



**New Partnership for
Africa's Development (NEPAD)
Comprehensive Africa Agriculture
Development Programme (CAADP)**



**Food and Agriculture Organization
of the United Nations
Investment Centre Division**

GOVERNMENT OF THE REPUBLIC OF THE SEYCHELLES

SUPPORT TO NEPAD–CAADP IMPLEMENTATION

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Volume V of VI

BANKABLE INVESTMENT PROJECT PROFILE

**Evaluation and Commercialisation
of Underutilized Marine Resources**

September 2005

SEYCHELLES: Support to NEPAD–CAADP Implementation

Volume I: National Medium–Term Investment Programme (NMTIP)

Bankable Investment Project Profiles (BIPPs)

Volume II: Sustainable Pork and Poultry Production

Volume III: Sustainable Vegetable and Fruit Production

Volume IV: Agro–Processing Pilot Project

Volume V: Evaluation and Commercialisation of Underutilized Marine Resources

Volume VI: Support to Wood Exploitation and Utilization

NEPAD–CAADP BANKABLE INVESTMENT PROJECT PROFILE

Country: Seychelles

Sector of Activities: Sustainable fisheries

Proposed Project Name: **Evaluation and Commercialisation of Underutilized Marine Resources**

Project Location: Seychelles Exclusive Economic Zone

Duration of Project: 5 years

Estimated Cost: Foreign Exchange..... US\$2.88 million
Local Cost..... US\$0.72 million
 Total US\$3.60 million

Suggested Financing:

<i>Source</i>	<i>US\$</i>	<i>SR million^(*)</i>	<i>% of total</i>
<i>Government</i>	650,000	3.58	18
<i>Financing institution(s)</i>	2,884,200	15.86	80
<i>Beneficiaries</i>	71,050	0.39	2
<i>Private sector</i>	–	–	–
<i>Total</i>	<i>3,605,250</i>	<i>19.83</i>	<i>100</i>

(*) US\$1.00 = approx. SR5.50

SEYCHELLES:

NEPAD–CAADP Bankable Investment Project Profile

“Evaluation and Commercialisation of Underutilised Marine Resources”

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Abbreviations

BIPP	Bankable Investment Project Profile
CAADP	Comprehensive Africa Agriculture Development Programme
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FAD	Fishing Aggregating Devices
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
MENR	Ministry of Environment and Natural Resources
NEPAD	New Partnership for Africa’s Development
NGO	Non–governmental Organisation
NMTIP	National Medium–Term Investment Programme
SBS	Seychelles Bureau of Standard
SFA	Seychelles Fishing Authority

I. PROJECT BACKGROUND

A. Project Origin

I.1. Two of the major assets of the Seychelles are its environment and the long term strategic importance of its EEZ. The major constraints faced by the country’s development are: the small size of Seychelles nation and geographic location; the extremely limited land area accessible for economic activity; the vulnerability of its economy, which is based entirely on fisheries and tourism which are both very volatile resources and shortage of skilled human resources. Despite this, fisheries have an enormous potential for food security enhancement as well as the generation of employment and foreign exchange.

I.2. This project stems out from the policy of the Seychelles Government to maximise the use of the marine resources as well as seek opportunities to explore under utilised resources (tuna and tuna like species, crustaceans etc.). This project also intends to look at value addition and the commercialisation of these resources and develop appropriate fisheries management plans for sustainable exploitation of these resources. Aquaculture has also been a priority for Seychelles for a number of years, however with a lack of technological know how and expertise, the government could not pursue this avenue. This project will explore the further development of aquaculture in Seychelles for increased production, revenue and consequently food security.

B. General Information

I.3. Seychelles, as a small island state with limited land area, is heavily dependant on its marine resources for food, employment and export. The fisheries sector has in recent years become the pivotal sector to the economy generating foreign exchange and ensure the overall food security of the country.

I.4. Traditionally, fishing has occupied an important part in the socio-economic development of the Seychellois people. An estimated 1,500 people or so are directly dependent on fishing for their livelihoods, whilst between 4,500 to 4,600 people are either directly or indirectly employed in fishing and other related activities. According to the latest population survey of 2002, a total of 2,200 households (10% of total households), translating into a total population of 8,800, are to some extent dependent on fishing and fishery related activities

I.5. Approximately 4,000 to 5,000 tonnes of fish are landed annually. The catch has remained relatively stable over the years. During the period of 1985 to 1998, small boats, (fishermen on foot, pirogues, outboard powered vessels) accounted for 38% of the catch, whalers (inboards undecked vessels) 48.34% and schooners (large decked inboard powered vessels) 13%, and sports fishing boats 0.6%, although annual variation occurred.

I.6. Continued high levels of exploitation within the inshore fishing grounds region have given rise to concern over the status of fish resources. Although there is some uncertainty with regard to size of under-utilized resources, there is some evidence that potential for further development of fisheries beyond the coastal fisheries exists in Seychelles (Mees *et al.* 1998). The scattered nature of available information and high levels of uncertainty in stocks assessments, however, dictate that a cautious approach to developing and managing these fisheries should be adopted.

I.7. The Seychelles Government realises the complexity of the situation. However, due to the *de facto* situation regarding access, it has been difficult to introduce any limiting access management regimes – fishing is considered as a fundamental right by all Seychellois. However, in view of the ever

increasing pressure on coastal fisheries, the *Seychelles Fishing Authority* in consultation with fishermen, *Fishing Boat Owners Association* and other NGOs have been implementing measures to encourage responsible fishing practices

I.8. As part of the reorganisation of the *Seychelles Fishing Authority* (SFA), responsibilities, government has attempted to explore ways and means of providing the Authority with the necessary resources to undertake fishery prospection studies, promote value addition to fisheries products and enhance aquaculture developments. The SFA has also developed an extensive and ongoing dialogue with the *Fishing Boat Owners Association* and fisher groups to ensure that the fishing industry continues to survive and guarantees food security for the country.

I.9. The fisheries sector is also a major source of foreign exchange earnings, derived mainly from the export of fish and fish products, revenue derived from the industrial tuna fishing activity and licenses granted for fishing rights in Seychelles EEZ. In the year 2002, the total gross earnings from fisheries amounted to SR1.2bn (US\$219m) amounting to approximately 40% of total current account receipts. That same year a total volume of 38,200 metric tons of fish and fish products were exported representing around 96% in value terms of the country’s total domestic exports.

I.10. There may be a number of resources within the waters of Seychelles which are under utilised. For the demersal and pelagic fishery, it may be possible to increase the catch up to 7,000 tons annually while keeping well within the sustainable yields. The increase could be achieved through increased focus on pelagic resources (tuna and tuna like species) as well as other demersal fish (deepwater snapper) and crustaceans (spanner crab). More evaluation, however, would be required to assess the feasibility of this. There are also indications that market access as well the relative competitiveness of Seychelles fisheries product on the international markets are also constraints which, if addressed, could increase the efficiency and returns on existing levels of resource utilization. Aquaculture will also be explored as means of increasing production and food security.

II. PROJECT BACKGROUND

A. The EEZ and Main Fishing Grounds

II.1. The Seychelles *Exclusive Economic Zone* encompasses an area of 1,374,000 km² of which only 48,019 km² cover ocean depths of less than 200 m, the remainder being over depth of 1,000–1,500 metres. (see map in Appendix).

II.2. The main group of islands (approximately 32) is granitic and within 30 miles of Mahe, the main island. The remaining are coralline and are more widely dispersed, with Aldabra lying over 500 miles west–south west of Mahe. There are two principal continental shelf or plateau areas: the Mahe Plateau and the Amirantes Plateau and these constitute the main fishing grounds.

II.3. The main fishing grounds (Mahe and the Amirantes Plateaux) are of steep sided plateaux rising rapidly from around 1,000 m. The Mahe Plateau is encompassed by an incomplete shallow rim of around 10–20 m, which surrounds an area of about 50–65 m² with subsurface granite and coral outcrops forming banks. The relative large area of the shallow banks and plateaux in Seychelles provides the potential for an important demersal, pelagic and coastal fishery. It has developed to involve a number of vessel types and different methods of exploitation, creating an important socio-economic activity. Although the project will focus primarily on shallow areas, the vastness of the exclusive economic zone also provides enormous opportunities for research initiatives into new and

under-utilised resources that could be of potential commercial and economic importance for the country.

II.4. Research activities will be conducted principally in the shallower areas more accessible to the local fleets at reasonable operational costs. Should the envisaged research activities carried out prove to be successful and of commercial potential, then this would help divert fishing effort off the coastal areas which are already showing signs of over-exploitation and encourage additional onshore activities. Possible sites for the expected additional activity will most probably be on the main island of Mahe, either in Port Victoria or Providence where land has been allocated for fisheries related development. Depending on research sites, the outer islands may have a role to play in the development of this project.

II.5. Suitable aquaculture development sites for cage culture will be identified in areas that would not create conflicts with other marine resource users and have no negative environmental impacts on the marine eco-system. Once identified, aquaculture concessions will be granted to the developers in line with the Fisheries Regulations.

B. Socio-Economic Contribution of the Fisheries Sector

II.6. The fishing industry in Seychelles is a major contributor to the economic development of the country. This economic importance is derived from its role as a source of employment, contribution to production and income generation, trade and foreign exchange generation, government revenue and most importantly as a major source of animal protein.

II.7. For the Seychellois family, fish constitute an important part of the daily diet and an important source of animal protein. The country has one of the highest per capita consumption of fish in the world with latest estimate standing at around 65 kg per annum.

II.8. It is estimated that the fishing sector including ancillary activities generates both directly and indirectly around 4,500 to 4,600 jobs, amounting to about 14% of total formal employment. In terms of income generation, the contribution of the fisheries sector to Gross Domestic Products at 1.0% to 1.5% is grossly underestimated as it takes into accounts only the artisanal sub-sector. Should all fisheries related activities be taken into account, the contribution to GDP would in the region of 15% to 20% annually.

II.9. The range of products produced by the sector is made up of fresh fish from the artisanal and semi-industrial fishery, canned and other processed tuna, black tiger prawns and spiny lobsters. Other processed products consist of dried shark fins and sea cucumbers, salted fish and smoked fish. Production of fish and fish products has grown substantially over the past 15 years, particularly as a result of the setting up a tuna canning factory in Port Victoria in 1987. Between 1990 and 2003, total production grew from 7,923 metric tons to 42,960 metrics tons, an increase of 442%.

II.10. To improve the socio-economic status of fishermen, it is government policy to encourage appropriate training for young people and encourage them to join the fishing industry and devise means to improve working conditions and the income earning capacity of artisanal fisher-folks. Concerns for safety at sea also features predominantly in the objectives of the government as regards to development of the industry. The implementation of the *Vessels Monitoring System* on local fishing vessels will greatly improve search and rescue operations.

C. Characteristics of Current Fishery

II.11. The artisanal fishery in Seychelles is characterized by 14 fishing sectors, with 7 main regions comprising of over 50 landing sites. Except for Port Victoria, the other landing sites have very limited and rudimentary shore based facilities. The artisanal fishing harbour in Port Victoria, recently rebuilt in 1998 with funding from the Japanese Government was planned to cater for the growth in the local fishing industry for over ten years but is already faced with the problems of congestions due to the ever increasing number of bigger vessels. A new fishing port is being planned for the Zone 6 of the *Providence Industrial Estate*. Two ice making facilities operated by private companies are in place but are occasionally faced with shortages. Besides Victoria, two other ice-making facilities are being operated by the SFA and another is found on the island of Praslin. Facilities for repairs and maintenance are available either in Victoria or the Providence area. There is a need on the other hand to provide proper landing and shore-based facilities at the main landing sites on the main islands

D. Institutional Perspective

II.12. From an institutional perspective, the SFA will be expected to have a major stake in the project from the point of view of research, administrative and management functions. In line with government policy, the collaboration of all parties having a stake in the project will be solicited. The main stakeholders, institutions and government departments bound to have a role to play will include, the fishing community, fishermen or boat owners associations, private entrepreneurs, licensing authority, *Ministry of Environment and Natural Resources* (MENR), etc.

E. Development Areas

II.13. Although several studies have been conducted to assess the feasibility of aquaculture practices, the development of aquaculture in Seychelles started only in the late eighties. The main reason is that, so far, the Seychelles has been self sufficient in the supply of fish for local consumption, of which the excess is exported. They also have a vulnerable and limited coastal zone which is under heavy demand for development projects and the environmental awareness of such developments is quite high. The lack of skilled work-force in fisheries specific to aquaculture also hindered the development of aquaculture practices. The high cost of investment, in particular the foreign exchange component has also caused limited investments in that sector.

II.14. To date there are two main projects that have been operational for several years. One is an integrated shrimp farm on Coëtivy Island that has been developed by a parastatal company, the Seychelles Marketing Board. At present the farm boasts 100 ha of ponds, two hatcheries and a processing plant. In 2003 production was close to 1,100 mt. The other project is a pearl oyster/giant clam farm that was developed by a private company on Praslin Island. Both projects are geared mainly towards the exports of their production.

II.15. However with the coastal fisheries reaching their exploitable limits in the future, there is a need to look at the culture of fish to compensate that, both for the local market and for the export market.

II.16. Earlier surveys in Seychelles during the mid-eighties showed that more than 80 species of algae were found around Mahe (Mshigeni 1985, 1987). However the surveys were restricted to Mahe and the inner granitic islands, and the outer islands were not surveyed. These surveys showed that some species, in particular *Sargassum* could be found in huge quantities around the islands of Mahe, Praslin, La Digue and the other inner islands. Other species of commercial interest like *Gracilaria*

were found to be well represented, but with much lower biomass than *Sargassum*. These studies showed that two genus of seaweed: *Sargassum* and *Gracilaria* are the most promising for commercial exploitation due to their high abundance. *Sargassum* can be used for algin extraction and *Gracilaria* for agar extraction.

II.17. The spanning crab (*Ranina ranina*) fishery in Seychelles started to function as a commercial fishery in 1986 when the resource was identified as viable. Studies carried out so far indicates a biomass of between 2,460 and 4,486 mt with an exploitable limit of 695 mt. Statistics indicate that only 30 mt are harvested per year, which would suggest that the stock has the potential to be exploited more extensively.

II.18. Research have shown that purse seine FAD fishery is often associated with high level of by-catches (non-targeted low value species), which can be up to 40 different species and 10% per 1,000 mt of target species. Those by-catches are landed and often use in the production of animal feed rather than for human consumption. There is a need to conduct feasibility study for the possible expansion of the domestic fishery towards those under-utilised FADs associated species and to promote their consumption locally and identify export market for those fresh product. There is also a need to maximise the use of sharks caught by the domestic fishery by exploring possibilities of commercialising shark meat and other shark products.

III. PROJECT RATIONALE

III.1. The fisheries sector is the main backbone for food security and is the major source of animal protein for the country. This sector employs about 5% of the population and taking into account other fishery related activities accounts for between 15% to 20% the country's GDP. It is also the major source of foreign exchange, with canned tuna and other processed fish being the predominant export, accounting for 97% of earnings, followed by fresh and frozen fish and frozen prawns.

III.2. Since the commercialisation of the fishery in the 1980's, the development of industrial tuna fishing in the Western Indian Ocean and the setting up of a canning factory in Port Victoria, the production of fish and fish products has grown substantially, from a mere 4,350 metric tons in 1985 to about 43,000 metric tons in 2002. However, this growth has come principally from the production of canned tuna, whilst production from the local fishery has remained fluctuated at between 4,000 to 5,000 metric tons annually.

III.3. With a generally favourable climate, despite seasonal rough weather which affects the Mahe plateau, the country has the potential to increase its fishery production through environmentally friendly aquaculture developments and cautious exploitation of offshore resources. If means of increasing the productivity of fishers can be found, there is an enormous potential for fisheries to contribute further to the socio-economic development of the country.

III.4. Fishermen have always been traditional in their approach to exploiting the fishery resources. Many attempts by the SFA to introduce new fishing gears to target new resources seem to end with difficulties especially with the maintenance of the gear and meeting of financial obligations. For example, the introduction of electric fishing reels in 1995 increased fish production by 5% but due to maintenance problems and availability of spares on the market, the use of such technology did not continue.

III.5. There are concerns on the existing fisheries resources imposed by the increasing population and tourism development. New areas of development for the local fishing sector needs to be identified and these includes new and under-utilised resources, promote value addition to the fishery products and develop aquaculture opportunities.

III.6. In Mees *et al., cit.*, it was concluded that all demersal fisheries near to centres of population are heavily exploited, (lobster, octopus, demersal fin-fish caught by traps and lines) and that further development of the small and semi-pelagic fisheries are constrained by unpredictability of supply, marketing and processing constraints. It also concluded that cautious development of under-utilised resources away from the coastal areas is however appropriate.

III.7. The implementation of this project should provide the means of diverting fishing efforts away from the coastal areas through diversification of exploiting opportunities, higher utilization and commercialisation of under-exploited marine resources, boost the inflow of foreign exchange and further promote food security and sustainable livelihoods. With the coastal fisheries reaching their exploitable limits in the future, there is a need to look at the culture of fish to compensate for that, both for the local market and for the export market. Large potential exist in Seychelles for aquacultures ventures but there also a number of constraints; technical know how, investment, environmental issues etc.

IV. PROJECT OBJECTIVES

IV.1. The *overall objective* of the project is to explore new and under-utilised resources in the Seychelles waters as well as promote the development of aquaculture projects of certain proven finfish species. The project will also look at the commercialisation and value addition to these fish products.

IV.2. The *specific objectives* of the different components of the programme are:

- to increase food production by improving access to the new and under-utilised fish and other marine resources;
- to improve the management of these resources through the development of appropriate management plans;
- to carry resources surveys and methods of exploiting these resources;
- to promote the development of cage aquaculture of key proven species;
- to improve market access through market research and value addition of the fishery products.

IV.3. The *secondary objectives* are:

- to increase the employment and income of the local fishermen;
- to strengthen the capacity of fishermen organisations;
- promote responsible fishing practices;
- increase value addition to the fisheries produce.

V. PROJECT DESCRIPTION

V.1. The project will run for 5 years and will comprise of four main components. Some of the activities proposed here will require greater scrutiny and feasibility studies to determine if they represent viable investment opportunities. Section XI : Issues and Actions, details some of the outstanding issues of project design which should be addressed prior to implementation.

Component 1: Development and Commercialisation of Underutilised Fish Resources

V.2. The goal of the first component is to achieve an increase in overall production from the fisheries sector, and simultaneously to promote value-added production, marketing and diversification of fishery products as a strategy to generate employment and income and a potential source of export earnings and a sustainable use of resources.

V.3. It is firmly believed that the possible expansion of the Seychelles domestic fishery is towards tuna and tuna like species. Within this group there are a number of species that are grossly underutilised, namely dolphin fish (*Corypheana hippurus*), rainbow runner (*Elagatis bipinnulata* and other Carangidae) and wahoo (*Acanthocybium solandri*). This project will promote access to these resources, establish its commercialisation and carry out stock assessments to ensure that stocks are exploited in a sustainable manner. There is already a fishery developing for swordfish and tuna that requires to be reinforced.

V.4. A number of deep-water anchored FADs (Hawaiian type) will be constructed and deployed just on the limit of the Mahe Plateau (60–65 nm limit from Mahe) as well on the oceanic waters and will be exclusively reserved for local fishers. SFA will conduct feasibility study to target FADs associated species such as those mentioned above. The project will promote the consumption of such species locally and provide the necessary information on export markets. Vessels targeting those species will have their post harvest operations reviewed and improved to ensure the freshness of the fish caught. This will also entail the installation of additional equipments on board those vessels. It will also look at the processing facilities and also developed a sound extension programme for maintenance of these FADs. The project will undertake studies to evaluate the current infrastructure and operational difficulties for improving post harvest operations.

V.5. It is also intended through this project to assess ways and means to maximise the use of sharks caught by the local fishery. The demand for shark and shark products (except for the fins) has always been very erratic. The common practice is to discard the carcass at sea after the fins have been removed. Feasibility studies into the development of other products such as more appealing use of shark meat (fresh, frozen, salted or brine, and smoke), liver-oil (for cosmetics and pharmaceuticals), skin (for leather and sandpaper), teeth (in jewellery), and cartilage (ground to powder and to be used as ‘anti-cancer’ cure needs to be undertaken

V.6. There is also an underdeveloped crustacean fishery for spanner crab. The constraints expressed so far includes lack of market and there is a tendency to move towards live produce but the current types of vessels do not allow this shift. The project will look at maximising the revenue from this fishery through better handling procedures and marketing strategies.

Component 2: Development of Management Plans

V.7. The exploitation of these under-utilised resources will be subject to some sort of management measures through operational management plans to ensure sustainable harvesting. The

adoption of a Precautionary Approach to the management of these resources will require particular emphasis on the collection and analysis of adequate fisheries and scientific data and mechanisms for assessing and reviewing management measures.

V.8. The management plans will be developed using a participatory approach to ensure that all stakeholders have say in management measures that may affect them. For new and developing fisheries, management guidelines would have to specifically take into account the need to:

- Control access to the fisheries early, before problems arises;
- Estimated fishery potential of these resources;
- Build in flexibility so that it is feasible to phase out effort should the need arise;
- Encourage development of fisheries that are economically viable without long-term fiscal incentives.

V.9. For the management options chosen to be of significance and produce the desired impacts there would need to be extensive direct consultations between all stakeholders to ensure that informed decisions are taken and that there is a clear and effective licensing and regulatory system in place as well as enforcement measures. Specific guidelines for potential investment in the relevant fisheries will need to be drawn up.

Component 3: Development of Cage Aquaculture and Algae Production

V.10. In view of the land scarcity for aquaculture development, it is felt that cage culture may be a better option to develop fish farming. The project will look at the potential to culture species from the rabbitfish (Siganidae) and snapper (Lutjanidae) families. Rabbitfish and snappers are quite popular with the local population, and some species of snappers, like the emperor red snapper (*Lutjanus sebae*) have a good export market. Fish will be sold both on the local market, to reduce pressure on the natural stocks, and on the export market in order to increase the foreign exchange inflows. New markets can be developed for farmed fish. Plate-size snappers which are in demand from restaurants can be easily produced in a farm, whereas wild-caught fish of the same species are often large individuals that cannot be served whole in most cases. Farmed fish can also be supplied throughout the year, contrary to wild-caught fish that cannot be caught throughout the year, due to bad weather during some periods of the year.

V.11. Rabbitfish are farmed routinely in several countries in south and Southeast Asia and the technology is well-understood. The technology for breeding the red snapper in captivity is still at a trial level, and there is little literature available. The technology for the breeding in captivity of the red snapper will have to be transferred from elsewhere through technical assistance. However this species is interesting for Seychelles to culture. It has advantages on other countries that may want to breed this species. Good quality brood stock is readily available, and the fish is not ciguatoxic in Seychelles waters, which is not the case in the other south-west Indian Ocean islands (Mauritius, Madagascar, Comoros, Reunion), and the fish is known to grow well in our local conditions.

V.12. It is expected to implement the project in two phases. During the first phase, which may take 2 years, the following will be carried-out:

- Site identification for location of cages (at sea) and hatchery (on land);
- Identification of appropriate cages for local conditions, procurement and placement of cages;

- Environmental impact assessment
- Collection of wild-caught juveniles of rabbit fish and red snappers for growth trials in cages;
- Work with the Animal Feed Factory to produce appropriate pelleted feed;
- Market research;
- Training of aquaculturists.

V.13. If the growth trials are good, then the second phase will look at:

- Construction of a multi-species hatchery, so as not to rely on wild-caught juveniles;
- Transfer of technology to the local community, which could then invest in small-scale farms.

V.14. It is intended after completion of the pilot stage to carry out a further *Environmental Impact Assessment* (EIA) to determine;

- The impact of feed use on the environment;
- Whether there has been any introduction of diseases; and
- Gene deterioration and possible impact on wild stocks.

V.15. In addition to the above there are quite a few under-utilised resources from the Seychelles waters, one of them being algae or seaweeds. These are not exploited except for those that fall on beaches and very small quantities are used as fertiliser in plantations. However it is known that some species of seaweeds can be consumed and others contain several compounds like carragenan and phycocolloids (agar, alginic acid) that have numerous applications in several industries (food, paint, cosmetics.). Some 400–500 species of seaweed are collected for food, fodder or chemicals.

V.16. The project will address the following:

- Update the information collected during the previous surveys, in view of the environmental changes (partial reef collapse due to high coral mortality in 1998) and physical changes (land reclamation around Mahe and Praslin). There is a need to check if the species composition and the potential biomass are still the same;
- Surveys of the principal outer islands for their potential in seaweed collection;
- Determine the sustainable levels of the different species of algae;
- Assess the potential markets for the different compounds that can be extracted from local seaweeds, and the potential for setting-up of extraction facilities locally (desk study).

Component 4: Product Development and Marketing

V.17. It may be assumed that the major constraint confronting the existing fishing processing industry and future expansion of this sub sector is the ability to develop new product and access the appropriate markets to sell their products. There is also the emerging demand on traceability and sanitary issues of fishery products which somewhat cause certain problem for developing countries to access markets and to meet international food standards

V.18. This project will address the following:

- Review the current trends in fishing process.
- Review market access.
- Evaluate post harvest practices and provide solutions
- Determine the opportunities for fish process and upgrading of existing facilities including the fishing vessels.

VI. INDICATIVE COST

VI.1. The table below shows the broad cost of the different project components. It indicates what physical and price contingencies are in terms of the preliminary calculations conducted. There is fairly good understanding of the overall cost involved however there is limited information available for the project components and activities to be able to break it down to the specific components.

VI.2. The project has a planned developmental aspect ranging from identification of issues, put in place pilot projects, improving a number of facilities, upgrading vessels, carry our market research, explore aquaculture opportunities, improve access to under utilised resources and develop appropriate research and management measures for these resources. Provisions will also be made for extension services and the transfer of technology and various know-how to prospective promoters and entrepreneurs.

Project Cost Summary by Component					
Component	Local	Foreign	Total (US\$)	% Foreign Exchange	% Total Base Costs
1. Development of Under-utilised Resources	100,000	400,000	500,000	80.0	15.9
2. Development of Management Plan	17,000	68,000	85,000	80.0	2.7
3. Cage and Sea weed Aquaculture	340,000	1,360,000	1,700,000	80.0	54.2
4. Upgrade of Facilities, Product Development & Marketing	170,000	680,000	850,000	80.0	27.2
Total Baseline Costs	627,000	2,508,000	3,135,000	80.0	100.0
Physical Contingencies	31,350	125,400	156,750	80.0	5.0
Price Contingencies	62,700	250,800	313,500	80.0	10.0
Total Project Costs	721,050	2,884,200	3,605,250	80.0	115.0

VII. PROPOSED SOURCES OF FINANCING

VII.1. The successful implementation of this research project will very much depend on the financial support of both local and international parties. At this point in time, it is not possible to determine the role or extent to which the relevant parties will be involve in the financing of the project

VII.2. First and foremost, it is expected that international funding agencies or financial institutions will provide the majority of the required funding for the research activities. Contribution in monetary terms by the Government of Seychelles will be relatively limited Local contribution is expected to be in more in kind, i.e. making available the necessary staff, office space, research vessels etc. It is also

expected that any import of materials will be on a duty free basis. Similarly, foreign experts and local consultants will be exempted from the payment of any form of taxes or *Gainful Occupation Permits*.

VII.3. It is however not expected for some of the beneficiaries to have a major contributing role in the project. Nonetheless, the private sector or potential entrepreneurs will be expected to come up with the necessary investment capital once the sustainability and financial viability of the different outcomes have been ascertained. Involvement of the private sector is deemed essential to ensure continuity of the project.

VIII. PROJECT BENEFITS

VIII.1. The project will, if successful, be of immense social and economic benefits to the country.

VIII.2. Firstly, it will help in the diversification of the local fishing industry and ensure maximum utilisation of the marine resources. New and under-utilised resources will be identified and the research activities will enable the authorities and relevant parties to determine the sustainability and economic viability of exploiting these resources. It is possible for knowledge gained in the culture of specific species of fish applied to the culture of other species.

VIII.3. Secondly, the project will be a catalyst for the gradual boost in the sector’s output. Increased output should eventually translate in increased income and the sector’s contribution to national wealth creation. Overall, the project is expected to have positive impacts on the economy. The enlargement of the European Union Market will provide enormous potential for our fish export. However, there will be a need for continuous market researched and identifying lucrative niche markets

VIII.4. The potential for commercialisation of the outputs on the local and international market will provide consumers with new range of products and generate a net inflow of foreign exchange into the economy. Furthermore, these new activities will generate both direct and indirect domestic employment and even present an opportunity for increasing the number of women involved in the industry. This will also provide a stream of income to a new section of the population.

VIII.5. From a conservation point of view, the identification of new and under-utilised resources that can be of commercial importance will be a determinant in diverting fishing capacity from the already over exploited coastal areas.

VIII.6. The project will provide a formidable platform for further dialogue and interaction between the between the relevant authorities and the other stakeholders and may incite interest within the scientific, research, conservation and business communities in the marine resources of the country.

IX. IMPLEMENTATION ARRANGEMENTS

IX.1. The successful implementation of the project and ensuring its continuity in the commercialisation must involve all parties having an interest in the exploitation, conservation and commercialisation of the identified resources. The role and responsibilities of each party must be clearly defined as the project progresses and mechanisms will have to be put in place to ensure consultation and flow of information between all parties concerned.

IX.2. The *Seychelles Fishing Authority* will have the overall responsibility of the project, which will entail conducting of the necessary research activities and ensure that research results are disseminated to the relevant stakeholders. These functions will be entrusted to the research section and operation sections of the SFA. The research section will be responsible for planning and conducting the research activities as well as the identification of specific resources that will be targeted. It will also be responsible for producing final reports of the research activities undertaken and with the help of other parties devise operational management plans for the exploitation of these resources. The operations section be involved mainly in the identification and design of appropriate gears and techniques and operation of the research vessel.

IX.3. Furthermore, SFA will be responsible for drawing up terms of reference for short and long-term technical assistants as well as identifying the appropriate consultants. SFA will also be responsible with liaising with the relevant government authorities with regards to employment and procurement matters relevant to the project.

IX.4. Fisher beneficiaries and relevant NGOs would play an increasingly important role in the project by being involved in the different planning, design and operation processes of the specific components of the project. This will be made possible through a consultative planning process to ensure their full participation and that their interests are taken in consideration.

IX.5. A number of other authorities and government department will have a key role to play in the successful and timely implementation of the project. These will be involved with such matters regarding conservation of resources, employment of foreign consultants, procurement and import of materials and equipment, aquaculture concessions, investment procedures, exports etc...The government, as a facilitator for inducing investment will be required to, in line with current macro-economic policies, design appropriate investment policies and criteria conducive to attract investments.

IX.6. The private sector will play a pivotal role in the final stages of the project. Private entrepreneurs will constitute the main source of investment capital that will be required to ensure the success and continuity of the project.

X. TECHNICAL ASSISTANCE REQUIREMENTS

X.1. The project would require both long term and short term TA inputs. The *long term TA* would be in the fields of: (a) fleet development (b) Product development and marketing (c) aquaculture development and (d) pelagic stock assessment.

X.2. *Short term TA* inputs would include: (a) a specialist in fish handling for exports (b) an environmental specialist to carry out the environmental impact assessments for the aquaculture projects and (c) market research and product competitiveness. The terms of reference for these TA will be elaborated once the projects have received the appropriate funding

XI. ISSUES AND PROPOSED ACTIONS

XI.1. There are several areas that would need to be examined in detail as part of further processing during the planning and implementation phases of this project:

- **Availability of the stock.** Although the SFA has considerable experience in stock assessment studies it however, lacks the expertise when it comes to pelagic stocks, which are highly migratory. Setting FADS for fishers to increase their catch have been proven in many areas of world but it must be sustainable and that the fish being exploited are not juveniles. Before opening any large-scale exploitation on FADS some basic population parameters need to be established to ensure that we do not overexploit such stocks.
- **Participation.** Participation of stakeholders is clearly crucial to successful implementation of the project. The means of ensuring the full and willing participation of local communities in the planning, implementation and monitoring of the programme must be elaborated. There are examples of successful consultative planning at the service cooperative level which could be used as models. Wherever possible, local NGOs with experience in this field should be contracted to assist in the execution of certain project activities. Provision must also be made for field staff to be trained in this approach to working with fishermen and for flexibility in the way conservation programmes are designed and implemented at the local level, to reflect the interests and capacities of the fishing communities concerned.
- **Aquaculture.** Aquaculture is relatively new in Seychelles and the SFA has next to none experiences in aquaculture for production of marketable commodities, mostly food for human consumption. The SFA has also no experience in fin fish aquaculture. Moreover, the aquaculture activities will exclusively be confined to the marine environment. Aquaculture in the marine environment is very challenging especially when coasts are relatively exposed. In addition to internal factors such as selection of species, intensity of the operations, ranching etc. there is the natural environment in which the aquaculture functions, and which it is highly dependent. Provisions should be made for the social environment, particularly the legal, economic and cultural regimes and the markets the product will target. In general, there is a need to confirm the feasibility of the aquaculture component during the course of project preparation, particularly as it represents a significant share of total project financing.
- **Project scale.** As the aquaculture project is only limited to a five year period, the SFA feels that given that the project will focus on marine fin fish, the time span might be too short in order to understand the whole life cycle of the species. It may be necessary to expand the scale of the project when taking into account the potential life span of these species.
- **Financial.** The main financial issue is the attractiveness to fishermen of participating in the different projects of the programme. The willing and voluntary acceptance of the programme by fishermen is extremely essential. Under these circumstances, there is often in fisheries development project a considerable gap between the economic returns and investment to be made. Consequently, a way forward is assist the fisher or vessel owners with financial incentives to encourage their participation in the project.
- **Institutional.** Although no major institutional constraints can be identified, it will be however very crucial to have good networking between the different parties concerned.
- **Environmental.** The project is aimed specifically at improving the livelihood of fishermen and minima impact on the environment is foreseen. Nonetheless, planners must be alert to possible adverse environmental consequences of some of the activities proposed, such as the aquaculture development projects. In the case of the aquaculture projects there might be a need to conduct EIAs before the pilot studies are implemented.

- **Policy.** Government is clear of the priority that it places on the maximisation of revenue from its marine resources. However, the objectives of paramount importance are sustainable use of the marine resources and responsible fishing practices.
- **Human Resources.** The SFA has limited human resources in certain specific fisheries related areas. This is specifically true for aquaculture and stock assessment work. This is synonymous to many island countries with limited human resource base. There is a need to look at the human resource base for these development especially aquaculture. Training of personnel in stock assessment and aquaculture practices would be essential.

XII. POSSIBLE RISKS

XII.1. There are five main risks which can identified at this stage:

- **Implementation delays.** Delays are expected due to timely allocation of finance to start the project as well as delays in decision making process
- **Technological.** This may come as the lack of technical information to circumvent problems arising from the implementation of the programmes. Because these harvest and post harvest operations are highly technical, sound information is critical as this may jeopardise the timely implementation of the programme and compromise the success and benefits of the project.
- **Fishing on the FADs.** Part of the poor performance of fishermen has been because they were not interested in FADs as fishery enhancement tool. The only solution to this problem is to ensure that from the beginning, fishers are fully involved in the planning and design of the schemes, especially in deciding on organisational as well as the maintenance issues. Fishermen’s input in identifying appropriate location for placement of FADs will be necessary.
- **Markets.** Perishable product, in this case fish, needs to be marketable in a timely manner. In most cases fisheries are developed without first identifying the appropriate markets and appropriate mode of delivery. This will cause loss of revenue and wastage of fish products. It is envisaged that potential markets are identified prior to committing capital investments as well as the most suitable product type.
- **Aquaculture sites.** Typical problems which the aquaculture development projects face is the limited number of suitable sites for development and the increasing use of marginal sites, coupled with the lack of pilot-scale projects operations before full investment are made. Poor advisory services from the government, lack of appropriate extension services and possible resistance from fishermen and other conservationist groups. The project must ensure that these are considered and rectified prior to project implementation

Appendix 1: Map of Project Area

