Report on
Existing and Potential
Employment Opportunities in the
Fisheries Sector
In
Seychelles

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<td>ADB</td>
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<td>IEO</td>
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<td>ILO</td>
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<td>IOT</td>
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<td>IOTC</td>
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<td>IPA</td>
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<td>IRD</td>
<td>Institut de Recherche pour le Developpement</td>
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<td>JICA</td>
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<td>MARPOL</td>
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<tr>
<td>MCS</td>
<td>Monitoring, Control and Surveillance</td>
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<td>MCSS</td>
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<td>ME&amp;NR</td>
<td>Ministry of Environment &amp; Natural Resources</td>
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<td>MPA</td>
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<td>MSY</td>
<td>Maximum Sustainable Yield</td>
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<td>SIF</td>
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<td>SMB</td>
<td>Seychelles Marketing Board</td>
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<td>SOCOMEP</td>
<td>Société de Controle d’Expertise Maritime de Pêches</td>
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<tr>
<td>STCW</td>
<td>Standard of Training Certification and Watch Keeping</td>
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<tr>
<td>TOR</td>
<td>Terms of Reference</td>
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<tr>
<td>VMS</td>
<td>Vessel Monitoring System</td>
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<td>WTO</td>
<td>World Trade Organisation</td>
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<td>YES</td>
<td>Youth Enterprise Scheme</td>
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EXECUTIVE SUMMARY

1 Introduction

The Fisheries Sector in Seychelles is critically important both for food security and economic development. In terms of foreign exchange earnings it surpasses tourism, however, the number of people employed in the sector has remained stagnant (except for the canning factory) accounting for 15% of total formal employment.

The main objectives of the study were to identify the present constraints (in employment) of the sector and make recommendations on how to overcome these shortcomings so as to improve the employment situation.

The study consisted of interviews, site visits, surveys, meetings and discussions with the various stakeholders from both government and the private sector. As a result of the tsunami disaster, new interviews and site visits had to be undertaken and some statistics updated. At the same time a desk study was conducted with a review of all available documentation on the subject. At the end of the first two months the consultant visited Mauritius to compare developments in the fisheries sector in that country with that of Seychelles and observe how Mauritius is coping with the employment requirements of its rapidly expanding fisheries sector, in particular in the industrial tuna fishery.

2 FINDINGS AND CONCLUSIONS

Full time fishermen directly involved in fishing activity account for approximately 1,750 persons representing 5% of formal employment. The number of people involved in processing and ancillary services is around 3930 representing 10% of formal employment. The canning factory (IOT) employing 2500 workers, and the Coetivy prawn farm employing around 330 workers are by far the two largest employers in the fisheries sector. The best prospects for an increase in employment in the sector are in the fish processing/export sector and ancillary services (sale and maintenance of vessel equipment and fishing gears, stevedoring, net repairs, etc.) offered to the Industrial tuna fleet. The other major findings from the study are as follows:

2.1 The Resource Base

2.1.1 The state of demersal resources, in particular in inshore waters for the various types of artisanal fisheries - handline, trap, net fishery, etc., have nearly reached their optimum level of sustainable exploitation and any further expansion of these fisheries should be done cautiously. The prospect exists for a moderate expansion of demersal handline fishery (which is the most important local fishery) to target deepwater resources at the edge of the plateau, on small offshore banks and around the Southern Island Groups. There is a need, however, to carry out new demersal resource surveys in the Seychelles EEZ since the last demersal surveys date from 25 years (Tarbit, 1980).
2.1.2 A potential exists for further exploitation of small pelagic species i.e. mackerel, sardines and horse mackerel (*Decapterus*) mainly for bait and/or fish processing on the Mahé Plateau but this assumption needs to be reconfirmed by new resource surveys. Concerning this issue, the EU financed tuna tagging project should play a key role, provided that Seychelles participates actively in both the scientific and commercial (with fishermen) aspect of the project. However, from personal conversations with the Head of the EU Delegation and with the Project Coordinator, this consultant has come to the conclusion that unless the Seychelles side participates more aggressively in the implementation of the project, it cannot optimise the benefits, contrary to some of the other regional states (notably Mauritius and Madagascar).

2.1.3 The best prospects for future development (and employment) in the local fishery, in particular for the export market, are in the semi-industrial longline fishery where swordfish and tuna stocks are still considered to be fairly stable. A new marketing strategy needs to be developed with the identification of new markets possibly in Asia (for sashimi grade tuna) and the quality of fish landed and exported closely monitored by the Veterinary Department to avoid any repeat of the former ban on the export of swordfish to EU countries.

2.1.4 The prospects for the development of successful mariculture projects in Seychelles are limited. This is due to the scarcity of land and marine sites (both for ponds and fish cages), the high cost of labour and competition from cheap and high quality wild caught fish. It is therefore not advisable for government to invest in large-scale mariculture projects and instead to allow foreign investors with the know-how and capital to take the initiative.

2.1.5 In recent years the shark fin and sea cucumber fishery has proved to be a lucrative export fishery but there is a need to identify new export markets for shark products (meat, skin, oil, etc.) so as to minimise the discarding of carcasses at sea. It is proposed that a foreign expert be recruited with funding from the EU to advise on how to improve the marketing of shark meat and shark products. Meanwhile, there is an urgent need to collect accurate statistics and implement appropriate management plans for these two fisheries as the resource is showing signs of overexploitation.

2.1.6 The Sports fishery, including fly fishing, 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 of developing this lucrative business on a much wider scale than charter vessels based on Mahé. There is a need however for the tourism department to market Seychelles as a big game destination to attract the necessary high-class clients. The SFA initiative to place FADs on the Mahé Plateau and beyond should make a significant contribution in improving the catch rates of large pelagic species for the Sports fishery.

2.2 Processing and Manufacturing Services

2.2.1 Evidence suggests that the benefits to Seychelles from preferential tariff arrangements for the export of canned tuna to the EU countries will be lost in the near future. This means that the prospects for the export of canned tuna to the EU are bleak unless the cost of local production can be reduced so as to be competitive on world markets. Moreover, this would indicate that the canning factory cannot operate profitably
in the EU market if competitors from Asia are allowed further quotas and/or duty exemptions.

The alternative is to invest into a new tuna loin factory taking into consideration the local labour constraints and the high demand for loins on the European market.

2.2.2 Export of demersal fish species from Seychelles is becoming prohibitive due mainly to the high value of the Seychelles rupee and competition from neighbouring states such as India, Oman, Dubai, Maldives and Indonesia, which are exporting the same species at reduced prices. The fish export companies should therefore adopt new export marketing strategies exploiting smaller markets and certain “niche” markets such as the high-class hotels in the region that are willing to pay high prices for premium quality fresh fish on ice.

2.2.3 Developing value-added processing activities is in the long term, one way for the Seychelles to increase foreign exchange earnings and to improve its macro-economic situation. This can only be achieved through setting up clear policy guidelines and planning by government to ensure that these policies are carefully implemented. There is a need to encourage more joint ventures of foreign-owned processing industries. The know-how, contacts and capital of overseas partners could help to diversify both products and markets.

2.2.4 The employment opportunities in the local processing plants (Oceana, Sea-Harvest and smaller fish processing plants) will depend on the availability of raw material (in particular swordfish, tuna, bourgeois and grouper), identification of new markets and future investments in the sector, promoted by the new Agriculture and Fisheries (Incentives) Act, 2005.

2.2.5 The key to the development of the artisanal fishing industry is to identify new export markets as well as training fisheries personnel and fishermen. Emphasis should be placed on the constant monitoring of the industry and devising good management plans and policies ensuring sustainable development of the sector while avoiding confrontation with the various stakeholders.

2.3 Institutional Support to the Fishing Industry

2.3.1 If SFA is to maintain its position as the most important regional tuna research and management centre in the Indian Ocean, it needs to recruit further qualified technical staff, in particular for the industrial tuna section. It may be obliged, failing the recruitment of local scientific staff, to recruit expatriates to fill the required positions. These could in turn train their Seychellois counterparts.

2.3.2 The new EU/Seychelles Agreement is the most important agreement between the EU and a third country, both in terms of direct financial compensation allocated and for the various financial options proposed for the development of the fisheries sector.
For example it makes provision for:

1) Funding resource surveys in Seychelles’ waters.
2) Up-dating the working contract of Seychelles seamen on EU purse seiners and paying compensation for non-employment of Seychelles seamen on EU purse seiners.
3) Providing financial assistance for the promotion and development of the local artisanal fishery.

In order to derive the optimum benefit from the Agreement however, Seychelles Authorities (SFA) must monitor its implementation closely and ensure that the best use is made of the proposals in the Agreement.

2.3.3 The Maritime Training Centre does not have the required personnel and infrastructure to support a comprehensive programme for maritime training. There is a need to recruit expatriate staff for training of students and/or establish cooperative links with all the training institutions/countries to improve the MTC’s training capacity. A notable achievement of the MTC however, is that at least half the skippers and marine mechanics on the semi-industrial longline fishing fleet are former graduates of the school.

2.3.4 The creation of the Fishing Boat Owners Association (FBOA) has promoted a proactive dialogue with Seychelles authorities to improve transparency and alleviate many of the existing problems between SFA and the fishing community. This is fundamental to the future sustainable development of the fisheries sector in Seychelles. There is a need, however, for the FBOA to expand its activities to Praslin and La Digue and not concentrate solely on Mahé.

2.4 Port Facilities and Services

2.4.1 Despite the fact that Port Victoria is the leading tuna fishing port in the Indian Ocean, due to stiff competition from other regional ports, for example Port Louis, the present port infrastructure and services are becoming inadequate. There is a need therefore to improve the infrastructure for the future - including new tuna quays, warehouses, cold stores and land allocation for net repair, storage of salt and construction of recreational facilities for the industrial fishing fleet.

2.4.2 The quality of services provided to industrial tuna vessels while in port is extremely important, particularly in a competitive industry such as the industrial tuna fishery. If not satisfied with the services offered in one port, because of their mobility and autonomy, vessels can easily move to another port. This is the reason why it is important for the authorities to understand the requirements of the fleet and show flexibility to their requests.

2.4.3 It is doubtful whether the building of a dry dock and a new vessel repair facility in Seychelles would be economically viable. The reason for this is that dry docks presently exist in all regional states, i.e. Mauritius (2), Madagascar, Dar-es-Salam, Mombasa and South Africa. The high cost of labour and lack of skilled manpower, as well as the foreign exchange difficulties, are drawbacks for Seychelles. Instead, government should
consider providing financial incentives to the present vessel repair facilities, on a short to medium-term basis, in order to improve and upgrade their facilities.

3 RECOMMENDATIONS

The following recommendations derived from the study are intended to improve the fisheries employment situation in the sector.

3.1 The fisheries sector has a considerable contribution to make to the country’s economic development and there is no doubt that it presently operates well below its maximum potential. In order to optimize the development of the sector, new and well-defined policy guidelines with clear strategies need to be implemented and updated as conditions in the fisheries sector change. Any policy decision that is taken by government must be carefully implemented and closely monitored by the implementing agency.

3.2 In the face of declining demersal resources around the coastal areas of the granitic islands, further exploitation must be carefully monitored with certain management measures imposed. Seychelles has a multi-species fishery and fishermen can easily switch from one resource to another, thus maintaining a high level of fishing pressure on marine resources. This is well illustrated in the semi-industrial fishery, which over the last two years has switched from a purely tuna and swordfish fishery to a sea cucumber and shark fishery mainly due to a ban on the export of swordfish. SFA should therefore take up the offer under the EU Agreement relating to the prospection of deep-water resources in Seychelles waters.

3.3 In a drive to further diversify the fisheries sector, government should actively encourage the setting up of joint ventures to diversify the fishery and increase the economic returns. This is particular the case in the semi-industrial fishery, in the processing and services sector i.e. construction of warehouses, cold stores, fishing quays, etc. Clear policy guidelines should be available for foreigners wishing to invest in the fisheries sector, as they could otherwise be discouraged.

3.4 In view of the fact that it is likely that the advantages Seychelles has benefited from preferential tariff arrangements for canned tuna will be lost in the near future, (rendering export of Seychelles canned tuna to EU countries prohibitive), a feasibility study should be carried out to investigate the possibility of investing in product diversification. One option that should be considered is the construction of a new factory for the production of tuna loins for export. This would cut operating costs and reduce labour requirements. There is also a need to develop new markets for canned tuna, possibly in Southern African and Middle East countries, to avoid depending solely on EU markets.

3.5 Due to the lack of adequate infrastructure at Port Victoria it is recommended that a master plan be drawn and land be set aside for such facilities as new fishing quays, building of warehouses, ship waste reception facility, fishing net manufacture and repair, storage of salt, building of cold stores and, recreational facilities for industrial fishermen. This plan should be implemented after consultations with various stakeholders including the Port Authority, SFA, ship owners and the private sector. Government should encourage private investment for building Port Infrastructure while providing the
necessary land and facilitating administrative procedures such as planning approval. This would give a much-needed psychological boost to private investment and help to counteract the recent developments at Port Louis, that have been widely publicized in the regional press.

Seychelles should not forget that there are regional ports competing for the tuna fishing business, which represents a direct challenge to Port Victoria. Port Victoria presently has the edge over most of its competitors in view of its geographical position and efficient administrative support. There are no grounds, however, for complacency in such a highly competitive industry where so many factors lie outside Seychelles control. The most important point to remember is that the authorities should adopt a more flexible approach towards the tuna fleet in order to ensure the dominance of Port Victoria as the first tuna fishing port in the Indian Ocean.

3.6 SFA is suffering from a shortage of qualified scientific staff as a result of resignations (including non-renewal of contracts) and high turnover rate of senior marine scientists but it appears that no newly qualified Seychellois graduates are willing to work for the Institution. SFA should therefore, as a last resort, consider recruiting qualified expatriate staff, particularly for the industrial tuna section. The expatriate staff would be in a position to train Seychellois counterparts. There is also an urgent need to draw a serious and credible manpower plan for SFA to address its medium to long term staffing requirements. SFA should also develop a cohesive national research programme, identifying research priorities within the sector.

3.7 The proposed new Maritime Training Centre building will be a welcome addition for the training of Seychellois aiming to pursue a career in the maritime sector. The consultant is of the view that in the short-term the school should prepare Seychelles students for further training overseas as there are many foreign institutions (in Réunion, France, Spain and India etc.) offering free scholarships in maritime studies. It is however the task of careers guidance counsellors to make students aware of career opportunities in the maritime sector and that these jobs are well remunerated. Meanwhile a national coordinator should be appointed for the MTC to coordinate all offers of international technical assistance and/or funding for the school so that these offers are not lost.

3.8 Concerning the poor recruitment of Seychelles seamen by EU and Seychelles flagged purse seiners, it is difficult at this time to propose a definite solution to this long standing problem, except that in future it is proposed that fishermen working on purse seiners should undertake a period of basic training at the MTC. As a short-term measure it is recommended that SFA carries out a background check on the proposed candidates (perhaps checking police records and character checks). A fisherman record book, which entitles the applicant to be recruited on purse seiners, should only be issued after SFA is satisfied that the applicant meets the basic requirements. There is a need however, to have more consultation with the industry and government should consider setting up an advisory committee headed by SFA to study the problem.

Meanwhile the present employment contract for Seychelles seamen working on EU purse seiners should be reviewed, as there are discrepancies between the Spanish and French contracts (see Annex II). Since the new Agriculture and Fisheries (Incentives) Act, 2005, exempts fishermen from paying social security, there will be no need for a ‘service contract’ with the ship owners and this is another reason to negotiate a proper
employment contract. The condition of the contract should be in line with the terms specified in the new EU Agreement.

3.9 A difficult decision on how to reduce the fishing effort on certain fish stocks will have to be taken in the future. When it is a multi-species fishery and the resource is overfished - in particular if the revenue from the fishery is lucrative (for example sea cucumber and shark fishery) - finding an equitable solution for all stakeholders is a difficult matter. At times, after the fisheries manager takes a difficult and unpopular decision, it inevitably falls on the shoulders of the highest authorities i.e. the Minister or even the President.

An attempt should therefore be made to reach a compromise with all stakeholders but whatever the decision reached it should not interfere with the objective of resource conservation and/or fisheries management. This is an urgent matter as otherwise unpopular decisions will be taken in the near future (such as fleet reduction, closed areas etc) that stakeholders will find difficult to accept.
INTRODUCTION

The 100 or so small islands making up the Republic of the Seychelles have a surface area of 444 km², with a combined length of coastline of 600 kms. Moreover, the islands have poor soil and few natural resources hence, apart from the tourism industry, the country has limited opportunities for land-based development and as a result the fisheries sector is critically important for both food security and economic development. Fisheries and related activities is a major employer in the Seychelles economy, accounting for 15% of formal employment.

The current document stresses that employment is closely linked to the state of the resource and the protection of marine environment. For this reason the first part of the report analyses in depth the state of various types of fisheries, the resources they target, as well as the main constraints they are currently facing. In the second part of the report, emphasis is placed on the analysis of the Post-Harvest Sector, including processing, servicing and manufacturing, since these are the sectors showing the best prospects for increased employment in the fishing industry in Seychelles.

1. GEOGRAPHICAL SITUATION

The country’s vast economic zone covers an area of over one million sq. kilometers and is located on one of the most productive fishing grounds in the South-West Indian Ocean (Figure1). In addition to extensive pelagic resources the Seychelles, unlike other island states in the region, has a large continental plateau, rich in demersal resources.

The plateaux have steep sides, which rise rapidly from around 1000 meters, the largest being the Mahé Plateau. This is surrounded by a narrow shallow rim of around 15 to 30 meters depth surrounding a central area of about 45 to 65 meters, with the surface granite and coral outcrops forming small banks.

The majority of the population of 80,000 live on the three main granite islands (Mahé, Praslin and La Digue), while the coralline islands are sparsely populated. The remaining islands and plateaux to the South and next to Mahé Plateau are all coralline in nature and include the Amirantes Plateau, the Alphonse group, Providence and Farquhar group and the Aldabra and Cosmoledo group.

Most of the domestic fishing activity is centred on the Mahé and Amirantes Plateaux, with occasional fishing trips targeting specific species (for example deep-water snappers and groupers) to the Southern Island groups, the furthest, Providence and Farquhar groups, being more than 700 kms from Mahé.
## TABLE 1
The total fishable areas of Seychelles Banks and Plateaux at shallow (0-75m) and intermediate (75-100m) depth strata and length (KM) of the 100 ms depth contour (Mees 1998).

<table>
<thead>
<tr>
<th>LOCATION/STRATA</th>
<th>SHALLOW STRATA</th>
<th>INTERMEDIATE STRATA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOTAL</td>
<td>FISHABLE</td>
</tr>
<tr>
<td>Mahé Plateau</td>
<td>41,338.00</td>
<td>26,500.00</td>
</tr>
<tr>
<td>Inshore</td>
<td>6000.00</td>
<td></td>
</tr>
<tr>
<td>Offshore</td>
<td>6,500.00</td>
<td></td>
</tr>
<tr>
<td>Trawlable</td>
<td>14,000.00</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>41,338.00</td>
<td>26,500.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outlying Islands, Plateaux and Banks</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks South of M.P, including Platte</td>
<td>2198.6</td>
<td>1619.6</td>
</tr>
<tr>
<td>Amirantes Plateau inc. Desroches</td>
<td>3999.0</td>
<td>2399.0</td>
</tr>
<tr>
<td>Alphonse</td>
<td>190.0</td>
<td>114.0</td>
</tr>
<tr>
<td>Providence/ Farquhar</td>
<td>1621.1</td>
<td>927.7</td>
</tr>
<tr>
<td>Astove/ Cosmoledo</td>
<td>398.1</td>
<td>238.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8406.8</td>
<td>5299.6</td>
</tr>
</tbody>
</table>

| GRAND TOTAL                            | 49744.8        | 31799.6 | 2730.8 | 823.0  |
FIGURE 1
Map showing Seychelles EEZ with detail of the islands: Mahé, Praslin and La Digue
1.1 The Resource Base

1.1.1 The Artisanal Fishery

As stated above the artisanal fishery targets demersal resources such as *Lutjanids* (snappers), *serranids* (groupers), *le thrinids* (capitaines) and *carangidaes* (caranques) found 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 MT of fish landed annually.

This catch supplies the local market demand, including hotels and restaurants, with approximately 800 MT of fish, mostly groupers and snappers designated for the export market.

The coastal demersal resources (within 10 km from the granitic islands) are considered to be over-exploited whilst an unexploited potential exists on the edges of the Mahé Plateau and on some offshore banks. However, the extent to which this potential is directly accessible to the artisanal sector is limited by the requirement for increased capitalisation.

1.1.2 The Semi-Industrial Fishery

This fishery is relatively new, dating back from the early 1990s and has been developed with the objective of relieving pressure from demersal resources by targeting swordfish and tuna caught in deep waters outside the continental plateau.

There are approximately 12 vessels involved in its fishery ranging in size from 14 to 22 meters with annual landings of 400 MT. Although stocks are considered to be stable, in the last two years landings have dropped considerably due to a reduction in fishing effort as a result of a ban on export of swordfish imposed by the EU, due to the high level of cadmium in swordfish. Most of the semi-industrial vessels have instead been targeting sharks for their fins, with carcasses discarded at sea.

1.1.3 The Industrial Fishery

The industrial fishery, which is composed of foreign owned licensed vessels, which includes Seychelles registered vessels, falls under two main categories: the purse seine fishery (mainly EU, French and Spanish vessels) and the long line fishery (mainly vessels from the Far East i.e., Taiwanese, Japanese and South Korean). Whilst the purse seiners target mainly surface swimming tuna (skipjack and yellowfin) the longliners target large, deep swimming, big-eye and yellowfin tuna.

The catch from purse seiners has remained mostly stable for the last 10 years, with around 300,000 MT of tuna caught in the waters in the South West Indian Ocean. For the last two years the catch has been exceptional with landings of over 400,000 MT, the dominant species being yellowfin (SFA Annual Report).

Approximately 85% of the tuna catch from purse seiners is transhipped in Port Victoria with around 90,000 MT being landed for processing by the IOT (Indian Ocean Tuna Factory).
According to available scientific evidence, whilst stocks of skipjacks show no evident signs of immediate concern, that of big-eye and yellow fin have almost reached their optimum sustainable level (Report of the Seventh Session of the Scientific Committee of the IOTC, November 2004).

1.2 Climatic Conditions

The Seychelles climate is characterised by a North-West Monsoon from November to March, with variable winds and calm periods.

The South East Monsoon, which blows from the middle of May to October, with strong winds averaging between 15 to 25 knots, is a severe constraint to fishing operations.

There are two inter Monsoon periods from October to November and March to April, with light variable winds and calm periods. These are considered the most favourable fishing season for the domestic fishing fleet corresponding to periods of glut for fish landings.

Air temperature is mostly stable throughout the year ranging from a low of 24°C to a high of 30°C. Rainfall may occur throughout the year but is at its heaviest in December and January and there is a dry period between June and September (Table 1.2).

The hydrology of the Seychelles is affected by the eastward flowing Equatorial Counter Current and the westward flowing currents north and south of it. The currents are modified to a certain extent by the onset of the different monsoon periods. The southern islands lie in the west flowing South Equatorial Current, the northern in the east flowing Equatorial Counter Current. For the Mahé Plateau, Tarbit (1980) described the prevailing conditions, which are summarised in Table 1.2.

Table 1.2: A summary of the hydrological conditions over the Mahé Plateau (adapted from Tarbit, 1980).

<table>
<thead>
<tr>
<th>DETAILS</th>
<th>OCTOBER</th>
<th>NOVEMBER</th>
<th>DECEMBER</th>
<th>MARCH</th>
<th>APRIL</th>
<th>JULY</th>
<th>AUG - SEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIMATE</td>
<td>End of SE Trades</td>
<td>NW Monsoon begins</td>
<td>NW Monsoon</td>
<td>End of NW Monsoon</td>
<td>Inter-monsoon period</td>
<td>SE Trades (from June)</td>
<td>SE Trade Victim</td>
</tr>
<tr>
<td>SEA SURFACE</td>
<td>Eastwards over surf.</td>
<td>Predominantly east.</td>
<td>Predominantly E and SE</td>
<td>Wool Plateau washed over</td>
<td>Mostly southerly</td>
<td>The southerly current</td>
<td></td>
</tr>
<tr>
<td>CURRENT</td>
<td>area of Plateau</td>
<td>wards but northern</td>
<td>Counter Current. Clock</td>
<td>Equatorial Counter Current</td>
<td>modified to SE/SW by the</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>flow components</td>
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<td>to the cold</td>
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<td></td>
<td></td>
<td>over S of Plateau</td>
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<td></td>
<td>A small southerly circ.</td>
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<td></td>
<td></td>
<td>Eastward counter-current</td>
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<td></td>
<td>north of the Plateau</td>
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<td></td>
<td></td>
<td>in N but NW Monsoon pushes</td>
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<td>counter-current south-</td>
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<tr>
<td>UPWELLING/NUTRIENTS</td>
<td>Continues along S and</td>
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<td>SE edges of Plateau</td>
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<tr>
<td></td>
<td></td>
<td>Surface water between</td>
<td></td>
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<td></td>
<td></td>
<td>Mahé and very nutrient</td>
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<td></td>
<td>rich, Algal growth</td>
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<td>over S of the coast</td>
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<tr>
<td>THERMOCLINE</td>
<td>A dome of cold water</td>
<td></td>
<td></td>
<td>Surface and bottom</td>
<td>A well defined thermocline</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>occurs S of Plateau,</td>
<td></td>
<td></td>
<td>temperatures over</td>
<td>at 75 - 100m W and E of</td>
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<tr>
<td></td>
<td>Thermocline at 20 -</td>
<td></td>
<td></td>
<td>Plateau similar, no</td>
<td>the Plateau and &lt;35m S &amp; W</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>30m</td>
<td></td>
<td></td>
<td>definite thermocline</td>
<td></td>
<td></td>
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<tr>
<td>TEMPERATURE</td>
<td></td>
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<tr>
<td>SURFACE</td>
<td>26-28°C</td>
<td></td>
<td></td>
<td>29.2°C</td>
<td></td>
<td>29°C</td>
<td></td>
</tr>
<tr>
<td>35-39 m</td>
<td>26.3°C</td>
<td></td>
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<td></td>
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<tr>
<td>30-34 m</td>
<td>26.4°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-29 m</td>
<td>26.4°C</td>
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<tr>
<td>20-24 m</td>
<td>26.4°C</td>
<td></td>
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<tr>
<td>15-19 m</td>
<td>26.4°C</td>
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<td></td>
</tr>
<tr>
<td>10-14 m</td>
<td>26.4°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-9 m</td>
<td>26.4°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4 m</td>
<td>26.4°C</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

12
2. EXISTING GOVERNMENT POLICY AND OBJECTIVES

The fisheries policy of the Government of Seychelles was first drafted in 1986. At that time both the Artisanal and Industrial fisheries were in a development stage and the policy reflected the priority to promote the development and conservation of marine resources as well as optimizing the benefits.

In 1985 the number of Licences issued to the industrial tuna fishery was 49 for purse seiners and 165 for long-liners, with an annual purse seine catch of around 130,000 MT. The total purse seine catch has continued to rise and it peaked at 407,684 MT in 2003. The artisanal fleet has declined from 410 vessels in 1985 to 330 in 2003, however the nature of the fleet has changed dramatically with most vessels being entirely mechanized, and larger and better equipped with improved safety facilities.

Hence the new fisheries policy drafted in 2002 (and approved in 2005) has taken into account the changing nature of all aspects of fisheries in Seychelles.

2.1 Overall Policy Objectives

The long-term policy objectives of the Government of Seychelles for the fishing industry are "the promotion of sustainable fisheries development and optimising the benefits from the fisheries sector for the present and future generations".

The policy statement focuses mainly on the following objectives:

- To promote the conservation and management of marine resources to ensure the long-term viability of the industry.
- To generate the maximum amount of employment.
- To maximize revenue from fisheries and related activities.
- To maximize foreign exchange earnings.
- To promote the maximum linkage with the sectors.
- To promote safety at sea.
- To maintain Port Victoria as the major tuna landing/transhipment port in the Western Indian Ocean.

2.2 Guidelines and Objectives

a) To promote conservation and management of marine resources in order to ensure the sustainability and long-term viability of the Industry. Marine resource conservation will continue to be a top priority for the Government. The Government will endeavor to utilize the appropriate management tools and research to ensure the long-term sustainability of the resource. When the best scientific evidence is not available a precautionary approach to management will be adopted.

b) To generate the maximum amount of employment

The fisheries sector will continue to be developed with the view of generating the maximum amount of employment opportunities for Seychellois either directly or
indirectly. The Government will also ensure that the livelihood of fishermen and those involved in supporting activities are maintained or enhanced.

c) To maximize revenue from fisheries and other related activities

The government will ensure that the maximum amount of foreign exchange is earned through the export of fish and fish products.

Emphasis will be on improving both fish quality and health standards. Export of canned tuna, frozen prawns and other processed products will be enhanced. Government will continue to negotiate fisheries agreements with foreign countries and fishing companies and ensure that the facilities and services in Port Victoria are utilized to the maximum. The Government also aims to create conditions that will increase the contribution of the fisheries sector to the national wealth by increasing production and adding value to fisheries products, such as reducing or diminishing trades tax on fisheries equipment and material.

d) To promote an integrated economy

The creation of ancillary industries and services to provide input to the fishing industry and the contribution of the fisheries sector to the economy such as manufacturing, tourism and agriculture will lead to a more integrated Seychelles economy. The government will ensure that full advantage is taken of all potential linkages and multiplier effects for further diversification of the economy. Cooperation with other Ministries, departments and agencies will be encouraged.

e) To enhance food supply and food security

Steps will be taken to ensure that self-sufficiency in fish is maintained and that the domestic market is at all times adequately supplied. The nutritional importance of fish consumption will be further emphasized with local and international food health standards being adhered to.

f) To promote safety at sea

Government will continue to assist local boat owners in acquiring safety equipment at affordable prices and intensify its efforts to educate fishermen on the importance of safety at sea. In order to attain these objectives, government will provide the necessary navigational aids such as emergency distress beacons, VMS transponders, etc. In this respect, the implementation of the Vessel Monitoring System (VMS) system for the local fleet will play an important role.

g) To maintain Port Victoria as a major tuna landing/transhipment port in the Western Indian Ocean

The industrial tuna fishing in the Western Indian Ocean has grown significantly over the past decade. This has resulted in Port Victoria becoming an important base for the industrial fishing fleet and as the main transhipment/landing port for tuna in the region. To maintain this position the Government will continue to invest in port infrastructure and other facilities and also ensure that the services provided
are efficient and cost effective. Emphasis will be placed on services and facilities aimed at encouraging more longliners to call at Port Victoria.

3. SOCIO-ECONOMIC BACKGROUND TO THE FISHERIES

3.1 Overview of the Fishing Industry

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. It provides important revenue from export and foreign exchange earnings as well as an invaluable source of animal protein. With the emergence of Port Victoria as the principal tuna transhipment port (in the mid 1980s) and, the tuna canning factory (IOT) as the largest national employer (in the late 1990s), the fisheries sector has established itself as one of the key sectors in the Seychelles economy, even surpassing tourism in foreign exchange earnings. Indeed, figures from the Central Bank indicate that the gross inflow from fisheries in 2003 was SR 3.357 billion or 12.5% higher than earnings from tourism. This illustrates the important role of fisheries in the national economy (source: SFA Annual Report). Export of fish and fish products in 2003 accounted for more than 92% of the domestic export (Table 3.1).

TABLE 3.1
Export of fish and fish products – 2002 – 2003 (MT & SR’000)

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003(p)</th>
<th>%change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MT SR, 000</td>
<td>MT SR, 000</td>
<td>MT SR, 000</td>
</tr>
<tr>
<td>Fresh and frozen fish</td>
<td>477.00 18,176.00</td>
<td>689.00 27,648.00</td>
<td>44.44 52.11</td>
</tr>
<tr>
<td>Canned tuna</td>
<td>34,791.00 843,670.00</td>
<td>35,757.00 1,023,142.00</td>
<td>2.78 21.27</td>
</tr>
<tr>
<td>Frozen Prawns</td>
<td>218.00 8,734.00</td>
<td>835.00 37,976.00</td>
<td>283.03 334.81</td>
</tr>
<tr>
<td>Other processed fish</td>
<td>2,713.00 47,259.00</td>
<td>1,724.00 27,853.00</td>
<td>-36.45 -41.06</td>
</tr>
<tr>
<td>Dried shark fins &amp; sea cucumber</td>
<td>39.00 2,134.00</td>
<td>247.00 1,919.00</td>
<td>533.33 -10.07</td>
</tr>
<tr>
<td>Others</td>
<td>- -</td>
<td>108.00</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>32,238.00 919,973.00</td>
<td>39,261.00 1,118,646.00</td>
<td>2.68 21.60</td>
</tr>
<tr>
<td>Total domestic export</td>
<td>959,609.00</td>
<td>1,216,000.00</td>
<td></td>
</tr>
<tr>
<td>% of domestics exports</td>
<td>95.87</td>
<td>91.99</td>
<td></td>
</tr>
</tbody>
</table>

Source: SFA Annual Report
(P) Provisional
Whilst the export of canned tuna and frozen prawns constitute the major part of export and foreign exchange earnings, the contribution of the semi-industrial and artisanal sector is yet to show its full potential. Export from the artisanal sub-sector, namely fresh and frozen fish, accounted for only 2.5% of the total volume of export for fish and fish products and around 2.5% of foreign exchange earnings. The general trend continued whereby an increasing percentage of the artisanal catch was destined for the local tourism industry (including an increase in demand by foreign fishing vessels) and export market. Of the 3,800 MT of fish landed in 2003 only 689 MT were exported.

Besides the canning factory and the prawn farm, other people directly employed in the local fishing industry in March 2005 amounted to around 1,750 fulltime fishermen. These operated around 400 fishing boats ranging from pirogues to larger and better-equipped vessels to be able to go further offshore. In addition there were an unrecorded number of recreational fishermen who participated in the domestic fishery.

The fisheries sector has a strong multiplier effect in that it provides employment to many people involved in the marketing, processing and sale of fish. The sector also allows a number of jobs in such activities as trap manufacture; net mending, boat building and repairs, marine engine repairs as well as other related activities. The fishing sector also provides firm linkages to other sectors of the economy such as tourism, services, processing and manufacture, agricultural production, craft etc…

The artisanal fishing sector also guarantees adequate supply of animal protein to the population and Seychellois people are amongst the highest fish consumers in the world with a per capita consumption of approximately 70 kg annually. However, recent trends indicate that the level of per capita fish consumption is slowly declining due to an increase in the population and a shift to meat products (in particular chicken) as incomes increase.

3.2 Recent Trends in the Fishing Sector

During the last 10 years the Seychelles fishing industry 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 offering a wide range of incentive and concessions to the fishery sector.

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 fishing sector. These include the introduction of electric reels, drop-lines, echo sounders and GPS that have facilitated the work of fishermen and at the same time helped to improve catch rates. The SFA has also introduced the longline monofilament technique for tuna and swordfish. Commercial fishing operation started in the early 1990s with new vessels being imported (mostly from Sri Lanka) and to-date there are approximately 12 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 Japanese Government Aid from JICA), with the African Development Bank (ADB) and the
European Union (EU). The introduction of these new larger and more comfortable vessels had the objectives of enabling fishing vessels to efficiently exploit offshore resources and stay longer at sea. There has been some constraint with the programme, however, mainly due to high investment costs, unreliable crew, and 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).

Government also embarked on a different programme to further improve existing infrastructure and facilities (such as improving fishing port facilities and quays) including reef passes clearance for safer navigation. New projects were implemented to build new tuna quays and improve existing ones. A new artisanal demersal quay was built to improve berthing facilities for local vessels and provide better and more hygienic conditions for landing fish. Ice making plants were also constructed outside Victoria, namely at Anse-La Mouche and Anse Royale, to provide ice for fishermen in these districts.

Local fishermen benefited from the provision of soft term loans from the Development Bank (DBS) to purchase new fishing boats and engines. Since 1995, interest free loans have been available to fishermen under the Youth Enterprise Scheme (YES), to purchase 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 to purchase boats and engines. 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 Fishermen also benefit from cheaper fuel through the fuel voucher scheme where a rebate is offered on every litre of diesel or benzene purchased for commercial fishing operations. Local fishing companies involved in the semi-industrial fishery targeting tuna and swordfish, also benefited 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).

As a means of diversifying the fishing sector, the Government has encouraged investment in aquaculture with the potential to generate foreign exchange. Besides the prawn farm at Coetivy, an aquaculture farm was set up at Praslin for rearing giant clams for the aquarium trade. A pearl farm was also set up at Praslin in the Curieuse National Park and results have proved promising. At this stage all other aquaculture projects proposed have yet to be implemented.

One of the major constraints of the artisanal fishing industry is the ageing workforce and poor recruitment in the industry. In this respect the Maritime School must play a major role in the future to help resolve this problem and more effort should be placed in the training of young people for a career at sea. The problem of poor recruitment of fishermen is reflected on Industrial purse seines where the quota of two Seychellois seamen on each EU vessel has yet to be met.
During the mid 1990s government liberalized the export market for fresh and frozen fish, which triggered investment in this area. However due mainly to the high capital investment required, exporters were not able to meet the required European Union criteria for export of fish and fish product and to-date only two fish export companies are operational.

Nevertheless, several exporters were able to capitalize on the high market demand for bêche de mer and shark fins in the Far East and a lucrative export trade has been established in this sector.

Finally, the setting up of the Fishermen Boat-Owners Association has provided a forum for open dialogue between the government, the relevant authorities and the fishermen.

3.3 The Fisheries Sector and Economic Development

The fishing industry has a considerable contribution to make to the country’s economic development and there is no doubt that it currently operates well below its maximum earnings potential. Nonetheless there are numerous constraints that need to be resolved in order to ensure the full development of the sector.

3.3.1 Strength of the Sector

The fishing sector is particularly important in the socio-economic development of the country as it provides the basic requirements of the daily diet, generates employment and income, contributes to export, and earns the country valuable foreign exchange whilst contributing revenue.

One of the main strength of the sector is the geographical position of the Seychelles and its proximity to the main tuna fishing grounds. This has enabled Port Victoria to develop as the main tuna transhipping port of the Indian Ocean and the tuna canning factory (due to the availability of fresh and cheaper fish) to expand to become the largest single national employer and the leading foreign exchange earner.

Moreover, the presence of a large continental plateau around the main granitic islands with rich demersal resources at close proximity has given rise to a lucrative export market for premium quality fresh fish mostly to European markets.

3.3.2 Constraints

The fishing industry in Seychelles must overcome a range of problems and constraints, which undermine the smooth development of this sector. One such constraint is the high capital investment and operating cost compared to the low return on investment. In addition, the financial cost associated with the investment, such as high interest on loan repayment and insurance, represents a major hurdle to the individual investor. However, some resourceful entrepreneurs have been able to overcome these constraints to run viable ventures.

Another major constraint is the lack of experienced and reliable labour force, which hampers the smooth development of the sector. Despite the efforts of the Maritime Training School to train young people to enter the industry, the success has been
negligible with more graduates ending up in jobs other than the fishing industry. Hence, out of a total of 150 students graduating from MTC between 1999 to 2004 only around 19 are presently known to be working in marine related fields (see section 7.2). These constraints not only affect the artisanal fishery but also the industrial fishery with the industry being unable to recruit fishermen to meet the quota of Seychellois seaman required to work on the industrial tuna fleet.

The labour problem is further aggravated by a recruitment factor, which the artisanal fishing sector is facing, resulting in an ageing manpower base. This problem needs to be addressed and the Maritime Training Centre should play a leading role in this respect.

The problem is no doubt compounded by the fact that despite difficult working conditions and the financial insecurity of the fishing industry, remuneration is low compared to other occupations. The seasonal fluctuations in earnings (in particular during the S.E Monsoons) represent another difficult aspect of fishing as a reliable source of income. Furthermore because of the poor level of education, most fishermen are unable to manage their ventures in a satisfactory manner. Some eventually end up with large debts and in certain cases their vessels are repossessed by the bank. The high level of risk associated with the fishing industry is a crucial factor in hampering investment, in particular for larger commercial operations. Statistics from the lending institutions (in particular the DBS and YES Scheme) indicate that the sector has the worst repayment rate of any development projects with loan arrears from the fisheries sector being more than 60%.

Although the situation for ice production has improved recently with the construction of ice plants at Anse La Mouche and Anse Royale, the tsunami disaster has caused a temporary disruption in ice production, fortunately this coincided with a reduction in the fishing effort due to the damage suffered by certain fishing vessels. A further major problem facing the industry is the periodic lack of fishing material and bait due to seasonal demand. This can have a serious impact on the performance of the industry as fishermen have to stay longer periods in port awaiting supplies. It is nevertheless true that in 2003, government through SFA has made a serious effort to remedy this situation with the importation of over 800,000 EURO worth of fishing material that was sold to fishermen. In addition SFA has set up a line of credit of 1000 EURO for registered fishermen to import their basic spares requirements. According to SFA’s Operations Manager however, only around 20 fishermen have so far taken advantage of this generous offer (this could be due to a lack of publicity or simply to poor organisation on the part of fishermen). Hence, the scarcity of foreign exchange is still a lingering problem for most fishermen, with the lack of spare parts, fishing equipment and material hampering the development of the sector (for example no echo-sounders, GPS and VHF radios are presently available on the local market).

Finally, people have the tendency to regard fishing as a low status job, normally preferring to join other professions. This adverse public perception has a serious repercussion on the development of the fisheries sector.

3.3.3 Prospects

Although further research and fishing trials may reveal new or unexploited resources, in general the opportunity for a large increase in the landings of demersal fish is moderate.
There is a potential for cautious further exploitation of the demersal resources in deeper waters at the edge of the plateau and on small offshore banks beyond the Mahé and Amirantes Plateau (for example Carreira, Adelaide, Macleod and Bulldog banks.)

Concerning the semi-industrial tuna and swordfish fishery; the availability of the resource does not appear to be a major constraint, although IOTC has noted that local swordfish stocks may be over fished, (Report of the Seventh Session of the Scientific Committee of the IOTC. November, 2004). Fishing techniques need to be refined and predation from false killer whales kept under control. There is a need to carry out new research surveys on demersal (deep-water snapper and grouper) and small pelagic fish stocks - sardines, anchovies, horse mackerel (Decapterus spp). Indeed, since the late 1970s and early 1980s when several demersal trawl surveys were carried out by R/V Prof. Metsyatsev (1976-77), Nauka (1979) and Coriolis (1980) and pelagic acoustic surveys by the Dr Fridjof Nansen (1979) and Coriolis (1979-80) giving estimates of distribution and abundance of stocks (Tarbit, 1980), no other surveys have been carried out in the Seychelles EEZ. The estimated biomass of decapterus obtained from the acoustic surveys is particularly interesting, with estimates of total biomass ranging from 115,000 to 150,000 tonnes and a conservative MSY of 45,000 suggested by Tarbit (1980). In this respect, SFA needs to take advantage of the EU financed tuna tagging project, with pole and line tuna vessels using live bait, to obtain more information on pelagic (both small and large) stocks.

Another area where output from the fishery can be improved is in the marketing strategy. At present there are only two fish exporting companies who tend to concentrate on exporting to large markets. There is a need to identify new, perhaps smaller, overseas markets (‘niche markets’) in particular in the Far East and encourage more investors to enter the export trade so as to increase competition and give a better price to the fishermen. One area that deserves closer attention is the marketing of shark products such as meat, cartilage, skin and oil, as these products are in high demand on world markets. In order to assist in the marketing of shark products, a foreign expert could be recruited with funding being sought from the EU. Exporting more fish products must not be achieved at the expense of lowering quality standard. The policy of grading and offering higher prices for premium quality fish has to be encouraged to ensure that only fish of the highest quality is landed and exported.

Related to this, improvement on returns in the fishing sector requires more efficient post harvest handling and quality control, thus maximizing export value. More investment by the private sector in fish processing facilities with the accepted standards of hygiene and quality control would also lead to an increased catch rate and improved earnings. This would have a direct bearing on the purchasing power of fishermen and contribute to alleviate national employment.

3.3.4 Threats

When assessing the contribution of the fishing industry in the economic development of the country, one needs to consider the numerous threats that can hamper economic development.

The major threat facing the fishing industry (whether artisanal or semi-industrial) is the over-exploitation of the fishery resources and localized over-fishing. This could lead to
the disappearance of certain target species (such as cordonnier and bourgeois) and would require closer monitoring of marine resources and updating management options.

A further threat to the artisanal fishing industry is the increased competition in the export market from countries such as India, Dubai, Oman, and Indonesia etc., that export the same species as Seychelles but at a much cheaper price. This threat is compounded by the high value of the Seychelles rupee. For example, Mauritius (which imports fish from the above countries) finds it difficult to import fresh fish from Seychelles due to the high value of the Seychelles rupee (a 5 kg bourgeois selling for SR 100/- in Seychelles would cost MR 500/- plus freight, in Mauritius).

Hence Seychelles’ competitive position is dependent on the stability of the exchange rate and securing cargo space on shipping vessels and airlines.

The same applies for the industrial fishing sector where the predominant position of Port Victoria as the main tuna transhipment port in the Indian Ocean is being challenged by other regional ports, in particular the East African ports of Mombassa, Dar-es-Salaam and Port-Louis (Mauritius).

The key to the development of the artisanal fishing industry is to identify new export markets as well as training fisheries personnel and fishermen. Emphasis should be placed on the constant monitoring of the industry and devising good management plans and policies ensuring sustainable development of the sector while avoiding confrontation with the various stakeholders.

3.3.5 Conclusion

The fishing industry is one of the most important sectors of the Seychelles economy and its development is crucial to the financial health of the nation.

The contribution of the sector can be further enhanced by utilising the various options available for fisheries development such as improving the quantity and quality of fish landings, utilizing under-exploited resources, identifying new export markets etc ... This can be achieved through application of well-defined policy guidelines and effective planning that will allow for the smooth development of the industry.

4. PRESENT EMPLOYMENT SITUATION IN THE PRE-HARVEST SECTOR

Besides the canning factory and the Coetivy prawn farm, the number of persons directly employed in the preharvest fishing sectors in 2005 amounted to approximately 1,750, representing 5% of total employment.

The employment opportunities in the various fisheries sub-sectors are discussed below and are dependent on the state of the resource, the constraints and prospects for future development.

Table 4.1 gives an estimate of present and future employment potential in the various artisanal fisheries.
4.1 The Artisanal Sector

The artisanal fishing sector can be divided into various types of fisheries, which include the following:

4.1.1 The Handline Fishery

This is by far the most important type of fishery accounting for more than 73% of total fish landings. Almost all types of fishing vessels are involved in the fishery – Mini Mahé, whalers, Lekonomi, Lavenirs and schooners and because it targets the same species, the dropline fishery has also been included in this category.

**TABLE 4.1(I)**

<table>
<thead>
<tr>
<th>Type of Fishery</th>
<th>No. of Persons Employed</th>
<th>Potential for Future Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demersal Handline</td>
<td>1000</td>
<td>Moderate</td>
</tr>
<tr>
<td>Trap</td>
<td>350</td>
<td>Moderate</td>
</tr>
<tr>
<td>Net (mackerel)</td>
<td>90</td>
<td>Moderate</td>
</tr>
<tr>
<td>Octopus</td>
<td>60</td>
<td>Moderate</td>
</tr>
<tr>
<td>Lobster</td>
<td>40</td>
<td>Poor</td>
</tr>
<tr>
<td>Crab Giraffe</td>
<td>10</td>
<td>Moderate</td>
</tr>
<tr>
<td>Live-Fish</td>
<td>N/A</td>
<td>Poor</td>
</tr>
<tr>
<td>Mothership</td>
<td>N/A</td>
<td>Poor</td>
</tr>
<tr>
<td>Sports</td>
<td>60</td>
<td>Good</td>
</tr>
<tr>
<td>Sea Cucumber</td>
<td>100</td>
<td>Moderate</td>
</tr>
<tr>
<td>Shark</td>
<td>40</td>
<td>Poor</td>
</tr>
<tr>
<td><strong>TOTAL No. Employed</strong></td>
<td><strong>1750</strong></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 4.1 – ARTISANAL FISHERIES**

*Estimated present employment and potential for future employment*

<table>
<thead>
<tr>
<th>Type of Fishery</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carangues</td>
<td>38.0</td>
<td>30.0</td>
<td>30.0</td>
<td>37.0</td>
<td>30.0</td>
<td>41.6</td>
<td>33.6</td>
</tr>
<tr>
<td>Bourgeois</td>
<td>5.0</td>
<td>13.0</td>
<td>10.0</td>
<td>8.7</td>
<td>14.1</td>
<td>10.0</td>
<td>11.5</td>
</tr>
<tr>
<td>Job Gris</td>
<td>11.0</td>
<td>18.0</td>
<td>17.0</td>
<td>11.6</td>
<td>16.4</td>
<td>12.4</td>
<td>15.8</td>
</tr>
<tr>
<td>Emperors</td>
<td>5.0</td>
<td>8.0</td>
<td>5.0</td>
<td>8.9</td>
<td>11.3</td>
<td>6.9</td>
<td>6.1</td>
</tr>
<tr>
<td>Bonito</td>
<td>5.0</td>
<td>1.0</td>
<td>3.0</td>
<td>1.7</td>
<td>1.2</td>
<td>1.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Groupers</td>
<td>3.0</td>
<td>3.0</td>
<td>3.2</td>
<td>2.5</td>
<td>1.5</td>
<td>2.4</td>
<td></td>
</tr>
</tbody>
</table>

Source: SFA Annual Report
Unfortunately, there is currently no reliable information on the total number of full-time commercial fishermen within the population. This is partly as a result of the lack of distinction between recreational and part-time fishermen and full time commercial fishermen. SFA has introduced a system to register all full-time fishermen but up to now the list has never been completed, mainly due to a lack of cooperation by full-time fishermen (Wakeford, 2000).

From this consultant own count it has been estimated that the hand-line demersal fishery employs around 1,000 full-time fishermen plus an indeterminate number of part-time and recreational fishermen. The fishery targets mostly high value demersal species, such as snappers and groupers on the Mahé and Amirantes Plateaux as well as semi-pelagic species such as carangues and becunes caught mostly inshore within a radius of 15 miles from the main granitic islands. This fishery provides the main landings for national consumption and export trade.

Table 4.1(I) shows the relative importance of the main species landed by the hand-line fishery and indicates that although there are annual fluctuations in landings, there appears to be no long-term declines in catch rates of most species.

This would suggest that the inshore resources have been heavily exploited and stocks located around the edge of the Mahé Plateau and offshore are still lightly exploited and the biomass has remained constant.

Constraints

The main constraints facing the fishery is the declining catch rates of the target species such as bourgeois and vieille, which are high valued species, destined for both the local tourist industry and export trade. Moreover, the practice of paying a higher price for plate-size fish should not be encouraged.

The other major constraint to the fishery is the access to credit since most fishermen must provide the necessary collateral or a guarantor in addition to a sizeable deposit (25% to 40% of the capital). The DBS grants loans of between SR25,000 to SR 6 million. From 1991, loans were granted at an annual interest rate of 9% for loans up to SR50,000 and at 12% for loans over SR50,000. Unlike the DBS, the YES scheme does not require a form of collateral or a guarantor. Moreover, insurance costs are very high representing up to 7% of the investment. Hence fishermen face difficulties at meeting loan repayments in particular during the S.E Monsoon when the financial returns are lower.

The DBS is currently being used within the fisheries sector to acquire the capital necessary to purchase large boats, whereas the YES initiative is used to purchase small boats. It is therefore a contradiction that financial incentives are given to increase the level of fishing pressure where it is least required, i.e. inshore areas (Wakeford, 2000). In addition there are high operating costs with fluctuation in the market price (in particular during the good fishing season). The availability and cost of spare-parts and fishing equipment is a further constraint in particular due to the foreign exchange situation.

Finally the periodic shortage of ice and bait and difficulty in obtaining reliable crew is a problem for boat owners, in particular for larger vessels. The new Agriculture and Fisheries (Incentives) Act, 2005, permitting boat owners who have invested more than
SR300,000 to be exempted from paying G.O.P when recruiting foreign crew, should help to alleviate this problem.

**Prospects**

The resource base in Seychelles waters could be a constraint, and pending the availability of more accurate statistics on the demersal stocks, a precautionary approach should be taken for any large-scale increase in the fishing effort.

Some unexploited potential exist for demersal resources at the slopes of the Mahé Plateau and certain offshore banks in the Seychelles EEZ. Tarbit (1980) has estimated the total biomass of demersal resources on the Mahé Plateau at 80,000 tones and Mees (1996), has since revised this estimate of the total biomass of commercially important demersal species available to the hand line fishery at 42,000 tones, with an MSY of 5,650 tones.

Upgrading of the fishing fleet and more widespread use of ice would permit a higher quality fish to be landed (in particular for the export trade). Although considerable effort has been made by SFA towards upgrading fishing vessels and providing better distribution of ice, there is still room for improving living and working conditions on vessels as well as safety standards. Moreover, the importation of fish boxes (by SFA) to be sold to professional fishermen for preservation of the catch would play a valuable role in improving fish quality, enabling fishermen to have a better price for their catch (in particular at the district landing sites) and increasing family income, thus encouraging more fishermen to enter the fishery.

The demersal handline fishery has been given a much needed boost by the introduction of the Agriculture and Fisheries (Incentives) Act, 2005, which will ensure that fishermen pay no business tax and only boat owners making a profit of more then SR240,000 pay 15% business tax. In addition boat owners will pay no trades tax on imported capital equipment, consumables and raw materials and receive a further rebate on fuel. These incentives should play a valuable role in attracting serious fishermen and boat owners to invest in the industry as well as in contributing to improve fishermen’s incomes. In order to ensure the sustainability of the fishery however, management measures need to be introduced such as Protected Areas and introducing minimum size limits for certain target species such as bourgeois.

The employment potential for this fishery is considered to be moderate pending confirmation of unexploited demersal resources in the Seychelles EEZ through new resource surveys.

**4.1.2 The Trap Fishery**

This fishery provides approximately 15% of total fish landings and its importance is underscored by the fact that it is the only technique that can be used to catch certain species such as ‘cordonnier’ and ‘cacatoi’.

The fishery targets mostly species associated with reefs and shallow coral banks. It shows a strong seasonal nature, with effort concentrated in the S.E Monsoon when
rough weather forces fishermen to operate in inshore areas (sometimes in lagoons protected by reefs). Trap fishing is often undertaken by fishermen to supplement other fishing activities.

Constraints

The major constraints facing this fishery include the large number of traps and the problem of inadequate statistics. Fishermen also experience problem in obtaining bait, which is sometimes very expensive. The problem of lost traps through theft and by fishermen (including divers) tampering with fish in the traps is another issue. The shortage of construction material (bamboo or metal meshing) and scarcity of trap manufacturers is a serious constraint.

Moreover, the high cost of traps makes the trap fishery a high-risk investment - a trap with rope costs an average of SR 500/700. Fishing with traps in the spawning period (in particular for cordonnier) at full and new moon is a severe problem for the resource. Trap fishermen sometimes find themselves in conflict with tourists, in particular from high class hotels, which look forward to a pristine and eco-friendly environment, which to them is in conflict with trap fishing.

Finally, the recent Tsunami disaster has destroyed a large number of traps, in particular in inshore areas on the East and West coast of Mahé and it is likely that there will be a decline in the landings from this fishery in the next South East Monsoon where fishing effort by the trap fishery is concentrated inshore, mostly inside the reef.

Prospects

Although there are signs that some trap species (in particular cordonnier) are getting scarcer the resource overall is still stable.

In order to prevent over-exploitation of the trap resource in future some basic management measures should be implemented.

There should be better monitoring and enforcement of the fishery particularly in respect to undersized traps and traps with metal mouths which are not biodegradable. Another proposed management measure, is the prohibition of trap fishing inside reefs during the N.W Monsoon and avoiding fishing with traps for cordonier during the spawning period, i.e. two days before and after the full and new moon. Enforcement of these measures (although by no means an easy issue) should be seriously considered in order to avoid further resource depletion in particular in Marine Parks, which are important breeding grounds and also provide nurseries for juveniles.

4.1.3 The Net Fishery

This fishery mainly targets mackerel and consists primarily of two types of gear: beach seine and gill nets. Beach seine are only utilized at Beau Vallon in the North-West Bay whilst gill nets are used as an encircling net or set gill nets and are more widely used around the granitic islands.
The catch from this fishery is used primarily for domestic consumptions and if the price is reduced, mackerel is usually purchased for bait.

All nets are licenced and the operation is usually carried out with a Mini Mahé with a crew of 3-4 persons. The latest survey indicates that there are approximately 25-30 fishing boats involved in this fishery, which would provide employment to a total of 100-110 fishermen.

A potentially important net fishery for small pelagic stocks, in particular horse mackerel (*Decapterus*) was identified on the Mahé Plateau in the late 1970s and early 1980s (section 3.3.3) with a total biomass of 150,000 tones and an MSY of 45,000 tones suggested by Tarbit (1980).

**Constraints**

The major obstacle with the fishery is the periodic abundance of the resource with periods (years) of scarcity being followed by glut periods. This leads to marketing problems with fishermen being unable to dispose of their catch; during glut period’s mackerel are discarded or sold at a very cheap price. The problem is compounded because mackerel is easily spoilt especially when left in the sun, due to its high oil content. Hence although mackerel is the bait of choice for fishermen, it is difficult to procure it on a regular basis. The fact that there is a lack of storage facilities to freeze mackerel to be used for bait compounds the problem.

**Prospects**

The resource base is not a constraint for this fishery although the seasonability can be considered a problem for efficient utilization of the resource. The main problem facing the fishery therefore is how to cope with the marketing issues arising from the post-harvest situation. If these could be resolved the resource would be utilized more efficiently with higher economic returns and better prospects for more fishermen to enter the fishery. There is a need to carry out new resource surveys in particular for mackerel and *Decapterus* to confirm the presence of these species on the Plateau as reported by acoustic surveys in the late 1970s and early 1980s. In this respect the EU financed tuna tagging project utilizing the pole and line fishing technique with live bait, should reconfirm the availability of these bait species on the Mahé Plateau (and the Seychelles EEZ). Indeed, should the results prove positive it could give rise to a lucrative fishery for local fisherman in particular since the project is also prepared to finance fishing equipment (fishing nets, underwater lights, winches etc) for fishermen (pers. com. Head of the EU Delegation). The prospect of utilizing underwater lights at night to catch bait species is an option that should be seriously considered for the future.

### 4.1.4 Octopus Fishery

This fishery can be considered as a part-time subsistence fishery with the resource targeted mostly by skin divers and foot fishermen who usually utilise a pointed iron spear or wooden stick.

The annual landings are around 50 MT although the fishery is subject to high variability in annual landings. The principle markets are hotels and restaurants catering for the
tourism market and take-aways with a limited quantity sold to other private domestic purchasers.

Constraints

A major problem facing the fishery is the periodic fluctuation in landings that can be associated with a resource constraint. Another difficulty is that marketing is done independently of the size of the catch as octopus is usually sold by weight rather than by size.

Although a maximum size limit can be set, one problem that can hamper the effectiveness of this measure is the fishing technique (spearing with a stick), which may result in the death of the animal, even if undersized octopus is returned to the sea.

In view of the subsistence nature of the fishery it would be difficult to enforce size or weight limits. Perhaps a more suitable management option would be to ban is octopus fishing in Protected Areas and increase enforcement in Marine Parks in particular around St. Anne and Cerf Island, important breeding grounds for octopus.

Prospects

There appears to be no constraints with the resource base and, as there is a high demand for octopus, marketing is not an issue. The fishery is mainly a subsistence level and does not represent a threat for the sustainability of the resource. However, there are few prospects for more fishermen to enter the fishery and/or an important increase in landings. It is recommended that the resource be utilized only for the domestic market since it is doubtful whether it could withstand an export fishery.

4.1.5 Lobster Fishery

This is a seasonal fishery with the an open season from the beginning of November to the end of January. Lobsters are harvested at night by skin divers using underwater flashlights.

Since 2001 there has been an average of 30 licences granted annually with each licence covering up to three divers.

Almost all the catch is sold to local hotels and restaurants at an average price of SR100/- per lobster. A Lobster licence costs SR 550/- and a restriction of 30 licences exists despite the high demand.

The fishery has remained closed over the last two years as the resource was considered over-fished.
Constraints

It is difficult to enforce the regulation and illegal fishing activity is a major problem even outside the closed season. This is not only a concern for the resource base but to licensed fishermen who feel that illegal fishermen encroach on their market and undercut their prices.

Prospects

The major concern for the future prospects of the fishery is the resource base. The fact that the fishery remained closed for several years between 1983 to 1989 and did not show a significant stock recovery when it was re-opened in 1989 underscores poor recruitment or poor enforcement. It is estimated that only 10 MT were landed during the 1989/1990 season when the fishery was re-opened.

The best policy is a constant monitoring of the resource and continue to restrict the number of licences issued when the season is opened. In the meantime lobster for the tourism trade should be imported to supply the local market as well as undercutting the demand for local lobster.

The possibility of a moderate exploitation of the resource on the coralline islands for the local tourism market could be explored but the potential for any large expansion of the fishery is limited.

4.1.6 Crab Giraffe Fishery (Ranina ranina)

This fishery is carried out by a maximum of three vessels using loop tangle nets. The crabs are found on the Mahé Plateau but their distribution and density vary according to the season and the type of substrate. The species has been caught throughout the year though it shows a marked scarcity in the S.E Monsoon.

In the last 10 years annual landings have ranged between 10 MT to 30 MT.

Constraints

Very little is known of the biology and seasonal distribution of this crab except that the wide seasonal variations restrict fishing activity. Limited demand, both for the local and, export market, impedes the development of the fishery.

Prospects

Bearing in mind the fact that fishing pressure is still light the resource base would not appear to be a limiting factor. The main issue is improving marketing of the product and profitability of the fishery. Trials with the export of live crab have been carried out with mixed results but they should be pursued. The catch of the fishery should continue to be closely monitored. Should secure markets be identified, good potential for expansion of the fishery exists.
4.1.7 Live Fish Fishery

This fishery targets some high valued species such as snappers, groupers and emperors, which are sold on the Far East market (mainly Hong Kong). Only one company was authorized to carry out live fish fishing operations from Farquhar in 1997 and it involved a group of 40 fishermen from China.

The company exported three consignments of approximately 20 MT of fish to Hong Kong by sea. Fish are stored in cages and require special care to reduce mortality. In the Philippines and Indonesia, where such fishing practices were widespread, the fishery has been rather destructive both to fish stocks (fish of lesser value are used as trash food for feeding prized live fish) and to the habitat. Severe resource depletion followed.

Constraints

The 'Live Fish Fishery' targets three or four fish species that fetch a very high price on the Far East market. The mortality rate is high even when fed with fresh trash fish. Hence, the fishery is in direct competition with the traditional handline fishery.

Prospects

The resource base for this fishery is very limited and the fishing technique is in most cases harmful both to fish stocks and to the environment. Marketing is very sophisticated and it is doubtful whether any Seychellois entrepreneurs could pursue this fishery profitably. It is therefore recommended that this fishery be prohibited in Seychelles waters.

The potential for employment for this fishery is poor to non-existent.

4.1.8 Mother-Ship Dory Ventures

Mother-ship dory operations consist of a large mother-ship vessel (usually a refrigerated cargo/reefer vessel) equipped with at least a dozen small boats that fish within the vicinity of the anchored mother-ship. All small fishing vessels return to the safety of the larger vessel with their catch before nightfall.

In Seychelles the earliest mother-ship-dory venture operation dates back to the early 70s when several foreign-owned vessels were authorized to fish in Seychelles waters. Because these ventures were never closely monitored very little is known of the economic viability of the venture except that fish stocks around certain outlying islands such as Providence and Farquhar were severely depleted (Harris, A. et al.1995).

The last mother-ship dory operation was that of the “Pecheur Breton” in 1991-1993 and contrary to previous operations, SFA observers were placed on board to record the catch and monitor compliance with Licence conditions.

The mother-ship venture because it fishes with a large number of boats, covering a restricted area, accounts for a high fishing pressure on the resource. It is an efficient fishing technique in terms of volume of fish caught but requires efficient handling, processing and freezing to ensure fish quality. In any case all fish caught by such fishing
technique are frozen and the market value of the catch is automatically reduced. Therefore, unless such operations are well managed, it can be very wasteful in terms of the quality of the final product while at the same time having severe repercussions on the state of the resource.

**Constraints**

In the early 1990s the SFA drew up a mother-ship-dory management plan restricting fishing operation to certain islands of the Amirantes, and Southern islands of the Seychelles Group but banning fishing operation on the Mahé Plateau. If these measures are enforced it would in effect make such ventures economically unviable.

**Prospects**

A mother-ship dory operation can be made viable when fishing grounds (or fishing banks) are located at long distances from the home port and can only be accessible by larger vessels that provide a safe fishing base. Such is the case in Mauritius, where several mother-ship operations exist, exploiting distant water banks (such as St Brandon, Agalega, Saya de Malha and the Chagos Archipelago) that are beyond the autonomy of smaller fishing vessels. In the case of Seychelles, it is therefore strongly recommended that the present management measures be enforced and no licences be granted to such operations.

4.1.9 Sports Fishery

Sport fishing, primarily for big-game fish, is an important activity for charter boat owners catering for tourists although the sharp reduction in the catch rate of inshore pelagic resources in recent years (in particular tuna) is forcing a change in the focus of these activities from fishing to pleasure boating.

In January 2004, there were 30 licenced sport fishing vessels participating in the fishery with daily rates of around SR 6000 for six persons. Although charter fishing vessels are required to complete a logbook for SFA, compliance has been poor.

**Constraints**

The major constraint to this fishery is the lack of large pelagic species on the Mahé Plateau. Since most operations are day charters, the boats are restricted to fish on the Mahé Plateau where large pelagic species (in particular tuna) are very scarce. This problem dates back to the last 20 years and is related to the number of purse seiners licensed to fish in Seychelles waters. These vessels that target tuna schools and other pelagic fish (such as dolphin fish, kingfish, sallfish and marlins as by-catch) reduce the occurrence of such species on the Mahé Plateau. SFA has taken the initiative to anchor FADs (at least six have been placed so far) on the Plateau to attract pelagic fish targeted by the sport’s fishery. Another problem to this fishery is a market constraint with a limited number of clients willing to pay large sums of money to charter vessels.
Prospects

Although the prospects for the sports fishery, in particular for larger charter vessels fishing outside the Mahé Plateau are good, the revenue has declined in recent years. Some charter boat owners have invested in sailboats, which are used purely for pleasure cruising.

Another alternative would be to upgrade charter vessels to be able to carry out several day trips beyond the edge of the plateau. In any case the new Tourism Board, together with the Marine Charter, would need to market Seychelles as a big game fishing destination to attract the necessary clients. The charter boat fishery is particularly important for island resorts with hotels – such as Denis, Bird, Alphonse, and Desroches etc. These islands have a potential to develop this lucrative business on a much wider scale than for the charter vessel based on Mahé. In this respect the development of fly fishing for tourists in the outlying islands, in particular Alphonse and Desroches, looks very promising and should be encouraged by the tourism department with the promotion of Seychelles as a fly fishing destination on the world market.

It is estimated that at least 60 persons are presently involved in this fishery but the future employment prospects for are very good, provided the proper marketing strategy is adopted.

4.1.10 Sea Cucumber Fishery

This fishery is carried out by skin divers (as well as scuba divers). The sea cucumber is either salted or dried directly and exported to the Far East markets (mainly Hong Kong). Sea cucumber exports are given in Table (4.1.10) below and show a significant increase in 2003. Although a licenced fishery, the data collected is not accurate and does not reflect the real exploitation of the resource. Many small, unlicenced producers sell directly to the processors/exporters and these statistics are not recorded. The SFA is presently carrying out a research programme as part of an FAO project with the objective of setting up a Management Plan for the fishery. This is a limited entry fishery with only 25 licences granted to fishermen (of which around 16 units are active) and four to processors/exporters. This would indicate that at least 100 persons are presently involved in this very lucrative fishery.

Constraints

Lack of accurate resource data is the major constraint. Producers selling directly to processors/exporters are also a problem. SFA should continue to limit the number of licences issued, pending a review of the fishery and the establishment of a proper management plan.
**Prospects**

SFA will be implementing a management plan for the fishery, which is expected to be ready by the end of 2005.

If the fishery is closely monitored and well managed it should provide a reliable source of foreign exchange for exporters and producers alike, in particular now that the new Agriculture and Fisheries (Incentives) Act, 2005 has created more favorable investment conditions for these operators.

<table>
<thead>
<tr>
<th>TABLE 4.1.10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity and value of sea-cucumber exported</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Qty (Kg)</td>
</tr>
<tr>
<td>16,035</td>
</tr>
</tbody>
</table>

Source: SFA Annual Report

**4.1.11 Shark Fishery**

Shark are fished mostly by long-lines as gillnets have been banned since 1998. In view of the high demand for shark fins from the Far East markets, the fishery has shifted from a purely by-catch fishery to a target fishery, with most fishermen keeping only the fins and discarding the carcass at sea. The fishery is presently being carried out by certain semi-industrial longline vessels since the target species - swordfish and tuna – have showed a reduction in catch rates. Very little data is presently available on the shark fishery, which makes implementation of management measures for this fishery difficult. According to recent anecdotal evidence, shark catch rates have declined drastically in recent years, in particular on the Mahé Plateau, which makes the necessity to implement management measures even more urgent. It is also common knowledge that an important source of shark fins is from industrial tuna fishing vessels operating in Port Victoria.

**Constraints**

The main problem facing this fishery is the difficulty in obtaining accurate data and enforcing present management measures. This fishery represents considerable wastage mainly because no stable market has been identified for the meat, skin, jaws, oil, etc. The fishery is expensive in terms of lost fishing gear that has to be replaced and the fishing operation itself is physically demanding on fishermen.

**Prospects**

Unless the fishery is well managed and proposed management measures are enforced, the resource base will continue to decline. It is proposed that all vessels larger than 24 meters, which have separate fish holds, should return with the carcass but a market must be identified to encourage fishermen to comply. The EU has enacted legislation banning
shark fining on its vessels and Seychelles should consider doing the same for its semi-
industrial longline vessels and for Seychelles’ flag vessels. It is proposed that a foreign 
expert be recruited to advise on how to improve the marketing of shark meat and shark 
products with possible funding from the EU.

The SFA is presently working on a shark management plan that once implemented 
would play an important role in the management of the shark fishery. Based on present 
trends, the future employment prospects for this fishery would appear to be poor.

**DISCUSSION**

The Seychelles artisanal fishery (of which the sports fishery is included) is noteworthy 
due to its diverse nature in terms of its multispecies and multi-gear character. This 
however, in itself, represents a serious constraint in the management of the resource.

The Catch Assessment Survey (CAS) published annually by SFA provides important 
information on the general status of the fishery and the catch rates for the various 
commercial species. The accuracy of the CAS statistics, could improve considerably if 
more fish recorders were recruited and data was recorded from landing sites during early 
mornings (for becune and carangue in particular) and during weekends when 
recreational fishermen land large quantities of fish. Moreover, the CAS survey provides 
little information on the status of the various fish stocks, except that it shows that there 
has been a declining catch rate around the granitic islands. This is due to the increasing 
fishing pressure from coastal population on inshore resources. Although there is no 
concrete evidence of overfishing in Seychelles waters, a precautionary approach should 
be taken. SFA should also seriously consider reviewing its data collection system in 
order to improve its statistics, as future fisheries management measures will be gravely 
compromised if it is based on incomplete statistics.

With the implementation of the vessel monitoring system programme (VMS) in artisanal 
boats (even if it is only on larger vessels) more data should be available on the 
distribution of fishing grounds and various types of artisanal fishing operations in 
Seychelles waters. This would allow for a better assessment of fish stocks by fisheries 
sector and fishing banks, so as to decide on the necessary management measures that 
could be implemented and enforced. According to the MCS Manager at SFA, this is one 
of the objectives the VMS programme, in addition to monitoring illegal activities and 
improving safety at sea.

In the final analysis, the choice should be between the sustainability of the resource on 
one hand and further exploitation on the other. In short, whatever the social and 
economic objectives of fisheries development may be, emphasis should be placed on 
sustainable resource use and the protection of the Environment. This should always take 
precedence over any social objectives, including the creation of employment, since 
overfishing will result in a failure to meet other, non-biological objectives.

**4.2 Aquaculture**

Although several aquaculture projects have been discussed in Seychelles, only three 
projects have been implemented so far. The availability of land and fresh water
resources being a limiting factor, any aquaculture project would have to be marine-based aquaculture or more precisely mariculture. There are presently three ongoing mariculture projects in Seychelles, all being located outside Mahé. These are the Coetivy Prawn farm, the Pearl Oyster farm and Giant Clam farm located on Praslin.

4.2.1 The Prawn Farm

The Prawn farm is operated by the Seychelles Marketing Board and is located on Coetivy Island 300 kms from Mahé. The farming operation started in 1989 and now occupies at least 50% of the island (including housing facilities for the staff) with 200 rearing ponds covering a total area of 80 hectares. The main species reared is the giant black tiger prawn (*Peneus monodon*) with brood stocks still imported from Madagascar and Mozambique. In 2003, 835 MT of frozen prawn were exported to a value of SR 37.9 million. This represents almost a 300% increase over the export for 2002 when only 218 MT were exported to a value of SR 8.7 million. The farm presently employs a total of 337 workers of which only 62 are Seychellois (18%), the rest being expatriates (mostly from Sri Lanka and Thailand).

The Coetivy farm has experienced severe difficulty in recruiting local labour because most Seychellois workers find island life isolated and rather tough. According to a senior employment officer, the turnover rate of Seychellois working on the farm is high and a special vocational training programme is being planned at the MTC (Maritime Training Centre) to recruit and train workers willing to work on the islands.

4.2.2 Pearl Oyster Farm

The Praslin Ocean Farm Ltd. was established in 1995 and is located in the National Park between Praslin and Curieuse covering a total area of 18.7 hectares. An underwater longline system (demarcated by surface buoys) is utilised for the production of adult oysters and the collection of spats (Oyster juveniles) from the wild. When the oyster is mature (taking approximately two years) a nucleus is inserted by a foreign expert to produce a pearl. The nucleus once inserted takes two years to produce a round pearl of marketable size. In 2003 approximately 750 oysters were harvested with the yield being more than 98% and it is expected that production in 2004 will improve as more oysters were grafted in 2001/2002, which should be ready for harvest in 2004.

The harvested pearls are washed with salt and sorted according to size, colour and thickness, and exported mainly to Japan and Australia. The farm employs limited manpower, which includes two Seychellois workers/divers, the owner, and the Japanese expert who visits the farm for a few weeks every year to carry out the grafting operation.

During 2004, a dispute arose between the local fishermen from Praslin (mostly trap fishermen) and the Environment Ministry on the authorization allowing them to fish (set fish traps) in the Park during the S.E Monsoon. Fishermen argue that they should have the same right as the farm owners, if not more so, since they are Seychellois nationals.

4.2.3 Giant Clam Farm

The Giant Clam farm, which is under the same management as the Pearl Oyster farm, was established in 1993. The clams are reared in four raceways located on land at
L’Amitié, next to the Praslin airport. Clams are exported for the aquarium trade but although 7,026 giant clams were exported between 1993 and 2001, demand has slowed down considerably and in 2003 only 300 clams were exported compared with 600 for the previous year. The main problem is that market demand in the worldwide aquarium trade is for clams with vivid colours, while the clams produced in Seychelles are mostly brown in colour. The farm employs two Seychellois workers with the owners assisting.

Table 4.2.1 below shows the export performance of Prawns, Clams and Pearls Oysters from Seychelles.

<table>
<thead>
<tr>
<th>Year</th>
<th>Frozen Prawns</th>
<th>Pearls</th>
<th>Giant Clams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity (tons)</td>
<td>Value SR’000</td>
<td>Rounds</td>
</tr>
<tr>
<td>1992</td>
<td>14</td>
<td>338</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>62</td>
<td>2,750</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>38</td>
<td>1,855</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>128</td>
<td>6,874</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>188</td>
<td>10,893</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>406</td>
<td>22,664</td>
<td>170</td>
</tr>
<tr>
<td>1998</td>
<td>581</td>
<td>34,103</td>
<td>800</td>
</tr>
<tr>
<td>1999</td>
<td>159</td>
<td>7,738</td>
<td>180</td>
</tr>
<tr>
<td>2000</td>
<td>345</td>
<td>18,867</td>
<td>270</td>
</tr>
<tr>
<td>2001</td>
<td>251</td>
<td>13,238</td>
<td>15</td>
</tr>
<tr>
<td>2002</td>
<td>218</td>
<td>8,734</td>
<td>-</td>
</tr>
<tr>
<td>2003</td>
<td>835</td>
<td>37,976</td>
<td>622</td>
</tr>
</tbody>
</table>

Source: SFA Annual Report

4.2.4 Constraints

The major constraint for the development of mariculture in Seychelles is the availability of sites, both on land (for ponds) and at sea (for cages and longlines). Land sites are a constraint since marine aquaculture projects have to be located next to the sea or within close proximity to pump seawater. Even land or closed lagoons (such as at Providence) around the reclamation project is not appropriate as the water around it is very silted and would adversely affect production.

Sea cages sites or any mariculture concession at sea, is also limited because it has to be located in protected areas and not interact with other stakeholders (marine parks, fishing activities, tourism, navigation passage etc.). The Seychelles has a vulnerable and limited coastal zone, which is under heavy demand for development projects, and the environmental awareness of such developments is quite high. In addition the problem of security from theft has to be considered. Hence the best location is on an outlying island
away from the main population centres but the cost of production on an island far from Mahé is high due to the need to transport staff, material and supplies. Moreover, it is difficult to recruit Seychellois workers to work on islands.

The second most important obstacle that hampers the development of aquaculture projects is that Seychelles has a plentiful supply of high quality wild fish that are readily available at a low price. It would therefore be difficult to compete with the locally caught fish due to the high cost of production of cultured fish. Moreover, any mariculture project for fin fish requires a high capital investment with advanced technology for setting up the project, rearing the species and marketing the final product. The high cost of investment for most mariculture farms discourages private investment since the risk factor is also very high (aquaculture projects are notorious for disease epidemics). The case in point is the Coetivy Prawn farm where the project occupies at least 50% of the island with sophisticated equipment having to be imported and annual production of prawns being extremely erratic.

The other factor to be considered is the cost of transportation, in particular airfreight costs that can be prohibitive. Currently the national airline has limited cargo space, which may hinder the export of perishable marine products, in particular if the animal is to be transported live.

4.2.5 Prospects

For the reasons stated above, the consultant believes that the prospects for further development of aquaculture in Seychelles is at best poor, with the exception of culture of high-valued species such as pearl oysters and possibly marine prawns. It is doubtful if any fish farming venture, in view of the high cost of operations (including availability of land and marine sites), could compete with high quality wild caught fish readily available on the local market at a very low price.

The example of regional states such as Mauritius and Réunion certainly speak for themselves. Mauritius, with limited natural marine resources but with more land, fresh water resources and a high demand for fish and fish products, has yet to prove the economic viability of any aquaculture projects - even in the private sector. Aquaculture trials carried out with several species, including fresh water prawns (*Macrobrachium rosenbergii*), red tilapia, and red claw (*Cherax Quadricarinatus*) have all ended in dismal failures, despite heavy investment by both the government and the private sector.

The same is true of La Réunion where, despite the scarcity of marine products and a high demand for these species, trials to farm marine turtles, red drum and red tilapia have yet to prove their economic viability.

Therefore, before Seychelles considers the promotion of any new aquaculture projects (except for the two already attempted) it should study the trials carried out in these two neighbouring states. These examples illustrate the problems facing aquaculture development in a small developing island state such as Seychelles.
4.3 The Semi-Industrial Fishery

The semi-industrial longline fishery targets swordfish and tuna stocks found outside the Mahé plateau but mostly within the Seychelles EEZ. The fishery started in 1993 with first fishing trials carried out on the research vessel 'Etelis', by Mr. William Travis, a fisheries consultant recruited by SFA.

The Seychelles owned fleet comprises up to 12 vessels ranging in size from 14 to 22 meters with an average of 5 - 6 crew per vessel. Most vessels were purchased overseas, mainly from Sri Lanka and, are equipped with modern electronic equipments and monofilament longline spools.

The peak landing of the semi-industrial fleet was approximately 500 MT/year with swordfish being the predominant species (60% of the catch) followed by yellowfin and big-eye tuna. The catch is sold to the two export companies, Oceana Fisheries and Sea Harvest, exporting primarily to the EU (UK, France and Italy). In the last two years however, there has been a considerable decline in the catch which can be attributed to a drop in the fishing effort due to the export ban on sword fish exports to the EU, hence forcing fishermen to target other species (mostly shark and sea cucumber).

Some semi-industrial vessels have benefited from soft-term loans provided under the EU/Seychelles Fishing Agreement. Their IPA status have allowed these vessels to benefit from duty free fuel, and trade tax exemption on bait, spare parts and fishing gear which has encouraged initial investment in the industry.

4.3.1 Constraints

There are several constraints facing the semi industrial fishery and that has forced the fishery in the last two years to switch from swordfish and tuna to target sharks and sea cucumber.

In the last two years a ban has been imposed on the export of swordfish to the EU due to the level of cadmium in swordfish being higher than the minimum acceptable standard set by the EU. This ban has in effect forced ship owners to seek other resources and since it coincided with a sharp demand for shark fins, most semi-industrial vessels switched to targeting these species.

The other major problem hampering the development of the fishery is a high predation rate (with losses averaging 20% on the catch) mostly from false killer whales and large pelagic sharks. This represents a considerable loss of earnings for the fishery in both biological and economic terms and although some research has been carried by SFA and IFREMER (Réunion) the problem has yet to be resolved.

Moreover, very little is known on the biology and population dynamics of the species except that the resource base is still considered to be stable although the latest scientific report of the IOTC scientific committee (November, 2004) indicates that local swordfish stocks may be over-fished. There are still no indications however, of what the maximum sustainable yield (MSY) could be. Since the semi-industrial fishing operations targeting swordfish and tuna have resumed in March 2005; results have proved very promising with certain vessels landing up to eight mt of fish per trip.
There is a need to provide more training for the crew so as to enhance the development of the fishery. At present the crews are receiving training mostly from Réunion but further training is needed although it has to be noted that unfortunately at least 50% of students who have received overseas training (in Reunion, France and Portugal) are no longer pursuing their careers in this field. Concerning this issue, SFA has played a major role with at least six of the skippers on the semi-industrial fleet having received practical training on the SFA research vessels and the three skippers presently working on the SFA research vessel, being former graduates of the MTC. Despite some obvious shortcomings, the MTC should continue to play a leading role in providing students with adequate preparation to pursue their academic and practical training overseas.

The availability of serious and well-motivated crew will no doubt play a key role in the development of the industry for the future. In this respect the new Agricultural and Fisheries (Incentives) Act 2005 that make provision for boat owners to employ foreign crew paying only a very reduced G.O.P fee should contribute to resolve the problem of poor recruitment in the longline fishery. In addition to training as seaman, the crew will require training in fish handling and quality control so as to improve the potential for the export market. In conjunction with any expansion of the fishery there will be a need to guarantee airfreight capacity between Seychelles Europe and Japan.

Finally if the fishery is to develop further there will be a need to create new port facilities, since the present facilities at the artisanal port are very congested. The project to build new port facilities for the semi-industrial fleet at Providence would be a welcome addition.

4.3.2 Prospects

In January 2005, Government officially announced that the ban on the export of swordfish to the EU would be lifted due to a change in the EU standards for heavy metal (Cadmium). This decision should give a breath of life to the semi-industrial fishery targeting swordfish, which had almost come to a standstill in the last two years. Once again, the export of these species should be revived and the prospects for further development of the fishery appear brighter with more vessels resuming their effort to target swordfish and tuna.

Since the resource base is not considered to be a major constraint (at least for the time being), the main issue is to develop a viable marketing strategy, which will permit an increase in revenue for both the producers and the export companies, thereby creating the necessary incentive for more fishermen to enter the fishery. Concurrently, market research needs to be undertaken (by SFA) to find openings for shark products i.e. meat, skin, cartilage, oil etc. since it is evident that shark could continue to be a major by-catch or even a target species. The recruitment of a foreign expert to provide advice on shark marketing would be a very valuable asset at this stage. In fact, anecdotal reports from recent trips by semi-industrial longliners targeting shark, appear to indicate that catch rates for sharks have declined drastically in particular on the edge of the Mahé Plateau.

SFA should therefore implement the proposed shark management measures as soon as possible to ensure the sustainability of this resource. The major objective would be to ensure that the catch is fully optimised whilst at the same time ascertain that the resource is not being over-exploited.
4.4 Industrial Tuna Fishing

The Industrial Tuna Fishery is composed uniquely of large foreign-owned licenced vessels that fall into two main categories: the tuna purse seine fishery, composed of EU vessels, French and Spanish, with 37 Seychelles registered vessels (11 purse seiners and 26 longliners) and the longline fishery made up mostly of Taiwanese, Japanese and South Korean vessels.

4.4.1 The Industrial Purse Seine Fishery

The tuna purse seine fishery dates back to 1984 when the European purse seiners from West Africa (mainly French and Spanish) moved to the Western Indian Ocean utilising Port Victoria as their central operating base. In the same year the Seychelles government, recognising the potential for the tuna fishery, established the Seychelles Fishing Authority (SFA) to coordinate and manage the development of the fisheries sector.

By late 1984 there was a peak of 49 purse seiners licensed in Seychelles with transhipment of 98,400 MT of tuna for the year. The fishery expanded to an annual average of 55 licensed vessels with an average catch of 300,000 MT per annum between 1989 and 2000. In the last three years however, catches have increased dramatically to peak at 407,000 MT in 2003. In view of Port Victoria’s strategic position in the middle of the tuna fishing grounds, together with efficient administrative assistance by SFA, Port Victoria has become the most important tuna transhipment port in the Indian Ocean. In 2003 more than 80% of the tuna transhipped was carried out at Port Victoria with approximately 90,000 MT landed for processing by the Indian Ocean Tuna Cannery (IOT).

The tuna purse seine fishery targets mostly surface swimming yellowfin and skipjack. From the inception of the fishery in 1984 skipjack was the dominant species making up 55-60% of the total catch. In 2003 yellowfin became the dominant species caught accounting for 48% of the landings, while a 10% drop was recorded for skipjack, making up 47% of the catch. According to available scientific evidence however, yellowfin stocks are considered to be almost at sustainable level of exploitation while the skipjack resource continues to be robust. (IOTC Scientific Report, November 2004). Table 4.4.1 gives the purse seine catch statistics for the last 10 years.
TABLE 4.4.1
Tuna catch statistics for the last ten years

<table>
<thead>
<tr>
<th>Year</th>
<th>Total catch MT</th>
<th>Catch Rate MT/day</th>
<th>Yellowfin</th>
<th>Skipjack</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Catch</td>
<td>%</td>
<td>Catch</td>
</tr>
<tr>
<td>1994</td>
<td>280,114</td>
<td>22.21</td>
<td>94,610</td>
<td>34</td>
<td>154,002</td>
</tr>
<tr>
<td>1995</td>
<td>307,135</td>
<td>21.27</td>
<td>108,123</td>
<td>35</td>
<td>159,591</td>
</tr>
<tr>
<td>1996</td>
<td>265,658</td>
<td>20.52</td>
<td>92,429</td>
<td>35</td>
<td>145,134</td>
</tr>
<tr>
<td>1997</td>
<td>271,100</td>
<td>17.41</td>
<td>71,370</td>
<td>26</td>
<td>171,404</td>
</tr>
<tr>
<td>1998</td>
<td>252,595</td>
<td>16.35</td>
<td>69,905</td>
<td>28</td>
<td>151,894</td>
</tr>
<tr>
<td>1999</td>
<td>331,424</td>
<td>23.66</td>
<td>87,659</td>
<td>26</td>
<td>213,182</td>
</tr>
<tr>
<td>2000</td>
<td>330,340</td>
<td>24.71</td>
<td>118,738</td>
<td>36</td>
<td>191,912</td>
</tr>
<tr>
<td>2001</td>
<td>296,141</td>
<td>21.77</td>
<td>112,097</td>
<td>37</td>
<td>161,107</td>
</tr>
<tr>
<td>2002</td>
<td>379,253</td>
<td>28.88</td>
<td>127,156</td>
<td>33</td>
<td>218,415</td>
</tr>
<tr>
<td>2003</td>
<td>407,684</td>
<td>34.54</td>
<td>196,388</td>
<td>48</td>
<td>190,224</td>
</tr>
</tbody>
</table>

Source: SFA Annual Report 2003

One of the characteristics of tuna caught by purse seiners destined for the canning factory is the great fluctuation in the world market price. For example in September 2004, the world market price for skipjack was 900.00 €/MT while in the following month (November 2004) it dropped to 550 €/MT.

**Seychelles Registered Purse Seiners**

In February 2005 there were 11 tuna purse seiners registered in Seychelles, all being Spanish-owned vessels. In 2003 foreign purse seiners registered in Seychelles transhipped a total of 77,876 MT of tuna compared to 53,550 MT in 2002. Of the 11 vessels, three were fully registered in Seychelles, the rest being vessels with parallel registry, i.e. registered in both Seychelles and in a third party state (Belize, Panama and Netherlands Antilles).

According to the Managing Director of Indian Ocean Trading Ltd, the company that manages Seychelles registered tuna vessels, his objective is to create an “Association Thoniere Seychelloise” which would speak in one voice so as to benefit both ship owners and Seychelles. At present Seychelles registered purse seiners pay an annual licence fee of US$60,000 (Non EU vessels or vessels that are not Seychelles flagged pay US$90,000 per annum). In addition, each vessel pays registration and other administrative charges amounting to US$15,000 per vessel.

**4.4.2 The Industrial Longline Fishery**

This fishery dates back to the early 1950s when Japanese longliners fished in the Western Indian Ocean. In 1979 after the official proclamation of the Seychelles Exclusive Economic Zone (EEZ), longliners from the Far East (mostly Japanese and South Korean vessels) were licensed to fish in Seychelles waters. The annual number of licences
issued to longline vessels averaged around 250. Between 1990 and 2001 the annual number of longline licences issued increased to a high of 415 licences in 2003 (282 Taiwanese, 43 Koreans and 90 Japanese). Seychelles has presently signed Fishing Agreements for longliners with Japan and the Taiwanese fishing associations.

A preliminary catch analysis for the year 2003, indicates that the longline catch was 6,273 MT, with the catch per unit effort (CPUE) for that period being 0.52 MT/100 hooks, (Table 4.4.2).

TABLE 4.4.2

Catch statistics for industrial longliners reported by country for 2002 and 2003

<table>
<thead>
<tr>
<th>Chapter 2 Country</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effort (Hks)</td>
<td>Catch (MT)</td>
</tr>
<tr>
<td>Japan</td>
<td>3,830,279</td>
<td>2226</td>
</tr>
<tr>
<td>Taiwan (RoC)</td>
<td>7,871.193</td>
<td>2572</td>
</tr>
<tr>
<td>Taiwan* (RoC)</td>
<td>2,028,050</td>
<td>1086</td>
</tr>
<tr>
<td>Seychelles</td>
<td>1.667,960</td>
<td>913</td>
</tr>
<tr>
<td>South Korea</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,397,482</strong></td>
<td><strong>6797</strong></td>
</tr>
</tbody>
</table>

Unlike the purse seiners, longliners target large deep-swimming tuna, in particular big-eye (favoured by Japanese longliners), which fetches a higher price on the Japanese sashimi market. In December 2004 according to INFOFISH (FAO Publication) the average price of big-eye tuna in Japan ranged from US$7,600.00/MT to US$14,000.00/MT depending on the fat content and quality of the fish.

4.4.3 Constraints

The main constraints facing the development of the industrial tuna fishery is the lack of adequate port infrastructure, such as berthing space and cold storage facilities. Purse seiners tranship most of their catch to reefer cargoes, to be transported to Europe and other regional canneries (Mauritius and Madagascar) and such transhipment operations can be carried out at anchorage. Longliners however, require more berthing space and preferably cold storage facilities (at -60° C) to store their catch for onward transportation to Japan. Because of lack of berthing space and cold storage facilities (at -60° C) in addition to the fact that fuel and shipchandling costs are high, longliners prefer to tranship directly at sea or land their catch at other regional ports such as Port Louis, Durban, Singapore and Phuket.

In view of the inadequate infrastructure facilities, Port Victoria is now facing stiff competition from other regional ports, (notably Port Louis, Mauritius), which are upgrading their facilities and where labour is much cheaper than Port Victoria. Other constraints facing Port Victoria are the operating costs (US$ 4.00/MT for transhipment and higher port fees) and lack of space to stock spare parts and repair fishing nets for purse seiners. A major complaint by ship-owners is the lack of facilities to store salt, which has to be kept in the open air, facing theft problems and unhygienic conditions.
Ship-owners also complain of the unreliability of Seychellois sailors, whom they claim are too problematic and not hard working enough, preferring to recruit sailors from Madagascar and Africa. Indeed, according to the EU Agreement all EU registered vessels should employ at least two Seychellois sailors but in January 2004 out of 39 EU purse seiners there were only 36 Seychellois crew employed on EU vessels. This is less than half the required quota agreed. Under the new EU Agreement taking effect on the 18 January 2005, if no Seychellois seamen embark on EU purse seiners, ship owners will be obliged to pay a flat fee of US$20 for every day the vessels fishes in Seychelles waters. The money collected from this source, according to the EU Agreement, should be used to train Seychellois seaman/fisherman.

Concerning the resource base itself, although there is no concrete evidence of overfishing, scientists are still concerned about the state of big-eye and yellowfin stocks in the Western Indian Ocean (Report of the Seventh Session of the Scientific Committee of the IOTC, November, 2004). The consensus is that the number of licensed vessels should be frozen at the current level until sufficient data is collected to enable the implementation of proper management measures.

One concern is the widespread use of Fish Aggregating Devices (FADs) that not only increase the catch rate of the fleet (with large catches of juvenile fish) but also increases the percentage of by-catch of pelagic species such as dolphin fish, rainbow runner, bonito, shark etc., which are generally discarded at sea.

The Indian Ocean Tuna Commission (IOTC) has proposed a one-month moratorium every year for the closure of the FAD fishery in the Somali basin and although some companies support such a moratorium, a general consensus has yet to be accepted.

### 4.4.4 Prospects

Despite the above grievances, prospects for the continued development of the industrial tuna fishery in the Western Indian Ocean and Seychelles (Port Victoria) being the base of fishing operation remain bright. Seychelles must however rise to the challenge presented by other regional ports (in particular Mauritius) that are seeking a share of the “cake”.

The major advantage Seychelles has to offer is its strategic geographical location in the middle of the tuna fishing grounds, plus the fact that it has large stocks of tuna in its EEZ.

The newly created Seychelles Ports Authority is a step in the right direction to work towards solving some of the constraints mentioned above. All ship owners feel is that the Seychelles authorities need to show more flexibility when dealing with the fishing fleet. The authorities should realise that although Seychelles has been successful in attracting and retaining the purse seining fleet, there are no grounds for complacency in such a highly competitive industry, where many factors lie outside Seychelles control. High revenues are obtained only if a high standard of service is maintained.

### 4.4.5 Development of Seychelles-owned Purse Seine Fleet

This idea has been tossed around for a long time and when taken at face value, direct involvement in the industrial tuna fishery through vessel ownership may appear to be the
best policy to maximise the national benefits to the tuna fishery and create national employment. Indeed, although it may be an attractive idea, there are some serious constraints in entering this fishery.

The extremely high technical nature of the fishery would require a high capital investment, which would in turn require high service loans. A modern purse seiner fishing in the Indian Ocean is presently valued at approximately US$ 25 million.

This represents a considerable investment in foreign exchange, given the foreign exchange constraints the country is facing. Moreover the complex vertical integration of the fishery and centralised ownership of the vessels and marketing of the catch would make it difficult to compete with a well-established fleet.

Moreover the EU represents a big market share of this business and provides heavy subsidies to EU vessels. French and Spanish companies used to receive up to 40% subsidies on construction of vessels and additional hidden subsidies and contributions towards licensing charges and cost of daily operations. Such subsidies create unfair competition and Seychelles would be unable to compete in this market.

In addition, success in the purse seine fishery is very dependent on the skill and experience of the skipper and crew. The best skippers are already employed and it is doubtful whether they would be willing to move to an untried operation, thus further limiting the potential for a successful entry in this fishery.

It is therefore advisable for Seychelles not to invest in purse seine vessels (except in the case of a favourable joint-venture) but instead concentrate on the peripheral investments locally controlled, such as licensing and the provision of goods and services to the existing fleet.

4.4.6 The New EU Seychelles Fishing Agreement

EU contribution

This is the most important fishing agreement for Seychelles and in fact the agreement is the most important tuna agreement signed between the EU and a third country.

The agreement dates from 1984, and the current protocol covers the period, 18th January 2005 to 17 January 2011. The agreement is based on a total quantity of tuna of 55,000 MT (the previous protocol was for 46,000 MT) caught in the Seychelles EEZ with the financial contribution per MT increased from 50 € to 75 € for each additional tonne of tuna caught. However, the total annual amount to be paid by the EU cannot exceed 8,250,000 €. The total number of EU vessels allowed to fish in Seychelles waters has been reduced from 67 to 52 (40 tuna purse seiners and 12 longliners).

The EU financial contribution has increased from Euro 3.46 million to Euro 4.125 million per year. From this sum it has been agreed that some financial support will be provided for the development of the local fisheries sectors. Part of the financial contribution provided by the EU will also be used to defining and implementing a sectoral fisheries policy in Seychelles with a view to promote responsible fishing and sustainable fisheries in Seychelles waters. These will include measures to enhance scientific research, vessels monitoring system, and funds allocated for technical cooperation and training.
Ship-Owners Contribution

The licence fees for the purse seiners and longliners have been increased as follows:

- Euro 15,000 for purse seiners based on 600 MT of fish caught annually inside the EEZ (600 MT @ 25 Euro/MT). The licence fee for the previous agreement was Euro 10,000/vessel (based on 400 MT of fish caught per vessel in the EEZ).
- Euro 3000 for longliners of more than 150 GRT equivalent to the fees due for 120 mt of tuna caught in the Seychelles EEZ.
- Euro 2250 for long-liners of 150GRT or less equivalent to 90 MT of tuna caught in the Seychelles EEZ.

According to the Agreement, each tuna purse seiner should employ at least two Seychellois seamen designated by the agent and in agreement with ship owners. The agreement further specifies that all Seychellois seamen should have an employment contract. The contract shall include the condition for repatriation, and guarantee social benefits such as life insurance, sickness and accident insurance and pension benefits. Seamen wages shall not be lower than those applied to non-Seychellois crewmembers performing similar duties and shall under no circumstances be below ILO standards (See Annex III for problems with local contract of seamen).

Comments on the EU Agreement

- Seychelles (SFA) needs to consider the necessity to organise the monitoring of payments for vessels fishing in the EEZ, which do not have Seychellois crew on board. The crews on vessels change constantly and this requires close monitoring to ensure compliance with the agreed clause, which states that vessels should pay US$20.00/day for everyday they are fishing in the EEZ without a Seychellois crew. Data from the VMS section should be very useful to assist in calculating payments to this effect.

- SFA should seriously consider setting up an observer programme to collect accurate data on board in particular for species composition and by-catch discarded, such as sharks, as proposed in Chapter VI of the Annex to the Agreement. The consultant is however aware of the high cost of observer programmes and the difficulty of recruiting reliable observers, but is still of the opinion that this option should not be entirely ruled out. This issue was discussed with the Executive Secretary of IOTC and although he acknowledges the difficulties of setting up such a programme he feels that a small scale programme could be started with for example one observer placed on a local 22-meter semi-industrial longliner.

- Since the new EU Agreement makes provision for a greater inter-action with the Seychelles authorities, it is more of a partnership agreement, and Seychelles must try and obtain the maximum benefits from it. For example, the Agreement states that the parties should encourage experimental fishing especially relating to deep-water species in Seychelles waters. Seychelles should take up this offer, as there is limited knowledge on the potential of this resource.
5. EMPLOYMENT SITUATION IN THE POST HARVEST SECTOR

5.1 Processing

There are three main fish processing plants in Seychelles. These are the Indian Ocean Tuna cannery (IOT) that processes tuna caught by the industrial purse seiners, Oceana Fisheries Company Ltd and Sea Harvest fish processing plants, that process and export fish caught by the artisanal and semi-industrial fishery.

5.1.1 Indian Ocean Tuna Cannery

The Indian Ocean Tuna (IOT) cannery located at Port Victoria is one of the largest tuna canning factories in the world, processing around 90,000 tons of tuna per year. It is one of a number of tuna processing plants belonging to Heinz European Seafood. The plant has a processing capacity of 417 MT per day but peak production has been 386MT/day.

IOT is by far the biggest company in Seychelles with 2,500 employees, of which 1,575 are presently Seychellois (63%) and 925 expatriates (37%) (mainly from the Far East, Africa and Europe). It has a cold store of 7000MT capacity but considering that it requires 2,200 tons of raw materials a week, a larger cold store would be required to make provision for buffer stocks. IOT manufactures tin cans from imported sheet metal and cardboard boxes are imported from South Africa, which contributes to increasing operating costs.

IOT consumes about 8% of the power generated in the country and is the largest consumer of water in Seychelles. Local contractors carry out building works and maintenance in the factory. The company has a staff of around 100 persons that currently carries out maintenance of the plant. Expatriate specialist teams carry out special maintenance and overhaul works. The factory has a fishmeal plant for processing fish waste from the production of canned tuna.

Constraints

In the last few years export from the IOT canning factory has increased significantly to reach 35,757 MT in 2003 (valued at SR1.02 billion). It is a general consensus that further expansion of the cannery in Seychelles would probably not be feasible due to the present dominant size of the factory and the stress on local demand for requirements such as labour, electricity and water resources.

Labour is undoubtedly a major constraint. According to a senior labour officer, with already nearly 1,600 Seychellois employed, it would be difficult to recruit more qualified workers locally, having almost reached saturation level in a country of 90,000 inhabitants. Moreover, it has been calculated that expatriate labour is more expensive (due to housing and transportation requirements) and a drain on the Company's foreign exchange reserves. Despite these constraints however, both IOT and government are pursuing their efforts to boost the employment of local labour at IOT ("Nation", 13/04/05).

Based on the production costs, canned tuna from Seychelles is not competitive on world markets, probably due to the high local operating costs as well as to the high value of the Seychelles rupee.
Prospects

The demand for canned tuna expanded rapidly worldwide during the 1990s but the market is now showing signs of saturation. In fact global demand has declined over the last two years, in particular in the United States. The weaker demand and lower prices have led to the promotion of non-canned tuna products in the market such as tuna pouch and frozen tuna mince.

On the other hand the Sashimi market, due to the consumer demand for higher quality products has expanded from Japan to Europe as well as in the USA. Over the last 25 years, the world market for frozen, ready to cook products from fish, has grown into a variety of products. Therefore in order to help the tuna processing industry to survive, product diversification should be introduced and an obvious diversification is the production of tuna loins. It is understandable however, that having invested in the most modern and expensive tuna canning machinery, at this stage, IOT is reluctant to switch to new fish processing equipment such as for loin processing. There is therefore perhaps the need to seriously study the economic viability of building a modern loining plant taking into consideration the local labour constraints.

Many canneries worldwide are presently planning to modify their machinery to process loins and the loin market is presently in full expansion. For example, there is a 40% increase in demand for loins in the Spanish market. Many canneries in Europe now base part of their production of canned tuna on tuna loins, which are cooked, vacuum packed and re-frozen at the various bases of the tuna fleet such as at the new TDM (Thons des Mascareignes) factory in Port Louis, Mauritius which is scheduled to open in May 2005. The weight and volume of loins constitute one third of regular canned tuna and would represent considerable savings on cost of freight for reefer vessels and cold storage space.

In addition, loin processing plants require about the same investment and land area (it can even be carried out on a factory ship anchored in harbour) and about two thirds of a normal canning factory’s labour force.

Therefore, operating costs would be considerably reduced and loins, being a raw material for European canneries, would have guaranteed access to the EU market. This factor is the main reason that has encouraged IBL (Ireland Blyth Ltd) and Spanish entrepreneurs to invest in the new TDM factory in Port Louis, ("L’Express", 23/03/05).

Hence, the future prospects of the canning factory will depend on how Seychelles can cope with the forthcoming annulment of preferential trade arrangements, which have so far guaranteed the success of the tuna canning operations.

According to the Cotonu Agreement, as an ACP (African Caribbean and Pacific) State, Seychelles benefits from preferential tariff status given by the EU for the export of canned tuna to EU States.

Moreover, according to this agreement, Seychelles pays no import duties when exporting to the EU, which accounts for 95% of the canned tuna exported by the IOT (mainly to the UK, France and Germany). In addition to the preferential tariff treatment, Seychelles, like
Mauritius, has a special exemption from the rules of the country of origin; provided the tuna is caught by EU or ACP owned vessels.

These two preferential arrangements however are being challenged by the World Trade Organization, (WTO) who argue that an exemption can only be granted if the EU enters into negotiation with Thailand and the Philippines, the other main exporters of canned tuna to the EU. In April 2003, agreement was reached with the EU to allow a 12% reduction of duty for 25,000 MT of tuna from 1st of July 2003 to 30th June 2004 for Thailand and the Philippines.

Hence, when the system of preferential tariff for canned tuna is enforced it will have a negative impact on the market share of canned tuna exported by the Seychelles, as exports will no longer be competitive. The table below shows import amounts and prices for the five largest exporters of canned tuna to the EU in 1999.

**TABLE 5.1**

**Volume and price of EU tuna imports from the five exporting countries**

<table>
<thead>
<tr>
<th>Exporting Countries</th>
<th>Imports MT</th>
<th>Aug. Price CIF EUR/MT</th>
<th>Including Duty EUR/MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivory Coast</td>
<td>45,744</td>
<td>23.2</td>
<td>23.2</td>
</tr>
<tr>
<td>Ecuador</td>
<td>41,027</td>
<td>22.0</td>
<td>22.0</td>
</tr>
<tr>
<td>Seychelles</td>
<td>31,302</td>
<td>26.3</td>
<td>26.3</td>
</tr>
<tr>
<td>Thailand</td>
<td>37,021</td>
<td>18.9</td>
<td>23.5</td>
</tr>
<tr>
<td>Philippines</td>
<td>38,842</td>
<td>16.5</td>
<td>20.4</td>
</tr>
</tbody>
</table>

Source: *Consultancy on the Assessment of the needs of the Fisheries Sector (Badea Project)*

If the EU decides to remove the preferential tariff for tuna, then the future production of canned tuna from IOT will be in doubt. According to a study financed by the EU entitled “Report on the Impact Assessment of Economic Partnership Agreements (EPAs) on Seychelles & Preliminary Adjustment Scenarios” (Landell Mills, April 2004) evidence suggests that IOT cannot operate to the necessary level of profitability in the European Markets if its competitors from Asia are allowed further quotas or reduction in duty. The report concludes that Seychelles should therefore seek funds for market studies for alternative and profitable markets for its fisheries resources, and for studies of how locally added value in processing can be encouraged and financed.

Because of the certainty that the tariff barrier will disappear, there is a lack of incentive to invest in tuna canneries and IOT has actually no plans for expansion of the plant. The absence of new plant investment could have serious repercussions on the infrastructure required at Port Victoria to accommodate the purse seine fleet.

As mentioned above, one solution for the tuna processing industry is to turn the canning operation into the manufacturing of loins (as in Mauritius). This could cut operating costs
by reducing labour requirements and the cost of export. Though it is true that at present
loining operation is labour intensive, mechanisation and innovation could help.

Finally there is a need to develop new markets for canned tuna apart from the EU,
possibly to Middle East and African countries, since Seychelles is vulnerable to changes
in the market situation in Europe. In the final analysis however, Seychelles must find
ways to reduce the cost of production (maybe cut down on imported labour) of canned
tuna to be competitive. This is a crucial test, which will decide on the future prospects of
the tuna canning operation in Seychelles. This is why we should try to use the new
reclaimed land to turn Port Victoria into the most modern and efficient tuna port (cut
down on delays, excessive movements, etc.).

5.1.2 Oceana Fisheries Company Ltd.

The Oceana Fisheries processing plant was built by government in 1984 and originally
belonged to the Seychelles Marketing Board. In 1995, it was sold to local investors (and
purchased mostly by former employees) through a privatisation programme. The
company presently rents the processing plant from government and as of January 2005
it employed 54 workers the majority having been trained on the job. As a result of the
increase in landing of swordfish and tuna for the processing and export market, Oceana
has had to employ eight casual workers as from April 2005.

The company's main activities consists of the purchase of fish from the artisanal and
semi-industrial fleet, to be processed and sold both for the local and export market. In
2003, the company exported 201.1 MT of fish (a decrease of 25 MT compared to 2002)
valued at SR5.6 million (CIF) with Mauritius being the company's main market for mostly
frozen fish (69.9 MT), followed by La Réunion (55.6MT), England (50.1MT) and France
(14.6MT). Pelagic fish (33.8%), bourgeois (29.8%) and Job fish (15.8%) were the most
important fish group exported. (Source: SFA Artisanal Statistical Bulletin). The company
is one of two local fish processing export companies that has been certified to sell its
products to the EU.

Oceana also owns a 14.5meter longliner and has contracts to purchase fish from 14 local
vessels. Fishing vessels on contract with Oceana are provided with ice, free of charge
and are guaranteed a preferential price for their catch. Ice is also sold to other fishermen
with the company having a total ice production capacity of 36 MT/day as of February 20.
**Constraint**

The major obstacle hampering the increase in production and export is the lack of raw material - in particular swordfish and tuna, which are the most sought after fish products on the EU market.

Concerning the export of demersal species, the company finds it difficult to compete with other regional countries such as India, Oman, Maldives and Madagascar, who export the same demersal species but at a cheaper price. This situation has been aggravated by the high value of the Seychelles rupee which makes export of fresh fish to such countries as Mauritius prohibitive. The fact that there are only two exporting companies, who undercut each other’s prices for fish export, does not help.

Marketing is also hampered by the marked seasonal variations in demersal fish landings, with landings considerably reduced in the S.E Monsoon (July to September). This coincides with the period of highest demand for fish products in Europe due to the summer holidays.

A further problem is that the company suffers a periodic shortage of bonito bait, which is the preferred bait by fishermen. Even if mackerel, the major local species utilised for bait, is abundant at times, the poor quality of the product, as well as the high cost of freezing and storage, make the purchase and storage of mackerel prohibitive.

**Prospects**

The fact that the EU has relaxed its standard on heavy metal (cadmium) for swordfish as of February 2005, will allow the export of these species and the revival of the semi-industrial fishery. Swordfish is the most valuable species for the local export industry and should larger quantities of swordfish become available the company is planning to recruit more workers for the processing and export section. As of the end of April 2005 the Oceana longliner “PISCES” had made three consecutive fishing trips with average landings of eight tonnes per trip (six tonnes of swordfish & two tonnes of tuna).

Concerning the export of demersal species, the priority is to find new markets for high value, top quality fish such as bourgeois and groupers. The prospects of finding “niche markets” such as hotels in Mauritius that are ready to pay high prices for premium quality fish, is potentially good.

**5.1.3 Sea Harvest Processing Plant**

Sea Harvest Company is the other fish processing company exporting both pelagic and demersal species from the local artisanal and semi-industrial fishery. The company has plans to renovate its semi-industrial long line fleet and to purchase more vessels from overseas with the recruitment of expatriate skippers mainly from Australia. Should such plans materialize, the company also plans to improve and expand the available berthing space and the factory processing capacity. Sea Harvest presently employs 28 full time employees and as of April 2005 it also employs 10 casual workers. It plans to increase the number of permanent employers should its development plans materialize.
At present the company purchases fish directly from both local and foreign vessels (Taiwanese longliners) producing both fresh and frozen fish fillets and whole fish mostly for the export market. The company plans to increase its daily ice production to 20MT/day as of January 2005 and it has a freezer capacity of 40 MT. The main export markets are Germany, UK, and France. Sea-harvest has also experimented with the export of live crab giraffe and frozen carangues (by containers) but the results have so far been mixed.

**Constraints**

Sea Harvest suffers basically the same constraints as Oceana Fisheries for the export of its products, i.e. competition from regional countries, high value of the Seychelles rupee and seasonal scarcity of fish during the S.E Monsoon. In addition however unlike Oceana Fisheries, its berthing space and processing facilities are very limited and unless it acquires more space the factory cannot hope to expand its production.

Because the company was more dependent on the export of swordfish and tuna the EU ban has affected its export the hardest. The landings of these species have also been more affected by the high predation rate from false killer whales, which accounts for a 20% loss in the landings.

**Prospects**

Should Sea Harvest’s expansion plans for more processing facilities and a larger fishing fleet (in particular longline vessels) materialize, the export prospects would look bright. The company’s marketing strategy appears to be more aggressive, having experimented with the export of new species and tried new overseas markets such as Singapore, Japan and South Africa.

### 5.1.4 Other Fish Processing Outlets

In 1994 there were five local processing/export companies exporting their products to the EU markets. Today, there are only two (Oceana and Sea Harvest) from the five mentioned above that still survive (Source: Report on the future of the European Union - ACP Countries Fisheries Relations). 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.

Two of these fish processing outlets, one at Bel Ombre and the other at Anse la Mouche, have prospered, doing mostly fish fillets, chilled and frozen fish to be sold locally to hotels, restaurants and even to the two export oriented processing factories. Between them these two fish processing plant employ an average of 10 permanent employees and up to eight 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-cumber 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. In 2003, 72 MT of dried sea cumber was exported mostly to Hong Kong, Malaysia and Singapore to a value of SR2,036,876 (Source: Seychelles Customs). The tonnage and value of shark fin exported was however under-declared, and, according to
statistics published by MISD in 2003, 175 MT of shark fins was exported to a value of SRI.9 million. (The average price of shark fin on the world market is US$150/kg).

**Constraints**

The smaller fish processing plants in Seychelles do not have the necessary technical know-how and sometimes-financial means, to upgrade their facilities to the required standard for export, in particular to EU countries.

The necessary technical assistance could be provided by the MTC in consultation with the veterinary department and guidance of SFA. Soft loans could be provided for such developments to interested entrepreneurs. At the same time the processors/exporters in particular those processing sea cucumber and shark fins, should be required to provide SFA with accurate statistics, so that proper management measures for the sustainable exploitation of the resources can be implemented.

**Prospects**

Developing value added processing activities is, in the long term, one way for the Seychelles to increase foreign exchange earnings and to improve its macro-economic situation. This can only be achieved through setting up policy guidelines and planning commitment by government to see that these are seriously implemented. The incentives provided in the new Agricultural and Fisheries (Incentives) Act 2005 should play an important role in assisting interested entrepreneurs by providing the necessary financial incentives to invest in modern processing /exporting plants.

There is a need to encourage more joint ventures or foreign-owned processing industries in particular for the manufacture/export of value-added marine products. The know-how, contacts, capital of overseas partners, could help to diversify both products and markets.

**5.1.5 Employment in the Post Harvest Sectors**

The actual number of people employed in the post harvest sector i.e. processing, manufacturing and servicing, is given in Table 5 below. The table clearly indicates that the canning factory (IOT) is the single most important employer in Seychelles (accounting for 64% of total employment). The table also indicates that the best prospects for future employment are in the service sector (in particular ship repair and maintenance, net repair and employment of Seychellois on foreign fishing vessels).

The consultant’s view is that future employment prospects in the two largest fish processing factories (IOT and the Coetivy prawn farm) have reached saturation level and an increase in overall employment in these two factories is minimal (this is also the view shared by a senior labour officer). There is, however, a possibility that skilled jobs presently occupied by expatriates in these two processing plants can be replaced by Seychellois. These would involve skilled Seychellois personnel i.e. technicians and administrative staffs and not unskilled Seychellois workers. The number of employment opportunities in the local processing plants (Oceana, Sea Harvest and smaller fish processing plants) will depend on the availability of raw material (in particular swordfish, tuna, bourgeois and grouper), identification of new markets and future investments in the sector, promoted by the new Agriculture and Fisheries (Incentives) Act, 2005.
6. **LINKAGES WITH OTHER SECTORS OF THE ECONOMY**

One of the major objectives of the fisheries sector is to build optimum linkages with other sectors of the economy. Presently the main sectors that the fishing sector can be linked to include: The Tourism and Agriculture sector, the Services sector and the Manufacturing sector. Although these sectors have traditionally been linked to the artisanal fishery, the development of the industrial fishery has created many new opportunities, in particular in national employment. A large number of employment opportunities, which cannot be easily quantified, are also indirectly linked to the fishing sector through the multiplier effect.

6.1 **Tourism and Agriculture Sector**

The artisanal fisheries sector provides the different supply of fish and marine resources required by the hotels and restaurants, either through fishmongers/fish retail outlets or directly through contacts with fishermen. At the same time this sector supplies the demand for local fish for approximately 1,200 crews on around 50 foreign fishing and cargo vessels who consume large quantities of high quality demersal fish. Ship
chandlers, who purchase from fishing outlets or directly from fishermen, supply fish to these vessels. It is estimated that tourists and crews on foreign vessels consume 40% of the high quality demersal fish caught by the artisanal fishery. Moreover fishermen can get a better price for their fish and ship chandlers have the opportunity to receive payments in foreign exchange.

The same is true of agricultural products, in particular fresh vegetables, fruits, eggs and mineral water that are required by industrial fishing vessels and other vessels calling at Port Victoria. In a separate study carried out by the consultant in the early 1990s, it was calculated that the industrial fishing fleet consumed at least 50% of the production of agricultural products mentioned above (including imported vegetables). This represents a considerable incentive for employment in the agricultural sector.

By the same token, foreign fishermen have a high purchasing power when on shore leave. They are granted cash advances on their generous salaries and spend considerable amounts on shore services such as restaurants, taxis, car hire, telecommunications, transportation etc. Although this expenditure is difficult to quantify it no doubt provides a valuable boost to the local tourism industry.

6.2 The Service Sector

The fishing industry, in particular the industrial fishery, has strong linkages with the service sector including, repair and maintenance of vessels, electronic repair workshops, net repair, shipchandling and stevedoring.

6.2.1 Vessel Repair and Maintenance

There are presently two main vessel repair yards catering for the requirements of the industrial vessels and at least three smaller ones dealing with the requirements of the artisanal fishing fleet. In addition there are several private boat builders who build and repair vessels when the demand arises.

However, since there are no dry dock facilities major repair and maintenance work on large vessels are either carried out at the vessel’s homeport or other regional ports with dry docks (Madagascar, Mauritius, Kenya, Dubai, etc.)

The main local ship repair yard is Naval Services situated at Port Victoria, which carries out repairs on vessels of up to 500 GRT with a maximum length of 50 meters. The shipyard employs 23 experienced persons and can carry repairs on steel, aluminum, fiberglass or wooden hulls. One of the major constraints facing the company is foreign exchange, since it has to import all equipment and spare parts from abroad.

The other important shipyard, Marine Engineering Works, located at the Providence Industrial Estate, also faces the same foreign exchange constraints as Naval Services. The shipyard can carry out repair to vessels of up to 30 meters and employs 18 workers that have mostly been trained on the job.
Similar limitation applies to the Seychelles Electronics Maritime Company (SEYCM), which carries out repair and maintenance of electronic equipments on French and Spanish purse seiners and on certain foreign longliners.

The company has 19 full-time employees plus a visiting electronic engineer who attends to more complicated repair work. Since SEYCM receives payment through the vessel’s agents, it is paid in local currency rather than in foreign exchange.

6.2.2 Fishing Net Repair

The local subsidiary of the international net manufacturing company, Casamar, carries out important net repairs as well as manufacturing new nets for purse seiners. The Company presently employs seven permanent staff but has 80 casual laborers that are employed on a more or less permanent basis when manufacturing nets or carrying out urgent repair work. According to the company’s director, 2004 was an exceptionally good year as it manufactured five new nets for a French Company valued at US$2.5 millions and the company’s turnover for the year was over US$3.0 million.

The Company, however, has to face serious constraints such as limited open space to repair the nets and has requested a relocation site at the industrial estate at Providence to fit in with their expansion plans. Although the plans have been approved, they are still awaiting for a definitive date when they can move to the new site. According to company management, allocation of foreign exchange is not as severe a constraint compared to other service sectors since an advance payment is requested for the purchase of the required material before carrying out repairs to nets. Another small net repair company (B. Toulon) repairs purse seine nets for a Spanish Company and employs five full-time employees and an average of 30 casual workers.

6.2.3 Quality Control of the Catch

The Fish Inspection unit of the Veterinary Department is the Competent Authority for inspection and issuing of certificates for the export of all fish and/or fish products originating from Seychelles. In this capacity the Fish Inspection Unit therefore issues certificates for all local fish and tuna originating from local and Seychelles registered fishing vessels exporting to EU countries. The Authority also monitors heavy metal content (cadmium, mercury, etc.) present in various fish to certify that it is within the acceptable standard and control the fish species allowed by the importing countries. The Fish Inspection Unit employs a permanent staff of seven persons including four fulltime fish inspectors.

Another private company SOCOMEP (Societe de Controle d’Expertise Maritime des Peches), issues certificates for aggregates, fish quality and temperature control to cargo reefer vessels transporting tuna to foreign ports. The company employs seven permanent workers and 15 casuals depending on transhipment activity.

6.2.4 Ship Chanding

The regular provision of food, drink and other consumable items to the tuna vessels is a major logistic problem for the vessel operators. Local supplies of fruit, fresh vegetables, eggs and fish (except for tuna) have to be obtained locally and are not always available.
They are presently two ship chandlers supplying shipping vessel with fruits, vegetables and assorted goods. (Southern Ocean Pty and 99 Ship chandling) which employ a total of 15 persons and a private ship chandler, L. Adrienne, who supply vessels with local fish employing three persons. Under a special agreement reached, reefer cargos in-bound to collect tuna can bring supplies directly on payment of a trade tax of 15% when goods are stored at the Port (duty is exempted when goods are transshipped directly from reefer vessels to purse seiners). Ship chandling is an area where considerable benefits can be made in both Agricultural and Fisheries sectors (section 6.1 above). This valuable contribution to the Seychelles economy is a good example of a benefit with a high multiplier effect on local employment and incomes.

6.2.5 Stevedoring

The arrival of tuna purse seiners in 1983 and early 1984 had a dramatic effect on the demand for casual labour at Port Victoria. Employment of stevedores in 1983 averaged 130 persons, by 1985 the total had risen to 550 and in 2004, it averaged 750 workers. The local shipping agent, Hunt Deltel, employs around 500 stevedores and the other local company, Land Marine, employs around 250.

The generation of employment and local added value represents one of the most important benefits of the increase in transhipment activity in Port Victoria. The fact that many local workers depend on employment from fishing vessel transhipment is very noticeable during the low period of vessel activity, between March and May every year, when most fishing vessels operation moves to the Mozambique Channel.

6.2.6 Bunkering

The provision of fuel for foreign fishing vessels is one of the most important services a fishing port should to cater for. It is important to note that fuel purchase has a very different impact on the local economy compared to that of other forms of expenditure. Fuel has to be imported and the net benefit to the economy is a small fraction of the gross purchase. Expenditure can therefore appear to vary considerably when the price of oil varies and the US$ exchange rate fluctuates (since oil prices are set in US $).

6.3 Manufacturing Sector

The manufacturing sector in the fishing industry is equally important in both the artisanal and industrial sectors. These include building of small fishing vessels (up to 12 meters), construction of Fish Aggregating Devices (FADs), manufacture of fishing nets, fishmeal, traps, and manufacture of crafts and artifacts from materials obtained in the fishing industry.

6.3.1 Construction of fishing vessels

Although Naval Services occasionally manufacture local vessels, mostly for inter-island trade, the majority of fishing vessel (apart from a few private carpenters) is manufactured by Fibertech at Providence and Praslin Boatyard at Baie St Anne.

Fibertech, which employs five workers, is a family-run business and the major builder of local vessels for the artisanal fishery. The company builds and repairs all models of
fishing vessels from 5 meters Mini Mahé is to open whalers and decked schooners of up to 15 meters. A major constraint is the shortage of building material, in particular fiberglass and paint. As of February 2005, all construction work has stopped, while awaiting the arrival of fiberglass material. It is to be noted that Fibertech had already repaired four large fishing schooners that had been seriously damaged as a result of the Tsunami disaster.

Praslin Slipways and Engineering Pty also build fishing vessels of various sizes and are presently completing a 15-meter fishing schooner. It has recently repaired two large schooners that have suffered damage during the Tsunami disaster but work has come to a standstill due to lack of material. The owner has had to release all his workers pending the arrival of new stocks of material expected in early March 2005.

A similar situation arises for another private boatyard at Praslin run by Mr. Rodney Pouponneau who has had to close shop due to the lack of fiberglass material. This boatyard was previously the major manufacturer of fishing vessels for Praslin and La Digue and even for clients from Mahé.

### 6.3.2 Manufacture of Fish Aggregating Devices (FADs)

FADs are utilized by purse seiners to attract tuna schools so as to improve catch rates and facilitate fishing operations. Although most FADs are actually constructed on board vessels by the crew, the raw material used, bamboo, is purchased locally from small contractors who charge an exorbitant price. Because large quantities of bamboo are utilized (since high percentage of FADs are lost at sea), entire bamboo forests are sometimes destroyed to provide material for building FADs for the fleet.

The average FAD for the purse seiners requires approximately 25 to 30 pieces of bamboo averaging four meters in length. To construct a typical FAD, requires cutting down 10 bamboo trees, an average tree being 12 meters high. As a matter of comparison, to construct an average size trap (14 -15 meshes wide) requires 6 pieces of bamboo, each four meters in length, i.e. two bamboo trees. Therefore with the material used to build one FAD, roughly five fish traps can be constructed, and since the average purse seiner requires 25-30 FADs, it is equivalent to the construction of 150 traps (30 FADs @ 5 traps/FAD).

For a fleet of 19 vessels, for example the Spanish fleet, this represents enough material to build 2,850 traps (19 vessels @ 150 traps/vessel). Due to theft or FADs being lost at sea, a typical FAD would have a lifetime of not more than 6 months, hence a conservative estimate of the number of bamboo trees required for one fleet is estimated at 11,000 trees - the material required for constructing 5,700 traps. This represents almost twice the estimated annual number of traps used by the artisanal trap fishery. Government should therefore seriously consider issuing permits for cutting down bamboo as is done for most other types of trees.

### 6.3.3 Fish Trap Manufacture

The utilization of fish traps in the artisanal fishery is an important fishing technique, which accounts for a large proportion of the artisanal catch. Traditionally, local traps were built
of bamboo and this is still the preferred raw material used. However since bamboo is now becoming scarcer and the number of trap makers has become rare, traps are also built from metal meshes or metal frames covered with netting. The fisheries legislation specifies however, that all traps built of metal meshes or metal frames must have a biodegradable mouth made of bamboo in order to eliminate ‘ghost fishing’ if the trap is lost.

Scarcity of bamboo has become a major constraint in particular in the smaller granitic islands of Praslin and la Digue and most traps have to be purchased from Mahé. Bamboo forests close to the main roads have been destroyed and it now requires several hours walking distance to find a new source of bamboo. This is particularly the case in south Mahé. The main reason for this is the indiscriminate felling of bamboo trees to provide material for the construction of FADS for purse seiners (Section 6.3.2 above).

Moreover, the traditional craft of making traps is rapidly becoming lost with the older generation and it is recommended that the MTC incorporate regular training in trap making as part of its curriculum.

6.3.4 Manufacture of Nets

Most gill nets used for the mackerel fishery are imported, but fishermen have to mount the nets with a bottom rope and sinkers and head rope with floaters. As mentioned above, the local net repair and manufacturing company, Casamar, manufactures entire new nets for the tuna purse seiners, in addition to carrying out net repairs. A new tuna fishing net costs an average of US$ 500,000 and represents four to five weeks’ work for around 30 experienced casual workers. In 2004, the company manufactured five new fishing nets for French tuna purse seiners.

It has to be emphasized that fishing net is the essential piece of fishing equipment for a purse seiner and the success of a purse seine operation will depend on the quality of the net. Hence, allocating suitable land for the manufacture and repair of nets should be considered a priority in a tuna fishing port. According to the Managing Director of Casamar in Seychelles (and also confirmed in “L’Express” of the 23/03/05), the company will be opening a subsidiary in Port Louis that will start operations in May 2005.

6.3.5 Manufacture of Fishmeal

IOT has a fishmeal plant which processes fish waste from the tuna cannery and from discarded fish that is unfit for human consumption. In 2004, approximately 10,000 MT of fishmeal was produced by IOT, of which 30% was sold to the animal feed factory to manufacture prawn feed for the Coetivy prawn farm. The rest of IOT’s production is exported mostly to South Africa, Philippines, Australia and Sri Lanka at an average price of US $470 (FOB) per MT.

6.3.6 Manufacture of Handicrafts and Artifacts

Raw material from the fishing industry (and the aquaculture farms at Praslin) can be used for manufacture of crafts and jewellery by local artisans.
These include shark jaws and teeth for jewellery, shark cartilage for walking canes and clothing accessories. Large game fish are mounted as souvenir trophies as well as bills from swordfish. Pearls from the Praslin Ocean Farm are sent to Australia to be mounted with gold and re-imported to be sold locally. With more imagination and identification of new markets, better use can be made from such species as sharks i.e. shark liver for oil, leather from shark skin, squalene from the cartilage etc.

According to the Chairperson of the Seychelles Craft Association there are presently only five local artisans involved in this industry, down from around 20, three years ago. This sharp reduction is mainly due to the lack of preservative chemical (formalin) and other treating agents on the local market. Most of these former artisans are now involved in the buying/selling trade for clothing and even imported artifacts. Again, according to the Chairperson, these artisans would be willing to pursue training courses offered at La Reunion to learn new skills utilizing raw material from the fishing industry and, her association is presently working on such training programmes.

6.4 Port Services in a Regional Context

The services mentioned above, required by the industrial tuna fishery, represent considerable employment opportunities and play a major role in the country’s economic development.

The quality of services provided to industrial tuna vessels while in port is extremely important particularly in a competitive industry such as the tuna fishery. If not satisfied with the services offered in one port such vessels, because of their mobility and autonomy, can easily move to another port.

It is nevertheless true that vessel owners and crews get attached to a port and a country after a certain period of time - even if the port does not offer the best facilities, but makes a concerted effort to meet the requirements of the fleet.

The case of Port Victoria is interesting, for despite several shortcomings in the services offered, and several threats by foreign ships to relocate the fleet to other ports, it is still the main base for the purse seine tuna fishing fleet operating in the Western Indian Ocean.

A deeper analysis of the advantages and drawbacks offered by Port Victoria compared to such regional ports as Port Louis (Mauritius), deserves a closer evaluation.

The advantages of Port Victoria include the following:

- It occupies a strategic position in the middle of the tuna fishing grounds in the Western Indian Ocean.
- It provides a well-protected harbour, safe from tropical cyclones and other environmental phenomenon.
- It provides good and efficient administrative support to the fishing fleet (with the assistance of SFA, the vessel’s agents and port services) with proven ability to rapidly resolve short-term administrative and logistical problems.
- It provides security both for the vessel when in harbour and to the crew when on shore leave.
- The local population is friendly and the surroundings are pleasant. Both vessels and crew are made to feel welcome in a politically stable environment.

**Compared to regional ports, (such as Port Louis), Port Victoria suffers the following drawbacks:**

- Lack of adequate infrastructure such as berthing space and cold storage facilities.
- Higher cost for fuel, provisions, water and electricity, with periodic shortage of these items (in particular fuel).
- Higher cost of port services such as transhipment fees, taxes, port and harbour dues, lighterage fees etc.
- Higher cost of labour for stevedores and for the repair and maintenance of vessel equipment.

When weighing the pros and the cons of Port Victoria, ship owners have come to realize that the higher costs are principally due to the size of the country (the economy of scale) and the fact that most consumables goods are imported making it more expensive. The same applies to the high cost of labour, arising from a greater demand on a small labour pool. Yet, the size of the country and a more streamlined administrative structure has helped form a closer human rapport with the authorities. Over the years this has created a closer cooperation, and even allowed a better understanding and friendship to develop between the ship owners and local authorities.

This human rapport with ship owners is very important; in particular with Spanish ship owners. Decisions can be made on the basis of personal trust and this has to be closely nurtured.

One of the shipowners summed it all when he told me: “We love this place and would not want to leave it; we know its problems and we are ready to accept them (unless we are faced with insurmountable economic odds). All we ask is for the authorities to also understand our needs and show more flexibility to the requirements of the fleet”.

In the same context, the proposed project by a Spanish armateur to finance the construction of new infrastructure at Port Victoria i.e. tuna quays, warehouses and cold stores would give a much needed psychological boost to other private entrepreneurs to invest in fisheries development projects and the consultant believes that government should give it's full support to the project. Indeed, since the opening of IOT tuna factory almost ten years ago, there have been no major new projects in the Port area capable of attracting much needed publicity, whereas Port Louis has constantly been in the regional limelight for the last two years.
7.0 INSTITUTIONAL ORGANISATION/RESOURCE CAPACITY BUILDING

7.1 The Seychelles Fishing Authority (SFA)

As a general rule, institutional support for fisheries management and research in the Indian Ocean States has not received the priority and support it deserves to allow them to fully develop their national fisheries potential. Seychelles is perhaps an exception, since its main fisheries institution, the Seychelles Fishing Authority (SFA), was from its inception given the autonomy and institutional support to manage and develop the country’s fisheries.

The SFA was created in 1984 at the time of intense development in the fishing industry, in particular in foreign industrial tuna activity. SFA absorbed the staff from the defunct Fisheries Division and Fishing Development Company (FIDECO) and became the executive arm of the government in all fisheries related matters. SFA presently employs a staff of approximately 100 people, which includes scientific and administrative personnel.

7.1.1 Role and Objectives of SFA

The main objectives for the creation of SFA are as follows:

- To develop the fishing industry to its fullest potential.
- To safeguard the fisheries resource base of the country for sustainable fisheries development.

The main functions of SFA as defined in Article (5) of the Seychelles Fishing Authority Establishment Act are as follows:

1. To promote, organise and develop fishing industries and fisheries resources in Seychelles.

2. To assist in the formulation of this policy with respect to fishing development and fisheries resources.

3. To conduct negotiations, engage in meetings, seminars or discussions with regard to fishing or fisheries and the establishment or operations of fishing industries, whether at a national or international level, on behalf of the Republic.

4. To identify the manpower training requirements of Seychelles with regards to fishing and fishing industries.

SFA was therefore the only regional fisheries organization, with a mandate to perform management and planning development, scientific and training functions as well as carrying out a regulatory function by:
Conducting surveillance in collaboration with the Coast Guard in relation to fishing operations in the exclusive economic zone of the Seychelles.

Monitoring the catch of all fishing vessels.

Carrying out scientific and development research.

Since its inception, the SFA has made remarkable advances and to this day is the most credible fisheries management and research organization in the Western Indian Ocean.

### 7.1.2 Constraints

The most serious constraint facing the SFA today is the structural organization compounded by the lack of qualified human resource. Some of the constraints will have to be addressed if SFA is to retain its objectives of being a regional scientific center for fisheries management and research.

The present structural organization of the SFA lacks adequate hierarchy in terms of job position. For example a gap exists between the position of Managing Director and that of Section Heads. Filling this gap would provide an effective delegation of authority and encourage self-motivation for personal advancement and improved performance among management staff, while at the same time relieving the MD of cumbersome administrative tasks. The proposed plans to restructure SFA could make provisions to address this problem.

The human resource problem is perhaps the most serious issue facing SFA today. The number of local technical expert available locally in the field of marine resources and fisheries has always been limited in Seychelles. The available scientists have to be shared with other national marine research centers (MPA, SCMR, SBS) and independent NGOs (for example Nature Seychelles, SIF and MCSS).

In addition, there are serious independent organizations based in Seychelles that work closely with the SFA towards producing resource management plans for tuna in the Indian Ocean. Those include the Indian Ocean Tuna Commission (IOTC), the French "Institut de Recherche pour le Developpement" (IRD) and the "Instituto Espanol de Oceanographia (IEO) from Spain. However the shortage of scientific staff at SFA, especially in the industrial tuna section, means that there is only limited collaboration resulting in missed opportunities for training and gaining international experience through working with these foreign institutions. In the case of IRD, which once had a solid team of at least three scientists based permanently in Seychelles, they now find it more convenient (and in part to cut operating costs) to have only one technician to collect data to be analysed in France.

The fact that the industrial tuna fishery section at SFA is almost entirely preoccupied in building, collection of data and data entry, limits the amount of time available for detailed analysis and collaboration with other institutions in supplying research on stocks and writing other scientific reports. Yet, the SFA on behalf of the government of Seychelles has a legal obligation to provide statistics on the landings and transhipment of tuna at Port Victoria. As such SFA must develop and provide expertise to undertake data collection and support research and stock assessment effort in the region and have the
capacity to deal with IOTC and EU issues. This in itself is a huge task in particular since the Industrial fishery section has consistently been seriously understaffed. Hence, in view of the enormous economic importance of the tuna fishery in Seychelles, the industrial fishery section needs to be strengthened to cope with the ever-increasing amount of work so as to maintain SFA’s position as an important focal point for tuna research and management.

There is therefore an urgent need to recruit and train more personnel for the industrial tuna section and SFA in general and develop incentives to attract high-level personnel and ensure a long-term commitment to the Institution (SFA). Although the new Fisheries Agreement (as the previous one) makes provision for EU funding for training, the shortage of SFA technical/scientific staff would make it difficult for these funds to be fully utilized.

The same situation exists, although to a lesser extent, in the artisanal fisheries section, where the availability and quality of the data collected is not up to the expected scientific requirements. Hence no data is collected for early morning fish landings (between 6 and 8 am), which mainly concern fish species, like becune and carangue and on weekends - when there are considerable landings by both the recreational and part-time fishermen. Due to poor remuneration and lack of incentives, most fish recorders lack job motivation and this is reflected in the quality of the data collected. One suggestion to rectify this longstanding problem is to give deserving fish recorders the opportunity to be promoted to fisheries technician, or any other more responsible post, instead of being stuck in a dead end job.

Moreover, there continues to be a lack of cooperation between SFA and the Ministry of Tourism and Transport and/or the Marine Charter whereby important data from the sports fishery is totally lacking. For example the SFA Artisanal Statistics for 2003 lists the number of sports fishing vessels operating as two, whereas from the consultant’s own survey there are an estimated 30 sports fishing vessels operating on Mahé, Praslin, La Digue and the outlying islands with hotels. In fact, the Seychelles Licensing Authority (SLA) licences all charter vessels (whether used for diving, sailing or fishing) under the classification of “Hire Craft”. According to an SLA list of hire craft there were 156 active hire crafts as of 18/2/2005. This is a longstanding problem but with painstaking negotiation with SLA this consultant believes that it is possible to resolve it, with SLA agreeing to give a breakdown of the various types of hire crafts into the three categories mentioned above.

Another area where there is a lack of accurate statistics is in landings of shark fin and sea cucumber. These are important fisheries and fish recorders should be assigned specifically to collect data from these two fisheries bearing in mind that many unlicensed fishermen sell their catch directly to processors/exporters and that these statistics are rarely recorded. Hence before any definite management plans are prepared for these two fisheries there is a need to collect more accurate statistics, which would reflect the real state of the resource and the actual number of operators involved in this fishery. Moreover it would give a better idea of the quantity of these fish products exported, and help the Custom Department in the collection of more realistic revenues.

Finally, now that SFA has established a credible and efficient VMS unit and that most of the largest artisanal vessels are equipped with transponders, the statistics from the
artisanal fleet should improve with the use of the VMS data on distribution of fishing grounds and fishing operations carried out by the different categories of fishing vessels. According to the SFA's MCS Manager this is one of the ultimate objectives of the VMS programme.

7.2 The Maritime Training Centre (MTC)

The Maritime Training Centre was established in 1979 with financial and human resource assistance from France. Its primary objective at that time was to train Seychelles seamen to work on the four newly acquired pole and line tuna fishing vessels that the Seychelles had received from the French government.

In 1981 the MTC was transferred to the Ministry of Education and became part of the Seychelles Polytechnic providing Diploma and Certificate grade training courses to students aiming to pursue their careers in the maritime sector. Training in maritime studies was provided to Certificate level in fields such as coxswain and marine mechanics, while Diploma courses were more technical and included courses in navigation and marine engineering. In 1999 the Centre was transferred to the Ministry of Agriculture and Marine Resources, and the course structure was revised with only courses geared towards the Certificate in Maritime Studies kept. The Vision document of the MTC (Vision 25) lists the short, medium and long-term goals of the institution.

These can be briefly summarized as follows:

**Short term Goal (3-5 years)**

1. To draft STCW 95 compliant syllabus for basic maritime courses.
2. To be on the white list of the IMO.
3. To achieve ISO certification.
4. To set up new infrastructure.
5. To acquire competent and qualified faculty either locally or through assistance from foreign institutions.
6. To develop links with other internationally recognizes maritime institutions.
7. To establish links with maritime related industries in Seychelles.

**Medium Term Goals (10 –15 Years)**

1. To offer advanced maritime courses.
2. To develop a highly qualified faculty to ensure advanced training.
3. To set up a modern maritime reference library.

**Long Term Goals (20 –25 years)**

1. To develop the MTC into a regional Maritime Training Centre.
2. To offer advance maritime courses to both national and international students.

The above objectives are intended to provide the MTC with the necessary tools for future maritime training so as to be the key facilitator in the development of the Maritime industry.
Table 7.2 indicates the number of students graduating from MTC from 1999 to 2004 during the period that it was administered by the ME&NR.

Table 7.2 Number of students graduating from the MTC 1999-2004

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Students</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>22</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>2000</td>
<td>31</td>
<td>25</td>
<td>06</td>
</tr>
<tr>
<td>2001</td>
<td>19</td>
<td>15</td>
<td>04</td>
</tr>
<tr>
<td>2002</td>
<td>26</td>
<td>21</td>
<td>05</td>
</tr>
<tr>
<td>2003</td>
<td>26</td>
<td>23</td>
<td>03</td>
</tr>
<tr>
<td>2004</td>
<td>26</td>
<td>22</td>
<td>04</td>
</tr>
<tr>
<td>TOTAL</td>
<td>150</td>
<td>127</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: MTC Management

According to a survey carried out by this consultant however, only 18 of the 150 graduating students are presently employed in marine related fields of the public sector (SEYPEC, SFA, SMB, IDC). This situation could possibly be explained by the lack of practical training opportunities while undergoing their training (which could have promoted career interest), as well as poor awareness of job opportunities presently existing in the maritime field. A notable achievement for the MTC is that at least half of the skippers and marine mechanics on the semi-industrial longline fleet (12 vessels) are former graduates of the MTC, as well as the three skippers on the SFA research vessel ‘L’AMITIE’.

The MTC is divided into three divisions: Deck, Engineering and Fisheries and includes several supplementary courses such as diving, first aid, fire fighting, radio and evening classes in navigation.

The current Certificate in Maritime Studies comprises 13 modules over a period of two years including one introductory module on the Environment and a three-month attachment within the industry. However, the Certificate course does not have a sufficiently high level of training for graduates to be able to work on foreign going or internationally registered vessels. This course provides the basic training required for employment at entry level or for example inter-island vessels, semi-industrial and artisanal fishing vessels. The MTC has an average of 250 applicants every year from which 27 are recruited making a total of 54 students attending the Centre at any one time. Motivated and qualified students who want to pursue their career in Maritime studies need to have the required sea-time experience and attend to advanced studies overseas (Réunion, France, Spain).

As of January 2005 the MTC has come under the responsibility of the Ministry of Education with the Ministry of Agriculture and Natural Resources remaining on the Board of Advisers to give the necessary technical input to the fishing industry. Although the school’s institutional framework has yet to be determined, according to the school’s present director the curriculum will only be modified in 2006. In view of the present uncertainty on the future training programmes and curriculum for the MTC it is difficult at
this time for the consultant to comment or make in depth recommendations on these subjects.

Meanwhile a group of instructors from India have visited the school in January 2005 to give courses in the STCW (Standard of Training, Certification and Watch Keeping) seamen-training programme. The STCW course, which is an international standard course extending for two weeks, allows graduates to find work on foreign going vessels and on the industrial fishing fleet.

**Constraints**

The most important constraints facing the school are infrastructure, shortage of material for the students to gain effective training and practice, and the lack of proper training vessels for the students to acquire sea-time experience. The latter has always been a major constraint, as the MTC did not have the necessary budget and trained crew for the purchase and proper operation and maintenance of training vessels. It has also been a problem for the school to find commercial vessels that accepted students on board, for training coupled with the lack of qualified instructors and training personnel wishing to work at the Maritime School. Again, this is due to the poor reputation of the school’s infrastructure, lack of training material and low standard of its recruits.

This situation could improve if the MTC takes up the offer of international organisations or countries that have offered to send trained instructors to the school. In an interview with Mr. Guy Piriou, Chairman and CEO of Chantiers Piriou, he confirmed that France would be willing to send teachers to work at the MTC or provide funding for the purchase of material and equipment for the school. Mr. Piriou also confirmed that the French Director of Maritime Affairs was seeking an invitation to visit Seychelles to explore possible areas of bilateral cooperation in Maritime training. Retired purse seine skippers have also approached the local representative of the French shipping agent and have offered their services to teach part-time at the MTC, in a private capacity. The decision to send instructors to India for further training is a step in the right direction. There is therefore an obvious need for the MTC to appoint a person to coordinate and follow-up all offers of international assistance so that these offers are not lost.

Partnership and cooperation agreement with other international organisation/institutes should be developed so as to give international credibility to the MTC courses, thus creating career opportunities that will attract high caliber school leavers in the maritime sector. By taking this approach, the MTC would be in a position to secure a broad funding base, as it will be providing training at various academic levels to a wide range of stakeholders within the fishing sector. This will allow available funds for training to be rationalized, improving access to modern facilities, training equipment and increasing credibility both locally and internationally.

Graduates from the MTC can find work not only on fishing vessels but also on any other types of vessel (cargo, tankers, etc.) as well as any mechanical or electrical workshop on shore. It is however, for the career’s guidance officers to make students aware of career opportunities in the Maritime sector and to explain that these jobs are well remunerated.
7.2.1 Future Maritime Training Centre

It is proposed to build a new maritime training centre during 2005. Land for the development of this new facility has already been allocated and funding for the construction has been approved by BADEA. The new building is designed to accommodate 100 students a year with an annual intake of approximately 50 new students. It is intended to reinstate the diploma course in maritime studies and other courses that will give international standing to the Institution but the exact institutional framework for the school has yet to be finalized.

7.3 Seychelles Crew on EU Purse Seiners

7.3.1 Present Status and Constraints

According to the EU Fisheries Agreement all EU purse seiners have to employ a minimum of two Seychelles seamen per vessel. This condition has not been enforced and the number of Seychellois employed on purse seiners has declined since 1984. As of January 2005 there were only 36 Seychellois crew on 39 foreign purse seiners whereas the EU fleet has a total of 40 vessels. Concerning the above, the ship owners are of the opinion that Seychelles seamen are too problematic and although there are certain good and serious elements (70-80%), the rest are difficult to work with (not cool headed and hard working enough) and ship captains simply have less problems with foreign crew from Madagascar and Africa. Moreover it is cheaper for ship owners to employ seamen of other nationalities.

It is difficult at this stage to propose solutions to overcome this well-known problem but certain measures can be enforced. Most Seychelles seamen working on purse seiners are picked from casual labour either by ship captains, who observe them to be hard working during transhipment, or by local representatives through family connections and friendships. In most cases no prior check on their background is carried out and SFA is requested to provide them with a record book, which entitles the applicant to be recruited on purse seiners.

According to the present EU Agreement, the Seychelles Seamen Employment Contract should guarantee the seaman social security cover applicable to them, including life insurance, sickness and accident insurance as well as pension benefits. However, on consulting the present contract, the condition of employment and insurance benefit are not as stipulated in the Agreement (Annex 2). The Agreement also stipulates “that wage conditions granted to Seychelles seamen shall not be lower than those applied to non-Seychellois crew members performing similar duties and shall under no circumstances be below ILO standards”. It is to be noted that the conditions of payment have only slightly improved since drafting the first contract in 1984. This is one reason that could explain why experienced and reliable Seychelles seamen are not motivated to join the purse seine crew. The consultant therefore believes that the terms of the present contract should be revised to make it on par with the conditions stipulated in the Agreement. Moreover, since the new Agriculture and Fisheries (Incentives) Act, 2005 stipulates that fishermen no longer have to pay social security contributions, the need for a “contract of service” (as is presently the case for the French contract) is no longer applicable and this provides an additional reason why the present contract should be reviewed. Finally some “moderate” publicity should be given to employment opportunities
on purse seiners with emphasis on the fact that candidates should have had sea-time experience and be physically fit.

Despite some of the problems that ship owners have experienced with Seychellois crew, the new EU protocol makes provision for a payment of US$20 per day per person for every day that the vessel is fishing in Seychelles waters without a Seychellois crew. Money collected from this fund will be used to provide training for Seychelles seamen.

7.4 Fishermen Association

In the past, Fishermen Associations in Seychelles did not receive the necessary support to be a credible organisation. The main reason for this is that the Seychelles fishing community is relatively small and widespread, consisting of different types of fishery, each with different requirements. In addition, Seychelles fishermen are known to be individualistic and instead of discussing their problems with the appropriate authorities, they tend to approach the highest authority (the Minister) thereby marginalising the need for a Fishermen Association.

However, in the last few years fishermen have had to face complicated issues and the need to develop proper channels of communication between SFA and the fishing community has become more important.

The first attempt in recent years to create a fishermen’s association was a worldwide Catholic support movement called “l’Apostolat de la Mer”. The organization 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. The organisation did not unfortunately 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. This Association presently has 35 members, each paying an annual subscription fee of SR500.00. A chairman was elected and the Association was given an office and secretary paid by SFA. The Association has monthly meetings with the Fishing Authorities (MENR and SFA) where issues of concern are discussed. Although there continues to be the problem of individuals bypassing the Association and going directly to the highest authorities to vent their grievances in general there is more cooperation between the members and SFA.

The FBOA has also achieved some measure of success in participating in discussions to obtain concessions on duty exemption for fishing material and safety equipment, and assisting fishermen in obtaining compensation for repair of vessels and replacement of equipment damaged in the tsunami disaster. At the same time it has proposed certain realistic amendments to the legislation, i.e. new licence fee structure, with fishing vessels paying a fee in proportion with the size and capacity of the vessel, instead of a flat fee of SR 125/- for vessels of all categories.
Another area where the FBOA could be of assistance to SFA is to convince members of the need to submit regular and reliable statistics that will eventually be used to improve the management of fisheries.

Hence the main objective behind the creation of the fisheries association is to start a proactive dialogue with the authorities, to improve transparency and alleviate many of the existing problems between SFA and the fishing community. This is fundamental to the future of the sustainable development of the fisheries sector.

8. REVIEW OF PAST, ON-GOING AND PROPOSED FISHERIES PROJECT

8.1 Projects in the Artisanal and Semi-Industrial Sector

Most of the on-going and proposed future fisheries projects are meant to (a) Consolidate the resource base by improving research/management plans, and (b) Improve the infrastructure at Port Victoria and various artisanal semi-industrial fish landing sites, so as to increase the capacity of the artisanal, semi-industrial and industrial fishing fleet. The objectives of these projects therefore, is to increase both the volume and quality of fish landings as well as to improving the comfort on fishing vessels so as to improve fishermen’s earnings and ultimately to encourage the younger generation to enter the fishery.

8.1.1 The Coastal Fisheries Development Project

Between 1987 and 2002 there were six coastal development projects that were funded by the Japanese government at a cost of SR 110 million. These projects were initiated by the Ministry of Environment and Natural Resources and SFA, with SFA being the implementing agency. The aim of these projects was to increase the capacity of the above sectors and it consisted of the following activities:

- Supply of engines, fishing gear, safety and navigational equipment
- Supply of two research vessels and ten fishing vessels
- Construction of four ice plants
- Construction and improvement of shore-based infrastructure, i.e. fishing harbour, quay, jetties, covered fish-landing area.

The above projects were aimed at increasing the capacity of the artisanal and semi-industrial fisheries sector.

The supply of engines, fishing vessels and fishing gear increased the resource capacity of the sector. The supply of ice plants helped fishermen to improve the quality of their catch and therefore of their income. The construction of quays and extension of the artisanal fishing port at Port Victoria and Bel Ombre resulted in better port facilities for both the artisanal and semi-industrial fleet.
The supply of two research vessels has permitted SFA to conduct various research projects and fishing trials that have been of direct benefit to the fishing industry. The last research vessel acquired by SFA in 1995, “L’Amitié”, has not only been utilised for SFA projects but also for regional projects. The fact that Seychelles is the only regional state that owns a large (20 meter) modern research vessel, which has been maintained in excellent condition, is a fitting testimony to the experience and dedication of its crew and the SFA Operation Section.

From the sale of vessels and fishing gear, a counterpart fund was generated which helped to finance other development projects, for example:

a) The excavation and deepening of the Cascade channel, and improvement of artisanal harbour facilities as in Bel Ombre.

b) Establishment of a semi-industrial longline development fund with the procurement of two longline vessels.

c) Building of stores for fishermen at Glacis.

8.1.2 Artisanal Fisheries Development Project

This project was initiated over the period 1984-1998 and implemented by the SFA. The project cost SR 79.3 million and was funded by the African Development Bank (75%) and the Government of Seychelles (25%). The overall goals of the project were to support the artisanal sector so as to improve fish supply and the balance of payment.

The project involved the following:

1. Provision of training and technical assistance for fish quality control and fish marketing.

2. Construction of Bel Ombre breakwater and landing facility

3. Supply of vehicles to SFA and Veterinary Department

4. Supply of nine fishing vessels

5. Supply of technical equipment such as electronic equipment, fishing gear, iceboxes etc.

6. Quay repairs.

The outcome of the project was to increase the resource capacity of the artisanal sector by the fact that fishing vessels were modernised and certain non-motorised vessels changed from outboard to inboard powered vessels. For the first time the problem of safety at sea was deemed to be important and life and safety equipment were ordered (life jackets, life rings, EPIRB’S etc.) and sold to fishermen at a reduced price.
8.1.3 Other Projects (on-going and proposed projects)

a) Rehabilitation of the Fisheries Harbour at Bel Ombre (on-going)

This project proposes to improve the existing artisanal fishing port at Bel Ombre to service the fishing sector in the North-West Bay. It involves building breakwaters and a sheltered harbour basin of approximately 80m x 30m, dredged to 5m depths. Various backup facilities are being proposed: marketing hall, cold store, stores for fishermen and an ice plant.

When this artisanal fishing harbour and its facilities are completed, Mahé will have a well equipped regional fishing center which will support the sustainable artisanal fisheries activity and help to decentralize the artisanal fishery as well as further improve fish quality, catch rates and hence the income of fishermen.

b) Large Pelagic Fisheries Research Project (on-going)

This project was initiated in 2000 by SFA and IFREMER (Institut Francais de Recherche pour l'Exploitation de la Mer) based at Réunion and has the objective of improving the economic viability of the semi-industrial longline fishery. It is aimed at acquiring more scientific and biological data on the tuna and swordfish stock by using satellite and temperature charts, mapping plankton concentration to locate fishing grounds, as well as to determine techniques to reduce the predation rate for the longline fishery from false killer whales.

The fisheries scientists have also carried experimental fishing trials to improve the catch rate of large, deep-swimming tuna such as big-eye tuna, by setting the longline at greater depth and by fishing at various period of the day when predation rate is reduced. The project is funded under the French cooperation agreement at an estimated cost of SR800,000 with SFA providing the research vessel. The project has also supplied computers and research material to SFA and is expected to provide fishery information through publication of temperature charts, posters, leaflets, etc, for dissemination to fishermen.

c) Tuna Tagging Project (on-going)

This is a EU funded project, which consists of tagging tuna in the Western Indian Ocean. The project will cost EU14 million and will start in mid 2005 extending over a five-year period. The Indian Ocean Tuna Commission (IOTC) will coordinate the project and funds will be dispersed through the Indian Ocean Commission (IOC). This is an important project that should play a significant contribution towards improving scientific and practical knowledge of the tuna and small pelagic stock in particular on its migratory movement and growth. At the same time the project will give the opportunity to local fishermen to obtain fishing equipment to capture bait fish to be sold to the tagging vessels and/or eventually to develop a new local fishery targeting a hitherto unexploited resource.

d) Management of Sea Cucumber Fishery (on-going)
The objective of this project is to determine the resource base for sea cucumber and develop a management plan for the fishery within SFA. The FAO at approximately US$290,000 and the Government of Seychelles at SR46, 200, fund the project. This fishery has become very important in the last few years as a new target species for both the semi-industrial longliners and smaller artisanal vessels, pending the lifting of the ban for the export of swordfish.

e) Evaluation and Commercialization of Under Utilised Marine Resources (NEPAD-CAADP BANKABLE PROJECT)

The overall objective of this proposed project is the development of new and under-utilised resources in the Seychelles EEZ and the formulation of management plans for their sustainable utilisation. The project will also provide the development of mariculture for marketing and value added potential of fish and fish products.

The project is estimated to cost US$3.6 million with funding expected to come from both local (20%) and international agencies (80%).

The cost and major component of the project can be broken down as follows:

- Development of under-utilised resources – US$85,000.00 (2.7% of total cost).
- Mariculture developments for fin fish and seaweed farming – US$1.7million – (54% of total cost).
- Upgrading of post-harvest facilities, product development and marketing – US$850,000 – (27.7% of total cost).

Once the sustainability of the project is ascertained it is expected that the private sector or potential entrepreneurs will come up with the necessary investment capital as this is deemed to be essential for the continuity of this project.

Consultant’s comments on the proposed project

Although the overall objective of this proposed project is deemed relevant for the development of the fisheries sector in Seychelles, priority has not been allocated to the most important components. The consultant is of the opinion that more funding should be allocated to the upgrading of post-harvest facilities together with product development and marketing, and less emphasis placed on the culture of finfish and sea-weed. Since there have been very limited trials carried on the culture of finfish in Seychelles, small scale experimental trial project should be carried out before investing large sums of money for the implementation of any full scale farming projects.

8.1.4 Fuel Voucher Scheme (on-going)

The fuel voucher scheme project was introduced in 1991 as an income support to the artisanal fisherman. Beneficiaries of the scheme receive vouchers aimed at reducing the operating costs for fishermen/boat owners, hence improving the viability of fishing operations. Registered fishermen who qualify receive a rebate of SR1.49 and SR1.73 per litre of benzene and diesel purchased under the scheme. In 2003 the total amount of diesel and benzene sold was 2.55 million litres at a cost to Government of SR4 million per year. To-date the scheme has absorbed a total of SR23 million. This incentive can be qualified as a subsidy to the artisanal fishery.
It is important however, that SFA continues to monitor the scheme carefully, as it is open to fraud by unscrupulous fishermen. (Mauritius had to cancel a similar scheme due to excessive abuse by the fishing community.)

The new Agriculture and Fisheries (Incentives) Act, 2005, entitles boat owners in the artisanal fishery to the fuel voucher plus a 0.30 cents rebate for boats using up to 4,000 litres of fuel per annum and 0.60 cents rebate for boats using more than 4,000 litres of fuel per annum.

8.1.5 Fishing Loan Scheme (on-going)

The Fishing Loan Scheme has been operating since the late 1970s through the Development Bank of Seychelles with input from the Fisheries Division and later by SFA. In 1997 another scheme was introduced called the Youth Enterprise Scheme (YES) that supplied credit facilities of up to SR50,000 to fishermen. In addition, fishermen can obtain loans from the Commercial Banks and in 2003, this source of funding exceeded lending from both DBS and the YES schemes. In the wake of the Tsunami disaster it is important that, pending a more comprehensive assessment of the state of the marine resource, SFA controls carefully the number of loans recommended for fishing vessels. It is suggested as a precautionary measure that in the next few months loans are only granted for the repair/replacement of fishing vessels and equipment and that no loans are granted for the construction of new fishing vessels (in particular for small outboard powered Mini Mahé) through DBS and the YES scheme.

8.2 Industrial Fishing Projects (on-going and proposed projects)

The projects listed below have been selected because this consultant believes they can play a key role in improving the facilities at Port Victoria and hence help consolidate and even improve the employment situation in the Fisheries Sector.

8.2.1 Repair and Extension of the Tuna Quay

This project consists of widening and rebuilding the old tuna quay and the inter-island quay to provide facilities at the fishing port. The project was completed in November 2004 and it should play a considerable role in easing the congestion at Port Victoria.

8.2.2 Ship Waste Reception Facility (proposed)

This proposed development is aimed at collecting used oil, bilge water and garbage at Port Victoria from the industrial tuna fleet. The facility will include storage, oil separation and solid waste treatment and the equipment will be designed in accordance with MARPOL recommendations. The development of this facility will be integrated with other development projects at the SFA port facilities and the proposed cost will be US$1.5 million.

8.2.3 Building of Fisheries Port Facility at Providence (proposed)

This proposed project would relieve congestion at Port Victoria as present quay facilities for the semi-industrial longliners are very limited. It could also serve the industrial
longline fleet provided there is adequate berthing space. The outcome of the project will provide employment for fishermen south of Victoria as well as providing land for fish processing and fishing vessel repairs and other fishing facilities. This project is estimated to cost US $8 millions will be contracted in three phases depending on the fishing fleet requirements. There have been many proposals for financing the project but it requires an investor with experience and the necessary capital (such as the Taiwanese Fisheries Association) to make a firm commitment for the project to really take off.

8.2.4 Allocation of Land for Repairs of Nets, Storage of Salt, Construction of Cold Stores and Recreational Facilities for Fishermen (proposed)

Ship owners consider this a priority, as these facilities are presently inadequate at Port Victoria. It is suggested that areas at Providence Industrial Estate should be allocated to net repair, and land close to the fishing port allocated to the proper storage of salt and the construction of cold stores and recreational facilities for the industrial fishing fleet. These facilities, if built, will consolidate the position of Port Victoria as the main tuna port for the Western Indian Ocean. It is to be noted that years after the completion of the reclamation project there is as yet no master plan for the future development of port infrastructure.

8.2.5 Construction of Dry Dock Facilities (proposed project)

Although this proposed project has been in the pipeline for some time, no concrete plans have been proposed. One formerly interested party, Chantier Piriou, has now built a new dry-dock in Mauritius and the venture has proved viable. This is one venture that would guarantee employment to a large number of Seychellois (the dry dock in Mauritius employs 110 people) but the main constraint in Seychelles is the foreign exchange problem, since all equipment, material and spare parts have to be imported. There is also a lack of skilled manpower in Seychelles and it would be counter productive to import skilled labour to work in such projects. In future the new maritime school could consider training personnel for this purpose.

8.2.6 Construction of a new factory for processing tuna loins (proposed project)

A study should be carried out on the feasibility of building a new tuna factory for processing tuna loins taking into consideration the local labour constraints and the present market demand for tuna loins. This study should take into consideration the eventual closure of the tuna canny, without any replacement, costing the Seychelles economy an estimated US$50m a year (Report on the ‘Impact Assessment of Economic Partnership Agreements on Seychelles & Preliminary Adjustment Scenarios’, Landell Mills, April 2004).

8.2.7 Study on the utilization of by-catch from purse seiners (proposed project)

It is estimated that at least 5 to 10% of the catch by purse seiners is discarded at sea and is therefore wasted. Based on the total purse seine catch of 407,000 MT in 2003, a conservative estimate of the by-catch discarded at sea would be around 30,000 MT. Although most of these discards are non-tuna species they are nevertheless edible fish species that can either be consumed as such or processed into value added products or/and fishmeal.
A study should be initiated to attempt to identify firstly the composition of the by-catch and secondly the economic feasibility of using the discards for viable purposes (in consultation with ship-owners). This study should take into consideration the logistics of such operations and how best to resolve the problems of storage and transport of the by-catch as well as the marketing of the final product.

8.2.8 Construction of new infrastructure of Port Victoria (proposed project).

A Spanish ship owner has proposed to finance a project for the construction of new tuna quays, warehouses and cold stores at Port Victoria. This project, which is estimated to cost US$10m. would give a much required psychological boost to private investments and help to counteract the recent large port developments at Port Louis, Mauritius, which has been widely publicized in the regional press. The project would make a significant contribution in consolidating the position of Port Victoria as the main Industrial tuna fishing port in the Indian Ocean. Government should therefore provide the necessary land for the project and facilitate the administrative procedures required for planning approval of the project. In effect, this project should be incorporated in the master plan for the development of Port Victoria.

8.2.9 Resource Surveys of small pelagics in the Seychelles EEZ (proposed project)

Since the late 1970s when several acoustic surveys for small pelagics were carried out by foreign vessels in the Seychelles EEZ (Tarbit, 1980), no other surveys have taken place to confirm estimates of biomass of small pelagic species, in particular of horse mackerel (Decapterus) which was estimated to have an MSY of 45,000 tonnes. If indeed, the presence of this resource can be reconfirmed, it would provide an important source of raw material for a new fishery both for bait (pole and line and longline fishery) and possibly for a new fishmeal plant. This new fishery could have an important impact on national employment in the fisheries sector.

9. CONCLUSIONS

Derived from the findings and analysis of this study the main conclusions reached are as follows:

9.1 Whatever the social or economic objectives of the fisheries sector, emphasis must be placed on sustainable use of the resource and protection of the marine environment. This should take precedence over social goals including the creation of employment, since over-fishing will result in the failure to meet other, non-biological objectives. Therefore a suitable balance of regulatory measures, fiscal and economic incentives and disincentives is required to ensure that the fishing sector is appropriately managed.

9.2 The state of demersal resources, in particular for inshore waters, has almost reached the optimum level of exploitation. Pending the availability of more accurate statistics, any increase in fishing pressure on these resources must be discouraged. There is more scope for fishing development of demersal species in deeper waters on the edge of the plateau and on fishing banks located beyond the continental plateau and
around the southern islands of the Seychelles Group, as well as for small pelagic species located on the Mahé Plateau.

9.3 Full-time fishermen involved in fishing activity account for approximately 1,750, representing 5% of formal employment. The number of people involved in fish processing and ancillary services is around 4,000, representing 10% of formal employment. The number of Seychellois workers available to work in the two key processing plants (IOT and Coetivy Prawn Farm) has reached saturation point and the prospect is minimal for future employment of Seychellois workers in these two factories. There is a possibility, however, that skilled Seychellois personnel i.e. technicians and administrative staff, could take over posts presently occupied by expatriate workers employed at these two factories.

9.4 Evidence indicates that preferential tariff arrangement benefited by Seychelles for the export of canned tuna to the EU will be discontinued in the near future. This means that the prospect for export of canned tuna to Europe are bleak unless the cost of local production at the canning factory can be reduced so as to be competitive on world markets. Evidence would strongly suggest that the canning factory couldn’t operate profitably in the EU market if competitors from Asia are allowed further quota and/or duty exemptions.

9.5 Export of demersal fish species from Seychelles has become prohibitive due mainly to the high value of the Seychelles rupee and competition from neighbouring states such as India, Oman, Dubai, Maldives and Indonesia which are exporting the same species at reduced prices. There is the potential for Seychelles to exploit certain “niche markets” such as the high-class hotels in Mauritius, who are willing to pay high prices for premium quality fish.

9.6 The key to the development of the artisanal fishery is to identify new markets, possibly in the Far East, as well as training new fisheries personnel and fishermen. Emphasis must be placed on the constant monitoring of the industry and devising good management plans and policies ensuring sustainable development of sector while avoiding confrontation with the various stakeholders.

9.7 The best prospect for the future development of Seychelles fishery for the export market is the semi-industrial fishery where swordfish and tuna stocks are still considered to be stable. Export companies must however, develop an aggressive marketing strategy for this fishery as well as identify new markets for shark products (meat, skin, cartilage, oil, etc), in addition to shark fins.

9.8 It is doubtful whether the building of a dry dock and a new vessel repair facility in Seychelles would be economically viable. The reason for this is that dry docks presently exist in all regional states, i.e. Mauritius (2), Madagascar, Dar-es-Salam, Mombasa and South Africa. The high cost of labour and lack of skilled manpower, as well as the foreign exchange difficulties, are drawbacks for Seychelles. Instead, government should consider, on a short to medium-term basis, providing financial incentives to the present vessel repair facilities in order to improve and upgrade their facilities.

9.9 The limited number of qualified technical staff employed by SFA, especially in the industrial tuna section, is a serious constraint in the future development of
comprehensive research and tuna management programmes, particularly if SFA wants to maintain it’s position as the focal point for tuna research and management in the Indian Ocean.

9.10 The Maritime Training Centre does not presently have the personnel and infrastructure required to support a comprehensive programme for maritime training. There is a need to recruit expatriate staff for training of students or/and establish cooperative links with other foreign training institutions/countries to improve the MTC’s training capacity.

9.11 Despite the fact that Port Victoria is the leading tuna fishing port in the Indian Ocean, due to stiff competition from other regional ports (for example Port Louis, Mauritius), the present port facilities are becoming inadequate. Most boat owners, in particular the Spanish fleet, have formed a close relationship with the Seychelles authorities and are ready to give Port Victoria a second chance provided the authorities show more flexibility to their requirements. There is a need for the authorities to respond rapidly when a problem arises and the appointment of a focal point would play a significant contribution to resolve this problem.

9.12 The recent tsunami disaster has had a serious effect on the inshore fishery, in particular in coastal areas, affecting both the marine habitat and the resource base. In addition, a large number of fish traps have been destroyed, and fish landings for the trap fishery in the next South-East monsoon, is likely to be affected. The consultant is of the opinion that that an in-depth study of the effects of the tsunami on inshore fisheries, including the economic impact of the disaster should be carried out in order to assess the damage caused.

9.13 From the consultant’s personal expertise and from private conversations with regional experts it is not recommended that government invest in mariculture projects, except for the farming of high-valued species such as pearl oysters and marine prawns. This is due to the high cost of labour, imported material and the scarcity of land and/or marine sites. Such projects would be unable to compete with high quality wild fish readily available on the local market at a low price.

10. RECOMMENDATIONS

The following recommendations are intended to consolidate and improve the present employment situation in the Seychelles fisheries sector:

10.1 The fisheries sector has a considerable contribution to make to the country’s economic development and there is no doubt that it presently operates well below its maximum potential. The full potential of the sector can only be achieved through the application of well-defined policy guidelines with clear strategies that need to be updated and refined as conditions in the fisheries sector change. Any policy decision that is taken by government must be carefully implemented and closely monitored by the implementing agency.

10.2 In the face of declining demersal resources around the coastal areas of the granitic islands, further exploitation must be carefully monitored with certain management
measures imposed. Seychelles has a multi-species fishery and fishermen can easily switch from one resource to another, thus maintaining a high level of fishing pressure on marine resources. This is well illustrated in the semi-industrial fishery which over the last two years has switched from a purely tuna and swordfish fishery to a sea cucumber and shark fishery mainly due to a ban on the export of swordfish. SFA should therefore take up the offer under the EU Agreement relating to the prospection of deep-water resources in Seychelles waters.

10.3 Any fisheries management measures should be proactive and based on the latest scientific evidence and not deferred until more information becomes available (management plans should be updated accordingly). In the absence of adequate scientific data, a precautionary approach should be taken for fisheries development.

10.4 In a drive to further diversify the fisheries sector, government should actively encourage the setting up of joint ventures to diversify the fishery and increase the economic returns. This is particular the case in the semi-industrial fishery, in the processing and services sectors i.e. repair and maintenance of vessels and equipment, construction of cold stores and fishing quays etc given. Clear policy guidelines should be available for foreigners wishing to invest in the fisheries sector, as they could otherwise be discouraged. Government should encourage private investment in building new port infrastructure and maximum publicity should be to such projects to give a psychological boost to the sector.

10.5 In view of the fact that it is likely that the advantages benefited by Seychelles from the preferential tariff arrangements for canned tuna will be lost in the near future, (rendering export of Seychelles canned tuna to EU countries prohibitive), a feasibility study should be carried out to investigate the possibility of investing into product diversification. One option that should be considered is the construction of a new factory for the production of tuna loins for export; this would cut operating costs and reduce labour requirements. There is also a need to develop new markets for canned tuna, possibly in Southern African countries, to avoid depending solely on the EU markets.

According to a report on the Seychelles economy financed by the EU (Report on the Impact Assessment of Economic Partnership Agreement in Seychelles. Landell Mills, April 2004), it is recommended that Seychelles should seek funds for market studies for alternative and profitable markets for its fisheries resources and, for studies of how locally added value in processing can be encouraged and financed.

10.6 Due to the lack of adequate infrastructure at Port Victoria it is recommended that a master plan be drawn and land be set aside for such services as new fishing quays, building of warehouses, ship waste reception facility, fishing net manufacture and repair, storage of salt, building of cold stores and recreational facilities for industrial fishermen. This plan should be implemented after consultation with various stakeholders including the Port Authority, SFA, ship owners and the private sector.

10.7 When reflecting on recent development in the tuna fishing industry in the region this consultant believes that Seychelles authorities must concentrate on three main points in order to maintain the competitiveness of Port Victoria:

- Maintain and develop new fishing port infrastructure.
➢ Adopt a more flexible approach when dealing with the requirements of the industrial fishing fleet since fish is a perishable commodity and the tuna industry is highly competitive.

➢ Ensure that fuel stocks at Port Victoria are sufficient to meet the requirements of the fleet at all times, as this is an essential commodity for the industrial fishing fleet

10.8 Seychelles should not forget that there are regional ports competing for the tuna fishing business, which represents a direct challenge to Port Victoria. Port Victoria presently has the edge over most of its competitors in view of its geographical position and efficient administrative support. There are no grounds, however, for complacency in such a highly competitive industry where so the authorities should adopt a more flexible approach towards the tuna fleet many factors lie outside Seychelles control. The most important point to remember is that in order to ensure the dominance of Port Victoria as the first tuna port in the Indian Ocean.

10.9 Government (MENR) should consider regulating the indiscriminate cutting of bamboo trees. Permits should be issued to that effect, with certain reserves set aside. Bamboo is used for mass production of FADs for purse seiners whilst trap fishermen are finding it more difficult to obtain material for building traditional bamboo traps.

10.10 SFA is suffering from a shortage of qualified scientific staff as a result of resignations (including non renewal of contracts) and high turnover rate of senior marine scientists but it appears that no new qualified Seychellois graduates are willing to work for the Institution. SFA should therefore, as a last resort, consider recruiting qualified expatriates, in particular for the industrial tuna section. The expatriate staff would be in a position to train Seychellois counterparts. There is an urgent need to draw a serious and credible manpower plan for SFA to address its medium to long term staffing requirements. SFA should also develop a cohesive national research programme, identifying research priorities within the sector.

10.11 The proposed new Maritime Training Centre building will be a welcome addition for the training of Seychellois aiming to pursue a career in the maritime sector. The consultant is of the view that in the short-term the school should prepare Seychelles students for further training overseas as there are many foreign institutions (in Réunion, France, Spain and India etc.) offering free scholarships in maritime studies. One Spanish ship owner has proposed that students from the MTC be given the opportunity to board purse seiners during their school vacation to get acquainted with the work on board and acquire sea time experience. It is however the task of careers guidance counselors to make students aware of career opportunities in the maritime sector and that these jobs are well remunerated. Meanwhile a national coordinator should be appointed for the MTC to coordinate all offers of international technical assistance and/ or funding for the school.

10.12 Concerning the poor recruitment of Seychelles seamen by EU and Seychelles flagged purse seiners, it is difficult at this time to propose a definite solution to this long standing problem, except that in future it is proposed that fishermen working on purse seiners should undertake a period of basic training at the MTC. As a short-term measure
it is recommended that SFA carry out a background check on the proposed candidates (perhaps checking police records and character checks). A fisherman record book, which entitles the applicant to be recruited on purse seiners, should only be issued after SFA is satisfied that the applicant meets the basic requirements. Moreover, an up-dated black list should be kept to exclude any seaman from purse seiners who has committed any serious infraction in the past. There is a need to have more consultation with the industry and government should consider setting up an advisory committee headed by SFA to study the problem.

Meanwhile the present employment contract for Seychelles seamen working on EU purse seiners should be reviewed, as there are discrepancies between the Spanish and French contracts (see Annex II). Since the new Agriculture and Fisheries (Incentives) Act, 2005 exempts fishermen from paying social security, there will be no need for a ‘service contract’ with the ship owners and, this is another reason to negotiate a proper employment contract. The condition of the contract should be in line with the terms specified in the new EU Agreement.

10.13 A difficult decision on how to reduce the fishing effort on certain fish stocks will have to be taken in the future. When it is a multi-species fishery and the resource is considered to be over fished - in particular if the revenue from the fishery is lucrative (for example sea cucumber and shark fishery) - finding an equitable solution for all stakeholders is a difficult matter. At times, after the fisheries manager takes a difficult and unpopular decision, it inevitably falls on the shoulders of the highest authorities i.e. the Minister or even the President.

An attempt should therefore be made to reach a compromise with all stakeholders but whatever the decision reached; politics should not interfere with the objective of resource conservation or fisheries management. This is an urgent matter as otherwise unpopular decisions will have to be taken in the near future such as fleet reduction, closed areas etc.
Annex I

Chapter 3 TERMS OF REFERENCE

Consultancy on existing and potential employment opportunities for Seychellois in fisheries and fisheries activities including recommendations on how to improve the present employment situation and identify the strategic training needs of this sector.

1. **Background**

The fisheries sector is the major earner of foreign exchange in Seychelles surpassing tourism inflows yet the number of people employed in that sector (except for the canning factory) has remained rather stagnant at around 4600. According to the SFA 2002 Annual Report it was estimated that the number of people directly and indirectly employed by the fisheries sector and ancillary activities accounted for approximately 14% of total national employment. The largest employer in the sector is by far the canning factory with approximately 2,500 employees; around 50% of those are expatriates. Though some 1,500 persons are employed as full time fishermen, only approximately 80 are employed on tuna purse seiners and this number has declined since the start of the fishery in 1984. Moreover, it is to be noted that according to the EU Agreements at least two Seychellois should be employed on EU purse seiners.

The Maritime Training Center, which was established in 1979, was initially designed to cater for 27 students per annum but a very limited number of graduates are actually employed in the fishing industry. The Center is now divided into three divisions: Deck, Engineering and Fisheries and includes several supplementary courses. The current Certificate in Maritime studies comprises 13 modules over a period of two years but that course does not have sufficient high level of training for graduates to work on foreign going or internationally registered vessels.

A new MTC building is to be built. It will accommodate more and it intends to reinstate the Diploma Course in Maritime Studies as well as continuing the Certificate courses and to implement an internationally recognized standard of Training Certification and Watch Keeping seamen training programme.

2. **Scope of work**

1. Review and give a breakdown of the situation of the total employment situation in the fisheries sector and related activities (fishing, repair, serving, processing, administration, fishing vessel building and repair, service industry, post harvest).

2. Analyse why the number of Seychellois employed on foreign tuna vessel (purse seiner and longliners), both Seychellois and foreign flagged, are insignificant and make relevant recommendations.
3. Review the conditions of employment of Seychellois sailors on local and foreign fishing vessels and make the necessary recommendations to improve the situation.

4. Review the current employment contract in view to make it more attractive for employment on foreign fishing vessels and what scheme(s) could put in place in collaboration with vessels owners to improve the situation.

5. Examine the curriculum of the present MTC and the future MTC in the light of short, medium and long-term employment prospects to improve both the quality and quantity of recruits as well as to improve the employment opportunities and make relevant recommendations.

6. Assess present conditions of employment, including job security, safety at work, retirement benefits etc. and its impact on employment opportunities and make recommendations.

7. Identify projects in the fisheries sector with the potential to enhance employment opportunities giving an indication of the benefits of such projects.

8. Compare employment conditions in other regional countries (namely Mauritius/ Madagascar) so as to propose modification/changes in our local legislation and what benefits these could bring to the national employment situation.

9. Make recommendations on what measures, policies etc. are required in order to increase employment in the fisheries sector.
Annex II

DIFFERENCES IN THE EMPLOYMENT CONTRACT OF SEYCHELLES SEAMEN WORKING ON EU PURSE SEINERS

1. Background

This contract was originally drafted in 1984 after several meetings/discussion with the representatives of boat owners, ship Agencies (ULC + Hunt Deltel) SFA and the Ministry of Employment. All four representatives were signatures to the contract.

The contract as it stands today is still basically the same as in 1984 with certain modifications/deletions to some articles. However not only does it need to be updated to meet the requirement of the new EU Agreement signed on 18/01/05 but the Spanish and French version have significant differences and it obvious that a uniform contract for all Seychellois seamen on all EU purse seiners needs to be formalized. This new contract should be in line with EU Regulations as stated in Section II of the Annex to the EU Agreement.

2. Main Differences in the Contracts

2.1 Salary Structure (see Articles 3)

The salary structures for the French and Spanish contracts differ significantly in several ways. Seamen on the French purse seiners receive a salary based on a per day prorata payment; the salary on Spanish vessels is based on a fixed monthly payment.

The Table below analyses the main differences in salary structure

<table>
<thead>
<tr>
<th></th>
<th>FRENCH VESSELS</th>
<th>SPANISH VESSELS</th>
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</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
<td></td>
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<tr>
<td>Salary</td>
<td>Able-seamen (on Deck)</td>
<td></td>
</tr>
<tr>
<td>&lt; 1 yr Experience</td>
<td>→ SR 2052/30 days (SR 68.40/day)</td>
<td>→ SR 1,556/month</td>
</tr>
<tr>
<td>&gt; 1 yr Experience</td>
<td>→ SR 2,484/30 days (SR 82.80/day)</td>
<td>→ SR 1,828/month</td>
</tr>
<tr>
<td>Greaser</td>
<td>→ SR 2,700/mon/30day (SR90.00/day).</td>
<td>→ SR 1,900/month</td>
</tr>
<tr>
<td>b)</td>
<td>Bonus on catch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SR 4.50/MT of Tuna caught</td>
<td>SR 3.50/MT (with possibility to increase in line with World Market price)</td>
</tr>
</tbody>
</table>
### c) INSURANCE Benefits

<table>
<thead>
<tr>
<th></th>
<th>Death Benefits</th>
<th>Sickness Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 1 yr Experience → SR 73,832</td>
<td>&lt; 1 yr Experience → SR 56,016</td>
</tr>
<tr>
<td></td>
<td>&gt; 1 yr Experience → SR 89,424</td>
<td>&gt; 1 yr Experience → SR 65,008</td>
</tr>
<tr>
<td>Greaser</td>
<td>→ SR 97,200</td>
<td>Greaser → SR 68,000</td>
</tr>
<tr>
<td>&lt; 1 yr 7 days maximum benefit</td>
<td>SR 478.80 + Cost of medicine</td>
<td>&lt; 1 yr Experience 31 days max. benefit</td>
</tr>
<tr>
<td>&gt; 1 yr</td>
<td>→ SR 579.80 + Cost of medicine</td>
<td>&gt; 1 yr Experience</td>
</tr>
<tr>
<td>Greaser</td>
<td>→ SR 630.00 + Cost of medicine</td>
<td>Greaser</td>
</tr>
</tbody>
</table>

### 3. Compensation (When vessel is sold or leaves Indian Ocean)

This article has been dropped in the French version, in the Spanish version it guarantees one-week salary for every year of continuing service on the vessel.

Note: This condition is never respected and according to fishermen no one has ever benefited from it.
## Annex III

### Proposed Management Options for the Artisanal & Semi-Industrial Fisheries of Seychelles

<table>
<thead>
<tr>
<th>Chapter 4 Fishery</th>
<th>Estimated Employment</th>
<th>Present status &amp; Constraints</th>
<th>Management Options</th>
<th>Recommendations</th>
</tr>
</thead>
</table>
| Mackerel Fishery           | 90                   | - Resource base not a constraint  
- Limited local market leading to wastage (seasonal)  
- Existing regulations not adequately enforced  
- Large price fluctuations is a severe marketing constraint  
- No processing (only Limited freezing) | - Legislation in force concerning seining areas (outside Marine Parks & Marine Protected areas)  
- time period and size of nets. | - Require improved enforcement of present legislation, for example all nets need to be tagged when licensed. |
| Shark Fishery              | 40                   | - Data inadequate to evaluate resource base  
- Wastage of the resource with mostly fins targeted, carcass discarded.  
- Need to identify market for meat, skin, jaws etc….  
- Fishing with nets prohibited | - Statistics of catches recorded  
- All vessels larger than 14 meters must return with carcass.  
- Proposed total ban on fishing would be difficult to enforce. | - All vessels must be licensed.  
- Identify markets for meat & other shark products. |
| Octopus                    | 60+                  | - Resource over-exploited and undersized stocks harvested.  
- No accurate data available because fishing by fishermen on foot & part-time.  
- Enforcement of proposed Management measures, difficult to and presently not implemented.  
- Fishing technique (spearing) is a constraint as the animal is killed and cannot be returned live even if undersized. | - Closed season until stocks recover sufficiently.  
- Consumers depends on above particular by hotels and restaurants.  
- Issue licences for this fishery  
- Legislate size limited | - Closed season during spawning period (November – January). |
| Trap Fishery               | 350                  | - Large number of traps with inadequate statistics.  
- Coralline species depleted (in particular cordonier siganus)  
- Traps undersized mesh a recurrent problem.  
- Fishing in spawning areas, stealing and tempering of traps a serious problem.  
- Lack of enforcement. | - All vessels should require a licence.  
- Traps should be tagged.  
- Closed season in lagoons during N.W Monsoons.  
- Improve enforcement.  
- All traps must have biodegradable mouth. | - Implement Mgt. options proposed.  
- Improved enforcement of present legislation (Police and SFA must jointly carry out enforcement) |
<table>
<thead>
<tr>
<th>Fishery</th>
<th>Value</th>
<th>Problems</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobster Fishery</td>
<td>40</td>
<td>- Material (bamboo/metal meshing) not readily available and trap makers rare.</td>
<td>- Implement management options proposed and reinforce enforcement.</td>
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<tr>
<td></td>
<td></td>
<td>- Resource over-exploited, illegal fishing common.</td>
<td>- Maintain closed season.</td>
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<td></td>
<td></td>
<td>- Enforcement of present legislation lacking.</td>
<td>- Resource recovery can only be achieved by banning fishery for certain years.</td>
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<td></td>
<td></td>
<td>- Need more cooperation from Hotels.</td>
<td>- Structure enforcement of consumers in particular Hotels and Restaurants.</td>
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<td></td>
<td></td>
<td>- Increase “on the ground” enforcement.</td>
<td>- Increase “on the ground” enforcement.</td>
</tr>
<tr>
<td>Lobster Fishery</td>
<td>40</td>
<td>- Resource over-exploited, illegal fishing common.</td>
<td>- Implement management options proposed and reinforce enforcement.</td>
</tr>
<tr>
<td>Demersal line Fishery</td>
<td>1000+</td>
<td>- Near shore resources over-exploited but potential for development of fishery further offshore in deeper waters and on southern island groups.</td>
<td>- Encourage more vessels to enter semi – industrial fishery (swordfish and Tuna).</td>
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<tr>
<td></td>
<td></td>
<td>- High operating costs and low purchase price.</td>
<td>- Enforcement of existing licensing conditions.</td>
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<td></td>
<td></td>
<td>- Price fluctuation is a problem for fisherman. Lack of manpower (ageing manpower base).</td>
<td>- Discourage loans for outboards or small boats.</td>
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<td></td>
<td></td>
<td>- Illegal fishing by both foreign and local vessels.</td>
<td>- Improve present catch statistics at landing sites.</td>
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<tr>
<td></td>
<td></td>
<td>- Depletion of long–lived high value species (groupers and snappers).</td>
<td>- Reduce or Remove trade tax on spares, fishing gear and fuel.</td>
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<td></td>
<td></td>
<td>- Practice of paying high price for plate size fish not recommended.</td>
<td>- More ice made available in district landing. Sites and markets.</td>
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<td></td>
<td></td>
<td>- More use of ice to improve quality for obtaining higher price.</td>
<td>- Sale of fish boxes made more readily available (SFA) to registered fishermen only.</td>
</tr>
<tr>
<td>Crab Giraffe Fishery</td>
<td>10</td>
<td>- Present catches below sustainable level.</td>
<td>- Continue to monitor the fishery closely.</td>
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<tr>
<td></td>
<td></td>
<td>- More research/study seasonal availability.</td>
<td>- Explore the export market in particular for live crabs.</td>
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<tr>
<td></td>
<td></td>
<td>- Develop export market.</td>
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<td></td>
<td></td>
<td>- Fishery in no immediate threat.</td>
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<td></td>
<td></td>
<td>- Could consider size limits and ban capture of berried female with eggs.</td>
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<tr>
<td>Sea – Cucumber Fishery</td>
<td>50</td>
<td>- More data required to define resource base.</td>
<td>- Commercial exploitation must be licensed and catch landings carefully monitored.</td>
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<tr>
<td></td>
<td></td>
<td>- Improve the catch data statistics.</td>
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<td></td>
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<td>- Many small producers sell their catch to licensed processors</td>
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<td>- Management measures can be introduced from statistics of ongoing research.</td>
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<tr>
<td></td>
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<td>- All vessels should continue to be licensed with limits on the number of boats.</td>
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</tr>
<tr>
<td>Semi-Pelagic line fishery</td>
<td>N/A</td>
<td>- Resource bare not considered being a constraint.</td>
<td>- Explore markets for the species.</td>
</tr>
<tr>
<td>(Carang and Becune)</td>
<td></td>
<td>- Shows strong seasonality with glut periods.</td>
<td>- Improve processing and better use of ice, to freeze top grade fish. (karang can be preserved in refrigerated sea water for one day)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- High price fluctuations.</td>
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</tr>
</tbody>
</table>
| Semi Industrial Fishery | 50 | - Resources not considered being a constraint.  
- Require improved marketing strategy in particular for shark by-catch.  
- High mercury and cadmium level pose a threat to the fishery.  
- Need more research on stock assessment and migration. | - Pursue Research on how to reduce predation.  
- Release of immature or under sized specimen of swordfish. | - Negotiate satisfactory arrangements with EU to ensure removal of ban of export to EU markets.  
- Vessels longer than 14 meters should be obliged to return with shark carcass.  
- More marketing research on shark products (meat, skin, oil, etc.). |
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