outer islands	26.8	D	Shark nets prohibited, NPOA being implemented
<p><i>Note: Targeted by the artisanal fishery, landed catch increased in 2007 indicates that high fishing pressure continues. NPOA indicates that shark fisheries are substantially data deficient but that significant historical, anecdotal and fisheries-independent information suggests inshore populations continue to be severely depleted.</i></p>				
Offshore -pelagic Sharks	Indian Ocean	267	O	None, NPOA produced

Note: Targeted by small-scale semi-industrial fishery. The offshore stocks is also subjected to increasing industrial fishing effort and is considered overexploited. NPOA has been produce and need to be implemented

Slope snapper <i>Pristipomoides filamentosus</i>	Mahé Plateau	34	R	None
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Note: Catch has remained constant. The MSY for the Mahé Plateau is 268t, and has not been exceeded over the last decade. Infact yield has been significantly below MSY and continues to be lower. Stocks were overfished in the early 1990s and is believed to be still recovering

Octopus	Granitic islands	28.7	-	None
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Note: This species is fished inshore by skin divers. Resources further offshore are unexploited. Resource potential and status is not known.

Species/Complexes/Groups	Fishing Grounds	Average Catch (t)	Stock status	Management Measure(s)
Sea cucumber	Mahé & Amirantes stocks	530	F, O	Limited entry, gear restrictions, 100% inspection on landing

Note: Catches has gone up by approx 26% in 2007. CPUE trend vary by species but are decreasing for high value species. Yields for several high value species exceeded TACs in 2007, including *Holothuria* spp. which is one of the highest value species in the catch.

Bivalves	–	Unknown	U	
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Note: Only very small subsistence fisheries exist, no monitoring or indication of status.

Fish Multispecies	Demersal line fish stocks	2204	F-O	None
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Note: Overall, an increase by 23% was recorded in 2007 catch and a yield was greater than the MSY. Several demersal (indicators species) stocks are fully or overexploited.

<i>Lutjanus bohar</i>	Mahé Plateau	72.2	-	None
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Note: No recent stock assessments since 2005 study, so status unsure. However, high fishing pressure continues in the absence of management measures, so concerns over stock remain.

<i>Lutjanus sebae</i>	Mahé Plateau	1060	O	None
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Note: Per recruit assessments done in 2008 indicate over-exploitation in recent years. The previous MSY was overestimated and 2007 catch is more than 4 times greater than revised MSY estimate (208 t). Stock overexploited and requires urgent management.

<i>Aprion virescens</i> (Note 12)	Mahé Plateau	660	F	None
<i>Epinephelus chlorostigma</i>	Mahé Plateau	45	F	None
<i>Stock assessments conducted in 2007 for the period 2004-2006 revealed overfishing in some years (2004) while in more recent years these had not been exceeded but were borderline . Stock considered as Fully exploited</i>				
Fish Multispecies	Semi-pelagic line fish stocks	1089	M	None
The stock status of the main target species, <i>Carangoides</i> spp., <i>Sphyrna</i> spp. and <i>Euthynnus affinis</i> have not been assessed, but fishery is concentrated inshore and is considered to be only moderately exploited				
Fish Multispecies	Semi-pelagic gillnet stocks	401	M	Gear/fishing time/area restrictions
<i>Rastrelliger kanagurta</i>	Semi-pelagic gillnet stock	314	U	Gear/fishing time/area restrictions
<i>Note: Targeted by the beach seine and gillnet fisheries. Highly variable fishery with large seasonal/inter-annual variability in catch and effort. Stocks of the main target species (e.g. Rastrelliger kanagurta) have not been assessed, but the fishery has been considered as under-exploited as only inshore portion of stock is targeted. Management plan being prepared.</i>				

Species/Complexes/Groups	Fishing Grounds	Average Catch (t)	Stock status	Management Measure(s)
Fish Multispecies	Inshore trap fish stocks	318	F-O	Minimum mesh size
<i>Siganus sutor</i>	Inshore trap fish stock	–	O	Minimum mesh size
<i>Note: Catches below MSY (445-471 t), Fishery has been fully- to over-exploited in previous years and the primary target species (S. sutor) is considered overexploited.</i>				
Spanner Crab (<i>Ranina ranina</i>)	Mahé Plateau	15	U	None
Note: This fishery has been underexploited with catches far lower than the MSY of 381t for the Mahé Plateau and effort is declining. Market constraints are the primary reason for underdevelopment of fishery.				
Deepwater shrimp (<i>Heterocarpus</i> spp)			U	

Note: Experimental trial with trap fishing continues but no commercial fishery yet exists. Stock under exploited

Stock Status Keys: U: Under Exploited, D: Declining, M: Moderately Exploited, F: Fully exploited, O: Over-exploited

R: Recovering

APPENDIX VI

Fisheries Policy and Governance

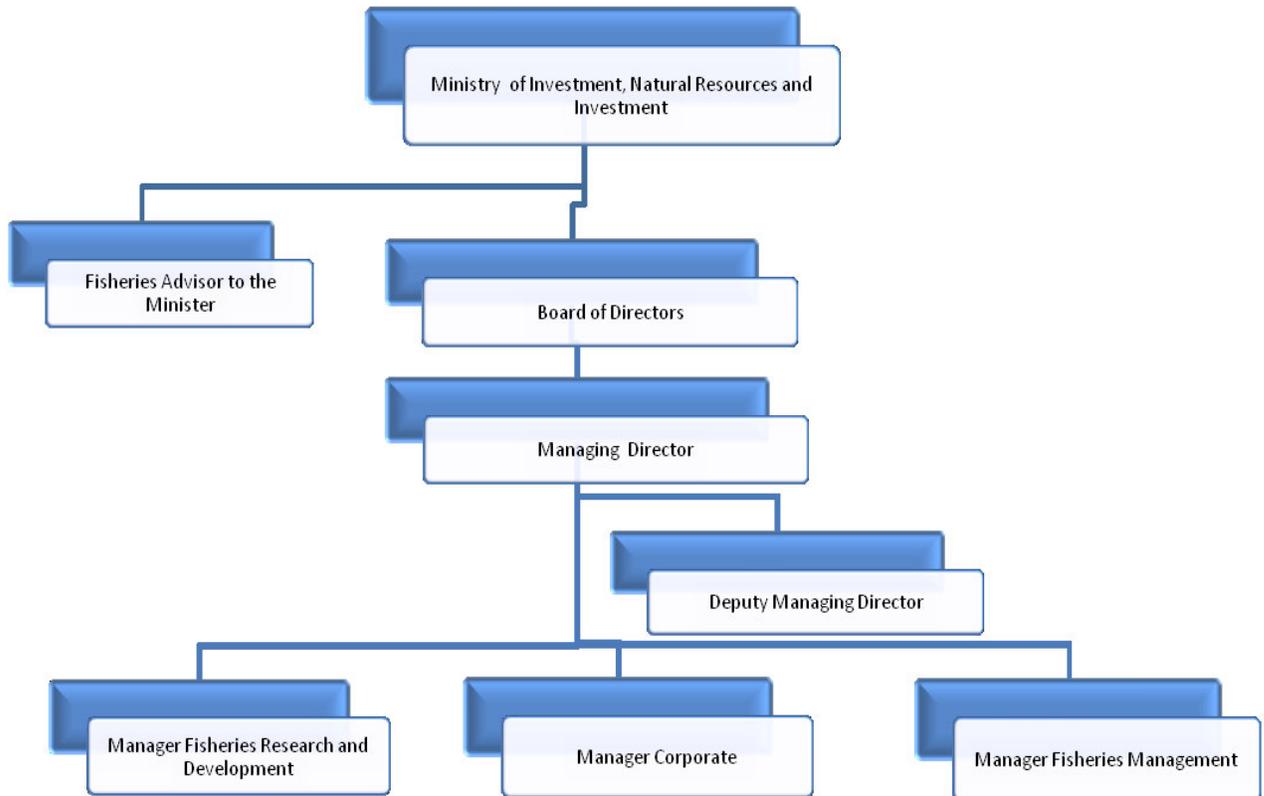


Figure 3. Organisation structure of the Seychelles Fishing Authority.

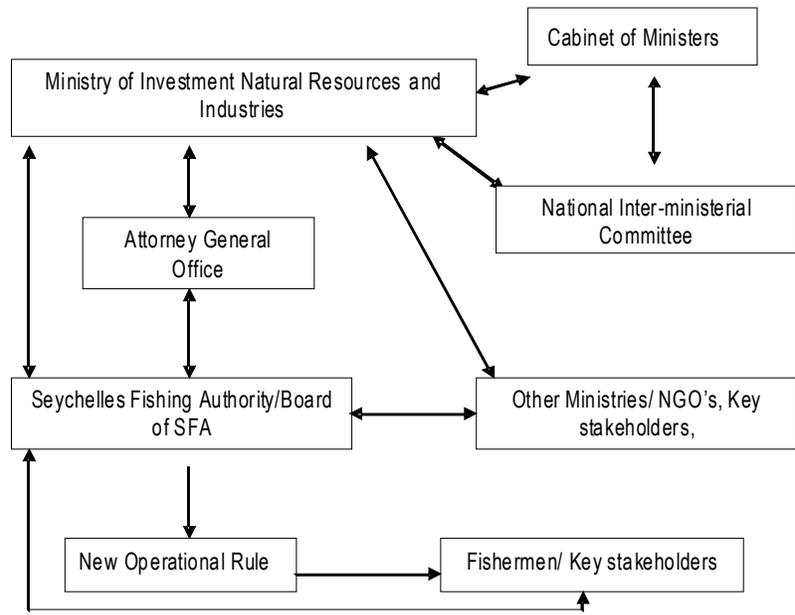


Figure 4. Decision making process in Seychelles for fisheries policy.

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1. Introduction

1.1 Overview of Coastal Tourism

Seychelles is a magnificent island state boasting stunning scenery, a relatively diverse and interesting flora and fauna with a rich and colourful cultural heritage created through the mixing of the Asian, African and European cultures. Since the arrival of the first settlers, visitors to these islands have always shown great admiration for the beauty of the islands and the hospitality of their pleasant and friendly inhabitants.

Most of the islands in Seychelles, in particular the coralline ones, can be considered as coastal zones in their entirety due to their size and homogeneity. Even on the high granitic islands, where the so-called plateau areas are the most easily recognizable landward part of the coastal zone, all human activities and ecosystems further “inland” usually tie in with coastal zones concerns through natural processes and the geography of the islands. According to Shah (1995) 87% of human settlement and infrastructure are situated on the coast in Seychellesⁱ. Infrastructure related to tourism is no exception and any new tourism development takes place on the narrow coastal plains. Therefore it can be stated that all tourism in Seychelles is coastal tourism.

Today the Seychelles economy is firmly based on tourism and fisheries and although the government is searching for other avenues to diversify the economic base, devoid of any significant reserve of natural resources, it is probable that tourism will remain the most important economic sector for many years to come. In the peak year 2007, with a total of 161 273 tourists, the industry contributed RS 6,823.8 million or 23.4% to the Gross Domestic Product of the national economy Government of Seychelles (2007).ⁱⁱ According to the National Statistics Bureau the indicative contribution of tourism to the GDP for 2010 is even 25.6%. This is a large percentage and probably one of the highest in the worldⁱⁱⁱ.

From the early 1970s, government has encouraged and emphasised private investment in the tourism sector. Tourism development has been placed in the hands of the private sector with the role of government restricted to regulating and monitoring development and activities in the sector. Maximum support is given by government in providing ‘tools’ such as infrastructure, access to tourist markets, marketing campaigns as well as incentives for the industry to further consolidate and sustain the growth recorded so far.

Before the opening of the International Airport in 1971, a limited number of only 1622 tourists reached Seychelles per annum via cruise ships and a small amphibious planes originating from Mombassa, Kenya. During the 1980s and 1990s tourist arrivals increased steadily from 47,280 in 1982 to a peak of 130,955 in 1996. From 1997 to 1999, there was a slight decline, which picked up in 2002 and reached 132,246 visitors arrival before reaching a peak in 2007 with 161,273 visitor arrivals^{iv}. The majority of tourists (99%) reach Seychelles by air and the country is served by several international airlines with Air Seychelles handling approx. 76% of the traffic in 2010 and with the other five airlines sharing the remaining 24%. The tourism industry is heavily dependent on the European market, which accounted for 76% of tourist arrivals coming by air to Seychelles in 2010^v. Currently Air Seychelles has a daily flight to Europe. Efforts are being made to better access other markets in the Middle East, Far East and South Africa. Europe has always remained the top market, and in 2009 the four most important countries (*in terms of share in arrivals*) are France, Italy, Germany and UK & Eire^{vi}.

The tourism products available range from self-catering accommodation and guesthouses that are generally owned by locals and owner operated to boutique hotels, 4–5 star establishments operated by international chains. Other products like car and bicycle hire, dive centres, small hire crafts, water sport operators and tourist guides are traditionally owner operated business. The table below compiles the distribution of the different products per island.

Table 1. Product Table

	Mahe		Praslin		La Digue		Other Islands		Total	
	estab	rooms	estab	rooms	estab	rooms	estab.	rooms	estab.	rooms
Large Hotels*	9	1024	11	537	1	69	3	142	24	1772
Small Hotels	35	267	21	187	16	131	9	125	81	710
Self Catering & Guesthouses	21	138	17	96	9	43	0	0	47	277
Subtotal	65	1429	49	820	26	243	12	267	152	2759
Restaurants & Cafeterias	73		37		10		5		125	
Car Hires	40		15		0		0		55	
Bicycle Hires	2		8		17		0		27	
Dive Centres	6		8		1		7		22	
Gass Bottom Boats	14		0		0		0		14	
Hire Crafts	107		64		17		29		217	
Watersports	4		3				4		11	
Travel Agents	4		0		0		0		4	
Tour Operators	5		1		0		0		6	
Tour Guides	4		4		0		0		8	

* above 25 rooms, Source Seychelles Tourism Boardⁱⁱⁱ May 2004

The tourism industry directly employed approx. 25% of the labour force and generated SR 2437 million worth of foreign exchange in 2008^{viii}.

Tourism remains the most important pillar of the Seychelles economy through direct and indirect contributions to the domestic economy (GDP) and through cash inflows of foreign currency including receipts and foreign direct investments. Revenue from tourism has increased steadily from SR. 353 million in 1986 to SR 938 million in 2004 and 2437 in 2008^{ix}. In fact, the contribution of tourism to the national economy is much more significant, since these statistics are based on conventional national accounting methods, which estimate only the direct contributions of tourism to the gross domestic product, and not the added value that is generated from the industry through indirect contributions.

Table 2 Tourism Economic Indicators 2005–2008^a

Details	2005	2006	2007	2008
Large hotels*	25	25	25	25
Small hotels/guesthouses	85	84	78	82
Self catering establishments	51	54	66	60
Visitor arrivals ('000)	128.7	140.6	161.3	159
Visitor nights ('000)	1248	1378	1597	1605
Average length of stay (nights)	9.7	9.8	9.9	10.1
Average expenditure per diem (SR)	842.9	906.2	1155.8	1510.5
Beds available (average)	4920	5140	5460	4840
Bed nights occupied ('000)	822	950	1116	1007
Room occupancy rate (%)	42	52	60	60
Bed occupancy rate (%)	44	50	56	57
Net Tourism income – (SR million)	917.2	1108.7	1643.7	1899.8

* hotels with over 25 rooms

Total bed capacity in the country was 48,405 in 2008 and the average bed occupancy rate 57%. From 2005 to 2008 the bed occupancy rate increased from 44 to 57 percent. In general the occupancy rates were higher in the 5-star establishments compared to the lower-class establishments. In terms of average length of stay, this declined slightly to 9.9 nights in 2007 compared to 10.1 nights in 2003^{xi}.

Table No.3 Tourism Expenditure, 2003–2007ⁱⁱⁱ

TOURISM EXPENDITURE, 2003 - 2007

	Million Rupees				
	2003	2004	2005	2006	2007
Hotel receipts					
Large Hotels	362.3	410.2	524.5	542.5	884.4
Small Hotels, Guest Houses	90.6	102.5	131.1	135.6	221.1
Total	452.9	512.7	655.6	678.1	1105.5
Less estimates for income from residents	3%	3%	3%	3%	3%
Hotel receipts from visitors	439.7	497.8	636.6	658.4	1073.3
Other local cash expenditure by visitors ⁽¹⁾	250.4	288.0	287.6	311.2	485.5
Restaurants	81.0	89.0	89.9	98.9	167.5
Car hire	26.6	26	25.3	29.4	38.4
Taxis & buses	10.2	12.7	12.4	14.0	22.2
Excursions	75.7	91.4	90.5	96.4	140.0
Handicrafts	31.7	41.2	36.1	39.0	67.7
Other shopping	14.6	14.0	15.0	14.6	21.9
Unallocated	10.6	13.7	18.4	18.9	27.8
Pre-payments (car hire, tours and trips) ⁽²⁾	12.5	14.4	14.4	15.6	24.3
Expenditure by cruise ship passengers and short-stay transit passengers	5.2	6.6	7.5	8.8	11.6
TOURISM EXPENDITURE ESTIMATE	708	807	946	994	1595
Commercial banks' purchases of foreign exchange from tourism sector ⁽³⁾	729	818	824	885	1194

1.2 Tourism livelihoods benefits and challenges

Since the 1970s when tourism started making an impact on the economy of Seychelles, small local entrepreneurs have seized the opportunity to open up small businesses in the form of restaurants, glass bottomed boats, excursions and in the field of art and craft. During the 1980s when the Development Bank of Seychelles started supporting small businesses with more substantial loans and the number of tourists rose, conditions became generally more favourable for small locally owned businesses, and a number of Seychellois entrepreneurs invested into tourism. Other non-mainstream small businesses, in the field of art and craft, horticulture and vegetable production, fisheries and guiding have also benefited and are further being strengthened and developed. The main focus at present is to train the managers and staff to provide value for money for services and products and to facilitate the creation of new businesses. To maintain the present distribution of wealth derived from tourism within the local population, it is necessary to continue supporting and developing other areas impacting on the tourism industry and thereby create new opportunities for investments by the locals.

Tourism is a major job generator and currently it is estimated that more than 7000 people are directly employed in the tourism sector, and the number is expected to expand significantly over

the next ten years. The ratio of tourist arrivals to local population is projected to leap from the level of 1.54 in 2001 to 2.25 by the end of 2010^{xiii}. This represents a great challenge since one of the major constraints facing the sector is an acute shortage of staff at all levels, from the lower ranks of employees to supervisory and senior management personnel. One of the main problems is the difficulty in attracting and retaining qualified Seychellois in many types of jobs, particularly in housekeeping, kitchen, food and beverage, and service, as well as in supervisory and managerial positions in hotels and restaurants. Even where staffing numbers are met, the quality and motivational levels of employees are often at variance with the demands of the industry.

As a result of these constraints, the industry currently employs a relatively high number of expatriates. In August 2010 1539 expatriates were dispersed over different levels only in hotels.^{xiv}

The Seychelles Tourism Academy at La Misere is currently the main establishment for the training of personnel for the tourism industry. However, its capacity and facilities are not adequate to meet the existing and future demands of the industry. Plans for its expansion and further development have been approved by Government and implementation has been initiated,

The main environmental issues and challenges due to tourism

Seychelles has always paid careful attention to the preservation and conservation of the environment, to the extent that it is one of the countries with the highest ratio of protected areas to total land area in the world with 47%. While the process of social and economic development, including tourism development, inevitably presents major environmental challenges, the tourism industry can promote development models that are in harmony with the natural environment and its elements such as biodiversity.

It is common knowledge that during the construction phase, which includes refurbishment and upgrading of facilities, huge volumes of solid waste are produced, some of which are illegally dumped into the environment. Waste management in Seychelles has evolved over the years. With the creation of the Solid Waste and Cleaning Agency and the contracting of STAR Seychelles to collect, dispose of and process waste and manage landfill sites, many existing difficulties and pollution problems have been adequately resolved. However, the situation is still far from ideal, the next phase will have to focus on the sorting out of waste at source to minimise the amount of waste that needs to be disposed of at the various landfills. Taking into account that the number of tourists and tourist facilities are on the increase, one result will be more waste requiring proper disposal and treatment. Another gap area is the collection and disposal of waste from cruise ships and other pleasure boats serving the islands. These gap areas will have to be assessed and monitored, and solutions found for the major existing and any emerging problems.

Another limiting factor is the amount of land available for food production which often leads to conflict over land use for agriculture and tourism even though both activities interact with each other. In addition, the annual shortages in rain during the south-east monsoon are more persistent compared to the past resulting in shortage of fresh water. To solve the water shortage problem, the authorities had no choice but to invest heavily in four desalination plants two of which are on Mahé and the other two on Praslin and La Digue.

Coupled with these negative impacts are new challenges produced by climate change, which in 1997 through heavy rains and intense stormy weather, caused landslides, widespread flooding and pollution of the marine environment. In addition, in 1998, Seychelles together with other island

states of the Indian Ocean lost 90% of its coral reef to coral bleaching caused by a rise in sea temperature. Over the last years the patterns of the dry and wet periods have changed causing severe droughts in some years. In 2005 the country faced the effects of a major Tsunami and although the cause of this natural phenomenon cannot be directly related to climate change, because of the loss of coral the buffering capacity of the reef was reduced. This resulted in a weaker coast line which was directly exposed to the impact of the tsunami. There are clear indications that these destructive climatic factors and the effects thereof are intensifying and will increase in frequency.

2. Biophysical

As mentioned before the small size of the islands and the relatively difficult terrain within the central areas of the granite islands result in most of the tourism related development combined with other facilities being constructed both for the use of the local population and the visitors alike on the narrow coastal plains. This concentrates the impact of development and human activities within a relatively narrow stretch of land and the immediate marine environment bordering to the shoreline, resulting in increased threats to the marine biodiversity and degradation of the coastal zone.

Development constraints

Low Lying Plateaus

The fact that the plateaus of the islands are low creates significant problems. A typical example is the high water table which rises with the tide. With most of the coastal plateaus consisting of sandy soil, this creates a serious problem for the septic tank system which is the most common sewerage treatment method in use. The low plateaus present a risk of water contamination because of insufficient filtration.

Mountainous Granitic Islands

The granitic islands which are the most inhabited of Seychelles' islands are mountainous with steep slopes which do not facilitate development and so the tendency is for development to occur along the coast. Furthermore, in view of the narrow coastline it is also not advisable to have too much development in higher lands as the environmental impact could be disastrous, causing erosion and pollution and also destabilizing the water catchment areas.

Inter-Sectoral Conflicts

In view of the limited land area and the concentration of the majority of the population on three islands, there is a conflict between the economic sectors for the limited developable land. This conflict is further exacerbated by social and environmental needs.

Inland Development

Despite the steep terrain, inland, development still occurs and, as building technology improves, development tends to increase, which creates run-off water, erosion from the development inland and silting of the coastal waters. Silting destabilises the marine ecosystem and further affects the coasts.

Climate Change

The climate changes being experienced cause further problems through rising water levels. This creates erosion from the seaward side of the islands and hence the coast faces pressures from both sides making it very vulnerable. This situation imposes further limits on what can be allowed and how it can be allowed.

3. Human environment

Since the establishment of the tourism industry in Seychelles the livelihoods in the local community have been based on tourism and serve the needs of the people well, including infrastructure development. The small establishments have direct access to the tourism market and are included in all marketing efforts at national level.

The informal sector e.g. art and craft, has also benefited from the industry, however the full potential of Seychellois artists and craftsmen who have great skills and imagination using different elements of biodiversity like wood and shells etc. has not been fully realised. Although the authorities have already invested substantially into sales outlets and training of new talents, a number of weaknesses were identified as limiting factors hindering the development of this important sub-sector. To overcome some of these the Small Enterprise Promotion Agency (SENPA) was created which is engaging especially small entrepreneurs in a development programme to pass on very specific knowledge such as how to package, market and promote their products as well as in book keeping etc.

Lack of Human Resources & Expertise

Whilst Seychelles is continuously investing in its people to have the required expertise in the long term, it still does not have the necessary population size and thus it cannot address all its coastal management needs as it would wish to. This problem worsens with the difficulty the country and in particular the government faces in attracting and retaining the few people that have been trained in these related fields.

The majority of the below listed concerns are not directly linked to employment in the sector, the importance of acknowledging and addressing such issues in the long term should not be underestimated.

The impacts of increasing tourist arrivals on the local culture have been compiled as follows:

- Conflict of interest between members of the local community and tourism establishments.
- Prostitution and degradation of the social fabric; Adoption of a materialistic approach to the development of human relationship and abuse of substances.
- Adoption of foreign lifestyles and culture and rejection of the Creole culture.
- Investment by foreign multinationals in 5-star establishments and other tourism facilities resulting in repatriation of the majority of revenue earned with an financial impact on less competitive small local establishments.
- Working hours within the tourism industry incompatible with family life

Population Growth

Population growth brings along increased demand not only for goods and services but also for further development and developable land. Hence the pressure on the coasts increases since the mountainous areas are not as accommodating. Such demands tend to suffocate sustainable development and environmental conservation needs.

Legislation and Enforcement

While Seychelles does have the legal requirements for the protection of the environment, the coasts and its biodiversity, the biggest challenge remains the ability to enforce the same. This constraint occurs in various forms including:

- Limited number of personnel in addition to the limited qualified personnel
- Lack of resources to police
- Partially outdated legislation

Environmental Responsible Behaviour and Public Awareness

One of the most important constraints being faced currently is a medium level of environmentally responsible behaviour although the general awareness of the public and the tourism sector on environmental issues is relatively good. Despite environmental campaigns being regular features for the last 15 years, the knowledge passed on to the communities, developers, local and overseas investors, operators' etc. does not necessarily translate into the necessary understanding and action. Whilst everyone has his/her wants they do not necessarily understand that there are limits and even negative chain effects of their desires on the environment.

In the context of the local community the most common response when told about the concerns is: "We have been doing this for generations and no such problem arose, so why should it be a problem now?".

Environmental responsibility of foreign developers and investors, who mainly choose to invest in Seychelles over other countries due to its natural beauty and the high emphasis placed by government on environment protection and nature conservation, varies greatly. However, in many cases the proposed developments are designed either with high density or include sensitive areas in their design or propose a design which has high impacts on the natural environment. The main reasons for this are mainly to gain economic advantages as well as to differentiate their products from existing ones. Consequently there exists a pressure for exemptions and if precedence is created government has difficulties in stopping the trend.

4. Policy and Governance

Vision 21: Tourism Development in Seychelles 2001–2010, is a strategic document and provided the guiding philosophy and principles for tourism development for the last 10 years based on the following vision.

"Tourism in Seychelles shall continue to be developed to the highest standards for the optimum social and economic benefits of the Seychellois people while maintaining a commitment to the protection and conservation of the natural environment and biodiversity" ^{xxv}

“Integrating Tourism for Environmental Sustainability” was one of the key areas identified in the document to reposition Seychelles as an exclusive and quality tourism destination which will set it apart from other destinations. The aim of this area was to ensure that tourism is a nationally integrated industry that takes account of the environmental carrying capacity and sustainability.

‘The sustainability of Seychelles’ tourism industry is directly related to the health of the natural marine and terrestrial environment, which will be ensured by requiring that all expansion takes place within the framework of maintaining the ecological, social and economic sustainability of tourism, giving utmost consideration to continuing and expanding application of environmental protection measures to designated protected areas, and more generally to the environment, in order to maintain the overall environmental quality of the Seychelles. Environmental management will be viewed as a continuous process with both government and private enterprises sharing responsibility for conservation of natural resources and cultural heritage. The planning, development and management of tourism development will be undertaken in a way that avoids serious environmental impacts. Specific tourism projects will be carefully planned to take account of the carrying capacities of their respective sites. Tourism development will be environmentally integrated, suitably designed, and will stress the conservation of electric power and water supply. Appropriate waste management techniques will be applied’.^{xvi}

In VISION 21 a series of chapters entitled Management of National Parks and other Protected Areas, Coastal Zone and Marine Resource Management, Tourism Planning and Development Standards, Tourist Facility Site Planning and Design Standards, Waste Management address environmentally related issues using as much as possible an integrated approach.

The VISION 21 Action Programme for Tourism Development sets out the actions and projects that were to be carried out during 2001–2010. The Programme represented a general guide for tourism development, also formed a basis for the development of more specific projects and programmes to achieve the objectives of VISION 21. For each recommended action the lead agency and the main implementing partners from both the public and private sectors were identified. The actions and projects contained in the programme are in many cases the joint responsibility of government and the private sector, with government playing either a lead or coordinating role in encouraging and facilitating private sector activities.

In 2005 the Ministry of Tourism and Transport was transformed into the Seychelles Tourism Board. with the main functions to: a) promote the efficient and sustainable development of tourism; b) assist and advise the government in development of the sector; c) encourage improvement of the tourism product; d) establish codes of practice and standards; and e) carry out market research and implement marketing strategies^{xvii} (Twining-Ward, 2009). STB, which carries the power base in terms of livelihood decision making, regulates tourism in collaboration with Seychelles Licensing Authority, Ministry of Finance, Department of Employment and the Ministry of Health. Tourism developments are mainly regulated by the Planning Authority and the Department of Environment which is working satisfactorily for the protection of coastal resources.

Following the substantial economic reform programme initiated in 2008, the capacity of the relevant ministries and government departments mandated to manage and support tourism, has been reduced due to a substantial reduction of staff across all levels including technical staff.

Due to the small size of the country it can be said that the livelihood concerns and contexts of all people with respect to tourism policy processes as well as concerning land, water and natural

resources issues are represented in the National Assembly and no new governance arrangements are required to encourage a more livelihood-based approach to tourism.

Since all tourism in Seychelles can be defined as coastal tourism the policymakers never considered it necessary to design specific policies and development plans for coastal tourism. It has always been the aim to address tourism development in a holistic manner taking into account the specificities of each site.

5. Planning and management

As already mentioned following the high dependency on tourism for the prosperity of all Seychellois, the entities responsible and mandated for the planning and management of coastal tourism fully understand the complex nature of this sector. However, as a result of the mentioned economic reform programme they are not always effectively able to roll out development sustainably, in a timely manner and cost effectively.

The set up of the Seychelles Investment Bureau was a major step, not only to attract the right responsible and sustainable investors but also to serve as a one-stop shop for all investors. High emphasis is placed on ensuring efficient and timely processing of proposals.

Tourism developments are being screened in collaboration with the Planning Authority and the Department of Environment having responsible planning practises in mind. The Environment Management Plan of Seychelles is fulfilling the role of an integrated coastal zone management plan which incorporates sustainable tourism in one of its 10 thematic areas. Consequently nature based tourism is being planned and managed using sound environmental principles, based on the understanding that communities where appropriate should have managed access to the natural resource base.

The communities are not disadvantaged or jeopardized in any way from licensing procedures for tourism activities. Contrary some products are reserved to local investors and operators only.

Environmental Legislation specifically addressing tourism development or activities does not exist. As mentioned earlier, however, it is common knowledge that any site development for a tourism project has to be done in accordance with the Environmental Protection Act 1994, following the Environment Impact Assessment Regulations.

To guide development, the Department of Environment has published a series of 13 guidelines. Those guidelines set out preliminary environment assessments which assist, if followed, in project implementation to ensure environmental sustainability. The ones directly related to tourism are Tourism, Coastal Zone Management and Construction. In general tourism project proposals require a Class 1 EIA. The approval process for such projects also includes the necessity to obtain environmental authorization. The Class I EIA requires the promoter to contact the environmental authority for the scoping process to draw up the terms of reference for the Environmental Impact Assessment. In the scoping process, the proponent is requested to formally seek the views of the different stakeholders or other parties which could be affected by the development. The scoping report obtained as result of this process is then used to prepare the Terms of Reference (TOR) for the preparation of the EIA. The first draft of the Environmental Impact Assessment (EIA) is submitted to the authority for verification. In case the EIA is up to the standard demanded by the Ministry, then it is put on a 2 week public inspection period where

it can be viewed and commented upon by any interested member of the public. The public comments are then taken into consideration when appraising the EIA.

Wastewater Management

The main institution involved in wastewater management is the Public Utilities Cooperation as the entity responsible for provision of adequate water to the population. It is a priority of the government to serve the entire population with sanitation systems by the year 2010 and reduce the usage of pit latrines to 10% by the year 2010. There are currently seven public water born sanitation systems on the main island and one on the second most populated island. These include the greater Victoria and East Coast housing systems. Currently about 90% of the greater Victoria population are served by these systems. The Beau Vallon Sewerage Treatment system serves 70% of the entire population of the northern region of the main island. Based on the national guidelines commercial and industrial developments are required to have their own sewage pre-treatment plants, so as to ensure that effluent discharges from enterprises into public sewers conform to stipulated standards. All legislation establishments are currently required to have their own treatment facility if they are not in the areas served by the public system. To date seven of the large hotels have set up their own individual treatment plants.

Building Regulations

The Town & Country Planning Act came into force in 1974 and this act aims to control the kind of development that takes place on all of the islands. The act differentiates between minor works and major developments but still makes provision for all forms of development to be submitted to the Town and Country Planning Authority. All the major agencies including the private sector are represented at this authority's meetings and they are given the opportunity to voice their opinions on the proposed development. All approvals granted are given with strict conditions.

One of the conditions set is that no building should be erected within 25 metres from the green line. This condition is mainly put to protect the sand dune on the coasts which protects the coasts from severe erosion.

Environment Legislation

Bearing in mind the dangers of having major developments on the mountains, a vast part of the islands have been designated as nature reserves and so very limited if any development may be allowed within these areas. Such measures provide for the protection of the water catchments, controls deforestation and hence limit the run-off and erosion that could otherwise occur.

Along the same lines, there are also protected marine parks where no disturbance of the marine life is allowed. Again such measures protect the reefs which in turn protect the coastal zones. In addition the biodiversity is also protected.

Integrated Development Plans

The various sectoral demands for coastal resources have necessitated the development of strategies that advocate integrated development. At least two of these documents have been developed so far. These documents are the Environment Management Plan of Seychelles which is in its second generation and Vision 21 which is the guiding principles for tourism development.

These documents propose development approaches that take into consideration the need to cohabitate with other economic and social sectors.

Although the tourism sector poses the greatest potential threat to the environment, one positive attribute of these two documents is that they are closely inter-twined in that they are more or less complementary rather than conflicting. Hence they at least mitigate the problems that the tourism sector creates.

These documents also address the concern of human resources and the need to train the required personnel for the respective sectors. However, they do not necessarily address the problem to the full.

Other Measures

Other measures that have been put in place or are being investigated include the establishment of environmental management systems, central sewerage treatment plants, mooring buoys, limits in height above which development cannot take place, etc.

Seychelles has a pool of well established NGOs especially in the field of biodiversity, nature conservation and environment. However although an intact environment is not only the primary base of but also the major attraction for tourism, only one NGO placing tourism at its core, the Ecotourism Society of Seychelles, exists. On the other hand the long established Seychelles Hospitality and Tourism Association now has a committee looking at environmental issues in the tourism industry.

6. Current projects

The “*Mainstreaming Biodiversity Management into Production Sector Activities*” Full sized Project, was signed in October 2007 between the Government of Seychelles (GOS) and the United Nations Development Programme (UNDP), and is funded by a Global Environment Facility (GEF) grant of US\$3,600,000. The project is part of the UNDP-GEF Portfolio in Seychelles and is implemented under a Programme Coordination Unit (PCU), and headed by a Biodiversity Programme Manager.

The project started in February 2008 with the recruitment of the Programme Manager, and has recently completed its Inception Phase. The Project is of a duration of 6 years, and has the following **Project Objective**: “*Biodiversity conservation is integrated into key production sectors of the economy*”. This Objective will be attained through the following Outcomes:

Outcome 1: “*Systemic and institutional capacities for mainstreaming biodiversity management within and across sectors are strengthened*”.

Outcome 2: “*Methods and means for integrating biodiversity and artisanal fisheries management are in place*”.

Outcome 3: “*The tourism industry is addressing biodiversity conservation as part of good practice in business operation*”.

The project seeks to galvanise support and investment from the tourism industry in managing on-site impacts and off-site externalities. It is recognised that developments may impose collateral damage, even when planned and executed to the highest standards and in compliance with EIA legislation. The project will seek to internalise these costs by providing developers with a menu of management options, which could include on-site and off-site remediation work. While investment will be encouraged through modifications to tourism licensing regimen and incentives, the focus will be on setting standards and leaving it to the operator to work out how best they may be realised. This approach is anticipated to be more cost effective and will replace a strict command and control approaches.^{xviii}

Another project which is being implemented by UNIDO on a regional level is “Demonstrating and capturing best practices and technologies for the reduction of land-sourced impacts resulting from coastal tourism”^{xix}.

7. SWOT analysis

<p>Strengths</p> <ul style="list-style-type: none"> • Tourism development has always been in the hand of the private sector • Some products such as small hotels with less than 10 rooms, tourist guide, taxi business, car hire to name a few are reserved for Seychellois only • The Department of Environment is well respected and executes its mandate relatively effectively • Environmental public awareness has been highly promoted and much increased over the last 15 or so years 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Limited understanding of local operators of the importance and advantage of sustainable practices in the industry • Limited engagement of communities to further the process towards sustainable tourism • Limited number of NGO’s in promotion of sustainable tourism and practices in the industry
<p>Opportunities</p> <ul style="list-style-type: none"> • The small size of the country allows for relatively effectively administration of the sector • The Seychelles Tourism Board (STB) has well-established links with the private sector and the SHTA • A recent study to analyse the value chain links in tourism has identified gaps and made recommendations on how best to address these. • A sustainability label for the tourism sector has been developed and is ready for implementation 	<p>Threats</p> <ul style="list-style-type: none"> • The ‘carrying capacity’ of the community in regards to tourism is limited and will affect the social fabric as well as the natural environment if not respected. • Sustainable practices in the tourism sector are only marginally integrated in operation • Capacity of the government is drastically reduced to monitor and evaluate tourism developments as much as operations

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United Nations Environment Programme Global Environment Facility (2007) Project document,. Full project “ Demonstrating and capturing best practices and technologies for the reduction of land-sourced impacts resulting from coastal tourism ” GEF Project ID 2129

9. List of projects

Project title	Funding Agency	Implementing Agency	Project Level
Mainstreaming Biodiversity Management in production sector activitie http://gefonline.org/projectDetailsSQL.cfm?projID=1620	GEF	UNDP	national project
Demonstrating and capturing best practices and technologies for the reduction of land-sourced impacts resulting from coastal tourism (regional project for the Sub-Saharan Region) http://gefonline.org/projectDetailsSQL.cfm?projID=2129	GEF	UNIDO	regional project
Seychelles Tourism Value Chain study	Commonwealth	STB	national project

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xix United Nations Environment Programme (2007) Project document, Global Environment Facility. Full project “ Demonstrating and capturing best practices and technologies for the reduction of land-sourced impacts resulting from coastal tourism ”.

III. Mariculture - Prepared by Dr. Thomas Ashley Shipton,
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1. Introduction

Farming Activity	Culture species	Culture technology	Production scale	Annual production (2006)	Employment	Number of farms	Consumption		
							Export	Domestic	Household
Prawn	<i>Penaeus monodon</i>	Pond culture	Small-scale commercial	704 ^{1 2}	350	1		X	
Giant clam	<i>Tridacna maxima</i>	Raceways	Small-scale commercial	585 ^{1 2}	-	1	X		
Pearl oysters	<i>Pinctada margaritifera</i>	Underwater longlines	Small-scale commercial	622 ^{1 3}	3 ⁴	1	X		

¹ Shipton and Hecht (2007)

² Clam production (exports) have dropped from 1,960 in 1996 to 585 in 2006 (Shipton and Hecht, 2007).

³ In 2003, 622 full pearls and 128 half pearls were produced. Current production levels are kept confidential. In terms of prawn production, production has reduced from 1175 tons in 2004 to 704 tons in 2006 (Shipton and Hecht, 2007).

⁴ The farm employs three local people. Japanese grafters are used to seed the oysters (Shipton and Hecht, 2007).

2. Biophysical

Farming Activity	Geographical extent	Environmental issues
Prawn	Coetivy Island	<p>The primary environmental issue pertaining to the sole shrimp production facility in the Seychelles accrues to the effluent waters from the production ponds that are released into the Lagoon on the eastern side of Coetivy Island (Bijoux et al 2008). The effluent stream contains relatively high concentrations of suspended solids / organic matter resulting from uneaten feed, prawn faeces, dead plankton and algae (WIOLAB, 2008). Due to the high volume and regularity of water discharge into the lagoon, it is likely that there is a negative impact on the water quality of the lagoon, and this could possibly affect ecosystem function. In mitigation, it is unlikely that prawn culture will grow significantly in the Seychelles as the availability and cost of coastal land is at a premium. Thus, the environmental impacts accruing to the sector are, and in all likelihood will in future be, limited to this one production facility.</p>
Giant clam	Praslin	<p>The giant clams are cultured using a flow-through system in which abstraction and effluent water arise and are discharged to the same lagoon (Bijoux, 2008). With respect to environmental impacts, the production technology that is used is relatively benign. Juveniles are hatchery reared, and thus there is no requirement for collecting juveniles from the environment. Importantly, artificial feeds are not required, and thus in terms of effluent streams, nutrient loading in receiving waters is not an issue. It is not anticipated that the activity, or an expansion of the activity, will result in significant environmental impacts.</p>
Pearl oysters	National Park between Praslin and Curieuse	<p>Oyster culture is a benign culture technology with no artificial feeds being used in the production process. Seed oysters are collected from wild stocks. While there is no information pertaining to the sustainability of harvesting of the spat, the culture operation is benign and should not negatively affect the environment.</p>

3. Human environment

Farming Activity	Developmental paradigm and livelihood issues
Prawn	<p>The prawn farm on Coëtivy island started as a pilot facility in 1989 (Alexis and Chang-Sam, 2006). Over a number of development phases it has expanded into a commercial operation with two hatcheries supplying 200 grow-out ponds (96 ha). The farm has a processing factory, and a feed production facility on Mahé. The majority of the 350 employees are from Thailand and Sri Lanka, with only 18% being Seychellois. The future expansion of the facility is problematic as the current operation already accounts for approximately 50% of the island, and access to additional land could prove difficult. High land values and limited space suggest that the prawn farm sector in the country will remain small, and contribute relatively little to coastal livelihoods.</p>
Giant clam	<p>There is one Giant clam farm in the Seychelles (Praslin Island). Production was initiated in 1993 using a land based hatchery / raceway system, and rearing on the seabed. The product is sold into the aquarium market. Over recent years there has been a drop in demand due to increasing demand for more colourful species or varieties on the market, and the reported absence of these varieties and/or species in the Seychelles. Another factor is that the species was put on the CITES list of endangered species, resulting in its export becoming more difficult. Clam farming is not a labour intensive activity and thus employment opportunities in the sector are minimal and will remain minimal.</p>
Pearl oysters	<p>There is one pearl oyster farm in the Seychelles. The farm was established in 1995 with the first harvest being undertaken in 1997 (Alexis and Chang-Sam, 2006). For pearl farming to develop in Seychelles there is a need to train local grafters to seed the oysters – currently Japanese grafters travel to the country to seed the animals. There is no value addition of the product and pearls are exported to Japan and Australia for setting. Some are re-imported for sale in the country. In terms of job opportunities, pearl farming per se is not a highly labour intensive activity - the current farm employs the owner and two divers, and thus in terms of promoting sustainable livelihoods, the number of employment opportunities that could accrue to the sector is likely to be limited.</p>

4. Policy and Governance

4.1 Policy

Legislation	Present	Comment
Fisheries Act	Yes	Fisheries (Amendment) Act of 2001 / Fisheries Policy of 2005
Aquaculture Act	No	Mariculture in Seychelles falls under the jurisdiction of the Fisheries Act of 2001
Aquaculture Policy	No	<p>The Fisheries Policy of 2005 is supportive of mariculture development. Notably paragraphs 4.1.5 and 5.1.4 state:</p> <p>“4.1.5 Aquaculture research and development will focus on consolidating the actual production and facilitate development in new breeding techniques for suitable species.”</p> <p>And; “5.1.4 The Government will promote responsible research and development of aquaculture and ensure that this development is ecologically sustainable, and allows the rational use of resources shared by aquaculture and other activities. Aquaculture will be promoted with the aim of minimizing adverse environmental changes and related economic and social consequences.”</p>
Sub-sector development plans	No	
Aquaculture Master plan	No	In 2010, and with funding from the African Development Bank, the Seychelles is planning to develop an aquaculture Masterplan. A major thrust of this plan is likely to be the promotion of marine finfish cage farming.
Aquaculture zoning	No	Aquaculture zoning will be undertaken as a component of the development of the aquaculture Masterplan.
Environmental Management Acts	Yes	<p>Environmental Protection Act of 1994 covers the EIA procedures. Additional legislation that is of relevance for mariculture includes: National Parks and Nature Conservancy Act of 1969 (Chapter 141) – for mariculture in Marine Parks.</p> <p>Town and Country Planning Act of 1972 – for land based mariculture (currently under review).</p> <p>Maritime Zones Act, No. 2 of 1999 – for sea based mariculture</p>
EIA Requirements	Yes	Any new mariculture venture is subject to an environmental impact assessment as prescribed by the Environmental Protection Act of 1994.

4.2 Governance

The Ministry of Environment and Natural Resources: Seychelles Fishing Authority (SFA) is mandated to administer, manage, develop and undertake appropriate research to facilitate the development of the aquaculture sector. While technical capacity is limited at the SFA and it does all it can to facilitate development, there is very little capacity to assess applications in terms of their biotechnical and financial viability, or to provide the support frameworks that are required to regulate the industry. The Seychelles Centre for Marine Research & Technology operates under the auspices of the Department of the Environment and has no research capacity per se. In terms of development, the organisation can do little more than facilitate research initiatives of foreign research organisations and Universities.

The Department of Environment in the Ministry of Environment and Natural Resources is responsible for the management of the EIA process.

5. Planning and Management

To date, there have been no independent and comprehensive assessments of the aquaculture opportunities in the Seychelles. In this regard, issues relating to the biotechnical and economic feasibility of developing the sector, the spatial requirements and constraints have yet to be adequately addressed. This lack of informed analysis has led to planning problems in terms of disagreement between key statutory role players with respect to recognising and realising the potential of the sector on the inner and outer Islands. For example, in response to the over-fished and depleted status of most demersal fish stocks, and a foreseeable future imbalance between fish supply and demand, the Department of Agriculture and Natural Resources and Seychelles Fishing Authority recognise the need for developing the sector. Similarly the Department of Environment recognises the opportunities and appears supportive of developing the sector. The Marine Parks Authority in principle also recognises the opportunities provided by the sector as alternatives for trap fishermen. However, the Island Development Company has expressed the opinion that mariculture has no potential on the outer Islands, and due to user conflicts, it would not be able to develop on the inner, populated Islands of Mahe, Silhouette, Praslin and LaDigue.

In 2010, the Government will be commissioning a sector development plan for marine aquaculture. The commission follows a scoping study that was undertaken in 2009 to define and detail the opportunities and the factors that constrain the development of offshore mariculture in the Seychelles. The goal of the master plan is to develop the platform upon which to develop a sustainable commercial sector that is integrated into the country's economic planning vision, the coastal zone and off-shore management strategies. In terms of livelihoods development, it is anticipated that the sector plan will focus on medium to large scale investments, and while undoubtedly providing employment opportunities in the coastal zone, developments are unlikely to impact small scale / subsistence level livelihood opportunities.

6. Development, Trade and Projects

There are currently no developmental projects in the mariculture sector. Past projects have included attempts to culture the edible Pacific oyster (*Crassostrea gigas*) at Anse le Moshe, and to develop a second pearl farm on Platte and Alphonse. Neither projects are now operational.

7. SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • High quality sea water • Most demersal stocks over-fished • Recognition by fishermen of future problems with respect to local fish supply • Private sector recognition of the potential of the sector • International linkages and research cooperation established by SFA • High level capacity to screen and evaluate applications • Excellent investment incentives 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Low level bio-technical aquaculture capacity • Absence of a comprehensive assessment of opportunities • Low level appreciation and understanding of future fisheries scenarios by some statutory bodies • Absence of future fish demand analysis (particularly in view of increasing tourist numbers)
<p>Opportunities</p> <ul style="list-style-type: none"> • Sea cucumber ranching (culture based fisheries) on outer Islands – if feasible could make significant contribution to GDP • Expansion of pearl culture • Sale of Coetivy prawn farm to private sector • Fin fish cage culture for local and hotel trade - small (50 ton) to medium scale (200 ton) per annum ventures • Aquarium fish and crustacean farming for the export market 	<p>Threats</p> <ul style="list-style-type: none"> • Organs of state not fully aware that in future depleted fish stocks are likely to limit supplies, and that demand for fisheries products will not be met by the traditional capture fisheries • Controlling interests and dominance of public sector in business

8. Recommendations for Sectoral Development

At present, the potential for mariculture development in the Seychelles is poorly defined, and in the absence of a comprehensive bio-technical and economic analysis of the development potential, recommendations to promote sectoral development would be premature. Nevertheless, in recent years government agencies have begun to recognise the sector's developmental potential. With funding from the African Development Bank, the Seychelles Fishing Authority is in the process of commissioning a mariculture sector development plan. Amongst others, the development plan will outline the scale and scope for sectoral development, and identify the appropriate interventions to realise the development potential. The plan will be completed in 2011.

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Policy

Fisheries Policy 2005

<http://sfa.sc/policy/policy2005.pdf>

IV. Agriculture and Forestry - Prepared by Dr. Elizabeth Ann Daley, E-mail: lizdaley@mafinga.demon.co.uk

1. Introduction

The Republic of the Seychelles is an archipelagic nation of 115 islands, located 1,500 km off the eastern coast of Africa. Forty one of the islands are granite-based with mountainous peaks and narrow coastal strips. The Seychelles has an area of 455 km², a coastline length of 747 km and a population of about 85,000 people at the last census in 2007 (Mangroves for the Future Secretariat no date).

Before independence, the Seychelles was a small agricultural economy operating at or near subsistence level with a GDP per capita of less than USD 1,000 in 1976. Today, the economy is primarily dependent on tourism and fisheries but GDP per capita has grown to reach USD 8,000 in 2003 (Government of Seychelles 2004).

In the 1940s, agriculture employed over three quarters of the Seychelles labour force. However, as of 1995, agriculture employed only 6 per cent of the labour force. Instead, in 1995, tourism generated around 15.4 percent of GDP, 60 per cent of goods and services, and 19 per cent of formal employment, whereas fishing, the second most important export, accounted only for 1 per cent of GDP and about 8 per cent of the exports of goods and services. In 1995, the public sector employed about 60 per cent of the formal labour force (IFAD 2010).

Tourism is still leading the economy, providing 60 per cent of foreign exchange receipts and employing about 17 per cent of the work force in 2003. However fisheries is now as important as tourism, with exports of canned tuna, fresh and frozen fish in 2003 constituting about 35 per cent of total foreign exchange earnings (Government of Seychelles 2004).

Subsistence agriculture, forestry, and fishing account for about 4 percent of Seychelles' GDP. It has been estimated that the Seychelles has a total of 6000ha of potential agricultural land of which only about 600 ha are currently farmed (as arable). In the late 1990s the Seychelles became almost self-sufficient in the production of poultry, eggs and pork, but it remains heavily dependent on the import of beef and staples such as rice, potatoes and some fresh produce. 1990s estimates of the food production index (FPI) for fruits and vegetables stand at 55 kg per capita per year (Government of Seychelles 2000).

2. Biophysical

Ecological fragility makes the Seychelles highly vulnerable to external changes in the global environment. For example, the 1998 warming of the Indian Ocean as a result of El Nino, caused 50 to 90 per cent mass bleaching and destruction of coral reefs in the Seychelles up to depths of 23m. The cost in ecological capital in terms of marine tourism and fisheries is not quantifiable (Government of Seychelles 2004).

The Seychelles consists of a complex assemblage of extremely fragile and endemic ecosystems and is therefore at serious risk from climate change, though the nature and extent of the potential threat has yet to be comprehensively researched and determined. Most habitats are expected to be severely modified by climate change. An increase in sea level will flood the mangrove areas, the extent of which can be seen in Table 1 overleaf; these are mostly located on the granite-based

islands behind the sand dunes and often below sea level. An increase in sea temperature, as evidenced after the 1997 El Nino event, will also have a huge impact on coral reefs. The destruction of coral reefs, whose extent is also shown in Table 1 overleaf, would effectively destroy vital habitats for a wide variety of coastal marine organisms. The Seychelles is also an important destination for migratory birds and other species and climate change could severely affect their migrating patterns (Government of Seychelles 2004).

Table 1: Valuation of Ecosystem Goods and Services in the Seychelles

Coral Reefs		Mangroves		Coastal Forests		Total
Area (km ²)	Value (Million US\$)	Area (km ²)	Value (Million US\$)	Area (km ²)	Value (Million US\$)	Value (Million US\$)
1,690	1.027	25	25	455	91	1,143

Source: Wio-Lab 2008

Protected natural areas in the Seychelles in the form of national parks and reserves constitute a total land area of 19,760ha, i.e. about 43 per cent of the total land area, as well as some additional 23,000ha of surrounding reefs and marine areas. Consequently, Seychelles has one of the largest proportions of protected conservation areas in the world in relation to its surface area and population. A number of laws protect habitats, national parks, marine protected areas, and individual species such as endemic land birds, sea-birds, marine turtles, at least 25 species of trees, shells, marine mammals, pond terrapins and giant tortoises. An additional 20 - 25 per cent of the land area is classified as being sensitive and may become protected areas in the near future. The Seychelles also has more than 1,000 species of endemic flora and fauna found nowhere else in the world (Government of Seychelles 2004). The Aldabra Atoll (which has the world's largest population of a species of giant land tortoise, about 100,000 individuals), and the Vallée de Mai Nature Reserve (with endemic Coco-de-Mer palms bearing the world's largest nut) were added to UNESCO's World Heritage Sites list in 1982 and 1983 respectively (Government of Seychelles 2000).

3. Human Environment

Most economic activities in the Seychelles, including tourism, take place in the coastal plains, and an estimated 90 per cent of the population live on the narrow coastal strip (Mangroves for the Future Secretariat no date).

A difficult mountainous terrain and low soil fertility put severe constraints on agriculture, including subsistence agriculture, although the traditional export-based copra and cinnamon industries are slowly showing signs of revival. In an effort to increase food security, the Government has taken steps to make the sector more productive and to provide incentives to farmers (Government of Seychelles 2000).

4. Policy and Governance

In terms of policy and legislation, there is no single piece of legislation covering all aspects of coastal zone management in the Seychelles. Integrated Coastal Zone Management (ICZM) issues are administered by several institutions under various sectoral laws, many of which are outdated (Government of Seychelles 2000). There is neither a specific integrated coastal management institution nor a specific co-ordination committee in the Seychelles. The mandate for coastal management is spread over several organizations and institutions. The Planning Authority gives the final approval for all developments in the country. The Department of Environment and the Ministry of National Development are the primary authorities dealing with coastal management. The Department of Environment contains an Environmental Engineering Section that houses the Coastal Zone Unit. The Unit is responsible for promoting and implementing ICZM and for dealing with all coastal management related issues in the country. Since the whole country is considered a coastal zone, more than a dozen laws and regulations, administered by different Ministries, directly or indirectly provide the legal framework for coastal management (Government of Seychelles 2000).

Even with so many laws and regulations, gaps in the regulatory framework for ICZM still exist and several of the laws are more than 10 years old. The Environment Protection Act of 1994 (EPA) and the Town and Country Planning Act of 1972 are the two most important laws that provide a legal basis for coastal management in the Seychelles. These two laws are administered and enforced by the Department of Environment and the Planning Authority respectively (Mangroves for the Future Secretariat no date).

Table 2 outlines what is thought to be required for a more comprehensive and integrated approach to coastal management and to governance in the coastal context in the Seychelles.

Table 2: The Needs for a More Comprehensive and Integrated Approach to Coastal Management

NEEDS for an integrated approach	MEANS to achieve this
There has been progress in achieving greater public participation in coastal management, which needs to be capitalized on and enhanced	Public participation in all aspects of coastal management should be mandated in comprehensive ICM legislation. ICM legislation should mandate budgetary allocations to enable the institutions responsible for ICM to <ul style="list-style-type: none"> ● Build their capacity to facilitate participatory processes ● Implement the processes.
Monitoring of ICM and public reporting on the results is not yet institutionalized in Seychelles.	Monitoring and making its results publicly available should be mandated in comprehensive ICM legislation. ICM legislation should mandate budgetary allocations to enable the institutions responsible for ICM to <ul style="list-style-type: none"> ● Build their own capacity to monitor and ● Facilitate the participation of civil society and the private sector in monitoring.
Access to reliable data on coastal resources and processes is indispensable for sound ICM decision-making	Information management mechanisms should be introduced to enable institutions to share information with each other and with the general public.

Source: Government of Seychelles 2000

There are no indicators for monitoring ICZM and/or determining the effectiveness of coastal management in the Seychelles. Monitoring is usually done based on the availability of capacity such as human resources and funds available instead of need. The Environmental Engineering Section of the Department of Environment conducts the National Beach Monitoring Programme that is aimed at establishing a long term monitoring system and a database so that effective shoreline and beach management is delivered. NGOs undertake monitoring of specific species and the activities of individual projects.

The EPA allows public participation in the environmental impact assessment (EIA) process, but there is no statutory provision mandating public participation in coastal management in general. Existing policies and rules for different sectors mention the need for public participation during the formulation of sectoral plans. National taskforce committees or national coordinating bodies, whose members are stakeholders with particular interests or direct involvement, have been set up for particular projects. Public participation in coastal management has historically been very low. Participation in consultation processes has increased as people have become more concerned about the state of the coastal environment and as district administrations and individual projects have encouraged it (Government of Seychelles 2000). Private sector participation in issues related to coastal management has also increased over the years. Several large-scale projects now have the private sector more involved in environmental protection. Some of the businesses have made donations to implement environmental projects, while others have formed partnerships to collaborate in environmental awareness-raising.

5. Planning and Management

Despite the noted policy and governance complexity, the Seychelles has a long and distinguished history of conservation and management of its natural resources. With two World Heritage Sites, fifteen marine protected areas (of different legal categories) with an area exceeding 46 km², and at least 45 per cent of the land area protected, Seychelles plans to designate for protection, and is committed to manage more land and marine areas, through the formulation of a second Environment Management Plan of the Seychelles (EMPS) 2000-2010.

Despite the small size of the Seychelles economy and the vulnerabilities of small island economies, the Government has been consistent in providing a substantial annual budget (about US\$ 5 million) to direct environmental activities which are also funded through private sector participation, loans and its own budgetary contributions, capital and recurrent costs for solid waste management, sewerage and waste water treatment, as well as marine resources management. This took place within the framework of the first EMPS 1990-2000. Since then the Government has matched donor funding for EMPS projects through budgetary and other financing.

An Environment Trust Fund (ETF) was established and as a direct outcome of the country's first EMPS, Seychelles now has a Ministry of Environment, a Marine Parks Authority, and various national institutions involved in the management of solid waste, sewerage and natural resources. Seychelles has numerous legislations pertaining to biodiversity conservation, and to addressing pollution control, coastal zone management, environmental impact assessments, plant protection, ozone regulations, air emissions and pesticide import and utilization. Climate change adaptation strategies for the long term sustainability of the unique natural habitats in the Seychelles will require the strengthening of technical and institutional capacity in monitoring and research, as well as the development and implementation of better and more appropriate policies for ICZM (Government of Seychelles 2000).

Seychelles is currently implementing its Second Environment Management Plan (EMPS 2000-2010). In the formulation of the EMPS 2000-2010, capacity building was regarded as one of the most important elements for the successful implementation of the Plan. The main areas for capacity building, which includes both human resources development and institutional strengthening, as highlighted in the Plan (Government of Seychelles 2000), are:

- Education and training;
- Science, research and technology;
- Policy development, implementation and management;
- Monitoring and assessment;
- Government, community and private sector partnerships;
- Awareness by decision-makers, private sector and the public;
- Public consultation and participation;
- Vulnerability and global climate change.

6. Development, Trade and Projects

Mangroves for the Future (MFF) Initiative; Investing in coastal ecosystems

Duration: 3 years (Extension of project funds into 2011 from donors)

Executing agency: IUCN

Budget: MFF SGF; USD\$100,000 allocated to four small NGO projects, An additional USD\$50,000 (outstanding) targeting CBOs' projects or other NGOs, USD\$300,000 for Full Sized project(s) to be developed.

Benefits to the Seychelles: MFF can largely be beneficial to the Seychelles in terms of facilitating funds to assist the country in investing in and better managing the coastal ecosystems and allowing a network of partnerships to grow. These partnerships, especially those of public and private sectors and other agencies, increase investments in coastal ecosystems, conservation and sustainable development. MFF compliments other existing coastal and marine projects in the Seychelles and in the future will seek to synergize the efforts ensuring coordination in coastal and marine project implementation (Mangroves for the Future no date).

Table 3: The Objectives and Outcomes of the Mangroves for the Future Initiative

Description	Project Objectives	Expected Outcomes
<p>MFF is a unique partnership-led initiative initiated by IUCN and UNDP and involving other UN agencies.</p> <p>MFF is founded on a vision for healthier coasts, ecosystems and communities in the region and operates in partnership with national governments, UN agencies, NGOs, community organizations and the private sector through a set of 15 Programs of Work specifically designed to address long term sustainable management.</p>	<p>Overall Objective</p> <ul style="list-style-type: none"> • To conserve and restore coastal ecosystems as key assets which supports human well-being and security in the Indian Ocean Region <p>Specific Objectives</p> <ul style="list-style-type: none"> • To strengthen the environmental sustainability of coastal development • To promote the investment of funds and effort in coastal ecosystem management • Integrate cross-cutting issues into its programmes; climate change, capacity development, communications, gender, private sector. 	<p>The MFF’s 15 Program of Work guide project activities; these are generally classified under the following three main key areas which are;</p> <p>(1) Building Knowledge</p> <p>(2) Strengthening Empowerment and</p> <p>(3) Enhancing Governance.</p> <p>They are implemented through /or in partnership with national governments, UN agencies, NGOs, CBOs, private sectors and other institutional partners... overseen by a regional steering committee (RSC) and national coordinating body, ensuring accountability, transparency and good governance, and offering learning opportunities among diverse countries, sectors and agencies.</p>

Source: Mangroves for the Future no date

7. SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • Very rich biodiversity and marine resource base, including World Heritage Sites, means awareness already exists of importance of marine and resource conservation for local dependence. • Strong tourist sector supports the economy, based around the natural resource base. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Policies and legislation starting to come into place and improved coordination under the EMPS. • Projects and tourist interest in sustainable development can help support improved environment and natural resource management by communities, including capacity development.
<p>Opportunities</p> <ul style="list-style-type: none"> • Policies and legislation starting to come into place and improved coordination under the EMPS. • Projects and tourist interest in sustainable development can help support improved environment and natural resource management by communities, including capacity development. 	<p>Threats</p> <ul style="list-style-type: none"> • Vulnerability of coral reefs to climate change threatens the main driver of tourism development and thus overall long term economic growth, including from unexpected phenomenon such as El Nino incidents. • Overall vulnerability to climate change means that Seychelles strongly affected by what happens in other countries, yet it is a small country (in terms of people and economy) so has little voice in international debates on mitigating climate change.

8. Bibliography

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Government of Seychelles (2004) *Seychelles - National Assessment of the Barbados Programme of Action+10 Review*.

IFAD (2010) *Seychelles: Employment Generation Project*.

Mangroves for the Future Secretariat (no date) *Policy Brief on Governance and Integrated Coastal Management - Seychelles*.

List of Datasets

None found.

List of Sector-Related Projects

Mangroves for the Future (MFF)

This has a country programme in the Seychelles, including the initiative described in Section 6 above.

<http://www.mangrovesforthefuture.org/Countries/Seychelles.html>

http://un.intnet.mu/Undp/downloads/seychelles/Mangroves_for_the_Future_Initiative-Project_summary.pdf

Marine Conservation Society

This also has a programme in the Seychelles.

<http://www.mcass.sc/>

Annex 1 – All References and Web-Links Identified and Reviewed in Report Preparation

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1. Introduction

The Republic of Seychelles is an archipelago country of 115 islands in the Indian Ocean. The group of islands is located northeast of Madagascar and 1500 km east of Kenya. The country has a total land area of 455 km² and a coastline of 491 km.

The Seychelles was originally colonized by the French and became a British colony following the Napoleonic War in 1814. The country gained its independence in 1974, becoming a one party socialist state in 1977 and returning to democracy in 1991. The constitution of 1993 provides for a unicameral legislature and a president, who is both the head of government and head of state. Creole is the lingua franca, while both English and French are official languages. The legal system of the Seychelles is based on English common law, French civil law and customary law.

With 87,000 inhabitants, it is considered a wealthy African nation, with a GDP of more than 9,500US\$ per capita.



Figure 1: Map of Seychelles

Considering the following points, Seychelles is unique in the African context:

- A medium GDP per capita and a low poverty rate
- 50th of 177 countries in HDI, ranking the country highly in terms of human development

- A strong awareness on environmental matters, supported by strong government commitment
- An economy which relies on environmental assets, including tourism and fisheries

1.1 Oil and Gas Sector overview

Though Tourism and Fisheries are the main activities in Seychelles, the Government:

- Highlights the importance of fuel and LPG in its economy (More than 25% of total imports and growing faster than population)
- Is fully aware of the risks related to upstream and downstream oil activities
- Has demonstrated a strong willingness to encourage oil exploitation.

Oil and gas activities are split in two sub-sectors:

Upstream activities: Seychelles has just started a new data gathering series, with 2D techniques, jointly conducted by Fugro Data Service AG (Switzerland) and Geomahakarsa Ltd (Hong Kong) (see map Annex 1). The results are due mid-2011. Seypec has contracts with those corporations.

Downstream activities: Seypec is in charge of the downstream activities, including refined fuel and LPG importation and distribution. The downstream oil industry is an important element of the economy, accounting for over 25% of imports.

Seychelles Petroleum Company Ltd (Seypec)

Seypec is a parastatal commercial organization which ensures the security of supply of Seychelles' energy needs. Seypec engages directly and indirectly in all petroleum related activities that would add value to its business. It carries out a number of petroleum related activities, both locally and internationally, in the upstream, downstream and shipping sectors.

1. Exploration Department Maintains an extensive and well-documented database of seismic data. It has vertically integrated its operations by successfully investing in and merging with the ex-Seychelles National Oil Company (SNOC). This has allowed double the number of oil, petroleum and chemical tankers to operate, thus, securing its logistics of supply. Moreover, oil and gas is one of the sectors promoted by the Seychelles Investment Board (SIB).

2. Shipping Division This division ensures the commercial management of the company's double hull petroleum and chemical tankers. Downstream, Seypec engages in its primary core activities, which are the procurement, storage, supply, marketing and distribution of refined petroleum products to the domestic and international market. International activities include marine bunkering, aviation refueling, bulk storage and transshipment and transportation of petroleum products by tankers. Domestic activities include the procurement, supply, marketing and distribution of refined products, which are mainly motor-gasoline (leaded and unleaded), gasoil (diesel), fuel oil, jet A-1, avgas, lubricants and liquid petroleum gas (LPG).

No access to the Seypec website was possible and no data could be found, thus, it is difficult to assess employment in the corporation.

1.2 Biofuels sub sector

No record was found on the agribusiness subsector and biofuels are not quoted among SIB's business opportunities.

1.3 Trends and prospects

According to the Environmental Management Plan for Seychelles (EMPS), if profitable oil and gas sites are found, the country will develop exploitation activities in the near future. Given that the Seychelles government is aware of the sensitivity of both the tourism sector and its population to oil spills, maximum safety has been guaranteed for future activities.

As quoted in the Strategy 2017 on Offshore Petroleum activity, "Government remains fully committed to developing and optimising the potential of Seypec's offshore businesses including storage, bunkering and regional oil distribution, international tanker fleet operations and oil exploration..."

2. Biophysical

Seychelles biophysical characteristics are also unique:

- Archipelago of 115 islands, 74 of which are coral islands
- A high endemic ratio, both marine and terrestrial and both fauna and flora, which is preserved owing to the high ratio of protected areas (42% of its area)
- Less sensitive to cyclones than other countries in the region, though cyclones in the region can create winds on the archipelago
- A high sensitivity to Climate Change, especially in relevance to rising sea levels

External risks are related to the fact that the country is on the maritime route linking Africa to Asia, exposing it to high-risk, transboundary events.

Given that the tankers Seypec uses for fuel and gas distribution are constructed with a double hull for safety, the risk of oil spills is relatively low. Though the Seychelles government is concerned about such spills, little information could be found on the side effects of offshore exploration on marine ecosystems.

Table 1: National data on energy consumption and impacts of climate change

Energy use (kt of oil equivalent)	Combustible renewables and waste (% of total energy)	Fossil fuel energy consumption (% of total)	CO2 emissions (kt)	CO2 emissions (metric tons per capita)
			743.79	8.79

Source: World Bank, year 2006

Table 2: Environmental and social issues of oil, gas and biofuel activities in the coastal zone

Coastal Oil & Gas Activity	Environmental issues	Social issues
Offshore exploration	<ul style="list-style-type: none"> Oil spills, accidents 	<ul style="list-style-type: none"> Restrictions for fishing zones Opportunities for employment
Oil & Gas transport	<ul style="list-style-type: none"> Oil spills, accidents Water and soil contamination Invasive species in ballast waters 	<ul style="list-style-type: none"> Risks of accidents (fire, collision, etc) Improvements in transportation network
Gas station and retail	<ul style="list-style-type: none"> Oil spills, accidents Water and soil contamination 	<ul style="list-style-type: none"> Opportunities for employment Opportunities for new services Fuel availability
Biofuels development	<ul style="list-style-type: none"> Swamp drainage Monoculture and biodiversity loss Pollution 	<ul style="list-style-type: none"> Opportunities for employment Opportunities for new services Competition for arable land

Box: Transboundary environmental impacts

There are very few transboundary risks in the Seychelles due to the islands' relative isolation. However, the islands lie on a major international oil transportation route and, therefore, are at risk from a major oil spill. The last incident occurred in 1972, when a Royal Navy vessel ran aground near Aldabra, discharging 40,000 t of oil.

Other risks include:

- Importation of alien vegetation (the cinnamon plant, *Taraserianthes salcataria*, and *Albizia* are currently outcompeting local species)
- Introduction of foreign plant pests and diseases, such as the fungus, attacking the indigenous takamaka tree (*Calophyllum inophyllum*)
- Introduction of alien animals (rats are causing significant problems on many of the islands), and
- Illegal export of plant and animal products (e.g. turtle shells).

The conservation of migratory seabirds in the Seychelles is dependent on the preservation of their habitats along their migration routes.

Source: EIA Country Report (6)

3. Human Environment

Tourism and fisheries contribute 25% and 8% respectively to GDP, making them the greatest sources of employment in the country.

Table 3: Jobs in coastal activities

	Direct jobs	Indirect jobs	Households	%GDP 2009
Tourism	7,260			25
Fisheries	4,600	1,000	2,200	8.4
Total Labour force	39,560			

Source: strategy 2017 National Bureau of Statistics, figures for 2005

According to the CIA fact book, the Seychellois labour force was estimated at 39,560 workers in 2006. Though the figures are not from the same year, it can be assumed that more than 25% of the labour force relies on coastal zone activities (tourism and fisheries). The unemployment rate is between 2% and 5%, depending on the source.

Human resource shortages are an issue in the Seychelles, especially for graduated workers. High-school level education is limited, which often forces students to migrate to other countries, few of whom come back.

According to the Strategy 2017, the Government is aware of the country's limited population and human resources shortage.

New employment policies will be introduced:

- to foster an active, empowered and multi-skilled flexible workforce, able to meet the needs of existing and emerging industries
- to develop both skills and attitudes
- to improve human capacity through partnerships with the private sector, improved and defined career development structures, increased Seychellois equity holdings and performance related incentives schemes
- to appeal to expatriate workers to augment and supplement, not replace, the local workforce in a manner agreed upon by the government and private sector through consultation
- to protect the underprivileged and uphold a minimum and dignified living standard. Compatible employer and employee minimum wages and hourly wage rates will be introduced

3.1 Socio-economical indicators

With a GDP around 9,573US\$ per capita, Seychelles is a wealthy African nation, with only 2% of the population under the poverty line (1.25\$/day in PPP). Nevertheless GDP per capita growth is only 0.53%.

Table 4: National economic indicators

GDP (million current US\$)	GDP growth (annual %)	GDP per capita (current US\$)	GDP per capita growth (annual %)	GINI Index (2007)
833.01	2.81 (7.26 in 2007)	9,579.74	0.53 (6.71 in 2007)	(not available)

Source: World Bank, year 2008, and HDI

Table 5: National social indicators

Population, total (million)	Population growth (annual %)	Poverty headcount ratio at \$1.25 a day (PPP) (% of population)	Human poverty index (HPI-1)	Human development index
0.087	2.23	2 (2007)	(not available)	0.845

Source: World Bank, year 2008, and HDI, year 2005

Table 6: National gender indicators

Life expectancy at birth, female (years)	Life expectancy at birth, male (years)	Literacy rate, adult female (% of females ages 15 and above)	Literacy rate, adult male (% of males ages 15 and above)	Gender-related development index (GDI)
77	69.1	92.25	91.41	(not available)

Source: World Bank, year 2002, and HDI, year 2005

The main issue for the country now and in the future is the number of visitors. According to the National Bureau of Statistics, the year to date figure for 2010 shows that 151 710 visitors arrived in the country, which is an 11% increase from the 2009 figure, which was 136 830. The number

of visitors will likely reach twice the number of inhabitants' in 2011. According to Strategy 2017, future development in the sector will attempt to fill the ecotourism niche. More than ever, the pressure on marine ecosystems will be of concern.

3.2 Details of corporate and social responsibility programmes of the oil and gas companies

No information could be found on specific actions concerning corporate and social responsibility

4. Policy and Governance

4.1 Policy and Legislation

Strategies / Regulations	Description - Comments
Strategy 2017	Seychelles global strategy
Environmental regulations	Environment Protection Act of 1994 effective from 1 st March 1995
Environmental Management Plan for the Seychelles EMPS	Includes a comprehensive Oil Resources Management in EIA Guidelines
EIA	Environment Protection (Impact Assessment) Regulations, SI No. 39 of 1996

Laws and Acts pertaining to oil activities and environment

Act or Policy	Key elements and regulations	Implementing authority
Dumping at Sea Act of 1974	Control of waste disposal from ships	Port and Marine Services,
(Overseas Territories) Order of 1975 (Chapter 67)		Ministry of Environment
Environment Protection Act, No. 9 of 1994 (Chapter 71)	• Environment Protection (Designation of Solid Waste Agency) Regulations, SI No. 48 of 1995	Division of Environment, Ministry of Environment
	• Environment Protection (Standards) Regulations, SI No. 83 of 1995	
	• Environment Protection (Miscellaneous) Regulations, SI No. 84 of 1995	
	• Environment Protection (Impact Assessment) Regulations, SI No. 39 of 1996	
	• Environment Protection (Marine Parks Authority) Order, SI No. 54 of 1996	
	• Environment Protection (Fixed Penalty) Order, SI No. 51 of 1999	
Fisheries Act of 1987 (Chapter 82)	• Fisheries Regulations, SI No. 35 of 1987	Ministry of Agriculture and Marine Resources
Fisheries (Amendment) Act, No. 3 of 1997		
Fisheries (Amendment) Act, No. 2 of 2001		
Maritime Zones Act, No. 2 of 1999		Port and Marine Services
		Ministry of Environment
Merchant Shipping (Oil Pollution) (Seychelles) Order of 1975 (Chapter 128)	• The Oil Pollution (Compulsory Insurance) Regulations, SI No. 8 of 1976	Port and Marine Services, Ministry of Environment
National Parks and Nature Conservancy Act of 1969 (Chapter 141)	• Management of protected areas	Division of Environment, Ministry of Environment
Protected Areas Act of 1967 (Chapter 185)		Division of Environment, Ministry of Environment
Wild Animals and Birds Protection Act of 1961 (Chapter 247)		Division of Environment, Ministry of Environment

4.2 Governance

Institution	Type	Activities and responsibilities
Ministry of Environment (MoE)	Government	
National Human Resources Development Council (NHRDC)	Government	<ul style="list-style-type: none"> • HR data collection • Sectoral needs assessments • Training
Seychelles Investment Bureau	Parastatal	<ul style="list-style-type: none"> • Match-Making • Petroleum activities promotion
Seychelles Petroleum Company (Seypec)	Parastatal	<ul style="list-style-type: none"> • Upstream and downstream Oil activities
National Interministerial Committee	High-level government interministerial body	<ul style="list-style-type: none"> • Policy, and socio-economic and macroeconomic decisions
Port and Marine Services Division, Ministry of Environment	Government	<ul style="list-style-type: none"> • Control of ship-borne waste pollution • Control of oil spills • Control of marine pollution
Seychelles Bureau of Standards	Parastatal	<ul style="list-style-type: none"> • Laboratory analysis • Information provision • Standards development and implementation
Seychelles Coast Guard Division, Ministry of Defence	Government	<ul style="list-style-type: none"> • Patrolling of territorial waters • Control of maritime pollution
Seychelles Fishing Authority	Parastatal	<ul style="list-style-type: none"> • Management of fisheries and aquaculture
Seychelles Island Foundation	Internationally sponsored quasi-non-governmental organisation	<ul style="list-style-type: none"> • Management of World Heritage Sites: Aldabra, Val Mer National Park
Solid Waste and Cleaning Agency	Parastatal	<ul style="list-style-type: none"> • Solid waste management • Littering abatement • Cleaning
Tourism Division, Ministry of Tourism and Planning Authority	Government	<ul style="list-style-type: none"> • Tourism planning
Risk Disaster Management, President's Office	Government	<ul style="list-style-type: none"> • rescue operations coordination • Monitoring ongoing and emerging disasters
Coastal Zone Management unit		<ul style="list-style-type: none"> • Coordination of coastal management activities • ICZM implementation

In theory, public participation is required in the EIA process.

Public participation:

The only mention of public involvement in the EIA Regulations is the two-week public review period for the final EIA report (Class 1 EIAs only). There is no mention of public participation in the EIA guideline documents prepared by the MoE, however, the standard terms of reference prepared by the EAPC Department states the following:

In preparing the EIA, the applicant/consultant should consult affected and interest groups. The EIA should detail any public comment sought from and any consultation conducted with any affected groups (e.g. community, environmental, industry) in developing the proposal and preparing the EIA. Early consultation is beneficial in helping to ensure that a development will cause a minimum of undesirable effects and in reducing delays in the latter stages of planning and design. In relation to this EIA, the following referral agencies should be contacted during the preparation of the EIA

Listings provided in the majority of EIA terms of reference are comprised of government agencies and parastatals, such as the PUC. Reference to civil society and NGOs was found in only one terms of reference document. Consequently, the majority of EIAs do not contain any true public participation.

With regard to public review of the final EIA report, the following deficiencies have been identified:

- The two-week period is too short.
- People do not understand the process and, therefore, are not motivated to become involved.
- People often do not notice the advertisements in the newspapers notifying them of the final EIA report's availability.
- The final EIA report is only available at the Botanical Gardens in Victoria between 08:00 and 15:00, Monday to Friday, however, if the project concerns another island, it will be available there as well.
- The EIA final report is finalised prior to any public involvement.
- There is no feedback to the public on the impact of their comments. They assume, therefore, that their comments did not have an influence on the final decision.
- Because people are not empowered to comment on technical reports, they feel intimidated to do so.
- People are afraid to speak out against the government, whom they consider as the ultimate authority (the projects are perceived to be a government *fait accompli*).
- NGOs lack capacity to become involved. NGO effectiveness is further reduced by the *locus standi* provisions in the EPA, which are weak.
- There also appears to be no feedback to the agencies consulted. They are not asked to comment on the draft document and, therefore, are unable to judge whether their concerns have been incorporated into project planning.

Source: EIA Seychelles Country Report (6)

5. Planning and Management

Investment facilitator

The Seychelles Investment Bureau (SIB) is a one-stop centre for all matters relating to business and investment in Seychelles. The SIB has the mission to promote investment and facilitate the investment process in a way that corresponds to the administrative, policy and legal framework of Seychelles.

Integrated Coastal zone Management (ICZM)

A National Coastal Environmental Policy exists as part of the Environmental Management Plan of Seychelles (EMPS, currently 2001-10-period). First drafts of all chapters of the new EMPS of Seychelles (2011-20) have been prepared. ICZM capacity development has also been finished (Policy Development, Planning Processes, Monitoring and Reporting).

An Environment Trust Fund (ETF) was established and as a direct outcome of the country's first EMPS, Seychelles now has a Ministry of Environment, a Marine Parks Authority, and various national institutions involved in the management of solid waste, sewerage and natural resources. The country has numerous policies pertaining to biodiversity conservation, and to addressing pollution control, coastal zone management, environmental impact assessments, plant protection, ozone regulations, air emissions and pesticide import and utilization. Climate change adaptation strategies for the long term sustainability of the unique natural habitats in the country will require a strengthening of the technical and institutional capacity in monitoring and research, as well as the development and implementation of better and more appropriate policies for ICZM (Government of Seychelles 2000).

Seychelles is currently implementing its second Environment Management Plan (EMPS 2000-2010). In the formulation of the EMPS 2000-2010, capacity building was regarded as one of the most important elements for the successful implementation of the plan. As highlighted in the plan (Government of Seychelles 2000), the main areas for capacity building, which includes both human resources development and institutional strengthening, are:

- Education and training;
- Science, research and technology;
- Policy development, implementation and management;
- Monitoring and assessment;
- Government, community and private sector partnerships;
- Awareness by decision-makers, private sector and the public;
- Public consultation and participation;
- Vulnerability and global climate change.

Policy Planning Initiative	Objective
<i>Strategy 2017</i>	Doubling GDP by 2017
Integrated Fisheries Development Project	Promotes fisheries strengths and tackles its weaknesses
Environmental Management Plan of Seychelles (2000– 2010)	Defines the environment protection and management plan of Seychelles from 2000 to 2010.
Seychelles Economic Governance Reforms Program	Sets out the economic reforms program of the country for 5 years.

EIAs are compulsory prior to investment in Seychelles. There are 2 categories of EIAs:

- Class 1 EIA: close to globally EIA conducted.
- Class 2 EIA: EIA for projects with no identified environment issues.

Oil activities are subject to the Class 1 EIA. Guidelines for oil activities have been drafted. Again, there is little reference to the side effects of offshore exploration on marine ecosystems and their impacts.

EIA Process:

Once a Class 1 EIA has been completed, it needs to be submitted to the MoE for approval. The EIA will be reviewed, whereupon, further information may be requested from the proponent. The MoE may also request that the EIA be reviewed by any person, organisation or agency in the public or private sector. Furthermore, the EIA is obliged to be open to public inspection prior to MoE approval. People may submit comments, however, no provision exists for such comments to be included in the final EIA report. Nevertheless, the Environmental Appraisal Committee – comprising at least five technical experts in the relevant development sector and representatives of the ministries or departments concerned – are obliged to consider any such comments in their decision making process. The MoE will approve the EIA, usually with conditions, or refuse environmental authorisation. The proponent is entitled to appeal the decision.

The Environmental Protection (Impact Assessment) regulations are currently being enforced, despite the prevalence of capacity issues within the regulatory authority (the MoE).

To date, the legal system has not been used to defend environmental principles relating to EIA in the Seychelles, although prosecutions have been instituted for poaching, effluent discharge, littering, etc. The process takes 4-6 months.

Source: EIA Country Report (6)

EIA Practice:

The legally defined EIA process has already been described above. However, in reality, the process is more complex. Class 2 EIAs are extremely brief and are not necessarily undertaken by personnel with specialist knowledge on the ecology of an area, however, they are a useful check on the sensitivity of a potential site. Class 1 EIAs are generally very comprehensive and are reviewed by several institutional bodies.

No formal records exist with regards to the number and types of EIAs that have been submitted to the EAPC Department for approval over the past ten years. It is, however, well known that the majority of EIAs submitted since the promulgation of the EIA regulations have been tourist developments.

The quality of EIAs submitted to the MoE is highly variable and there appears to be no trend towards an improvement in quality over time. The MoE produces detailed terms of reference for each project and requires that a scoping assessment is undertaken first. The MoE also specifies the potentially affected parties to be contacted. However, these terms of reference appear to be ignored in many of the EIAs and are even dismissed in some reports as being ‘too detailed’ for the project concerned.

A senior government official had undertaken several of the reports examined for this study. These reports illustrated an understanding of the issues involved and seemed to present a fair assessment of the situation. Some of the other locally produced reports lacked any understanding of either the

purpose of the EIA or the required process. Moreover, several reports produced by international consultants usually reflected issues prominent in their country of origin. Alternatives with respect to locations and technologies for proposals are, in general, not adequately assessed in the EIAs, despite the terms of reference that require these alternatives to be assessed.

Baseline data

The level of baseline data collected for EIAs was extremely variable, with some studies making comments such as 'Forestry services will undertake a detailed vegetation survey prior to commencement of construction' (Ove Arup 2000). Certain studies focus on offshore conditions (bathymetry) whilst ignoring vegetation almost completely – even if it could potentially be an environmental issue. It would appear that very little biophysical data is readily available in report form in the Seychelles. For this reason, consultants are obliged to collect all the data for the purposes of an EIA study, which is possibly prohibitive in terms of costs for some proponents. In other cases, the lack of understanding of the issues concerned means that important parameters cannot be defined. Hydrology, flood lines and, particularly, storm-water control are rarely dealt with in detail in the EIA reports, however, no evidence around the islands would suggest that these issues should be considered due to the nature of the rainfall (constituting heavy falls of short duration) and the topography of the area. Soil erosion, exacerbated by the extremely steep terrain of many development areas, is a significant problem in the Seychelles. Nevertheless, soil types, soil productivity and soil erodibility factors are rarely considered in EIA reports. Moreover, specific methodologies to manage erosion problems do not seem to have been given enough consideration for specific projects. Socio-economic, historical and cultural data are also generally scarce in the reports and very little attention is given to potential impacts in these fields.

Public participation

The MoE defines the necessary scoping process for each EIA. Although government departments are generally extensively scoped, the involvement of civil society is rarely a requirement, except when the EIA is presented for public comment. Furthermore, there is no call for educating the public within an EIA project to enable them to meaningfully contribute to the project.

Impact assessment

Very few of the reports reviewed described a process by means of which potential environmental impacts were assessed. No mention is made of the extent, duration, severity, or receptor sensitivity for particular impacts. As a result, the quantification of significance of the impacts is rarely undertaken. Most of the reports did not contain a summary table of impacts or receptors and they did not consider the different phases of development (planning, construction, operation and closure).

Environmental management plans

Most of the reports reviewed provided for the mitigation of identified impacts. However, very few provided a detailed description of proposed project activities, their potential impact, and specific avoidance or management of impacts. Moreover, environmental management plans tend to be generic at best. This complicates the design of a monitoring plan because there is no basis upon which to audit a site. In fact, monitoring plans, programmes and checklists were found in very few of the documents reviewed.

Source: EIA Country report (6)

6. Development, Trade and Projects

Development project	NGO / Donor / Private Sector	Project details
Western Indian Ocean Marine Highway Development and Coastal and Marine Contamination Prevention Project	GEF	Concerned countries: South Africa, Mozambique, Tanzania, Comoros, Madagascar, Mauritius, Seychelles and the Reunion Island. All countries are required to have a NOSRCP to provide a national framework for responding to oil spills and protecting coastal resources
The Small Islands Voice	UNESCO	The Small Islands Voice officially launched in Seychelles in March 2002. The project focuses on small island developing states and islands with other affiliations in the Caribbean, Indian Ocean and Pacific regions. This initiative aims to utilise existing and new communication technologies to promote the effective participation of civil society in sustainable island development and in the review and follow-up of the Small Islands Developing States (SIDS) Programme of Action in 2004.
Regional Coastal Management (ReCoMap)	European Union	ReCoMap is a regional programme for the sustainable management of the coastal zones of the countries of the Indian Ocean. It is an initiative of the Indian Ocean Commission which deals with seven countries of the region, namely Mauritius, the Seychelles, Madagascar, the Comoros Islands, Kenya, Tanzania and Somalia. The programme started in August 2006 and will end in 2011. The Programme aims to improve valorisation and sustainable management of coastal resources of the seven countries of the region.

7. SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • Strong Government willing to develop upstream oil and gas activities • Transparent and clear GOS mandates and responsibilities • Wealthy African nation • Strong coastal management program • Special regulation for Oil&Gas activities • Strong willingness to protect environment • Rich biodiversity • Economy dependant on tourism • Willingness to strengthen the workforce 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Seychelles consists of many separated islands. • Human Resource shortage • Weak capacity in EIA • GDP growth/capita<1% • Public participation is weak
<p>Opportunities</p> <ul style="list-style-type: none"> • Existence of Investment facilitator • ICZM implemented • Policies and legislation starting to come into place and improved coordination under the EMPS • Future ecotourism development 	<p>Threats</p> <ul style="list-style-type: none"> • Oil exploration side effects on marine ecosystem

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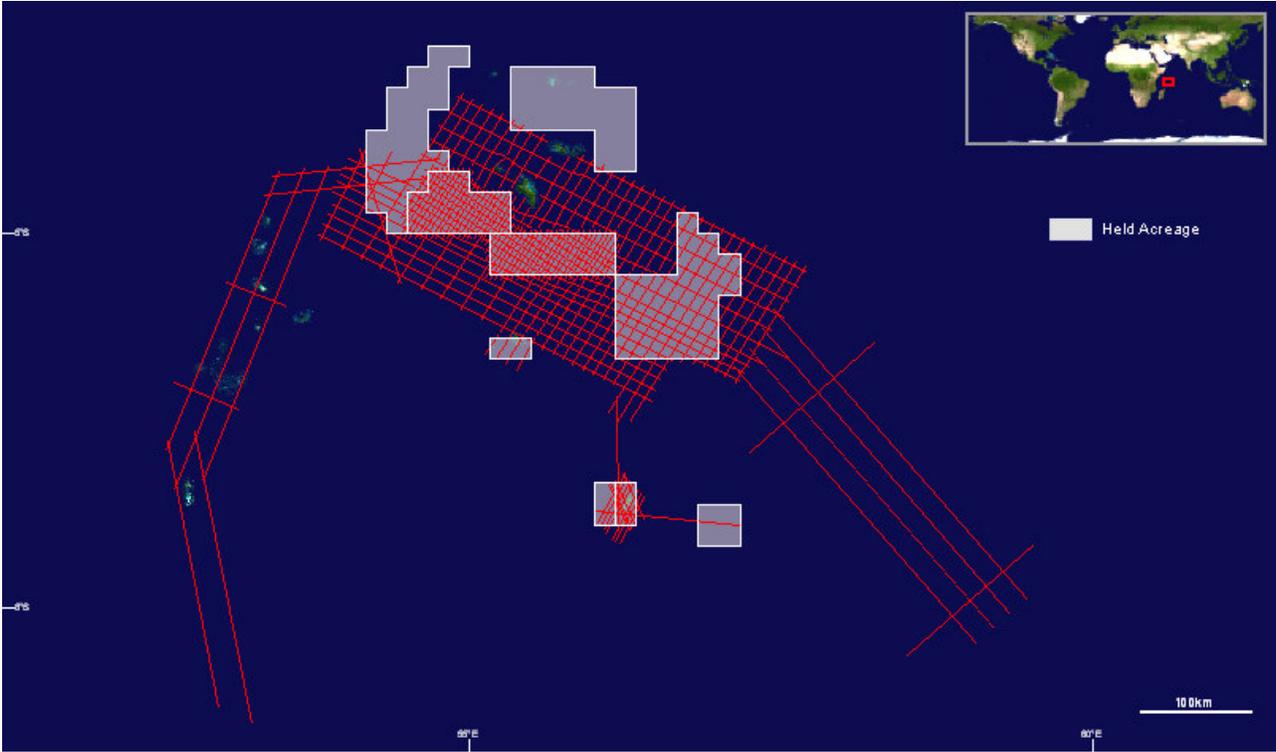
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Map of prospection blocks (Source: Furgo)
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VI. Ports and Coastal Transport - Prepared by Professor Gavin Maasdorp, E-mail: gmaasdorp@imanidevelopment.com

1. Introduction

Seychelles has a population of only about 82,000, and thus the role of the only port (Port Victoria) is by definition limited in terms of throughput, but for an island population absolutely essential and central to most economic activity. The facilities of the port provide for the needs of the local economy and also serve the very important fishing sector. The fundamental requirement for the port of an island nation is to meet the strategic supply needs of the population and this is the major consideration in future port development. There is, however, some potential to increase the volumes of cruise ship operations and to expand the role of container handling, as well as expanding facilities for the large tuna fishing industry that is a major economic sector.

2. Extent of port activities and transport

Port Victoria is the major gateway for all commerce of the country apart from some high-value commodities that are air freighted. The port offers a diverse handling capability including conventional and containerised cargoes, and also handles dry- and liquid-bulk imports. Port Victoria is the terminal for cruise vessels calling in the Seychelles, with this sector having the potential for further development and expansion.

The port is the centre of the vital fishing industry that generates the demand for processing and transshipment facilities. The fishing industry also creates demand for fuel, vessel supplies, chandlery, and associated commodities. The fisheries sector is the main foreign-exchange earner (SFA, 2006) – this includes processing of fish into exportable products as well as associated goods and services. Catches from domestic and artisanal fishing and the semi-industrial sector are very small compared to the larger industrial purse seine fishery. The canned tuna is processed at the *Indian Ocean Tuna* canning factory in the port. Of the total reported “domestic” fish production in 2006, some 40,222 tons were canned from a total of 45,222 tons of tuna, i.e., only 5,000 tons were derived from sources other than purse seine fishery. The output of the industrial deepsea, long-line tuna sector mostly conducted by Japan, Taiwan, China and Korea is uncertain. The IOTC reports that there are uncertainties around the accuracy of data reporting, and that catches are most likely underestimated.

In addition to these major roles, the port also handles a range of leisure and other cargo vessels. In order to handle the increasing volumes, there are plans to modify port operations and to diversify to meet shipping requirements.

It is recognised that the potential for growth of Port Victoria will primarily depend on access to port facilities and the full range of goods and services offered by the port. The Seychelles Port Authority has engaged consultants to identify the needs for infrastructure and equipment to best meet the challenges of modernising the port to keep pace with demand and to make the port as competitive as possible within the geographic area.

Fuel (oil products) is by far the most significant sector of general cargo (accounting for two-thirds on average between 2004-06); the demand is fairly stable and it is unlikely that there will be any real increase in this sector over and above the overall expansion of the economy as a whole. There may, however, be further opportunities to increase the bunker role of the port for cargo and fishing vessels – but existing facilities should be adequate. Import cargo consists of the whole

range of commodities imported into the islands, with the manufactured goods being most significant sector (averaging 19% between 2004-06).

The numbers of calls by cruise vessels has fallen from 62 to 38 during the period 2004-07 in line with the international trend in passenger cruising worldwide, and possibly accelerated by the threat of piracy in the region. As this is seen to be a potential growth area for the port in support of the tourist industry, plans are in hand to improve facilities and attract more cruise vessels.

3. Policy and Governance of Ports and Transport

The port is managed by Seychelles Port Authority (SPA) which exercises an autonomous landlord function on behalf of the government. It is seen to be a national asset that must be managed to provide the best possible service and economic advantage for the Seychelles. The SPA is fully conversant with the fact that there is competition amongst the island states of the Indian Ocean both to attract tourists and to ensure the largest possible amount of business from the pelagic fishery industry that is primarily based on the migrations of tuna in the northern section of the Indian Ocean.

4. Planning and Management of Ports

The planning and management of the port is controlled by the SPA. It has commissioned international consultants to review the needs of the port and to project the likely directions to be taken through to 2020. The report advocates seeking private capital to expand and modernise the container-handling facilities, expand and upgrade handling and passenger facilities for cruise vessels, and expand Zone 14 that is the location of the main fishery industry activities.

The report pointed out that the fishing industry is mature, and that projections of available catch make it unlikely to expand significantly in future. There is, however, a need to ensure that as much of the industry as possible is attracted to use the packing and processing facilities of Seychelles in competition with Mauritius, Comores and, to a lesser extent, the mainland ports in Kenya, Tanzania and South Africa.

5. Development and Trade

There has been a major change in government economic strategy, designed to double GDP by 2017. This has been described in the document *Seychelles' Strategy 2017* in which it is stated that *"The Government proposes to accomplish this by curtailing its role as an economic actor and to focus instead on operating as an economic facilitator, allowing Seychellois and international business to benefit from an increasingly business-friendly economic environment, streamlined regulatory structure and capable human resource base."*

In effect, this means that government will no longer be the major controller of projects, but instead will concentrate on creating a positive economic climate to encourage other parties to make required investments to improve competitive advantage and to take advantage of new opportunities. The approach effectively modernises the role of government and intends to draw on the experience of developed economies to optimise the future development of the economy. The port will benefit from this improved investment and business environment and the positive opportunities it creates for expansion, competition and better facilities.

In another initiative, the government will embark on a course of action designed to create an environment for developing into a financial and banking centre for the region.

6. Port Impact and Benefits to Coastal Communities

The primary impact of the port on the community is through the supply of essential imports. For the sections of the population engaged in the fisheries industry, the port is the focal point of supply to the vessels, the handling of the catch, and the processing, storage and export of the final products. It is a major attraction for cruise liners, and therefore an important element in the promotion of the tourist industry.

The effects of the remoteness of the islands and heavy dependence on the fishery sector will be reduced if current proposals to market the country as a cruise-liner destination can be implemented. One of the major obstacles is the ever present danger of piracy from Somalia and the consequent reluctance of shipping to transit the area.

The redevelopment of the port may increase the volumes of transshipment containers and reduce the costs of container handling. Tourism appears to offer further potential for job creation and, if the financial sector can be expanded, it will create opportunities for the educated sections of the population.

7. SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • Stable government. • Good planning framework. • Strong fishing and tourism sectors. 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Relatively low GDP. • International competition for declining fish populations. • Proximity to Somalia.
<p>Opportunities</p> <ul style="list-style-type: none"> • Development of port for cruise ships. • Expansion of offshore financial sector. 	<p>Threats</p> <ul style="list-style-type: none"> • Impacts of Somali piracy on shipping and cruise and fishing activities. • Reduced spending by main tourist sources.

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VII. Coastal Mining - Prepared by Mr. Thomas Cushman,
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1. Introduction

The Seychelles, officially the Republic of Seychelles, is an archipelago country of 115 islands in the Indian Ocean. The island group is located northeast of Madagascar and 1500 km east of Kenya, it has a total land area of 455 km² and a coastline of 491 km. The islands are divided into the inner islands and the outer islands. The inner islands consist of 41 granitic islands and the outer islands of 74 low lying coral atolls and reef islets.

The Seychelles were originally colonized by the French and became a British colony following the Napoleonic War in 1814. The Seychelles became independent in 1974, became a one party socialist state in 1977 and returned to democracy in 1991. The constitution of 1993 provides for a unicameral legislature and a president who is both head of government and head of state. Creole is the lingua franca and English and French are both official languages. The legal system of the Seychelles is based on English common law, French civil law and customary law. Tourism is the dominant industry.



Figure 1: Map of the coastal Mining activities in Seychelles

2. Mining Sector Overview

The country's mineral industry consists of the production of construction materials such as clay, coral, sand and stone. Experimental granite quarrying in the bedrock of Mahe and nearby granitic islands was tried in the early 1980s. A South African company's efforts to quarry and sell granite in the early 1990s failed due to opposition by environmentalists.

Coastal sand and coral mining in the 1980s and 1990s led to coastal erosion. These practices are now greatly reduced due to enforcement of the Removal of Sand and Gravel Act and the Environment Protection Act.

There are no formal companies listed as extracting minerals in the Seychelles. Any production of stone or sand is informal.

3. Environment

Coastal Mining Activity	Environmental issues
Informal Sand and Coral Mining	<ul style="list-style-type: none"> The main coral mining issues concern the loss of reef habitat, loss of natural breakwaters with concomitant indirect loss of adjacent coastal habitats, loss of the aesthetic value of the reefs for tourism, deforestation and reduced fish stocks. The mining of both coral and sand weakens the coasts natural protection against erosion

4. Human Environment

4.1 Socioeconomic Indicators

Social indicator	Seychelles
<i>Social indicators</i>	
Total population (2010 est.)	87,476
Population growth rate (2009 est.)	-3.5%
HIV/AIDS prevalence rate	0.2 %
<i>Economic indicators</i>	
GDP (2009)	\$767 million
GDP (real growth rate)	-3.5%
GDP per capita	\$ 8,768

5. Policy and Governance

5.1 Policy and Legislation

Coastal Mining Regulations	Description - Comments
Environmental regulations	<ul style="list-style-type: none"> Environment Protection Act of 1994 effective from 1st March 1995
Coastal Mining specific regulation	<ul style="list-style-type: none"> The Removal of Sand and Gravel Act of 1991

5.2 Governance

Entity	Responsibility/ Description
Ministry of Environment in Seychelles	The Ministry of Environment is responsible of the management of the environment in Seychelles. The Ministry of Environment issues the Environment authorization for all projects undertaken in the country.
Coastal Zone Management Unit	This unit is responsible for the co-ordination of coastal management activities as well as formulation of related policies. The unit is responsible also for the promotion of ICZM (Integrated Coastal Zone Management) practices in Seychelles.
National EMPS Steering Committee	This Committee is responsible of the application of the ICZM.
SEACAM (Secretariat for Eastern African Coastal Area Management)	SEACAM is the responsible of the management of coastal zones in Eastern Africa.

5.3 Planning and Management

Investment facilitator

The *Seychelles Investment Bureau (SIB)* is a one-stop centre for all matters relating to business and investment in Seychelles. The SIB has the mission to promote investment and facilitate the investment process in a way which is in line with the administrative, policy and legal framework of Seychelles.

Environment Management

The concept of Environmental Impact Assessment has defacto taken place since 1974 through the input in the Planning Authority from the Environment Sector i.e. formal, ad-hoc, in-house EIA, as compared to the now formal CLASS II EIAs.

However, under the auspices of the Environment Protection Act (1995) and its Regulations, more formal (CLASS-I) EIA procedures have gradually been introduced requiring full EIA studies by local or external experts and consultants with "Public Inspection of the EIA reports". This is a pragmatic adaptation of the EIA process, using existing institutions, avoiding duplication in consideration of technical manpower shortage, budgetary constraints as well as for efficiency and common sense.

The Environmental Impact Assessment of the Pollution Control and Environmental Impacts is to ensure that environmental considerations are given special attention during all types of development and at the same time provide an efficient means of inputting on the numerous applications for development with minimum delay and no additional and parallel bureaucracy for monitoring and enforcement. There are existing in-house ad-hoc Environment Impact Assessment procedures vis-à-vis the development Planning Applications and these are continuously being upgraded. These EIA are carried out on behalf of the proponent of projects by the staff in the Ministry of Environment who are guided by a detailed field checklist in their assessment. In the event that the environmental impacts of the proposed project are not very significant or can be mitigated, then an environmental authorization with specific conditions is issued to the proponent through the Planning Authority.

Integrated Coastal zone Management (ICZM)

A National Coastal Environmental Policy exists as part of the Environmental Management Plan of Seychelles (EMPS, currently 2001-10-period). First drafts of all Chapters of the New EMPS of Seychelles (2011-20) have been prepared. ICZM Capacity Development was finished (Policy Development, Planning Processes, Monitoring and Reporting).

5.4 Development, Trade and Projects

Policy Planning Initiative	Objective
Environmental Management Plan of Seychelles (2000– 2010)	Defines the environment protection and management plan of Seychelles from 2000 to 2010.
Seychelles Economic Governance Reforms Program	Set out the economic reforms program of the country for 5 years.

Development project	NGO / Donor / Private Sector	Project details
The Sandwatch Project (Beach monitoring program)	UNESCO	<ul style="list-style-type: none"> • Objectives of project are to: • reduce the level of pollution • train school students in the scientific observation and measurement of beaches • assist school students, with the help of their local communities, to apply the scientific data collected to the management of the region's beaches
The Small Islands Voice	UNESCO	The Small Islands Voice officially launched in Seychelles March 2002, project focuses on small island developing states and islands with other affiliations in the Caribbean, Indian Ocean and Pacific regions. This initiative aims to utilise existing and new communication technologies to promote the effective participation of civil society in sustainable island development and in the review and follow-up of the Small Islands Developing States (SIDS) Programme of Action in 2004.
Regional Coastal Management (ReCoMap)	European Union	ReCoMap is a regional programme for the sustainable management of the coastal zones of the countries of the Indian Ocean. It is an initiative of the Indian Ocean Commission which deals with seven countries of the region, namely Mauritius, the Seychelles, Madagascar, the Comoros Islands, Kenya, Tanzania and Somalia. The programme started in August 2006 and will end in 2011. The Programme aims at the improved valorisation and sustainable management of coastal resources of the seven countries of the region.

6. SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> • Strong coastal management program • Special regulation for sand and gravel mining • No onshore mineral potential 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Seychelles consists of many separated islands.
<p>Opportunities</p> <ul style="list-style-type: none"> • Existence of Investment facilitator • ICZM implemented 	<p>Threats</p>

7. Bibliography

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