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UNITED NATIONS

INDUSTRIAL DEVELOPMENT ORGANIZATION

October, 1990

ORIGINAL : ENGLISH

DEVELOPMENT OF MARINE RESOURCE-BASED INDUSTRIES IN SELECTED PACIFIC ISLAND COUNTRIES

(TF/GLO/88/908)

Based on the work of

Overseas Agro-Fisheries Consultants Co., Ltd.

(OAFIC)

in co-operation with

Forum Fisheries Agency (FFA)

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Preface

Within the framework of UNIDO regional and country studies, a project identification and formulation field survey was carried out on the assistance required in the development of marine resource-based industries in selected Pacific islands countries. The countries visited by the survey team were Marshall Islands, Federated States of Micronesia, Palau, Solomon Islands, Vanuatu, Tonga, Cook Islands and Fiji.

This study identifies and formulates a number (25) of projects for development of marine resource-based industries in the above countries based on the present status and prospects for development in the fisheries sector, especially, in the sector on marine resource utilization. The study identifies problems and prospects for utilizing marine resources as a base for industrial development in selected Pacific island countries.

This Report is divided into seven Chapters. Chapter 1 presents the background and the purpose of the study. Chapter 2 outlines the general status of fisheries in the Pacific region. Observations on the marine resource-based industrial activities in the selected countries are described in Chapter 3. Chapter 4 presents information on potential markets for products from marine resources. Chapter 5 presents an overview of fisheries assistance to the selected countries. Chapter 6 and Chapter 7 comprise the final section of the report by summarizing the projects identified and formulated in the study and presenting opinions and recommendations for the effective development of marine resource utilization in the region.

The study was conducted and the report prepared by the consultants, Mr. Yasumasa Matsuzaka (Team Leader) and Mr. Kenichi Kikutani (marine resources processing engineer) in cooperation with Dr. Seamus McElroy, Forum Fisheries Agency.

Explanatory Notes

Key to tables :

Three dots (...) indicate that datum was not available or was not separately reported ;

Two dashes (--) indicate a nil or negligible amount.

The following abbreviation are used in this document :

BDDP	British Development Division in the Pacific
EEZ	Exclusive Economic Zone
FAO	Food & Agricultural Organization of the United Nations
FFA	Forum Fisheries Agency
FSM	Federated States of Micronesia
F$	Fiji dollars
ICLARM	International Centre For Living Aquatic Resources Management
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Volunteers Programme
MMDC	Micronesian Mariculture Demonstration Center, Palau
NZ$	New Zealand dollars
OFCF	Overseas Fisheries Cooperation Fund, Japan
ORSTOM	Institut Français de Recherche pour le Développement et Coopération
PNG	Papua New Guinea
SI$	Solomon Islands dollars
SPC	South Pacific Commission
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
USA, US	United States of America
US$	United States dollars

Executive Summary

The fisheries sector in the Pacific island countries plays a great role in the social lives and the economy of the island peoples from the subsistence level to the industrial level. However, the marine resources are still not effectively used. The fisheries in this region as a whole are characterized by the coexistence of abundant under-exploited resources and limited local demand, especially in more isolated islands.

Various kinds of assistance have been conducted for fisheries-oriented development in the Pacific region. As just one example, the South Pacific Fisheries Development Programme, executed by FAO, attempts to conduct overall and regional fisheries development assistance in this field. However, assistance based on fishery products processing has been neglected in comparison to production-oriented assistance.

Field surveys analyzing the present status and prospects for better marine resources utilization were carried out in eight selected Pacific countries, namely Marshall Islands, Federated States of Micronesia, Palau, Solomon Islands, Vanuatu, Tonga, Cook Islands and Fiji. Existing problems and bottlenecks for utilizing marine resources as a base for industrial development were identified and development potentials in this field were studied in order to identify and formulate projects to assist further development.

Pacific island countries are specially disadvantaged by two major factors ; 1) their generally small size and small population, and 2) the great oceanic distances between individual islands, nationally and regionally. This second factor represents the major marketing disadvantage, which is based on the great distance between sources of supply and the markets for perishable fishery products. It is widely stated that there coexists over-exploitation of marine resources

around densely populated areas yet abundant under-exploited resources in isolated areas in this region.

As resource potential data on a regional or national basis is not generally available in the Pacific region, plans for marine resource utilization should be based on the analysis of the status of present production and condition of the resource (unexploited, moderately, fully exploited) on a country by country basis. The major potential resources available in this region are ; 1) tuna, especially skipjack and yellowfin tuna which are harvested at 600,000 tonnes per year level in the region, 2) certain kinds of demersal fish such as deep water sea snapper, 3) various kinds of reef fish, 4) shell fish such as giant clam, trochus, redlipped strombus and blacklip pearl oyster, and 5) other resources, such as shark, sea cucumber, seaweed (Eucheuma) and sponge.

In the Republic of the Marshall Islands, giant clam meat processing has potential because of the existing local marketing of giant clam meat in brine packed in glass bottles. Giant clam culture using juveniles from MMDC in Palau could support this utilization. Fish smoking and drying have been tried with the cooperation of the US Peace Corps. Such development will promote the utilization of mari e resources from the isolated outer islands to local markets in the urban population areas.

In the Federated States of Micronesia, which consists of the four States of Chuuk, Kosrae, Phonpei and Yap, fisheries development has been conducted in accordance with the marine resources availability and development strategy of each State. In Pohnpei , the Capital State, national governmental agencies in the fisheries sector conduct national fisheries development projects such as the Offshore Fisheries Development Project based on tuna resources. Marine resource surveys are carried out in Chuuk and Phonpei States. In Chuuk State, though sophisticated onboard fish handling activities are operating for landing fish catches to modern fish landing facilities,

fish handling after landing disrupts the full effective utilization of the products landed. Kosrae and Yap States have strong interests to develop trochus shell processing at the cottage industry level, in accordance with the national level initiatives for development of shellfish (trochus and giant clam) culture. In Pohnpei State, sponge culture and its processing has been developed but it encounters technical bottlenecks to its further progress.

In the Republic of Palau, the Government has a strong desire to improve and diversify existing smoking techniques. Excellent smoked fish products have been produced and are marketed even outside of Palau. MMDC in Palau plays an important development role. It has achieved remarkable success in giant clam culture in Palau and generated considerable interests in the Pacific area. MMDC considers trochus culture development potential. Utilization of giant clam and trochus shells for ornamental/button purposes is identified as offering real possibilities for development.

In Solomon Islands, export of shellfish (trochus and blacklip) has developed on a large scale (with on annual export quantity of 500 tonnes). Effective utilization of the shellfish meat has been identified as offering development potential. So too has the use of shell. Beche-de-mer also plays a key role in marine product exports in this country. Added-value can be increased (a) in the expansion of marine product exports and (b) by improvement of the relevant processing technique. Utilization of shark for skin, oil and meat processing and pearl oyster culture are both identified as offering prospects for development.

In the Republic of Vanuatu, in connection with the leading position of trochus and greensnail shell in marine product exports, utilization of the shell meat has been identified as of potential. Reactivation of South Pacific Fishing Company Ltd., the Government owned industrial fishing base, should bring significant effects to the development of the country's fisheries sector, both at the industrial and artisanal levels.

Other prospective developments include the full utilization of the abundant resources of sharks and promotion of fish smoking techniques which have not been fully established yet.

In the Kingdom of Tonga, sea cucumber is used variously for in fresh meat (stored in brine) to fermentation of the gonads. Development of this resource shows good potential. Black coral processing can be further developed to increase the value of products and effective utilization of the valuable but scarce marine resource. Developing smoked fish processing for the domestic market can be improved by expansion of the commercial and artisanal fisheries.

In Cook Islands, trochus shell has been successfully introduced after transplantation from Fiji. The potential for processing and utilization of shell meat are identified as possible actions for further development. In consideration of the local market potential to accept smoked marine products, improvement of processing technique is identified as being an important development.

In the Republic of Fiji, marine resources variously utilized from canning materials industrially to smoking materials artisanally. Beche-de-mer production and export have increased dramatically recently, yet the exporters often encounter marketing problem due to information shortage about buyers' quality standards, price fluctuations, fluctuations between supply and demand, etc. Fresh water clam is a promising material for utilization. Eucheuma farming and to simple drying process are well developed. However, a further step for processing to semi-refined carrageenan is identified as have significant development potential.

In the Pacific islands, various kinds for marine shellfish such as giant clam, trochus, turban shell, blacklip , real oyster, redlipped strombus, blood cockle and fresh water clam live in their waters. By comparison with perishable fish

utilization for edible purposes, the utilization of the shell for ornamental purposes has many advantages with regard to storage, transportation and production control given the prevailing conditions in the Pacific islands. Though various levels of shell processing have been attempted in each country, improvement of processing techniques for sophisticated products and the development of souvenirs in some countries should bring promising results for the effective utilization of these marine resources and for the countries' economies. Establishment of a shell and shell meat processing development center could play an important role in this field.

Pacific countries represent promising markets for marine products from the Pacific islands. Guam, Saipan and Hawaii within the Pacific region represent good potential markets especially for fresh fish. Okinawa in Japan also has very promising markets, especially for shell meat products because of its preference for marine products of tropical species, recent cost increases of processing there and a shortage of relevant resources. While beche-de-mer depends on Chinese markets as the biggest consumer, Eucheuma markets depend on Philippines as the biggest supplier. While sponge production has promising potential due to environmental problems in the Mediterranean Sea. Shark utilization is strongly identified as promising in a number of product markets. Also souvenir products for tourists should not be disregarded.

Various kinds of assistance for fisheries development in the Pacific countries have been conducted by government and private business. In comparison with fish production- oriented assistance, fish processing-oriented assistance seems to have been limited to date. Marine resources in the Pacific have been developed from the viewpoint of exploitation rather than utilization.

Based on the field surveys, 24 country projects and one regional project have been identified and formulated. Many of

these projects rely on technical assistance for technique improvement, processing demonstration, marketing advise and technical surveys. Two ways of project identification and formulation have been considered. One is to formulate some sizable projects covering common problems and subjects for several countries. Another is to identify specific factors existing in each country for formulation of industrial country projects. The latter way is adapted in this study, considering the different development stages of project implementation in each country.

Two major factors of unknown resource abundance and environmental pollution are identified as key points for successful project implementation. Though resource assessment is an essential prerequisite for development, the level of resource abundance is not easily determined accurately. In the Pacific countries, periodic resource inspection at each project base will be useful and realistic. In the course of the industrialization of marine products processing, environmental problems are often caused by waste water pollution from processing, shortage of wood for smoking, etc. These factors should be carefully examined when planning projects.

The role of international organizations such as FAO, FFA and SPC in the fisheries sector in the Pacific area are important and are much praised. Close contact and collaboration with these organizations is essential for successful implementation of assistance projects in the fisheries field.

CHAPTER 1 INTRODUCTION

1.1 Introduction

The fisheries sector in the Pacific Island countries has played a important role at the social level and for the economy of the island people, from the subsistence level to the industrialization level. But the marine resources have still not been utilized fully or effectively and the fisheries in this region are characterized by a coexistence of abundant under-exploited resources and limited local demand, especially in isolated islands.

Considering such situations in the Pacific Island countries, UNIDO undertook the project "Assistance in the Development of Marine Resource-Based Industries in the Selected Pacific Island Countries" [1/] and dispatched the mission [2/] for field survey in order to identify and formulate projects for development of marine resource-based industries.

UNIDO's assistance should be such as to facilitate the Governments of the selected Pacific Island countries to examine modern marine resource processing technologies and formulate a necessary programme to establish, modernize and diversify the production of marine food and other products for home consumption and for export.

In addition to the economic and social welfare which the Governments would like to pursue through future projects, such projects also offer an opportunity to expand the integration of the young generation and of women in the industrialization process.

1/ Cook Islands, Federated States of Micronesia, Fiji, Marshall Islands, Palau, Solomon Islands, Tonga and Vanuatu.

2/ The mission member are Y. Matsuzaka (OAFIC) as Team Leader, K. Kikutani (OAFIC) as Processing Engineer and S. McElroy (FFA) as Regional Coordinator (Market Adviser).

1.2 Project Background

The Pacific Island countries are surrounded by exploitable marine resources which only recently have been used in the industrialization process. The scope for development of industrial activities is considerable, ranging from fisheries and aquaculture to the industrial exploitation of seaweed, sponge, shellfish, etc. Marine resources to date have not been generally processed in the Pacific Island countries, except certain fish for canning industry and certain other small processing industries. As indicated in the development plans of several Pacific Island countries, it is important to promote marine resource-based industries' production for the domestic market as well as for export.

There are certain food and other valuable products to be produced from fish, including canned products, frozen products and other products. In addition to fish, there are many raw materials which could be of interest for the development of the marine resource-based industries. Several kinds of seaweeds could be processed to feed, food additives, industrial chemicals and certain pharmaceuticals. Some kinds of extracts from seaweed are used for lubricants or as food additives. Various shells are also utilized for jewellery, ornamental and button products.

In some countries in the Pacific region, the fish resources are not processed to any great extent but are exported in frozen or chilled form and only simple processing (drying and salting) is undertaken locally. In these countries, local canning of fish and other marine resources is not common. Several Pacific countries ,even Fiji and Solomon Islands, import a substantial amount of canned fish (e.g. mackerel, sardine, etc.). Some of these countries may reasonably consider initiation of local production of processed fish to substitute the imported products. While new areas of marine resource-based industries are to be explored, traditional processing methods of marine resources are also to

be examined extensively for the Pacific Island countries. These depend on the development stage of the country, the existing infrastructure and facilities and the supply of the raw material.

UNDP, through FAO, executes the South Pacific Fisheries Development Programme, which covers sectors in fishing and aquaculture, including effective utilization of refrigeration, storage, fishing gear, etc. However, comparatively little attention by UNDP has been focused to date on marine resources processing.

The UNDP agency, UNIDO, has been involved in the regional project "Small and Medium Industries and Entrepreneurship Development for the Pacific Island Countries" (DP/RAS/86/075), which has provided the Pacific Island countries with a number of expert advisory services and surveys/studies on selected potential industries. The areas/sectors covered under the above project cover many subjects including relevant marine resource-based industries, such as fish processing, trochus shell processing, etc. Moreover, UNIDO has provided the expertise for the manufacture of mother-of-pearl products (buttons, beads, jewellery, etc.) in some of the Pacific Island countries such as Fiji, Vanuatu and Papua New Guinea. UNDP has officially requested UNIDO to field a mission for the identification and preparation of potential marine resource-based industries for selected Pacific Island Countries. The available expertise and the existing information material has been useful for the execution of this project.

CHAPTER 2 OVERVIEW OF FISHERIES IN THE REGION (RAW MATERIAL SUPPLY)

2.1 General Aspect

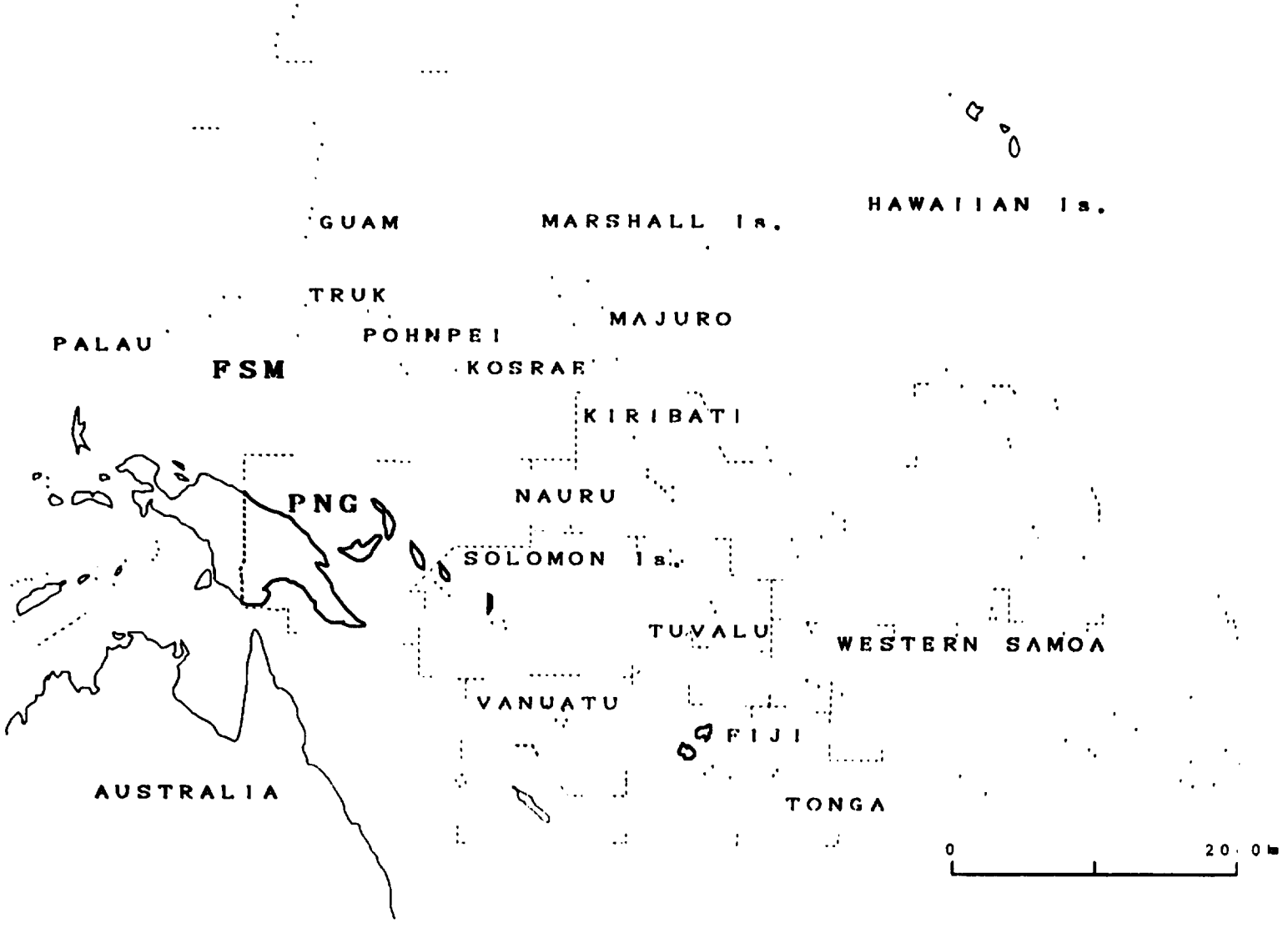
The selected Pacific Island Countries (Fiji, Solomon Islands, Tonga, Vanuatu, Palau, Federal States of Micronesia, Marshall Islands and Cook Islands) covered by this project are located in the western central Pacific (FAO Area 71 and the small western part of FAO Area 77). 1/ They have common disadvantages as Pacific island countries.

Pacific islands countries are specifically disadvantaged by two major factors : 1) the generally small size and small population of the countries, and 2) great oceanic distances between individual islands nationally and regionally and between sources of supply and their nearest markets. These factors result in additional costs of trade both in provision of materials and sale of products. This situation has been often expressed by many persons whom the mission contacted during the field survey in each country.

The total catch from this area (FAO Area 71) reached a record of 7.0 million tonnes in 1987 2/. This area comprises two different environmental regimes : 1) a neritic zone with extensive continental shelves adjacent to the Asian countries and 2) an oceanic zone with very steep continental slopes and many reefs and atolls around the large number of island countries which include the selected island countries of this project. Most of this large catch is harvested on the continental shelves of the coastal countries in Southeast Asia. The total marine central of the Pacific is lands of the western central Pacific was less than 1 million tonnes in 1989.

1/ Source : FAO, 1987, FAO Year Book Fishery Statistics Catches & Landings Vol.64

2/ Source : FAO, 1987, FAO Year Book Fishery Statistics Catches & Landings Vol.64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2.2 Fishing (offshore and inshore)

Though these island countries have an advantage in ownership of offshore (tuna) resources when they pass through their EEZ, they also have a comparative disadvantage in harvesting and processing these resources. Countries outside this region such as Japan, the Republic of Korea, Taiwan and USA have almost exclusively engaged in offshore fishing for skipjack and tunas. The tuna catches of the major Oceania tuna fishing countries (Fiji, Kiribati and Solomon Islands) are still small (Table 2.1).

Table 2.1 Catch of skipjack and yellowfin tuna
(1,000 tonnes)

Skipjack	1985	1886	1987
Area 71 Total	367	556	565
Major Oceania	36	45	51
Countries (%)	(10)	(8)	(9)
Yellowfin Tuna			
Area 71 Total	176	213	257
Major Oceania	10	5	9
Countries (%)	(6)	(2)	(4)

Source : FAO, 1987, FAO Year Book Fishery Statistics Catches & Landings, Vol. 64

Note : 1) Most of the Oceania catches were used for frozen products and canned tuna product export.
2) Most catches are taken by DWFNs

The total demersal fish catch of the Area 71 has leveled off at between 700,000 and 800,000 tonnes from 1983 to 1987. Most stocks in continental shelf waters have already been heavily exploited in Southeast Asian, but not in the Pacific

islands countries. Recently exploitation of the demersal fish stock has begun to be carried out in this area. It is expected to harvest increasing volumes of demersal (bottom) fish such as deep water snapper caught by bottom longline on a commercial scale in this area.

The inshore resources of the small island countries of the Pacific are mostly those of the tropical reef or lagoon environments. These environments harbour a diverse number of marine organisms and many families of fish, crustaceans and molluscs are represented. However, the relative productivity of marketable fish and other seafood from such reef and/or lagoon areas is not great. In addition to these conditions, the volume of fish reaching the commercial or market sectors in many Pacific island countries is a surplus from the subsistence fishery.

Consequently, a liable integrated statistical data on production of demersal and reef fish covering this project area is generally not available. Some of the countries have provided data on total fishery production.

Furthermore, in the inshore fishery in the Pacific island countries, careful attention must be paid to the relationship between the subsistence economy and the commercial fishery (including the artisanal fishery) if industrialization of the inshore resource is anticipated or required.

On the other hand, regarding the supply situation of reef and bottom fish from the Pacific Island countries, affirmative results have been described by Crossland (1988)[1/] and these are summarized below :

1/ Source : Crossland J. 1988, The market for Pacific Island fish in New Zealand, FFA, 88/25

1) Significant quantities of reef and deep bottom fish are available in some countries (perhaps several tonnes per month).

2) Good supplies of tunas are available from most countries (perhaps several tonnes per month).

3) Production of fish, particularly deep bottom species, is increasing.

4) The availability of fish for New Zealand market will be strongly dependent on returns that can be realized in other markets and the quantities that the buyers can absorb.

2.3 Shellfish Production (Aquaculture)

Various shellfish species which inhabit the reef and lagoon areas of the selected Pacific countries in this project are judged to offer promising raw materials, which can be utilized for shell processing and also for shell meat processing, when stock assessment, resource conservation and the transportation system for material collection is well provided.

The following shellfish species are found available and can be use for processing ;

Giant Clam (Family Tridacnidae)
Trochus shell (Trochus niloticus)
Redlipped strombus (Strombus luhuanus)
Turban shell (Turbo argyrortmus)
Blacklip pearl oyster (Pinctada margaritofera)
Ark shell (Family Anadara)
Fresh Water Clam (Batissa violaces)

Six species of giant clam which occur naturally in the region are commercially valuable. Their meat and shell are occasionally sold in the commercial market, but they are generally considered as important food items for subsistence throughout the region. The larger species have been subjected to over-exploitation and their stocks have declined rapidly in the last decade or two. All giant clam species are on the CITES list (Convention on International Trade in Endangered Species of Wild Fauna and Flora). Their trade is being controlled internationally. Giant clam culture is ongoing at MMDC (Micronesian Mariculture Demonstration Center) in Palau and ICLARM (International Center for Living Aquatic Resource Management) in Honiara, Solomon Islands in order to reseed Pacific island reefs and to possibly develop a viable aquaculture industry in central Pacific islands.

Trochus shell is widely distributed in the Pacific islands given the abundant availability of the natural habitat. Introduction/transplantation of trochus has also played a part in increasing the range of this species, which started in 1927 from Palau to Chuuk and has been continuing (e.g. Fiji to Tokelau in 1986). Trochus is an important gastropod mollusc in the region and it has been harvested in each country, mainly for utilization of the shell for natural button manufacturing. The meat is also valuable. Though most meat is consumed directly in the harvesting place. Some is wasted because of lack of the preservation method and transportation. Control of exploitation by size limits and restocking programmes are being conducted/considered in some of the island countries in the region (Table 2.2).

Table 2.2 Trochus Shell Production (tonnes)

	1984	1985	1986	1987
Fiji	361	92	234	285
FSM	—	--	200	--
Solomon Is.	469	500	662	650
FAO Area 71 Total	1,126	1,146	1,402	1,130

Sources : FAO YEAR BOOK Fishery Statistic Catches & Landings Vol. 64 1987

Redlipped strombus is one of the most widely seen gastropod species of coral reef in the Pacific islands, but its distribution is limited to the western Pacific. The species has not been confirmed in the eastern islands such as Tonga, Samoa, Cook Is. and French Polynesia. The mission was informed of the large natural stocks of this species in Marshall Is., Pohnpei State of FSM, Solomon Islands and Palau. Meat of this shellfish is valuable in the Okinawa market in Japan. It is a promising material for export if a sizable surplus production can be expected. Its shell can be used also for ornament/jewellery production.

Turban shells are a favored food in many countries in the Pacific. The situation for the meat of this species is the same as in the case of the redlipped strombus. Blacklip pearl oyster is widely distributed and the cultured black pearl produced by this oyster has become the most important export commodity for the region ; first in French Polynesia and now in Cook Islands. Cook Islands is now trying to develop pearl culture in the northern atolls. They exported about 11.4 kg of pearl to Japan in 1989. It is noted that the meat of the blacklip pearl oyster can be dried and produces a valuable material for Chinese cuisine. Fresh water clam harvested in Fiji is an interesting material for processing because its annual catch was about 880 tonnes through the municipal market alone in 1988. Surplus production can be expected. In addition, the harvesting and marketing operation of this clam is carried out mainly by Fijian women ; this offer positive aspects from the "women in development" programme.

2.4 Other raw materials from marine resources

Beche-de-mer is the trade name given to the cooked and dried product of a group of sea cucumber that is used in Chinese cuisine. There are about 1,200 species of sea cucumber worldwide, but only about 15 - 20 of the common species known in the tropical Pacific have some commercial value. Most

countries visited in this project manufacture beche-de-mer, mostly based on artisanal fisheries. Hong Kong is the largest importer of this product in the world and also the major re-exporter of the same. Other importing countries are Singapore, Taiwan and Malaysia. Beche-de-mer is distributed to Chinese communities throughout the world. Meanwhile, the fresh, chilled or frozen product is sold in Japan and Korea (Table 2.3).

Table 2.3 Imports of Beche-de-Mer into Hong Kong from Solomon Is., Fiji and PNG

(tonnes)

Major Pacific Islands	1985	1986	1987
Solomon Is.	24.8	96.0	105.5
Fiji	56.7	155.7	547.3
PNG	4.4	17.2	60.0
World Total	6,209.0	5,194.0	5,896.1

Source : INFOFISH, 1988, INFOFISH International 6/88, page 21

The processing method for this product is very simple, which is suited to a village-size industry. Its development has not progressed as much as it might have, despite the guidance of FAO, SPC, etc. Market information has not generally reached the manufacturers in the islands or atolls. Considering this situation, SPC has recently organized and been operating a SPC Special Interest Group (SIG) under PIMRIS (Pacific Islands Marine Resources Information System)[1/] on beche-de-mer.

1/ Source : SPC, 1990. Beche-de-mer Information Bullentin No.1

Seaweeds production in the Pacific island countries is centered on the culture of Eucheuma species. This has resulted from the successful transfer of this species to the region. It grows quickly and requires minimum care and investment. In spite of the technical progress made, returns from production have been small and have not been sufficient to support full commercialization (industrialization) today. Current high market prices offer a window of opportunity for this industry as Table 2.4 illustrates.

Table 2.4 Eucheuma cottoni production and demand
(tonnes)

	1987	1988	1989
Philippines	40,000	50,000	50,000
Indonesia	5,000	5,000	8,000
Others	250	250	350
World Production	45,250	55,250	58,350
World Demand	46,000	60,000	70,000
Shortfall	1,250	4.750	11,350

Source : McHugh, D, 1989, Prospects for Eucheuma Marketing in the World and the Future of Seaweed Farming in the Pacific

In parallel with the simple production of a dried product from Eucheuma, most producers or sellers of seaweeds eventually began to consider producing "Semi-refined carrageenan" (SRC). SRC is also known as seaweed flour and can be manufactured by using a very simple process, in which live or freshly dried seaweed is immersed in a weak alkali solution, dried and milled to a powder. The introduction of the SRC process may be a suitable measure to assist the operation of Eucheuma culture in the Pacific area.

Among the Pacific island countries surveyed under this project, only Pohnpei State of FSM is conducting a sponge culture operation. There is no difficulty as far as techniques

are concerned in sponge culture and the world demand for this material seems to be steady (Table 2.5).

Table 2.5 World Production of Sponge
(tonnes)

1983	1984	1985	1986
217	206	207	207

Source : Josupeit, H, 1989. Sponges : World Production and Markets

Recent trends have shown an increasing demand. Sponge culture in some Pacific countries offers promise provided qualified technical assistance is given.

Other raw materials with potential for development include shark fin, shark skin, mangrove crab, fish scale and fish skin. All these products have been considered here as suitable materials for industrial scale processing within the Pacific islands.

CHAPTER 3. OBSERVATIONS ON CURRENT MARINE RESOURCE-BASED ACTIVITIES IN THE PACIFIC ISLAND COUNTRIES

3.1 Republic of the Marshall Islands

1) Shell meet

The mission confirmed both in a meeting with the Marshall Islands Marine Resources Agency (MIMRA) and as result of a marine survey that several shellfish (redlipped strombus, giant clam, trochus and turban shells etc.) can be used for processing, although data on resources and sustainable catches was not available.

(A) Giant clam meat in brine packed in glass bottles and (B) wet salted meat of the same form are actually sold at retailer shops in Majuro and also redlipped strombus meat in seasoning is sold at roadside shops.

Considering that production scale is extremely small as family unit, manufacturing and technical level is primitive and product quality will not be accepted in the general world market. However, it is very important for starting industrialization that there is an existing market for the product. Essential effect will be expected on technical assistance aimed at laying a basic foundation for a shell meat processing industry starting in small experimental scale.

At the initial stage, the product should be distributed in the domestic market for general consumption and also for souvenir purposes. When processing level can be confirmed to have reached at the level of manufacture of quality product, product marketing in overseas countries should be studied. Potential market for the same product is confirmed in Okinawa, Japan.

Some shells of the above mentioned varieties will be utilized for button and jewellery fabrication. A private company has shipped 16.5 tonnes of trochus shell purchased from Enewetak Atoll recently.

2) Smoked and dried fishes

One project has started since 1988 with financial assistance (US$2,000.-) from Australia and with management and operation by Mr. David Saab of US Peace Corps. The project has already produced 171 lbs of salted/dried/smoked fish and sold the products at a supermarket in Majuro in 1989. Smoked goat fish packed in trays was sold in the Gibson Supermarket in Majuro during the field survey.

This project will provide a small fish processing unit with cooperation of inhabitants of a small atoll (one of Ailinglaplap Atoll islands) and at the same time the project will be expected to train and educate persons for a social level increase. The smoking technique and equipment developed by US Peace Corps has been applied to the project and realized favorable results. Step-up technical assistance together with additional equipment such as a small generator and a refrigerator for storing raw material fish is desirable.

On the other hand, Mr. Saab has shown his interests in colored fish scale for ornamental use in souvenir market because of simple processing.

3) Reef fishes

Various kinds of reef fish are harvested and sold in chilled from at retailers and supermarkets. They are parrot fish, goatfish, red snappers, groupers, unicorn fish, rudder fish, etc. The private sector has once tried to export parrot fish to Hawaii but it could not continue to obtain results. The study of practice of fresh fish handling, establishment of

a transportation system and collection of market information are essential in order to bring the business up to a mature stage.

The Overseas Fishery Cooperation Foundation (OFCF) of Japan has conducted one program since 1987 to assist in development of fishing operation with 8 FRP fishing boats (20ft.) and fishing materials and with technical assistance of the Japanese expert. The actual operation is carried out in the base located in Arno Atoll. It is expected to train the people and to increase the fish catch. Such improvement will be able to accelerate the raw fish export business.

The Majuro fishing base (ice making : 5 ton/day, frozen storage -30°C : 200 ton, cold storage : 50 ton) was constructed in a harbour by Japanese aid and is now available for use. This base is advantageous for raw fish and also shellfish handling and export operation.

4) Culture

Giant clam has been cultured in the culture bed in the sea by a Governmental project in which the juveniles were brought from MMDC in Palau. A private company (Robert Reimers Enterprises) is operating blacklip culture at Mili Atoll but they have still not obtained favorable results yet.

Present status of fisheries sector is summarized as there is a weak infrastructure for industrial development of marine resource-based products and difficult transportation between Majuro and the outer atolls. It's necessary for fisheries development in Marshall Islands to initiate work by an expert in very small scale operation and to collect reliable data by spending a certain time for the project implementation.

3.2 Federated States of Micronesia (Kosrae, Pohnpei, Chuuk and Yap States) 1/

1) Reef an Bottom fishes

Modern cold storage facilities have been constructed in Pohnpei (Teketik Cold Storage), Yap (Fisheries Complex) and Chuuk (Dublon Fisheries Complex) under Japanese grant aid. In a Japanese assistance program in Chuuk State, excellent post-harvest fish handling after catch on the fishing vessel is being carried out, but fish handling after landing at Dublon Fisheries complex is not standardized and sometimes undesirable handling has been done in the cold storage. Improvement of these fish handlings will promote supply of better fish to local market and furthermore stimulate chilled fish export to overseas market. Fish caught in the above fishing operation in Chuuk State are red snapper, silvermouth, trevallys, jobfish, emperors, croakers, parrot fish, seabass, etc.

2) Shell and Shell meat

In Pohnpei State, a private company (AHPW Inc.) is competently operating a trochus shell processing plant, where various button blanks are being produced.

FSM States Governments are proceeding shell fish culture (giant clam, trochus shell) projects. Natural resource of shellfish such as redlipped strombus is available for utilization. Research and Development Department of FSM stated that Yap and Kosrae States have strong intents to receive technical assistance to execute shell processing as Government supported program. The program is for establishing simple shell processing facilities and procedures on the spot and able

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1/ The mission carried out field survey only in Pohnpei and Chuuk States.

to provide the future plan. Higher level technique for producing ornament and jewellery will be required for expected souvenir market in the future. Shell meat from shell processing will be stored and utilized for commercial product development under the guidance in the fish handling and processing program.

3) Seaweeds/Sponge

In Pohnpei State, Mr. M. Gawel and Mr. R. Croft of Research and Development Department of FSM stated that seaweed (Eucheuma) culture has been carried out for more than the last 10 years and 16.0 tonnes of dried products were recently produced and exported to Denmark. The program is planned to produce 100 tonnes of this product per year in the future. Development of further processing of the material using a simple method such as drying is intended as future progress.

According to Mr. Croft, the present status of sponge culture in the Pohnpei waters is that the study is going well and will have a good harvest in the near future. Sponge processing is not so complicated, therefore they will be able to complete this project by their own efforts. But the immediate technical assistance for sponge processing, especially about raw sponge cleaning, will be required, because they have now faced such cleaning problem to be solved urgently.

4) Tuna fishery

National Fisheries Corporation (NFC) of FSM has formulated a fishery development program, mainly aiming at a commercial offshore fisheries. Offshore fishing will catch yellowfin, big eye, sward fish, etc. which are expected to be exported to Japanese fresh fish (Sashimi) market. However, the program is still in a planning stage for an action program in which NFC formally signed documents with Taiyo Fishery Co. of Japan for a joint venture in tuna fishing.

In a meeting with Pohnpei State and Chuuk State, strong intents were shown to start development of marine resource-based industry from stage of receiving technical assistance which is to provide a foundation for a quality assurance/quality control system and fundamental education/training on marine product handling and processing in each field.

3.3 Republic of Palau

1) General

As most households engage in fishing activities, a major portion of marine resource landed are consumed as the subsistence level in Palau (Table 3.1).

Table 3.1 Fish Utilization in Palau (1988)

	tonnes	%
Subsistence	1,800	75.6
PFFA sales	233	9.8
Private retailers	214	9.0
Processors	22	0.9
Exporters	113	4.7
Total	2,382	100.0

Source : Based on a field survey by OAFIC

The Palau Federation of Fishing Associations (PFFA), consisting of 8 local fishermen's cooperatives, operates fish collection and distribution for retailers and exporters and also provides facilities and services for fishermen's activities.

Fulltime fishermen are estimated between 100 and 200 and they mainly supply fish to PFFA. Reef fish such as snapper, sweetlips, seabass and parrot fish and shellfish such as turban

shell, clam, giant clam and trochus are the main species landed and caught by various fishing methods such as spear fishing, handline, trolling, gill netting, set netting and reef collecting.

There are about 500 registered boats (4 -8 m, 50 - 300 Hp engine), most of which are used at least part-time for fishing. Eleven FRP fishing boats (11 m, 70 HP, 3.2 tons) were provided under a Japanese grant aid project and play an important role in Palau's artisanal fisheries.

The PFFA has the following facilities ; fisherman's wharf, fish market, ice making plant, freezing cold storage plant. The fish market is located in the Malakal area in Koror. It is a main fisheries landing place. Fishing port in Angaur Island opened in 1989. These facilities will be the focus for the future marine resource-based industry development.

It is noted that about 180 fishing vessels (mostly longlines) registered in Japan, USA, China and Taiwan are operating in the 630,000 sq km of Palau's EEZ with Government permission. These vessels catch yellowfin, bigeye and skipjack. The Japanese fleet caught about 2,500 tonnes in 1988 in this area. The revenue from the fishing right has reached to US$800,000.- per year.

In the field of aquaculture in this country, the Micronesian Mariculture Demonstration Center (MMDC) has performed a very effective function. MMDC carries out research and development on commercially important mariculture species such as clams, turtles and trochus, and also conducts training programs and serves as a base of operations for visiting international researchers. The giant clam culture project conducted at MMDC is famous internationally and contributes to regional giant clam culture development by the distribution of juveniles for transplantation, and by its information services.

2) Smoked reef fish

Mr. David Idip and Mr. Noah Idechong of the Bureau of Resources and Development, Palau, wish to conduct a project for smoked reef fish expansion. There is an existing domestic market which offers some potential for expansion. The present domestic production is very small scale, but operates successfully. The retail business by YANO's store for home-made smoked fish is managed very successfully. Considering the strong preference for smoked fish, there is a big potential to diversify and introduce similar products such as soft smoked fish and smoked shell meat. There products may be exported to Guam. They also have potential as souvenir goods for tourists.

PFFA has one smoking machine (Enviro-Pac. Type CHU-1E) and also one vacuum sealing machine which were used in the experimental production of smoked fish in 1987 under the UNIDO assistance SI/TTR/87/801. This equipment will be used for future fish smoking trials.

3) Shell and shell meat

163 tonnes of trochus shell was exported to Japan in 1988. Over-exploitation was recognized, and a ban on trochus catch is coming in force from July 1989 to June 1992. Meat of trochus and giant clam give favorable taste and are one of the preferable food items in this country. It was observed that traditionally prepared (cooked) giant clam meat was sold at the delicatessen shop in Koror. According to Mr. Idechong, there reportedly exists good resources of redlipped strombus, the meat of which is also favored and valued on the Japanese market. The present catch of this shell is still at the subsistence level but it could be developed for industrialization on a limited scale given proper Government control. This meat can be processed in salted/frozen form as material for secondary processing and it is sure that the meat can also be processed in bottled and/or retort-pouched form which is a marketable product in the domestic and the overseas market.

It should be noted that this industrialization will have to start in a simple way, by establishing the size of the resources and instituting some control system on the level of exploitation. Shell of redlipped strombus will also be processed for ornamental purposes. Mr. Idip intends to promote the utilization of giant clam shell because they already have some stock of this shell and expect further output from giant clam culture project at MMDC.

4) Tuna

Excluding the tuna fishing by the foreign-registered vessels under Government licence, the local tuna catch was relatively small in 1989. Palau International Traders Inc. (PITI) carry out the export of fresh and frozen tuna to Japan using the former Vam Camp facilities since that company closed its operation. PITI is managing Mainland Chinese and Taiwanese registered vessels and the catches of about 1,500 tonnes of tunas have been exported mainly to Japan and the remaining to Taiwan from September 1987 to January 1989. There is reportedly more than two hundred vessels operating for PITI in Palau today.

3.4 Solomon Islands

1) General

Subsistence fishing had been the main type of fishing activity in Solomon Islands and the common practice for centuries past. However, since 1971 there has been growth of a cash economy which has made marine resources a source of both food and income. Further, there has also been substantial growth in the commercial tuna fishery to the point where the fishing industry is now pre-eminent in foreign exchange earnings and private sector employment. In 1987, 28,646 tonnes

of marine product was exported worth SI$56.4 million, accounting for 44% of that year's total foreign exchange earnings of SI$128.3 million. Fish exports have risen to account for 50% of foreign exchange earnings in 1989. By comparison, marine product export earnings represented only 14% of the total in 1971. Today the fishing industry plays a major role in Solomon Islands economy.

Commercial fisheries in Solomon Islands are based on tuna resources which have an estimated sustainable yield of 75,000 tonnes per year. Tuna catch over the past few years has been between 35,000 and 40,000 tonnes. Two companies account for this catch. Solomon Taiyo Ltd. (STL), a joint venture between Solomon Islands Government and Taiyo Fishery Co., Japan has been operating successfully not only in fishing but also in processing. At the second joint venture for commercial tuna fishing between Solomon Islands Government and STL, the National Fisheries Development Ltd. (NFD) was established. It operated 12 pole-and-line vessels and two purse seiners. Their catches were landed at Tulagi shore base. The industry based on tuna fishing has performed well and shown good results, when manage properly. This company was recently sold by Solomon Islands Government to British Columbia Fadeers Ltd. of Canada. It has 12 pole and line vessels and one purse seiner. The second purse seiner is on charter to STL.

On the other hand, it is noted that the provincial fisheries development program has been proceeding by utilizing fisheries centers situated throughout the provinces. There are a total of 9 fisheries centers which are located in the main local points for fish landings. They are places with large fishing populations mostly in rural areas. Each center has a power generator, block ice-making plant, fish handling area and outboard motor workshop. In addition to the main fisheries centers, 9 sub-centers were established to promote marketing of fish from rural areas, through the provision of ice, eskies and a marketing outlet to rural fishermen (Table 3.2).

Table 3.2 Fisheries Centers and Sub-Centers in Solomon Islands

Location (Province)	Center	Sub-Center
Western	2	2
Malaita	2	1
Makira	1	2
Isabel	1	2
Guadalcanal	1	1
Central Islands	1	1
Temotu	1	0
Total	9	9

Source : Fisheries Department Solomon Island, Annual Report 1987

As indicated in Table 3.3, the balance of trade in marine products in Solomon Islands has become to better situation and the quantity and value of imports of marine products in 1987 showed a drastic reduction from the levels of previous years.

Table 3.3 Exported/Imported Marine Products

Import	1985	1986	1987
Weight (tonnes)	701.6	804.4	221.6
Value (SI$)	1,006,311	1,400,147	506,880

Export	1985	1986	1987
Weight (tonnes)	29,039.8	41,585.6	28,646.2
Value (SI$)	32,904,748	54,384,164	56,335,046

Source : Fisheries Department, Solomon Islands, Annual Report 1986 and 1987

Total exported marine products in 1987 show that tuna products contributed 97.7% by weight and 93.3% by value. This indicates the preeminent position of the tuna industry in Solomon Islands. Table 3.4 shows export statistics for the non-fish marine products.

Table 3.4 Non-Fish Marine Export (1987)

	Weight (tonnes)	%	Value (SI$)	%
Beche-de-mer	146.4	22.2	939,533	25.0
Trochus Shell	445.2	67.5	2,045,169	54.4
Blacklip	28.3	4.3	186,472	5.0
Other Shells	25.9	3.9	248,714	6.6
Turtle Shell	2.4	0.4	168,104	4.5
Crocodile Skin	6.4	1.0	32,093	0.9
Shark Fin	4.5	0.7	134,842	3.6
Total	659.1	100.0	3,754,927	100.0

Source : Fisheries Department, Solomon Islands, Annual Report 1987

Note : 1987 arrange exchange rate US$1.002 = SL$0.50

2) Dried beche-de-mer

This product is an important item in non-fish marine exports from Solomon Islands. Raw material comes from artisanal fisheries conducted in each fishing ground. The drying process is simple and carried out by people in fishing villages. The main three companies are Sun King Enterprise Ltd., QQQ Wholesale Ltd. and Western Pacific Shells. They are traders in beche-de-mer, and at times they have guided the processing workers to improve the manufacturing method. Hard work on this kind of guidance to the fishermen has been emphasized by them, and their efforts have resulted in improving the production yield. About 50% of this product have been supplied in the part from Ontong Java Atoll which is very famous for dried beche-de-mer production in the world.

The technical assistance for quality improvement and quality control system in this product is a common requirement and this will also result in an increase in the income of the village people.

3) Trochus and other shell

Trochus dominates exports in the category of shell. It is predominantly harvested in the artisanal fishery. Fishermen catch trochus and sell the shell after the meats is taken from the shell. Part of the shell meat is used for subsistence food purposes, but often it is thrown away due to the lack of storage method and/or facilities.

As shown in Table 3.4, other shells (blacklip, brownlip, goldlip greensnail, etc.) are harvested and contribute to exports. They are harvested mostly in the artisanal/subsistence economy and with the shell being sold and the meat utilized for subsistence only. In this regard, Sunking Enterprise Ltd., Western Pacific Shell and DAIDO Solomon Is. Ltd. have an interest in bottled or retort-pouched processing.

Apart from the above, the Fisheries Deparrtment is interested in pearl culture/shell utilization using the existing blacklip, goldlip and possibly brownlip oysters.

4) Reef fishes

Melanesian Traders Ltd. (a private company) has a fish fillet processing plant where they manufacture frozen fillet products from reef fish caught in Solomon Islands waters (grouper, mullet and sweetlip, etc.) and sometimes frozen tuna steak and sailfish fillet for the domestic and export markets. According to a local newspaper, the Solomon Islands Government has recently approved a joint-venture company to construct a large seafood processing factory in Gizo, Western Province, where quality seafood products will be produced for both local and export markets. The production of chilled and frozen fish products in this country should increase, depending upon a more commercial fishing effort being made by the people in the future.

5) Shark

The whole shark can be used. It can be processed into dried fin, shark skin, shark meat and liver oil (squalene). One FAO consultant has once taught shark skin processing in Solomon and obtained good results, but processors are still requiring more guidance to complete the process. The world market of shark skin shows good potential. Therefore, technical assistance in this field, including salted storing technology will be effective for local industrialization. This will alsc assist improvement of the village societies. However, it is noted that targetted shark fishing (other than as a by-product of tuna fishing) is required for its industrialization. Dried shark fin is a very common product being traded in the world. Considering that some private company would like to produce the more value-added product, namely dried sharkfin fibers, technical assistance to process the fin to this dried fiber product should be considered.

6) Giant clam

The International Centre for Living Aquatic Resources Management (ICLARM) established the Coastal Aquaculture Centre near Honiara in 1987. Its activities started with culture of giant clam (Tridcna gigas). A field survey of giant clam stocks was also carried out in the Solomon Islands by the Fisheries Department and ICLARM in 1986. The largest species T. gigas has been found to be rare near urban areas. There is a tradition by coastal villagers of holding giant clams on nearby reefs. Their meat and shell are highly prized.

3.5 The Republic of Vanuatu

1) General

The marine resource-based industry, especially fish processing, is mainly guided by the Government in order to

develop artisanal fisheries by exploiting marine resources. A number of fisheries projects are currently being carried out and the Government has received financial and technical assistance for an extension program from aid donors of various agencies of the developed countries and international organizations.

The Fisheries Department has been promoting "Village Fisheries Development Programme ; "VFDP" since 1982. Under this program, small fishing boats and related facilities were financed or subsidized by aid organizations, fishermen were trained and a number of volunteers were recruited from overseas to assist in implementation of the programme throughout the country. It has been reorganized and slimmed down to concentrate on key places/villages.

The Fisheries Department plays a key role in fish marketing through in operation of Port Vila Fisheries Ltd. (NATAI). This company is wholly government-owned run on commercial guidelines and undertakes fish marketing activities for the artisanal fishermen. NATAI has an integrated operation, including fish purchase and sales, food product import/distribution and fishing materials supply based on two stations located in Port Villa and Santo. In addition, Mr. Lamry Vallance, Fisheries Consultant and manager of Natai, has produced tanned fish leather on a trial basis as material for ornaments or fashion items (bags, wallets), with assistance from New Zealand Government.

2) Shell processing

Trochus and greensnail are the leading items in the export statistics from Vanuatu as shown Table 3.5.

Table 3.5 Vanuatu Fisheries Export Products

(tonnes)

	1986	1987	1988
Trochus *	--	26	40
Greensnail	14	12	10
Other shell	--	--	6
Beche-de-mer	4	1	15
Sharkfin	5	--	3

* Trochus button blanks

Source : Fisheries Department, Vanuatu, Annual Report 1988

Two shell processing and trading firms, Melanesian Shell Products Ltd. and Hong Shell Products Co., Ltd. are operating well and are carrying out an expansion program of trochus button export, though the Fisheries Department is anxious to control harvesting considering the state of over-exploitation. The mission also observed the trochus shell processing operation at the branch plant of Melanesian Shell Products Ltd., in Santo which should be success, if it can secure sufficient shell.

The Fisheries Department and ORSTOM have studied the dynamics of the trochus harvest and the biology of trochus in Vanuatu since 1983. They are currently extending their survey by introducing new technology such as the utilization of a satellite system and if they obtained successful data it may be effectively used for the future management of this resource. The Fisheries Department is also considering a trochus culture program for reseeding reefs with hatchery reared trochus. However, earlier experiments were interrupted when the facilities were destroyed by a cyclone. Vanuatu is one of regular overseas suppliers of greensnail but there is little concrete information on the world trade in this shell and harvest records for greensnail in Vanuatu are limited. Export records are shown in Table 3.5.

These shell processors are manufacturing quality shell products such as button blanks, polished shells and other ornamental items by appropriate techniques. They are still considering to produce further value added products such as the finished button products and to utilize trochus and greensnail waist for inlay work.

3) Smoked fish, etc.

According to Mr. N. Crysler, Senior Extension Officer of the Fisheries Department of Santo, the smoked fish project is being planned at the Fisheries Training Center in Santo in order to produce a value added delicatessen type product to be marketed in Port Vila and Luganville, where the product can be sold at better prices. This project also aims at assisting the fishermen living in the islands far from urban centers, where convenient transportation and ice for storing fish are not available. The project is funded by the British Government and sample products produced under this project have been of good quality and well accepted by hotels in Port Vila in a preliminary trial. Production of beche-de-mer is not large as shown Table 3.5. Nevertheless, the Fisheries Department recognized the necessity for further technical assistance to improve the quality of the product and to establish a quality control system, including training of the authorized inspectors for export purpose.

4) Industrial fisheries

The only large scale fishing activities in Vanuatu have been conducted by South Pacific Fishing Co., Ltd. (SPFC) located in Palikulo Point, Espiritu Santo. The SPFC was established in 1957 as a transshipping, cold storage and fishing support base for the Japanese longline fleet operating in the West Pacific targeting on albacore. The major facilities at SPFC comprise unloading and transshipping wharves, a 2,340 sq. m cold store, two slipways, workshops, a fishing gear store and fuel bunkering facilities. The major

shareholders until 1987 were Mitsui Co., Ltd. (Japan) and the Government of Vanuatu. Mitsui donated its shares (about 75%) to the Government of Vanuatu in 1987. Hence, the Vanuatu Government is now 100% shareholder of the company. Table 3.6 shows the effect of this joint venture, its decline in activity since 1979 and the cessation of this activity altogether. Reactivation of SPFC is considered an urgent matter for fisheries development in Vanuatu.

Table 3.6 SPFC operation

Year	No. of boats	Ni-Vanuatu Crew	Fish Landed (tonnes)	Fish Re-Export (US$'000)
1970	26	*	9,240	2,274
1971	45	*	13,403	6,780
1972	55	*	15,598	8,162
1973	57	*	15,131	8,520
1974	67	*	9,424	7,460
1975	46	*	5,218	3,330
1976	28	*	6,091	5,341
1977	55	*	9,997	11,166
1978	48	*	9,182	12,560
1979	50	*	7,724	12,460
1980	65	*	6,932	11,990
1981	45	13	4,523	8,072
1982	28	33	3,863	7,664
1983	14	46	5,030	8,072
1984	18	37	3,906	7,303
1985	14	57	4,032	7,116
1986	6	22	1,186	3,813
1987	15	54	0	0
1988	33	120	0	0

Source : FFA (1982) Report, page 5 and Fisheries annual report, 1986 page 23

Note : Ni-Vanuatu employment scheme not in operation, before 1981.

According to SPFC, its present situation is summarized as follows :

1) SPFC employs 32 Ni-Vanuatu and 2 Japanese advisers in a total 34 people, who are mainly living at Palikulo.

2) The company does not contract any fishing boats and does not carry out any fishing activity, or fish sales and export. Presently, ship repair and coldstorage operation of chilled/frozen beef for export to Japan etc. is main line of activity.

3) As fishing support base business, SPFC acts as an agent for various fishing boats in Taiwan, Japan and Korea to help in their repair and to supply fuel oil, etc. (54 fishing boats called during the period January - December, 1989).

4) SPFC recruits Ni-Vanuatu crew on behalf of Taiwanese/Korean longliners and presently (as of Jan. 31/90) a total of 304 crew were placed on 76 boats.

5) The individual fishing licenses within the 200 Mile EEZ of Vanuatu is under the control of SPFC as authorized channel of the Government (Fisheries Dept.).

The SPFC facilities are being used for the above activities, but they are mainly under-utilized at present. The Government is keen to resolve the issue of keeping these facilities for fishing, or arrange this valuable site to be redeveloped for another purpose. They are keen to try to get some fishing company interested in these facilities.

3.6 Kingdom of Tonga

1) General

Tonga's is fisheries have been expanding to level of fish production of 2,000 tonnes per year (estimated by the

Fisheries Division) and considerable efforts have been made to develop commercial and artisanal fisheries in the last 10 years. The Fisheries Division stated that in 1988 total fish exports during the year amounted to 1,800 tonnes, which is 80% of a target of 2,000 tonnes.

The Artisanal Fisheries Development Programme (AFDP) has been conducted in order to discover alternative fisheries to absorb part of the growing fishing fleet and thus relieve the tension on the inshore fishing grounds. This is in recognition of the potential danger of overfishing of inshore fishing ground, where the artisanal fishing has been operated. Specific objectives of this programme are as follows :

- to expand artisanal fishing by introducing new fishing craft and improving fishing techniques which together will help to improve the amount of fish supplied to the local market and for export.

- to satisfy the domestic demand for fresh fish by putting into operation a total of 40 boats.

- to reduce the pressure on traditional fishing grounds by diversification into unexploited species in both inshore and offshore areas which are beyond the current range of the artisanal fleet.

- Enable the local fishermen to fish in an extended range of more than 50 miles from land and to get high catches of good size fish.

Under this AFDP, the Fisheries Division have confirmed (1) implementing the boat building scheme in which the construction of boats was undertaken in three boatyards, one in each of the main island groups of Tongatapu, Ha'apai and Vava'u and (2) the provision of fishing gear and equipment for the boats. Training of boat owners is also curried out as an essential part of the programme. It is noted that the above project has been provided by funds from different international organizations. FAO started this project off in 1985. It has been an undoubted success to date.

In order to support these fishing activities, the Fisheries Division operates 7 fisheries stations which have a freezer, cold storage and ice-making facilities. These stations are located in 7 separated islands. The Fisheries Division also operates four vessels for carrying fish from the islands to Nuku'alofa and general cargoes from Nuku'alfa back to the islands.

Aquaculture/mariculture programmes are also being conducted by the Fisheries Division. They are mullet culture, stocking of Lake Ano with mullet, giant clam culture and seaweed farming, the latter has not been a in success to date. Mr. Semisi Fakahau, Principal Fisheries Officer, intends to find out the best way to utilize the harvest from seaweed (Eucheuma) farming locally. Transport costs to export market are high.

Other than Government operations, the private sector is also operating well in Tonga. Two commercial firms, Maritime Projects Tonga Ltd. and Fuko Fisheries Enterprises, are conducting fish export business and they have made many efforts to establish the fish export channel to overseas markets. They are also interested in manufacturing smoked fished to be sold for local consumption and for export. Smoked fish is of high value and release the present operations from the schedules and uncoporative behaviors of Hawaiian Airways, their export carrier.

Concerning bottom fish resources, a Japanese fishing firm has approached the Fisheries Division for a joint venture agreement for deep bottom line fishing in Tongan waters. They aim to sell Tongan snapper and grouper fish on the Japanese fish market, using newly developed ultra low temperature freezers.

2) Sea cucumber

Tongannes consume beche-de-mer and even export the fresh, chilled and frozen products to Polynesian community in Auckland. Fresh sea cucumbers is stored in brine in used

plastic coke bottles, and are sold at the Government market. People in other island countries in the Pacific (Micronesians, Polynesians) have sometimes take this marine animal fresh in their diet. It is possible to develop the market for this kind of product (frozen or salted sea cucumber) among Pacific islander communities in both Australia and New Zealand.

One more value added product manufactured from sea cucumber for industrialization is salted/fermented intestines and/or gonad produced in Vava'u island. This fermented product is so-called "Konowata" in Japan and is preferred by Japanese gourmets, so this product should be sold at higher price, presently, US$330.-/kg at a retail shop in Tokyo market.

This product can be stored at room temperature and can also bear the high cost of air freight because of the high unit price. These factors showed to allow Vava'u's "Konowata" to be marketed in Japan provided the product quality is acceptable, although further evaluation and/or quality improvement of the product should be investigated prior to industrialization. It should be noted that this product can also be made as a by-product during the most usual dried beche-de-mer processing. Dried beche-de-mer is produced by Tonga fishermen under the direction of the Fisheries Division.

3) Black coral

Black coral is used for jewellery and ornaments. It is harvested at the moment in commercial quantities in Tonga and Fiji. It is also harvested in Hawaii and Taiwan. Black coral grows in depths of 150 to 300 feet below sea level. Therefore, it must be obtained by divers, who face numerous hazards including dangerous currents and shark attack. In Tonga, only a few divers work once or twice a week. The coral is harvested from coral forests in Tongan waters. It is increasingly being manufactured into jewellery and ornaments by two or three Tongan private firms. The export of unprocessed black coral from Tonga is now banned.

There are two firms engaged in black coral processing business in Tongatapu. One is "Handcrafted South Sea Jewellery" owned and managed by Mr. M. Guttenbeil, and another is "Black Coral Factory" which is located in the Small Industries Center at Ma'ufanga. Both are well equipped with various coral processing tools and machines. Ms. K. Mati has just taken over operation of the "Black Coral Factory". The Small Industries Centre is being managed by the Government. This facility is under the guidance of Mr. D.B. Shae, UNIDO Chief Technical Adviser. The facilities and system are useful also for the development of marine product exports.

Making jewellery and ornaments from black coral has progressed satisfactory and the standard of work at a high level. However, they are still interested in technical assistance, together with the introduction of latest equipment. They also need information on fashion trends from the jewellery world.

3.7 Cook Islands

1) General

Cook Island is internally self-governing and has been in free association with New Zealand since 1965. The Ministry of Marine Resources (MMR) was established in 1988. It is responsible for managing all marine resources utilization and for conducting fisheries development, which can be classified into the following three types according to the Second Development Plan issued by Ministry of Planning & Economic Development.

a) Subsistence : Subsistence fishing provides a significant proportion of the protein requirement of the Cook Islands people. It includes the collection of shellfish and seaweeds, reef fishing and netting, spear fishing (free-dive), handlining for reef fish, trolling and drop lining for tuna from small boats.

b) Lagoon : Lagoon fisheries, which comprises mainly trochus, pearls and pearl shell development and is increasing significance to the economy. Trochus was first established in the Cook Islands on Aitutaki in 1957. It reproduced sufficiently to allow commercial harvesting to start in 1980. Since then 20 to 40 tonnes of trochus (valued at NZ$40,000 - 90,000) have been harvested every one to three years. Pearl shell development began in the 19th century. Pearl shell contributed an average of 25 percent in value of total exports in the 1953 to 1957 period. It is still the major economic contributor to the economy of the Northern Cook Islands. Manihiki and Penrhyn are the main pearl and pearl shell producing islands, exporting US$350,000 of pearls in 1989. The production and export of pearls is developing rapidly, and is expected to generate about US$12 million in a few years wise.

c) Commercial : Commercial fishing can further be subdivided into two main categories :

(1) Artisanal Fisheries

Artisanal fisheries consists of fishing by small and medium sized operations within the 12 mile territorial limits on a part- or full time-basis. It centres around the capture of tuna and other pelagic fishes, mainly utilizing conventional trolling methods around Fish Aggregation Devices (FAD).

(2) Industrial Fisheries

This comprises medium to large-scale fishing operations within the 200 mile Exclusive Economic Zone.

The Ministry has completed the First Development Plan and started the Second Development Plan (1988 - 1992), under which the following programmes, objectives and action plan have been stated.

Subsistence fisheries Development Programme

Subsistence fishing remains a fundamental activity on all islands. Estimates of the subsistence catch in the southern group were obtained by the Agriculture Planning Unit for the years 1978 and 1979 and were conservatively estimated at between 800 and 1100 tonnes, and valued at NZ$2.5 - 4.0 million at current prices. Even if these estimates are too high, the current market value of the subsistence catch for the country as a whole may nevertheless approach NZ$5 million. Additionally these estimates bring into focus the possible magnitude and value of the catch, as well as providing useful baseline data on the relative importance of various fishing methods and species composition. A repeat of these surveys on both the Southern and Northern Group islands would provide useful comparative data. Concern has been expressed that subsistence catches are declining and that spear fishing may have a negative impact both on catch and on tourist-oriented sport diving.

Programme Objectives

- To carry out a comprehensive sampling programme of the existing subsistence fisheries resources of the Cook Islands.
- To formulate a realistic management plan for its conservation.

Plan of Action

A sampling programme based on the MMR's knowledge and experience of subsistence fishing activity has been devised.

The large Aitutaki subsistence fishery (530 - 790 tonnes, 1978/1979) will also be surveyed to provide data relevant to management of the lagoon gill net fishery.

The subsistence surveys will also provide information on prices, marketing arrangements, operation costs and so on, so that socio-economic factors can be evaluated.

Pearl Shell Development Programme

Bivalve mollusc cultivation initially requires the establishment of artificial spat collectors in the lagoon. The abundance of spat fall and other parameters affecting the growth of the mollusc have been taking place over the past years, and spats from the established Penrhyn and in particular Manihiki cultures, will be utilized in setting up farms on Rakahanga and Pukapuka.

Further developments will include pearl cultivation (including the much sought after black pearl), and technicians from Japan will be contracted to implement this phase.

In general, the major development emphasis in this sector will be one of expanding and consolidating development in the Northern Group.

Shell Fish Development

Seaweed and giant clam development. These two schemes have been undertaken, though for the time being they are still at the experimental stage.

The Ministry of Marine Resources has stated their strategy for fish utilization/post harvest operation in the Second Development Plan as follows.

- reduce waste and improve the quality of the final product
- develop new fisheries products from plentiful and low value species
- improve post harvest technology practices
- improve the marketing and distribution system

2) Trochus shell

The trochus introduction program to Aitutaki from Fiji in 1957 has been completed establishing regular annual harvests recently (but none since 1987). This successful plantation took more than twenty years, with continuous and enduring efforts made by fisheries officers concerned in Cook Islands.

The harvest records of trochus in Aitutaki show 20 to 45 tonnes of catches in a harvest year and this large amount of catch could be obtained only in Aitutaki atoll area (reef flat) and for a short period (harvesting duration is controlled by MMR e.g. 3 days in 1985, 2 days in 1987) compared with trochus production in other Pacific Island countries where the production points are located in many islands. The above situation may facilitate the operation of a shell processing plan on a commercial scale.

Shells can be processed locally to obtain a higher value (eg. button blank manufacturing) and processed meat (cooked, uncooked, frozen, bottled, etc.) manufactured under well organized quality control should have a market, in both domestic and overseas.

3) Smoked fish

The Mission confirmed the domestic potential for smoked fish in the market (including catering market) and observed a new small smoking facility in the private sector. Smoked fish production consider tuna/shell meat in Aitutaki, parrot fish/tuna/rabbitfish in Palmerston and eels in Mitiaro. It will assist fishery development in each island/atoll if the scheme can be favorably carried out with technical assistance, including assurance of raw material supply and a full market study.

4) Blacklip pearl oyster

Pearl shell production at Manihiki and Penryh started in 1945 and commercial scale pearl farming is currently only undertaken in Manihiki lagoon (since 1987) with the culture techniques based on that developed in the French Polynesian pearl culture industry. Black pearls are produced naturally from blacklip pearl oyster but more important is artificial pearl production by n cleus insertion, which is now being done in Manihiki. Japan imported about 26kg of black pearls from Cook Islands in 1989. There were no exports in 1988. Technology transfer from Cook Islands to other Pacific island countries in this field seems to be a real possibility. On the other hand, it is added that the properly dried (smoked) pearl oyster meat should have a potential especially in the Chinese food market.

2.8 Fiji

1) General

The population in Fiji at 720,000 is a large number among the Pacific island countries. This economy and development status is comparatively large and advanced. Consequently, the fishing industry also shows good production records and continue to contribute in an important way to the national economy.

Table 3.7 Local Fish Production

(tonnes)

	1986	1987	1988
Artisanal fish	4,338	4,737	4,748
Artisanal non-fish	1,804	1,927	2,120
Industrial fisheries	10,281	11,079	15,825
Bait Fishing	60	50	55
Subsistence catch	15,200	15,400	15,600
Total	31,683	33,193	38,348

Resource : Fisheries Division, Fiji, Annual Report 1988

Based on the above fish production, the marine product export has clearly expanded. The 1988 Annual Report of the Fisheries Division stated that 1988 exports were dominated by canned tuna (6,965 tonnes valued at F$39.8 million), but included increasing quantities of beche-de-mer (717 tonnes valued at F$2.85 million), trochus shell (398 tonnes valued at F$2.01 million), crustacean and mollusks (361 tonnes valued at F$1.68 million), fish pastes (224 tonnes valued at F$1.4 million) and fresh chilled fish (172 tonnes valued at F$0.18 million). Exports totaled F$51.2 million (a 90% increase over 1987) and re-exports totally F$2.3 million, while fishery products imported in 1988 were worth F$29.7 million (a 74% increase over 1987) according to the Bureau of Census and Statistics figures for trade (The increase in value is due in part to the large depreciation during 1987 of the Fiji dollars.).

The Fisheries Division presently operates twelve ice making and/or cold storage facilities located over the country for assisting artisanal fisheries and sometimes industrial fisheries. These facilities could also be used for future development in marine resource-based industry. The Fisheries Division is continuing to provide assistance to rural communities in the production of salted mullet and beche-de-mer through visits and on-site instruction.

2) Deep water snapper

In its 1988 Annual Report, the Division stated that the semi-industrial fishery for deep water snapper had reached what is estimated as full capacity in 1988. Nevertheless, the Fisheries Division continued to provide advisory service on gear development and exploratory fishing. Two exporters of fresh chilled fish are Mr. G. Russo, Managing director of TASU Ltd. and Mr. H. Walton, Manager of Rabi Denker Fishing Company. Their fishing and trading operations are going well despite facing many difficulties. They also carry out small-scale tuna longline fishing. Undersize tuna for export will be processed to smoked products which will be exported to the USA market. A specially smoked tuna loin shrink wrap package by TASU Ltd. is a good product. It was produced at a lamb smoking factory.

Table 3.8 Export of fish and smoked fish in 1988

	Kg	F$
Fresh/Chilled/Frozen Fish	72,235	423,246
Smoked Fish	1,663	8,045

Source : Fisheries Division, Fiji, Annual Report 1988

3) Canned Tuna

The cannery of Pacific Fishing Co., Ltd. (PAFCO) and Pacific Packaging Ltd. (PPL) located in Levuka island were visited during the field survey. The factory has 60 - 100 M. ton/day (1 shift=8 hrs) capacity. It is well operated with the assistance of three Japanese and one Canadian technical experts. Mr. Milieli Baleivanualala, General Manager, requested technical assistance for an energy saving programme in the cannery operation from UNIDO.

4) Trochus and Pearl Shells

Total export of trochus and pear shell is 456 tonnes worth F$2.48 million. According to Mr. H. Yuen, Director of Yon Tong Co., pearl shell and trochus shell are now processed into button blanks. Attempts are being tried to process finished button products. This value-adding process should be the trend for the business in future, although technical assistance in its operation is still required. He stated also that dried/smoked pearl shell meat is valuable in Chinese cuisine.

5) Fresh water clam

This shellfish specifically grows in Fiji's fresh water rivers. It has possiblities to be utilized on an industrial scale for both domestic and international markets. The Fijian people are fond of them. Also some frozen product has been exported to New Zealand. The Mission purchased this material in the municipal market in Suva City (F$0.45/kg) and tried to cook them for a preliminary evaluation. The result was favorable, both for the meat and the extracted soup.

6) Beche-de-mer

The production of beche-de-mer has increased for the last 20 years. Exports have also shown an increasing record. Based on such business growth, "Fiji's Beche-de-mer Exporters Association" was set up in March 1989.

Table 3.9 Beche-de-mer Annual Export

(tonnes)

1968	2.12	1985	66.20	
1973	11.02	1986	229.38	
1978	15.20	1987	640.39	
1983	32.90	1988	717.41	(F$2,852,273)
1984	53.10	1989	365.18	(F$1,890,82)

Source : Fiji Beche-de-mer Exporters Association, Financial Statement, 1989

This growth was made by efforts of the Fijian manufactures, exporters and the Fisheries Division with some assistance given by FAO, SPC, FFA, etc. over the past years.

According to Mr. Shardha Nand, Chairman of the Association, present status of beche-de-mer utilization is summarized as follows,

- Harvesting and drying is carried out at many village centres, but expertise in beche-de-mer processing has not kept pace with expansion. A large percentage of the harvest is wasted, and this could have been saved by a better knowledge of exporter's requirements.

- Harvesting is uncontrolled, and a certain minimum of stock management needs to be practiced if reefs are to remain fishable in the long term. Harvesting should be rotated and follow areas or "breeding reserves" left alone.

- Inadequate processing of some exports has given a bad name to Fiji beche-de-mer exports as a whole.

- As stocks decline in some areas, "price-wars" may result with overseas buyers maintaining an artificially high price to drive local buyers out of business.

Mr. Shardhaa Nand has also stated that more information about international standard, processing procedure, quality control, etc. is required. SPC's activities in the formation the Special Interest Group (SIG) on beche-de-mer and the SPC Beche-de-mer Information Bulletin should help in this respect.

7) Eucheuma seaweed farming

The report prepared by Dr. Y. C. Shang, University of Hawaii, for FAO Fiji (A preliminary economic assessment of aquaculture development in Fiji - June 1989), in regard to the present status farming started.

"Seaweed farming in Fiji was initiated in 1984. It was started as a joint project between a New Zealand firm, Coast Biological, Inc., with support of Fiji Fisheries Division, in association with villagers in the coastal areas. From 1984 - 85, Coast Biological, Inc., ran a pilot project at Rakiraki and Verata. Results indicated that the project has potential for development. Pilot farms were then established. Coast Biological, Inc. set up the Fiji-based firm and provided extension and support for seaweed farmers as well as a market for produced seaweed. The number of seaweed farms and total area of production, as well as the quantity of production, were all increased significantly from 1986 to 1987 and then declined in 1987 as a result of the political instability (Table 3.10). A trade embargo was imposed by the New Zealand Government on exports from Fiji. During this period farmers were provided a "receipt" but not paid for their seaweed. When the trade embargc was lifted in late 1987, Coast Biological, Fiji, was able to export its accumulated stocks to New Zealand."

Table 3.10 Seaweed Production in Fiji, 1986 - 88

	Farms	Area(ha)	Production(kg)	Value(F$)
1986	158	15	188,053	73,542
1987	216	27	220,200	83,747
1988	260-35(a)	23-6(b)	60,000	21,000

(a): Number of farms declined from 260 at the beginning of the year to 35 by the end of the year.

(b): Area declined from 23 to 6 ha.

Source : Shang, Y, 1989 Preliminary Economic of Aquaculture Development in Fiji, FAO

"In June 1988, Coast Biological, Fiji, notified seaweed farmers and the Fiji Government that it would stop purchasing dried seaweed from Fiji due to the stronger NZ$ to US$, high freight cost, etc".

"From September 1988, the Fisheries Department directly handled the extension, buying, and selling of seaweed. Marketing is handled by the National Marketing Authority (NMA). Recently, a new market for dry seaweed has been found through a Philippine Company, a subsidery of Marine Colloid, which owns processing plants in Boston and Denmark. NMA purchases dry seaweed from the farmer paying F$350/ton and sells at F$450/ton, f.o.b. The first order from Marine Colloid was 100 tons, but NMA can only provide 50 tons at this time".

"The world price of dry seaweed is not stable. With the increase in seaweed production in many countries, the price may fall or fluctuate in the future", but Dr. Shang also stated that seaweed farming in Fiji would be profitable if the farm price is over F$0.28/kg", calculated by him based on his investigation. He went on to say that" the social-economic impact of seaweed farming on the income of coastal families would be significant".

Mr. s. Henderson, director/Manager of Seaweed South Pacific Ltd. (SSP), in Lautoka, stated that their seaweed culture activities (which have largely involved taking over coast biological activities) have just started but they have obtained favourable harvest in the recent season, suggesting future success. He has a development plan for Semi-refined Carrageenan (SRC) production in Fiji which he has completed and submitted to the New Zealand government for funding consideration.

SRC is alkali - treated seaweed which can be produced in a cheap and simple facility. Commonly, it is done in a concrete or wooden tank with plastic liners. Fresh seaweed is placed in the alkali solution at ambient temperature and is held for about three hours. After soaking, the plants are spread out under the sun and dried to a moisture content of less than 30%. The dried product is processed to chip or to flour, which is commonly called "SRC" flours.

SSP consider parchase of seaweed produced by other Pacific countries and their export. This would enable us to formulate some ideas for a project covering such Pacific island countries, where seaweed farming is on-going on and which face current price problems. SPC processing technique may also be applicable in other Pacific countries to assist their further development.

CHAPTER 4 POTENTIAL AREAS OF MARINE RESOURCE-BASED PRODUCTS IN THE PACIFIC ISLAND COUNTRIES

In the EEZ waters of the South Pacific islands countries, tuna is the most important and abundant resource. It has already been partly industrialized and gives favorable benefits to these countries in terms of access fees, foreign exchange, employment and a general positive impact on the local economy. Markets for the main product (canned tuna) exist in USA, Canada and the Western European countries. Two countries in the region, namely Solomon Islands and Fiji have established the tuna canning industries and currently NFC in FSM has started to organize a canning industry. In time they should be managing an integrated catching and canning operation, including worldwide marketing. They are attempting to operate this business by their own efforts.

During the field work in each island country, several common bottlenecks to industrialization for the countries were found. These are a wide variety of fish species to be harvested, small catches of each material, poor transportation for raw materials and finished products among islands/atolls (where industrial bases and material harvesting areas are located), insufficient facilities for immediate processing and lack of skilled officials, workers, etc. Allowing for improvement of these bottlenecks, the potential areas of the products for development are identified below.

4.1 Fresh chilled and frozen fish

With regard to this product, deep water snapper and grouper families should be highlighted as most important species living in outer reef slope around the island countries and the most marketable ones in the overseas market. The markets for these fishes are currently existing in Guam, Hawaii, US West Coast, Australia, New Zealand and Japan. They

are always receiving the supplies of fresh fishes in chilled, frozen and fillet forms.

1) Japan

Japanese people are fond of taking marine products very much (approx. 9.3 million tonnes annual consumption of edible marine products) and keen about quality (taste, texture, color and flavor, etc.) based on freshness with their eating habit cultured for the last long time. Fish import, distribution/marketing system and structure seems to be very complicated for the overseas exporters. However, it is reported that more than 35 percent of fish and fish products being handled at the Tokyo Central Wholesaler (Tsukiji) market have been imported and the Tsukiji market is now handling 804,095 (1988) tonnes annually. According to one of major primary wholesaler firms, chilled fishes are able to obtain higher price for whole fish (sometimes ¥4,000/kg) when the fish species is suitable to raw with eating (sashimi). Furthermore there are 54 central wholesaler markets located in 46 cities throughout Japan handling ¥3,124 billion per year in 1987. Especially Kagoshima and Okinawa markets have been very familiar to the fishes harvested in the Pacific Island countries. In December, 1989, Okinawa market is reported to deal some groupers at ¥2,500 to 3,000/kg and parrot fish at 1,600 to 1,800/kg. Sizable quantity of chilled fish handled under desirable quality assurance and control operation can be exported to the Japanese market. In this connection, frozen tuna (bigeye/yellowfin) export for the Japanese Sashimi market becoming a big business should be minded. Frozen bottom fish supplies much of the product for cooked fish dishes at the restaurant, institutional and consumer level. It obtains a lower price than chilled fish at an average price ¥350/kg for headed and gutted fish.

2) Hawaii

Hawaii has become a significant outlet for Pacific Islands fish. In 1987 fresh fish imports were realized in Hawaii from Pacific island countries such as Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Palau, Tonga and Vanuatu and totally 170 tonnes. Imports now account for 20 percent of the Hawaiian bottom fish market, and 80 per cent of these imports are come from the tropical Pacific.

Demand in the Hawaiian market has continued strongly for some years and, in light of current evolutions in the State fishery, the market is likely to remain in an under-supply situation in the short-term, at least. A number of factors, including attractive prices, availability of air shipment space, species familiarity, high per capita seafood consumption (twice the mainland level) and a relatively less extreme attitude to freshness (compared to Japan, for example) combine to make Hawaii by far the most attractive market for fresh Pacific Islands fish.

3) Australia

Pacific islands bottom fish is a white flesh table fish which has strong demand on the Australian market. The Australian fresh and frozen fish market is heavily reliant on imports to satisfy local demand with total imports steadily rising to be currently exceeding 65,000 tonnes or 55 to 60 per cent of total apparent annual fish consumption. Large increases have been recorded for both imported whole fish and frozen fish fillets.

With improved economic conditions and firming of meat prices, demand for table fish species like deep water snapper can be expected to increase. Prices for good quality whole fresh chilled and frozen white flesh fillets remain firm

especially on a spot basis when local supplies are low. This usually occurs in the first two months of each year.

An analysis of the various market segments and marketing channels suggests that regional suppliers should be advised initially to market its fish through the State Fish Auction Markets in Brisbane and Sydney. In addition to displaying and selling the products on the State Auction Markets. It is also advisable to conduct a promotion in Sydney. This can be done in association with the South Pacific Trade Commission and be targetes for a small number of selected reputable seafood restaurants to gauge possible buying interest and price levels. A more focused marketing strategy should only be considered after an evaluation of initial sales on the respective State Fish Auction Markets and from feedback received from the restaurant promotion in Sydney.

4) New Zealand

Auckland offers a significant market for Pacific islands fish to absorb currently available surplus production from the FFA member countries. There is also a potential market for tuna and other pelagic fishes. Margins are expected to be tight and supply will be influenced by returns elsewhere, principally the USA market. Possible prices which could be achieved selling at the wholesale level (i.e. to retailers direct) are given in Table 4.1. There are estimates only based on prices realized for similar New Zealand species.

The potential for exporting fresh skipjack and yellowfin appears promising. While large yellowfin (30 kg) can fetch high prices in Japan, the price for small fish is much less. However, small fish would be the preferred size for sale at the weekend markets in Auckland. When local companies decides to market purse seine caught skipjack within New Zealand in the fresh form, this weakens the market. On the other hand, the skipjack season in New Zealand lasts from December to March

only, leaving the rest of the year when fresh product would be unavailable, unless imported.

Table 4.1 Estimated prices per kg for chilled Pacific islands fish in the Auckland market (wholesale level)

Species	Form	NZ$	FJ$	WS$	T$	SI$
Snappers	whole	4.00	3.92	5.43	3.65	5.45
Breams	whole	4.00	3.92	5.43	3.65	5.45
Emperors	whole	4.00	3.92	5.43	3.65	5.45
Yellowfin	whole	3.00	2.94	4.07	2.74	4.09
Skipjack	whole	3.00	2.94	4.07	2.74	4.09
Snappers	H&G*	9.00	8.82	12.21	8.21	12.26
Groupers	H&G*	9.00	8.82	12.21	8.21	12.26
Dogfish	Trunked	6.00	5.88	8.14	8.21	5.47

* Wing off ("Wing" refers to the pectoral and ventral fins)
Exchange rates as at Feb 1988.

Source : "Marketing of marine Products from the South Pacific" published by the Institute of Pacific Studies of the University of the South Pacific : copyright Forum Fisheries Agency 1989.

4.2 Smoked reef fish

Smoked reef fish produced from small catches in most of the island countries can not expect to move in the export market and to make a great deal in some countries such as Marshall Island, Palau, Vanuatu and Cook Islands. Good operation of smoked fish production and sales on a small commercial basis and sometimes on a trial basis were observed in the field survey. Their results are favorable and intention for further expansion with having technical assistance is recognized. Generally Pacific island people are able to enjoy

smoked fish and catering consumption/souvenir outlet in the tourism industry in each country would be expected, therefore, the domestic market for those products will be established providing that quality products can be sold at reasonable prices.

However, it is noted that Fiji has exported about 8 tonnes of smoked fish (not specified species) to Australia, New Zealand and Hong Kong in 1988 and Solomon Island has also exported 330.5 tonnes of smoked tuna to Japan (where this product will specifically used for fish seasoning product, Katsuobushi manufacturing) in 1987 among 815,466 tonnes of the world smoked fish production 1987.

Smoked eel to be manufactured in Mitiaro Island of Cook Islands is considered as potential product for development. Now smoked eel world production in 1987 is 1,425 tonnes (FAO YEAR BOOK 1987). Large eels are not much consumed in Japan and consumption of smoked eel in Europe is likely to continue in downward trend, particularly in area where large eels are used. Mitiaro eel should be oriented to be sold for local market.

4.3 Shell meat

Shell meat have a potential market in Japan. The Japanese consumers take various shell meats edible in any forms - fresh, boiled salted, dried, frozen bottled, etc. Throughout Japan, Sushi shop chains and the Japanese restaurants who are commonly utilizing raw fish and shellfish have been expanding, so such material consumption by them have become in a great volume. The situation in shell meat utilization in Japan is similar to that of fish. Shell meat can be processed in various methods (drying, smoking, boiling, freezing and bottling) and consumed in each diversified field as raw material and/or finished products. This condition gives advantageous factor to the island countries in manufacturing operation of the marketable products meeting severe sanitary requirements for export to Japan.

There are various shell meats available in the countries where manufacturing conditions have been different among them. Then, at initial stage, the resource assessment of each species should be started and other work evaluating the manufacturing conditions follows in order to develop the Japanese market.

Table 4.2 Shell meat price in Japan

A) Shell meat prices in Okinawa

Shell meat	Product form	Unit price/kg ¥	US$	AT
Trochus	boiled	5,000	33.30	Retailer
Redlipped strombus	boiled	8,000	53.30	"
Turban snail	boiled	7,000	46.70	"
Giant clam	fresh	10,000	66.70	"

B) Processed shell meat product prices

Product	Form	Unit price/kg ¥	US$	AT
Turban snail in seasoning	Packed in retort pouch net. wt 45gr.	5,440	36.30	Department store in Tokyo
Giant clam in Brine	Packed in glass bottle net. wt 100gr.	5,000	33.30	Public market in Okinawa

Source : Market survey by OAFIC in January, 1990

Okinawa markets have known tropical shell meat very much and are willing to handle them.

Fresh water clam harvested in Fiji should also have a market in Japan. It will be valuable to find out the best form of the product made from this material for the market in Japan.

Recently Sushi/Sashimi eating trend have been moving all over the world because of favorable taste and healthy foods. Currently Sushi Bar could be found in famous large cities in the world such as New York, London and Paris. Therefore, shell meat will be able to participate in such outlet lines and to expect some potentiality in the world market. Attention should be paid on bottled small shell meat (Mussels and cockles) in brine made in UK on the shelf of super market in Port Vila Vanuatu. It cost VT505.- each (US$4.30). Bottled/retort pouched shell meat products should raise their potential in domestic market in each country.

4.4 Shells/Black corals

Shells are the international commodity item, then shells are commonly exported to the overseas market where they are processed to button blank, jewellery and ornamental products. The shell traders in the harvesting countries have already well known the existing market and are operating their own business in accordance with the international trade manners. However, they are usually considering to look for more profitable direction by own efforts or sometimes with the external technical assistance.

Value-added processing will be studied in this direction. For example, the shell traders will process raw shells to button blanks or button blank dealers will handle the finished buttons to be manufactured in the harvesting island countries. Actual trend in such direction has been observed during the field surveys. In the case of jewellery and ornamental processing, various products as souvenir and handicraft items are found in the shop, which can be improved to be sold at

higher price. At the domestic markets in the Pacific island countries, many imported shell souvenir and craft products are observed unfortunately. If they can increase a volume of the own products in various directions, small but some contribution to the national trade will be expected.

Trochus and pearl shells are considered as major materials to be used for button blank, while there are greensnail, redlipped strombus and other shells to be used as souvenir/craft and in-lay materials. Trade data of shells and buttons are not easily obtained. FFA export market report shows the recent prices of shells in trade in Table 4.3.

Table 4.3 Shell prices offered at Dec. 1989 to Jan. 1990.

(US$/kg)

	Papua New Guinea	Solomon Islands	Vanuatu	Fiji	Australia
	(FOB)	(Prices to Producers		)	(FOB)
Trochus	6.00- 8.00	4.80	6.00	7.00-8.00	4.70
Blacklip	7 00- 9.00	4.40	5.00-6.00	—	4.70
Greensnail	25.00-30.00	3.50-8.00	4.00	—	14.00

Source : FFA, 1990, FFA export market report, 1st quarter 1990

Note : Prices to producers are opening prices. Bulk deliveries or regular supplies can obtain prices higher.

In a technical survey by the Mission in May, 1990 at button processors in Nara-Pref. in Japan, where many button processing plants are being operated, following findings are obtained.

a) Processors are mostly using trochus shells for button manufacturing and the most of the processed product (buttons) are shipped to Hong Kong. They would feel that

Hong Kong is now dominating the button market in the Pacific area.

b) Regarding trochus, they prefer material of 6 - 9 cm in diameter and they said they would like to use raw shells which are not boiled for meat extraction and give better quality product. The purchasing prices of trochus have been increased almost double during 1989 - 1990 and the current prices are shown in Table 4.4. They added that trochus shells harvested in Cook Island, Tahiti and New Caledonia have not been in good price range compared with others. They pointed out especially undesirable quality of trochus from Cook island causing lower pricing. That are : 1) difficulty to make a shine surface, 2) thickness of salt layer, 3) brittle nature of shell, and 4) lower production yield of buttons.

Table 4.4 Trochus prices delivered at Processors Plant in Nara-Pref. Japan. (¥ and US$/kg)

	Ex-rat : 150/$	
Export country	¥	US$
Fiji	1,300	8.70
Solomon Islands	1,400	9.30
Papua New Guinea	1,400	9.30
Cook Islands	900	6.00
Tahiti	900	6.00
New Caledonia	900-1,100	6.00-7.30
Palau	1,200	8.00

Source : Technical survey by OAFIC in May, 1990

Table 4.5 Blacklip prices delivered at Processors plant in Nara-Pref, Japan. (¥ and US$/kg)

Ex-rat : 150/$

Export country	¥	US$	
Solomon Islands	1,200	8.00	
Fiji	1,700	11.30	
Tahiti	2,000	13.30	(natural)
Tahiti	1,600	10.70	(natural)
Cook	1,800	12.00	

Source : Technical survey by OAFIC in May, 1990

Note : The above prices for the first class quality shells. The second class shells can obtain only half of the prices for the first.
Solomon's shell does not give good quality. Tahitian blacklips are showing preferable colors. Blacklips from Manihiki of Cook shows good quality with thick shell but that from Penrhyn of Cook are not good quality.

Black coral resources have been identified in the water of most island countries of the South Pacific and the mission considers some opportunities of expansion in the international black coral market for the Kingdom of Tonga, where a select number of diver - craftsmen harvested and carved black coral for some years and it is confirmed that private firms in the Kingdom are willing to expand own black coral business in the world competition during our survey.

With respect to prices based on the FFA's marketing book, black coral sells at between US$2 and $25 per kg for seasoned and trimmed pieces. The lower prices are for poor grade whip coral (US$2 to 10/kg), going up to some US$25 or more per kg for large carving coral. All prices are by negotiation, and while prices for exported Filipino coral might be expected to be stable, shipments of between 3 tonnes and 9 tonnes can rapidly flood the processing sector and produce a weak market.

4.5 Eucheuma Seaweed/Seaweed flour

The price of Eucheuma seaweed may fall or fluctuate in the future and nobody estimate reliable trend in the international marketing of this product. Following statement by Dr. D.J. McHugh for "Seaweed Workshop" held in FAO Suva in 1989, shows current market situation.

- "A survey of some of the major seaweed buyers in October 1989 showed that a dramatic reversal of the situation has occurred. Demand now exceeds the supply and the resulting shortage has led to a c.f. price, Europe, of US$700 per tone, double that of mid-1987. By mid-November the price in Indonesia had risen to US$800 but there were few buyers at this price. The shortage of Eucheuma has occurred chiefly because of two factors, first a leveling off of production in the Philippines in 1988-89 (Table 4.6) and second, an increase in demand from carageenan manufacturers (Table 4.7)".

Table 4.6 Eucheuma cottonii production, demand and price

(tonnes)

	Actual			Predicted	
	1987	1988	1989	1990	1991
Production					
Philippines	40,000	50,000	50,000	55,000	60,000
Indonesia	5,000	5,000	8,000	12,000	15,000
Other	250	250	350	500	700
World Production	42,250	55,250	58,350	67,500	75,700
World Demand	46,000	60,000	70,000	80,000	90,000
Price US$					
c.f.Europe	380	620	720	800	800
c.f.USA	440	680	780	870	870

Source : McHugh, D, 1989 Prospects for Eucheuma Marketing in the World and the Future of Seaweed Farming in the Pacific

- "Seaweed flour (formerly called semi-refined carrageenan) is also produced from Eucheuma and its production, demand and price are shown in Table 4.7. Production should continue to match demand, and demand is unlikely to increase very much unless new applications are found. The principal application is in the manufacture of canned petfoods and this market is dominated by one organization. The price has remained the same for the past two years and some producers are believed to be selling at a loss. As contracts are renewed it seems inevitable that some price rise must occur to compensate for the increased price of seaweed".

Table 4.7 Carrageenan and Seaweed flcur production and demand

(tonnes)

	Actual			Predicted	
	1987	1988	1989	1990	1991
Carrageenan					
World production		16,000	17,000	20,000	22,000
World demand			20,000	22,000	25,000
Seaweed Flour					
World production	5,800	6,300	7,000	7,500	7,500
World demand	5,800	6,300	7,000	7,500	7,500
Price, US$ (per tonne)	3,000	3,200	3,200	3,400	3,600

Source : McHugh, D, 1989, Prospects for Eucheuma Marketing in the World and the Future of Seaweed Farming in the Pacific

Considering the above market environment in the world, semi-refined carrageenan (SRC) is recommended for further development.

4.6 Sponge

According to the project evaluation report prepared by Australian Planning and Training Associates PTY. LTD., potentiality of this product is stated as follows.

"Sponges are used as luxury cosmetic items in developed countries, principally Japan, Europe and the USA. Difficulties with harvesting from the traditional areas has led to a worldwide shortage and the product is currently in strong demand. Good quality, prepared sponges of 5 inches overall dimension fetch approximately $1.00 each, wholesale, delivered".

As an export product, sponges are ideal in respect of the fact that they have restricted post-harvest processing, can be stored cheaply prior to shipment and have a high value per unit weight.

To what extent Pacific sponges, and FSM-cultivated sponges in particular, meet market requirements and what price they might fetch has not yet been finally determined, but the potential for successful marketing of FSM cultured sponges is positive.

Other papers (Sponge : World Production and Market by H. Josupeit Rome March 1989) said that the recent disease in the Mediterranean has created a substantial shortage in supply which is felt in European countries, while supplies seem to be sufficient in the USA and in Japan. In Europe, the boom of natural products increased the usage of marine sponge especially as bath sponges. The present light supply combined with strong demand created some market disturbance.

In addition, FSM sponge is still requiring to improve a sponge material cleaning method and practice. The completely cleaned sponges should have a potential market together with higher price. Technical assistance will be useful in this procedure.

4.7 Sea cucumber (beche-de-mer)

SPC, FFA and FAO have been assisting and promoting this industry being operated in fishing villages of the most of Pacific island countries for the last long time and are still continuing such activities in manufacturing and also in marketing areas. The following is a part of description on the dried sea cucumber market by INFOFISH (International 6/88).

"Sea cucumber is widely consumed in restaurants and at home by the Chinese in Southeast Asia. The product is mostly imported in dried form. The major markets for this product continue to be Hong Kong, Singapore and Malaysia, each of which will be dealt with here. Currently, People's Republic of China is drawing supplies largely from its own domestic production".

"While the markets are concentrated in Asia, countries where Chinese communities live also reflect significant market activity. USA, for example, supports quite a large Chinese population, and it is, therefore, not surprising to find US companies buying dried sea cucumber. Although this market is limited, it does nonetheless severe as a small outlet for such product".

"Hong Kong is the major market for dried cucumber, drawing supplies from Indonesia and the Philippines. The export volumes of Pacific island countries notably Solomon Islands, Papua New Guinea and Fiji to Hong Kong have also increased considerably. Table 4.8 shows such trends. Hong Kong is also the major re-exporter of this product and People's Republic of China has recently become the major out let as shown Table 4.9. Singapore and Malaysia are the markets for the product, but their import volume have been smaller compared with that of Hong Kong (Table 4.10).

Table 4.8

Imports of dried sea cucumber into Hong Kong (in tonnes/in HK$)

	1984		1985		1986		1987		1988	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Indonesia	1,052.0	12,951,240	243.9	23,767,117	2,472.0	34,157,909	2,173.3	37,281,617	438.2	9,227,449
The Philippines	1,370.0	10,690,630	2,954.0	32,003,078	1,560.4	21,036,574	1,934.0	21,060,374	247.3	3,086,716
Japan	17.0	4,808,634	21.0	6,272,827	67.7	16,745,928	55.0	14,947,251	6.3	1,797,485
Rep of Korea	3.0	3,470,047	26.0	3,842,726	15.1	2,663,660	26.0	5,312,568	0.3	69,397
Sri Lanka	—	—	1.4	145,351	53.5	4,330,572	30.0	3,082,224	3.7	166,440
Singapore	77.0	4,692,788	308.2	10,927,118	301.3	11,937,707	399.0	17,719,205	105.5	5,704,105
India	—	—	—	—	3.4	100,776	12.4	517,050	—	—
Africa	16.0	884,663	30.8	878,022	53.1	914,760	44.2	1,963,000	2.5	165,110
Oceania	79.0	3,332,565	13.1	481,160	60.2	2,360,984	38.0	1,658,129	6.0	149,299
Taiwan PC	3.0	215,300	15.1	989,698	44.4	1,276,774	7.0	245,560	21.0	874,420
PR China	15.0	301,556	108.2	1,472,753	122.0	734,165	269.0	4,294,253	4.0	49,825
Macau	0.4	62,175	3.3	160,062	13.4	515,933	2.7	446,775	0.2	33,700
Vietnam	22.0	402,666	1.0	6,150	0.7	11,384	7.6	136,000	—	—
Maldives	0	—	—	—	—	—	0.5	57,972	—	—
Solomon Is	35.0	2,743,516	24.8	1,219,011	96.0	4,425,646	105.5	2,877,065	15.4	740,064
Fiji	22.0	809,380	56.7	1,353,197	155.7	4,153,030	547.3	11,176,119	164.5	3, 18,747
PNG	1.0	70,000	4.4	165,356	17.2	975,637	60.0	2,384,379	72.4	2, 03,582
Others	192.6	5,121,918	2,397.1	6,147,126	157.9	4,606,392	184.6	6,660,364	37.7	1, 83,960
Total	2,905.0	50,557,078	6,209.0	89,831,752	5,194.0	110,947,831	5,896.1	131,820,505	1,125.0	29, 79,299

Source : INFOFISH International 6/88.

Table 4.9

Re-export of dried sea-cucumber from Hong Kong (in tonnes /in HK$)

	1984		1985		1986		1987		1988	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
USA	59.7	6,108,221	38.2	3,554,606	70.1	5,878,584	48.5	4,655,388	10.7	1,248,819
Canada	5.1	337,496	10.0	584.961	28.2	1,158,321	13.2	846,496	1.0	54,343
France	0.2	18,720	0.2	18,150	0.3	27,990	0.9	25,207	---	---
UK	3.0	197,947	2.0	229,375	3.3	192,264	2.0	239,680	0.4	60,223
Taiwan PC	180.8	6,076,461	280.0	9,815,360	296.0	9,432,468	413.4	10,978,762	120.1	3,451,511
Rep of Korea	387.4	6,262,123	24.1	431,376	13.0	255,372	---	---	---	---
Thailand	2.8	322,339	2.2	234,558	1.6	140,156	1.2	101,196	---	---
Japan	1.3	138,049	3.8	199,933	0.2	12,875	16.0	1,219,617	0.6	174,485
China	1,642.0	14,732,777	4,531.3	51,239,780	3,917.0	32,195,762	4,319.0	28,811,323	852.0	6,081,729
Malaysia	1.5	48,080	0.6	18,500	1.8	150,378	1.5	68,028	4.5	320,421
Singapore	104.0	7,632,490	92.1	6,018,967	151.5	8,550,777	103.3	7,364,043	25.4	2,047,947
Australia	4.0	418,100	4.4	398,913	4.8	403,863	3.2	333,097	0.3	24,397
Others	14.2	386,057	19.1	715,459	47.6	1,423,368	52.8	836,392	3.4	109,404
Total	2,405.0	42,678,860	6,209.0	73,459,938	4,535.2	59,822,178	4,975.0	55,479,229	1,018.4	13,973,279

Source : INFOFISH International 6/89.

Table 4.10 Comparison of Dried sea cucumber import in Hong Kong, Singapore and Malaysia

(metric tons)

	1983	1984	1985	1986
Hong Kong	2,125	2,905	6,209	5,194
Singapore	533	590	...	...
Malaysia	1,083	844	329	444

Source : INFOFISH International 6/88.

Beche-de-mer production in the Pacific countries should bring advantages to the fishermen's communities. Further technical assistance to improve product quality and to provide the marketing information must be still needed.

4.8 Shark

Shark fin is the most famous Chinese delicacy dishes in various manners and an important export product from Solomon Island and Fiji. There are already the existing market and the product is being handled internationally.

Table 4.11 Production of Shark fins, dried unsalted

(metric tons)

	1984	1985	1986	1987
Fiji	8	11	10	6
Solomon Island	...	...	...	4
World Total	164	133	88	123

Source : FAO YEAR BOOK 1987

Shark meat, provided that it is properly handled after catch, compares favorably with other highly - priced finfish species (M. Horn/F de Boer INFOFISH MARKETING DIGEST NO.3186). Actually Table 4.12 shows the world production, therefore shark meat utilization in the Pacific island countries can be considered to establish such business and also to promote the fishermen village development.

Table 4.12 Production of shark fillets, frozen
(metric tons)

	1984	1985	1986	1987
Chile	--	1	2	1
Denmark	269	30	4	4
New Zealand	145	72	51	46
South Africa	15	--	--	--
USA	3,144	2,398	1,112	703
Urguay	624	36	10	33
TOTAL	4,197	2,537	1,179	787

Source : FAO, 1987, FAO Year Book fisheries Statistics Commodities, Vol. 65

Apart from meat and fins, the Shark offers another product, which can become a money earner (L.G.Limps INFOFISH MARKETING DIGEST NO. 2/87) and Mr. Limps continued that there is, nonetheless, a keen demand for skins, but the market is highly quality conscious, making it necessary, therefore, for producers to exercise the greatest care in turning out the right product. This is essential as pricing depends on quality raw material that can best meet the requirements of the end-products.

The special feature of sharks is the surface of the skin known as "shagreen". The product originally derived from shark skin is this shagreen. This is a rough leather with denticles left embedded in the skin, used for rasping and polishing.

Removal of the dermal denticles allows the hide to be utilized as a "fancy" leather for shoes and small goods such as wallets, dress belts, handbags and purses or a "shrunken grain" type of leather. Boroso-leather or rousette is a rare and expensive product where the denticles are not removed but polished to a high gloss.

This type of processing has basic potentiality for development together with fish skin utilization and to approach the world leather market. Anyway it would be a first purpose that well-preserved quality material skin should be prepared and sold for the international leather processors.

4.9 Pearls

Cultured pearl production in Cook Islands should be transferred to other Pacific island countries having such resources and interesting in cultured pearl business.

Black pearls are produced naturally only from the blacklip pearl oyster. Because of their rarity and colouration top prices are attained for good quality black pearls. Cultured black pearls are also much sought after. The average price for round pearls is about US$100. Half-pearls or "blister-pearls" are also marketed and are used in pendants brooches and rings. The average price for blister-pearls is around US$10.- per piece. (N.A. Sims Cook Islands fisheries Resources Profile No.2 Ministry of Marine Resources).

The cultured pearls world market has completely matured, but the market will be still able to receive the cultured pearls if such pearls are made in favorable quality and supplied at reasonable price.

CHAPTER 5 EXTERNAL ASSISTANCE

Various kinds of external assistance have been conducted in the Pacific islands countries from short-term technical assistance base to turn-key project implementation. Recent project-based assistance in the selected countries is listed in Annex 6. Table 5.1 shows both the number of listed fisheries/marine resource-based projects and post-harvest projects. The latter have relationship with the development of marine resource-based industries.

Table 5.1 Recent Project based external assistance in the South Pacific

Country	No. of Projects	No. of executed Post-harvest Tech. Asst. Projects	On-going/ Approved	Proposed
Marshall Islands	13	0	1	
FSM				
National	20	4	4	16
Kosrae State	13	3	3	10
Pohnpei State	17	5	2	15
Chuuk State	17	4	6	11
Yap State	25	6	2	23
Palau	27	2	2	25
Vanuatu	38	7	22	16
Solomon Islands	37	5	28	9
Tonga	3	0	3	0
Cook Islands	16	1	9	7
Fiji	59	5	-	-
Total	285	42	82	132

Source : Prepared based on Joint Fisheries Strategy Mission report for Opportunity for Fisheries Development Assistance in the South Pacific (Volume II), FFA, SPC, UNDP, FAO, USAID and BDDP

CHAPTER 6 PROJECT IDENTIFIED AND FORMULATED

Based on both the field surveys and field discussions with fisheries staff in the eight selected South Pacific island countries on projects for assistance in the development of marine resource-based industries, some 25 separate projects were identified. They have been formulated in accordance with specific conditions in each island country. Though they have some products and market conditions in common, it was considered better to work up the specific projects formulated for each country separately. One project in common in all countries has been formulated as a regional project. It should be born in mind that there are very few people who are well qualified and have practiced experience in fish processing plus have experience in business establishment in the field of marine resources. It is considered that each project should be able to educate persons (trainees/counterparts) both in the essential theory and practice. These trained persons should participate in the project at a practical level in the island countries and achieve valuable practical commercial business oriented results.

The following lists the number of projects formulated by country.

Marshall Islands	2	Vanuatu	4
F.S.M.	3	Tonga	3
Palau	2	Cook Islands	2
Solomon Islands	5	Fiji	3

In total 24 projects, with between 2 - 5 per country, have been formulated as presented in the project documents (Annex 1). They are summarized in the PROJECT/COUNTRY MATRIX (Table 6.1).

It should be noted that some projects, such as projects No.23 and No.24 for Fiji will be undertaken in other island countries other than Fiji.

As one project is a common project covering most of the Pacific island countries, project No.25 "Integrated Development Centre for Shell and Shell Meat Processing in he South Pacific Island Countries" has been identified and formulated.

In considering the comprehensive project implementation for the South Pacific island countries, it is suggested that the integrated project management office for the development of marine resource-based industry in the South Pacific region will be based in Fiji. The office staff will consist of a project manager and a few experts covering each field, and the office is operated under the organic/effective schedules and action programmes. This system will be very similar to the two regional FAO projects in the Fishery and Aquaculture fields, and UNIDO will be able to manage this kind of organization in local post-harvest technology field with their experiences and support capability.

However, UNIDO has only recently participated in the fisheries industry sector in the South Pacific region, and as a result it does not have sufficient knowledge and information on this region. Consequently it is essential to maintain a good relationship and smooth communication with the international organizations in the region such as FAO, FFA and SPC. Occasionally, a joint project of UNIDO/other organizations should be formulated to achieve the best results for the region.

Table 6.1 PROJECT/COUNTRY MATRIX

	THE REPUBLIC OF THE MARSHALL ISLANDS	THE FEDERATED STATES OF MICRONESIA	THE REPUBLIC OF PALAU	SOLOMON ISLANDS	THE REPUBLIC OF VANUATU	KINGDOM OF TONGA	THE COOK ISLANDS	FIJI
SMOKED FISH PROCESSING (TUNA JERKY)	NO. 1	(Y) ○	NO. 6	EEL ○	NO. 14	NO. 19	EEL NO. 20	TUNA JERKEY ○
SHELL MEAT PROCESSING	NO. 2	(P) (K) ○	NO. 7	NO. 8				FRESH WATER CLAM NO. 22
SHELL PROCESSING		(K) NO. 3		NO. 12	NO. 16	BLACK CORAL NO. 18	NO. 21	
FRESH FISH (CHILLED) HANDLING FOR EXPORT (OA/OC)		(C) NO. 4		○		○		
SEAWEED PROCESSING		○		○		○		SEAWEED FLOUR NO. 23
SPONGE PROCESSING		(P) NO. 5						
SHARK PROCESSING		(C) ○	○	NO. 10	NO. 15			
BECHE-DE-MER PROCESSING	○	(C) ○		NO. 9	○	FERMENTED PRODUCT NO. 17	○	NO. 24
PEARL CULTURE INDUSTRY	○			NO. 11				
SPECIAL PROJECT					REACTIVATION OF SPFC FACILITIES NO. 13			DEVELOPMENT CENTRE FOR SHELL MEAT NO 25

NOTE : □ : Formulated project and its identify number
○ : Potential project

(Y) : Yap State , (C) : Chuuk State
(K) : Kosnae State , (P) : Pohpei State

CHAPTER 7 CONCLUSIONS AND RECOMMENDATIONS

1. Two approaches to project identification and formulation have been considered. One is to formulate some sizable projects covering common problems and subjects for several countries, and another is to formulate country base project based on specific factors existing in each country. It was decided to proceed with the latter approach in which the interests and level of activity in each country (government) provides the basis for project execution.

2. The results of the project identification and formulation process worked out according to the above mentioned approach are summarized in the PROJECT/COUNTRY MATRIX (Table 6.1). This table indicates a relationship among project themes and countries. In addition, one project (No.25) has been formulated as a regional project.

Recommendable priority of the proposed projects in each country is as follows.

(priority in order)

Country	Number of project
Marshall	No.1, No.2
FSM	Three projects have the same priority
Palau	No.6, No.7
Solomon	No.8, No.9, No.10, No.12, No.11
Vanuatu	No.13, No.16, No.14, No.15
Tonga	No.19, No.17, No.18
Cook	No.21, No.20
Fiji	No.24, No.23, No.22

3. Project formulation must always consider the resource situation and environmental pollution issues. From the resources standpoint, resource survey/stock assessment on the materials to be used for the industrialization has been added

into project formulation where necessary. Project or business planning in marine resource-based industry should be established on foundation for ensuring the current resources. The stock management should be essential for the marine resources industrialization.

Concerning environmental protection, marine product processing are always having dangerous factors, if it is not provided a suitable counter measure. For example, a fish processing, plant cleaning and other operations discharge a lot of waste water, which will sometimes indicate high degree of BOD (Biological Oxygen Demand) value. Smoked fish processing will require smoking material which are mainly wood chips and/or wood itself. When these smoking materials will be supplied from the surrounding forest (e.g. mangrove) of the processing place, the manufactures should consider the protection measure in the future. These factors are carefully studied in the course of project implementation.

4. Human resources are also very important subject on both sides of management and operation. As capable persons are required for project implementation, most of the formulated projects contain training activities. Necessary measures are recommended to be taken for keeping the effect of these training activities. Those measures should include establishment of technical communication from in-the-office level to the Pacific regional level.

5. Many of international organizations and the regional organizations such as FAO, SPC and FFA have been working and experienced in assistance for fisheries industries to the Pacific island countries for the last long time and doing the same at this moment. Therefore, the close contact and frequent communication with these organizations are absolutely required in order to carry out the project smoothly. Then, unique activity based on the characteristic of UNIDO can be

effectively materialized in this field in this region. Especially, strong collaboration with FAO is required for trochus projects (No.3, No.12, No.21), beche-de-mer projects (No.9, No.24) and some individual projects (No.4, No.5, No.11). Handicraft development projects (No.8, No.10, No.15, No.16, No.18) are recommended to be implemented in cooperation with ILO (International Labor Organization). Regional project No.25 is recommended to be implemented with SPC, which is now planning to establish a regional post-harvest fisheries facility in the Pacific.

6. All country base projects are recommended to be implemented under UNIDO technical assistance budget. Some big budget projects are recommended to be carried out with budgetary assistance with other organizations such as SPC for No.25 project. No.11 project is suitable to be listed up for UNIDO Investment Promotion Service activities. Assistance from Overseas Fisheries Cooperation Fund, Japan can be expected for No.4 project in Chuuk State. Assistance from Japan External Trade Organization (JETRO), Japan may be expected for handicraft development projects.

7. The UNIDO field representatives in the region are very characteristic and capable. Though they sometimes engage in other fields than marine resource-based industry, they should play important roles in execution of UNIDO projects formulated for the marine resources industry. This effective network will be able to strongly assist the project in execution directing to the successful end.

Annex 1

PROJECT DOCUMENTS (No.1)

Title : Improvement of Smoked and Dried Product Processing

Country : Marshall Islands

1. Background

Smoked fish products in Marshall Islands have been manufactured in one of the Ailinglaplap Atolls and are sold in the Supermarket in Majuro. The inhabitants of the atoll produce smoked fish under guidance of the US Peace Corps volunteer and the Government assistance aiming at social development in rural fisherman villages and also at income increase for the inhabitants.

Their production and sales trials in 1989 obtained favorable results in product quality subsequently in the sales, which shows there is a seed for small scale industrialization. Further technical assistance is required in order to expand these potential activities. Reef fish are currently used, but pelagic fish and shellfish are recommended to be used in the next stage. These activities can be expanded to other atolls.

2. Project objective

The objective of the project is to improve the current fish smoking techniques and packaging procedures, and to produce samples from various marine fish and shellfish available there. Appropriate business scale and operation schemes as village industry should be investigated.

3. Project outputs

Output 1 : Manual for smoked fish/shellfish processing applicable to the local conditions

Output 2 : Instruction note for product and quality control and domestic marketing

Output 3 : Samples of products from various marine fish and shellfish to be produced and marketed domestically

Output 4 : Modification plans for the existing smoking devices suitable for local operation

Output 5 : A report on potential products with results of products and test marketed

Output 6 : One person trained in production and planning

Output 7 : One person trained in quality control on products

4. Activities (6 M.M.)

- Investigation of the current processing procedures together with raw materials for smoked product processing and marketing.

- Actual production trials from various fish and shellfish and modification on the existing smoking device using materials obtained locally.

- Marketing survey in Majuro and other atolls such as Kwajalein atoll on products of the trials.

- Compilation of the production manual and instruction note for product safety and quality control.

- Analysis of the production cost and benefit and business scale suitable for Marshall Islands.

- Training one person in production and planning.

- Training one person in and quality control on products.

- On the job training for the above two person will be conducted together with one month concentrated training.

5. Inputs

5.1 Government inputs

- One counterpart
- Two trainees
- Smoking devices, raw material, sub material and energy costs
- Local transportation, secretarial and logistic support for the expert, including a suitable working place

5.2 UNIDO inputs

Expert in fish smoking practice and technology with marketing experiences (6 M.M.)	US$60,000.-
- Equipment	
Raw fish storing device (Freezer box)	US$ 5,000.-
Training aid (Text books and PH meter & Salino meter,etc.)	US$ 2,000.-
- Miscellaneous	
Printing manual, instruction note, report,etc.	US$ 5,000.-
Total	US$72,000.-

PROJECT DOCUMENT (No.2)

Title : Development of Shell Meat Processing

Country : Marshall Islands

1. Background

Processed shell meat products such as salted giant clam meat, the same brine packed in used bottle are being sold at retailer shops in Majuro and redlipped strombus meat is also sold in the same manner. The production scale is extremely small as family unit manufacturing and technical level is very primitive. However, it is confirmed that there are such resources and domestic market in this country, although volume of material supply and market potentiality could not be assured.

Therefore, the small scale industry of the shell meat can be established if the basic conditions for shell meat processing can be provided based on assurance of resources under technical assistance.

The better processed shell meat products (bottled, retort - pouched) will be manufactured for market expansion and will be able to aim at overseas market in the future.

2. Project objective

The objective of the project is to carry out a stock assessment of shellfish such as giant clam and redlipped strombus to be used for meat processing and to start up experimental scale production. The assistance in training counterparts should also be included.

3. Project outputs

Output 1 : A report on shellfish resource assessment for production planning.

Output 2 : Samples of products to be produced and test marketed domestically and for export.

Output 3 : A report on potential products and markets with results of processing demonstration, including quality assurance, quality control and product storage operation based on the local conditions.

Output 4 : One person trained in production and planning

Output 5 : One person trained in quality control.

4. Activities (8 M.M.)

- Execution of stock assessment survey for shellfish to be used for processing by the marine resources assessment expert with cooperation of the local counterparts who knows the potential areas. (3 M.M.)

- Preparation for starting up production trial and actual production tests using materials available by an expert of shellfish processing and technology together with the local counterpart (3 M.M.)

- Marketing survey on the test products not only in Majuro but also in other (1 M.M.)

- Test marketing of the products for potential export markets (including domestic tourists)

- Analysis of the production equipment required, production costs and benefits, appropriate business size based on the situations in Marshall Islands.

- Training one person in production and planning.

- Training one person on quality control.

5. Inputs

5.1 Government inputs

- Two counterparts in resource assessment and product processing

- Two trainees

- Raw materials, sub-materials and energy costs

- Local transportation secretarial and logistic support for the experts, including a suitable working place

5.2 UNIDO inputs

- Experts

  * Expert in marine resource assessment especially for shellfish (3 M.M.) US$30,000.-

  * Expert in shellfish processing practice and technology with marketing experiences (5 M.M.) US$50,000.-

- Equipment

  * Sealing capping and sterilizing equipment US$ 3,000.-

* Packaging materials for trial production (bottle/retort-pouch)	US$ 3,000.-
* Training aid (measuring devices)	US$ 2,000.-
- Miscellaneous	
* Printing manual, and report etc.	US$ 5,000.-
Total	US$93,000.-

PROJECT DOCUMENT (No.3)

Title : Development of Shell Processing (Button Blank)

Country : FSM ; Kosrae and Yap States

1. Background

Private company (AHPW Inc.) is now operating a well equipped trochus shell processing plant in Pohnpei State with raw material supplied from states of FSM. The FSM National and States Governments are proceeding with shell culture projects and the Kosrae and Yap States are intending to produce a value-added product such as button blanks using the material shells harvested in their own areas. With establishment of button blank manufacturing facilities and improvement of processing procedures, each of Kosrae and Yap State will be able to start the production of value added exportable product other than raw shell supply. This will be affecting favorably to the life of village people in the harvesting areas.

2. Project objective

The objective of the project is to assist development activities to establish button processing facilities in Kosrae and Yap States under the FSM National and States Governments projects and to train workers in operation of button blank processing machine (button blank cutter).

3. Project outputs (in each Site)

Output 1 : Lay out of simple button blank production line and the sample products

Output 2 : One person trained in production (incl. cutting out the blanks)

Output 3 : One person trained in quality inspection

Output 4 : A report covering production process, cost and benefit analysis, quality inspection, overseas marketing, and the appropriate business scale based on the results and the local situations.

4. Activities (3 M.M. in each State)

- Viability assessment on the button blank processing in the FSM area

- Laying out of simple production line and trial production with cooperation of the local counterpart (2.0 M.M.)

- Training one person in production and quality inspection (0.5 M.M.)

- Compilation of a report and manual for button blank processing (0.5 M.M.)

5. Inputs

5.1 Government inputs (in each State)

- One counterpart in shell processing
- Two trainees
- Button blank processing facility with one button blank cutter
- Raw materials and energy costs
- Local transportation, secretarial and logistic support for the expert, including a working place

5.2 UNIDO inputs (in each State)

- Expert in shell button processing having knowledge of overseas marketing of the products (3 M.M.)	US$30,000.-
- Equipment Training aid (measuring devices)	US$ 2,000.-
- Miscellaneous Printing manual and report etc.	US$ 1,500.-
Total (in each State)	US$33,500.-
Grand Total	US$67,000.-

PROJECT DOCUMENT (No.4)

Title : Improvement of Chilled Fish Production

Country : FSM ; Chuuk State

1. Background

Modern cold storage facilities (Fisheries Complex) at Dublon in the Chuuk State have recently received various good fresh fish such as red snapper, parrot fish, seabass, etc. because of desirable handling after catch on board the fishing vessel, but fish handling after landing at the Fisheries Complex is not standardized and often a wrong operation for fish handling has been carried out in the cold storage. When these fish handling procedures are improved, the domestic market will be able to utilize better quality fish and the export market should be accepting such chilled and/or frozen fish from this country.

2. Project objective

The objective of this project is to improve fresh fish handling procedures and to establish chilled/frozen fish processing standards aiming at the domestic and export markets.

3. Project outputs

Output 1 : Fresh fish handling manual and chilled/frozen fish processing standards based on the local situations of Chuuk State.

Output 2 : Manual for quality assurance and control including freshness test and sanitary examination.

Output 3 : One person trained in fresh fish handling and chilled/frozen fish processing.

Output 4 : One person trained in quality assurance and control practice.

Output 5 : A report on marketing viability of the products, analysis of cost and benefit based on appropriate business scale designed for Chuuk State.

4. Activities (4 M.M.)

- Investigation on the current fish handling situations and designing an operation plan of the Fisheries Complex with cooperation of the local counterpart (1.0 M.M.).

- Business viability study on the products to be produced.

- Training one person in fresh fish handling and chilled/frozen fish processing (0.5 M).

- Training one person in quality assurance and control practice with using inspection apparatus (1.0 M.M.).

- Test marketing of the products domestically (0.5 M.M.).

- Compilation of the report and manual including the export market information to date (1.0 M.M.).

5. Inputs

5.1 Government inputs

- One counterpart in fresh fish handling and chilled/frozen fish processing
- Two trainees
- Processing facilities, fish inspection room for training
- Raw material, energy costs, products transportation and shipping charges
- Local transportation, secretarial and logistic support for the expert, including a working place

5.2 UNIDO inputs

- Expert in fresh fish handling and chilled/frozen fish processing with knowledge of overseas markets and transportation practice (4 M.M.) US$40,000.-

- Equipment
  * Freshness inspection equipment and other testing devices for quality assurance/control US$10,000.-

  * Training aids (Text book etc.) US$ 1,000.-

- Miscellaneous
  * Printing manual and report etc. US$ 5,000.-

Total US$56,000.-

PROJECT DOCUMENT (No.5)

Title : Establishment of Cultured Sponge Processing

Country : FSM ; Pohnpei States

1. Background

Natural sponges have been used for cosmetic and household purpose for the past long time. Though natural marine sponge producing countries are Tunisia, Greek, Turkey and the Philippines, the recent environmental problems in the Mediterranean have resulted in a supply shortage of the products mainly in European markets. Natural sponge is resistant to acids, chemicals and heat, furthermore it is more absorben, tougher, softer and easier to clean than artificial sponge. It is recently stated that natural sponge is used for the space industry for shock absorption.

In 1985 one private investor started a test culture of sponge which is now becoming in success for growing commercial size sponge in the Pohnpei State. The species cultured is Spongia officinalis and takes two years from seeding to harvest. The survival rate is about 90%.

The sponge farm in Pohnpei has not harvested its product yet and is now facing problems of material sponge cleaning. The completely cleaned sponges should have a potential market and obtained higher price.

2. Project objective

The objective of the project is to improve the current sponge processing mainly of cleaning process and to provide the updated information of the world sponge market.

3. Project outputs

Output 1 : Manual for processing cleaned cultured sponge international market.

Output 2 : Two persons trained in cleaning method of cultured sponge and bleaching method of cleaned sponge.

Output 3 : Commercial samples to be evaluated in the international market and a report on test marketing.

Output 4 : A report on potential products, analysis of costs and benefits, appropriate business plan based on the suitable size for Phonpei state.

4. Activities (3 M.M.)

- Investigation on the current situations of cultured sponge processing and carrying out trials of processing sponge including suitable cleaning method with cooperation of the local counterpart.

- Training two persons in the cleaning and bleaching process with a cleaning equipment.

- Preparation of commercial samples to be used in test marketing for expert.

- Compilation of report and manual including plant layout covering all operation stages and the future production and marketing plan.

5. Inputs

5.1 Government inputs

- One counterpart in sponge processing and plant operation
- Two trainees
- Sponge processing factory with general sponge processing facilities
- Raw materials, energy costs and shipping changes
- Local transportation secretarial and logistic support for the expert, including a working place

5.2 UNIDO inputs

- Expert in sponge processing with knowledge of sponge marketing (4 M.M.)	US$40,000.-
- Equipment	
* Equipment for sponge cleaning process	US$10,000.-
* Training aids (measuring devices)	US$ 1,000.-
- Miscellaneous	
* Printing manual and report etc.	US$ 5,000.-
Total	US$56,000.-

PROJECT DOCUMENT (No.6)

Title : Expansion of Smoked Fish Processing

Country : Palau

1. Background

There are already established business of smoked reef fish in a private sectors. Fish smoking is actually practiced using a very simple facility in a small scale at a retail outlet. The smoked products together with other prepared products have been sold out in a Koror. Such marketing trend for marine processed products has been recognized and expansion program of smoked fish processing has been considered in order to diversify the products in Palau. A tourism market is clearly growing and indicating potential for special products as souvenir items for which smoked fish products can be investigated. There are a smoking equipment and a vacuum sealing machine at PFA, which are useful for smoked fish manufacturing trial after simple repairing and overhauling.

2. Project objective

The objective of the project is to extend smoked reef fish processing by using the latest smoking technique and by trial production of various smoked fish. Assessment of business feasibility is carried out for a commercial operation as local venture business in fish smoking.

3. Project outputs

Output 1 : To overhaul smoking and vacuum sealing machines to be used for production trial.

Output 2 : Sample products in various smoking types and packaging forms for domestic and tourism markets.

Output 3 : One trained person in production, quality assurance and quality control.

Output 4 : One trained person in marketing survey and product evaluation.

Output 5 : A report on potential products, analysis of cost and benefits and appropriate operation plan in Palau.

4. Activities (6 M.M.)

- Investigation of the existing smoking machine and the vacuum sealing machine and their repairing and overhauling.

- Test marketing survey using the sample products in both domestic market and souvenir markets with cooperation of the local counterpart.

- Compilation of production manual, covering all operation stages, quality assurance/control (QA/QC) manual and the report of this project implementation.

- Training one person in smoked fish production and QA/QC operation.

- Training one person in marketing activity through the sample evaluation and marketing survey by the expert.

- On the job training for the above two trainees to accumulate their own practical experience.

5. Inputs

5.1 Government inputs

- One counter staff
- Two trainees
- Processing facilities and repairing/overhauling costs
- Raw material, sub-materials and energy costs
- Local transportation, secretarial and logistic support for the expert, including a working place

5.2 UNIDO inputs

- Expert in fish smoking practice and technology with marketing experiences (6 M.M.)

  US$60,000.-

- Equipment
  * Packaging materials for trial production (Sealable synthetic bag) US$ 3,000.-

  * Training aid (Measuring device) US$ 2,000.-

- Miscellaneous

  Printing manual and report etc. US$ 5,000.-

  Total US$70,000.-

PROJECT DOCUMENT (No.7)

Title : Development of Shell Meat Processing

Country : Palau

1. Background

Meats of trochus and giant clam give favourable taste and are preferable food items in Palau. Prepared (Cooked) giant clam meat are usually being sold well at the delicatessen shop in Koror. Furthermore, it is informed that there is abundant resources of redlipped strombus in the shallow waters around the Palau islands. Meat of this shell is also preferable and valuable in the domestic market as well as in the Japanese (especially Okinawa) market. The present catch of redlipped strombus is still at subsistence level.

Therefore, meats of trochus, giant clam and redlipped strombus can be considered for industrialization and the products made from those material stills are able to approach to the domestic (incl. tourism) and the export (Japanese) markets. The meats can be processed into salted/cooked/frozen forms to be used as materials for the secondary processing and the bottled/retort-pouched meats can be studied for industrialization.

It is, however, emphasized that the stock assessment of these shellfish (especially redlipped strombus) must be carried out at the initial stage and the meat processing trials should be planned based on the results of the assessment. The MMDC is very active in such investigation and the resource assessment.

2. Project objective

The objective of the project is to carry out a stock assessment of shellfish in Palau and to develop shell meat processing industry based on the results of trial processing and test marketing of the products domestically and for export.

3. Project outputs

Output 1 : A report on a resource assessment of shellfish in Palau.

Output 2 : Samples of products to be produced and test marketed domestically and for export.

Output 3 : A report on potential products, analysis of costs and benefits and design of appropriate size of the processing plant with results of test processing and marketing.

Output 4 : Marketing plan for domestic, local tourism and the Japanese markets with business viability analysis.

Output 5 : Two persons trained in shell meat processing and production planning.

Output 6 : One person trained in quality assurance and quality control.

Output 7 : One person trained in product marketing in domestic and the export markets.

4. Activities (Planned duration : 12 M.M.)

- Execution of resource assessment for shellfish to be used for processing in the appropriate sea areas by the expert in marine resource assessment with cooperation of the local counterpart who is skillful with substantial knowledge on the Palauan sea areas for the assessment. (3 M.M.)

- Market survey and business viability assessment in the domestic market with sample products manufactured at the production trials and also product export planning practice (1.5 M.M.) by the processing expert and the local counterpart.

- Preparation of reports and marketing plan by the two experts and the two local counterparts. (2 M.M.)

- Training one person in production for fresh salted/chilled/frozen products and planning.

- Training one person in production for bottled/retort pouched products and planning.

- Training one person in quality assurance and quality control.

- Training one person in product marketing in the domestic and export markets.

- On the job training for the above four persons should be done through actual production trials by the export.

5. Inputs

5.1 Government inputs

- Two counterparts in resource assessment and shell meat product manufacturing/marketing.

- 4 trainees.

- Processing facilities and cold storage/freezing facilities

- Raw materials, sub-materials and energy costs.

- Local transportation, secretarial and logistic support for the experts, including a working place.

5.2 UNIDO inputs

- Experts
  * Expert in marine resource assessment especially for shellfish (3 M.M.) US$30,000.-

  * Expert in shell fish processing practice and technology with marketing experiences (9 M.M.) US$90,000.-

- Equipment
  * Sealing, capping and sterilizing equipment US$15,000.-

  * Packaging materials for trial production, bottle, retort-pouch) US$ 5,000.-

  * Training aids (measuring devices) US$ 2,000.-

- Miscellaneous
  * Printing manual and reports etc. US$ 5,000.-

Total US$147,000.-

PROJECT DOCUMENTS (No.8)

Title : Assistance in Giant Clam Shell Processing and Marketing

Country : Solomon Islands

1. Background

The main product from giant clam culture is the shell (about 80% by weight). The increasing interest in giant clam culture in the South Pacific region (Micronesia, Melanesia and Polynesia have culture projects), together with the pre-commercial scale expansion in the culture of giant clams (over 200,000/year 1 year old by end 1990 at both MMDC, Palau, and the Coastal Aquaculture Centre, Solomon Islands), have led to interest in an investigation of the potential uses and value of giant clam shell. Present day uses are known to include the production of lime, tiles (Indonesia), draughts, ornaments (as shells), scallop bowls, beer coasters and jewellery items.

Assistance could also be given on the use of trochus shell waste (from button blank manufacturer, of which there are currently 2 factories in Solomon Islands), for items of jewellery manufacturer in Solomon Islands.

2. Project objective

The objective of the project is to design, produce and test market items of value from giant clam shell (and other locally available shells). The size, value and development potential of the different uses of giant clam shell should be investigated and a business development strategy (with jewellery designs and a test market results) produced.

3. Project outputs

Output 1 : Samples of products of value to be produced and test marketed domestically and for export.

Output 2 : A report on potential products and markets for giant clam shell (and other surplus shells), with results of products designed and test marketed.

Output 3 : A business development plan for a potential investor, covering production, product development, processing and marketing, including an economic analysis of project costs and benefits.

4. Activities (3 M.M.)

- Investigation of the existing products produced from giant clam shell, their design, quality, market area, sales volume and price.

- Design and production of a variety of items of potential value for export markets (including domestic tourists).

- That test marketing of a selection of items of craft and jewellery produced from giant clam shell.

- Analysis of the production equipment required, production costs, expected into the wholesale and retail prices and market location and size (annual sales capacity) for a business venture based on Solomon Islands and exporting most of its production.

5. Inputs

5.1 Government inputs

- Local transport, secretarial and logistical support for one expert, including a suitable working place for producing designs and for test production.

- Raw material (giant clam shell and other waste shell) for trials.

- A local counterpart for training (optional, depending upon interest amongst potential or existing shell processors).

5.2 UNIDO inputs

- Expert in shell jewellery/craftwork production and marketing (3 M.M.) US$30,000.-

- International travel budget (including subsistence) for test marketing/evaluation of market potential. US$10,000.-

- Equipment
  Suitable processing machines US$10,000.-

- Miscellaneous
  Report production, etc. US$ 5,000.-

Total US$55,000.-

PRODUCT DOCUMENT (No.9)

Title : Improvement of Dried Beche-de-mer Processing

Country : Solomon Islands

1. Background

This product is an important item (106 tonnes/H.K.$2.9 million exported to Hong Kong in 1987) in non-finfish marine export from Solomon Islands. The beche-de-mer traders in the private sector have been doing purchase/sales business for the past long time and sometimes they have guided production workers on the spot to improve the manufacturing method. This was very hard work for the traders but obtained favorable results for the production yield improvement. About a half of this product in Solomon islands have been supplied from the Ontong Java Atoll, where is very famous on dried beche-de-mer production in the world. The technical assistance in quality improvement and quality control on the products is required and will also improve the economic situation of the village people finally.

2. Project objective

The objective of the project is to improve beche-de-mer processing and to establish a standard for export markets of the products.

3. Project outputs

Output 1 : A report on improvement of beche-de-mer processing in Solomon Islands and business viability assessment based on improved operation.

Output 2 : Manual for marketing standards for export and the relative QA/QC procedures.

Output 3 : Two persons trained in beche-de-mer production and QA/QC procedures.

4. Activities (6 M.M.)

- Improvement of the existing beche-de-mer manufacturing and business viability assessment by the expert with cooperation of the local counterpart (4 M.M.).

- Preparation of a report covering project implementation and a manual including marketing standards for export and QA/QC procedures (1 M.M.) by the expert and the local counterpart.

- Training two persons in an improved beche-de-mer manufacturing and QA/QC procedures by the expert with cooperation of the local counterpart (1 M.M.).

5. Inputs

5.1 Government inputs

- One counterpart in beche-de-mer processing
- 2 trainees
- Processing facilities
- Raw materials, sub-materials and energy costs

- Local transportation, secretarial and logistic support for the expert, including a suitable working place.

5.2 UNIDO input

- Expert in beche-de-mer processing practice and technology (6 M.M.)	US$60,000.-
- Equipment	
* Packaging materials	US$ 2,000.-
* Training aids (measuring devices)	US$ 2,000.-
- Miscellaneous	
* Printing manual and report, etc.	US$ 5,000.-
Total	US$69,000.-

PROJECT DOCUMENT (No.10)

Title : Development of Shark Utilization

Country : Solomon Islands

1. Background

Sharks can be fully utilized and processed to various product items such as dried fin, tanned skin (or salted skin as material), fillet meats (chilled and frozen) and liver oil. Solomon Islands have a potential resource of shark. Its utilization is worthy for the national purpose and also for village fishermen. Especially shark skin and shark meat processing are prominent items to be developed in Solomon Islands.

Shark skin world market is now showing good potential, subsequently salted shark skin must have a material market for the final product. Salt-used storing method can be applied easily for the existing shark catching areas and fishermen. Shark meat can be sold at higher price in the domestic and export market if the meat is properly handled after catch. FAO YEAR BOOK 1989 shows the world production of frozen shark fillet is 787 tonnes in 1987.

2. Project objective

The objective of the project is to develop shark skin and meat processing and to conduct their market survey and business viability assessment.

3. Project outputs

Output 1 : Skin storing and meat processing trials and product samples to be used for test marketing.

Output 2 : Production manuals covering all of processing stages and operation planning based on the viability assessment results.

Output 3 : One person trained in shark skin processing, storing and transportation process.

Output 4 : One person trained in shark meat handling and processing method.

Output 5 : A report on analysis of costs and benefits, design of appropriate business scale and marketing plan based on the results of trial processing and test marketing.

4. Activities (12 M.M.)

- Execution of shark skin storing trials including material handling/processing practice and sample production by the shark skin expert with cooperation of the local counterpart (4 M.M.).

- Execution of shark meat processing trials and sample production by the shark meat expert and the local counterpart (1 M.M.).

- Assessment of business viability on shark skin and meat processing with test marketing of the products (2 M.M.).

- Preparation of a report on the project implementation and production manual covering all of operation stages for skin storing and meat processing by the experts and the local counterparts (2 M.M.).

- Preparation of market survey report together with business viability assessment results and the future plan by the experts and the local counterparts (1 M.M.).

- Training one person in shark skin processing and storing by the expert and the local counterpart (1 M.M.).

- Training one person in shark meat handling and processing by the expert and the local counterpart (1 M.M)

5. Inputs

5.1 Government inputs

- One counterpart in shark skin handling storing and marketing.
- One counterpart in shark meat processing and marketing.
- Two trainees
- Processing facilities both for shark skin and shark meat
- Raw materials, sub-materials and energy costs
- Local transportation, secretarial and logistic support for the experts, including a working place

5.2 UNIDO inputs

- Expert
  * Expert in shark skin storing and tanning with marketing experiences (8 M.M.) US$80,000.-

  * Expert in shark meat processing with marketing experiences (4 M.M.) US$40,000.-

- Equipment
  * Processing devices (tanks etc) US$ 1,000.-
  * Packaging materials US$ 1,000.-
  * Training aid (measuring devices) US$ 2,000.-

- Miscellaneous
  * Printing manuals and report, etc. US$ 5,000.-

Total US$129,000.-

PROJECT DOCUMENT (No.11)

Title : Feasibility study on Pearl Oyster Culture and Pearl Production

Country : Solomon Islands

1. Background

Pearl culture and/or cultured pearl production in some of the South Pacific Island countries such as Tahiti, Cook Islands and Fiji have been carried out and succeeded by using blacklip oyster (Pinctade margaritifera). Cultured pearls are very important export product in those countries. In Solomon Islands, there are two species of pearl oysters (Blacklip and goldlip) which are caught by diver fishermen and exported as material for button, jewellery and inlay work (Black pearl shell export is 28 tonnes/SI$186,000.- in 1987). However, there is no pearl oyster culture industry in this country. The Fisheries Department is now interested in pearl culture using the existing blacklip and others.

2. Project objective

The objective of the project is to assess the possibility and viability of pearl oyster farming and cultured pearl production in Solomon Islands, and to train the local people in the appropriate technique for assessment practice and pearl oyster culture in general.

3. Project outputs

Output 1 : A feasibility study report on pearl oyster culture and pearl production including pearl oyster resource survey, investigation on the sea adaptability for oyster pearl cultivation and economic analysis.

Output 2 : Manual for assessment methods of the pearl-oyster culture industry to be used for future investigation.

Output 3 : Pearl oyster culture and cultured pearl production manuals in general.

Output 4 : One person trained in assessment practice for possibility and viability of pearl culture industry.

Output 5 : One person trained in pearl oyster culture technique and cultured pearl production methods in general.

4. Activities (9 M.M.)

- Preparation and execution of the resources survey and environmental assessment in the appropriate waters by the pearl culture expert with cooperation of the local counterpart (3 M.M.).

- Establishment of assessment method of the pearl culture industry and the pearl oyster culture/cultured pearl production method meeting to this country by the expert and the local counterparts (3 M.M.).

- Preparation of a report on a whole activity of the project implementation and manuals of pearl culture and cultured pearl production in general by the expert with cooperation of the local counterparts (1 M.M.).

- Training one person in assessment practice for possibility and viability of the industry (1 M.M.).

- Training one person in pearl oyster culture technique and cultured pearl production method in general (1 M.M.).

5. Inputs

5.1 Government inputs

- One counterpart (local expert) well knowledgeable in pearl oyster harvesting.

- Two trainees qualified for this training purpose of the project.

- Materials to be used for the total investigation and energy cost.

- Local transportation, accommodation, office and secretarial and logistic support for the experts.

5.2 UNIDO input

- Experts
  * Expert in marine resources assessment with substantial knowledge of pearl oyster (4 M.M.) US$ 80,000.-

* Expert in aquaculture with substantial knowledge of pearl oyster culture and cultured pearl marketing (5 M.M.). US$100,000.-

- Equipment
  * Specified marine survey devices and pearl oyster culture equipment US$ 20,000.-

  * Training aids (Textbook measuring devices) US$ 2,000.-

- Miscellaneous
  * Printing manuals and report, etc. US$ 5,000.-

Total US$207,000.-

PROJECT DOCUMENT (No.12)

Title : Assistance in Development of Finished Button Products Manufacturing

Country : Solomon Islands

1. Background

Shell export in 1987 is about 500 tonnes in weight and SI$2.5 million in valve. Shellfish such as trochus, blacklip and other shellfish are harvested by village fishermen and collected by the private sector for the international deal. There are a few enterprises operating this business in Solomon Islands. They have studied and already initiated value-added processing of shells which is a button blank manufacturing. However, the Fisheries Department and the private sector are still intending to establish a higher level shell processing than the current one ; finished button products.

2. Project objective

The objective of the project is to provide technical assistance in a level-up development for shell processing of finished button products in order to obtain higher profit and finally to assist the village fishermen in their life.

3. Project outputs

Output 1 : A report on the project implementation and production manual of finished button products manufacturing with a plant lay-out.

Output 2 : Product samples to be used for test marketing for export and business viability study results.

Output 3 : Two persons trained in operating button manufacturing equipment.

4. Activities (6 M.M.)

- Investigation on the existing button blank factories and introduction of modern button product manufacturing (3 M.M.)

- Evaluation of sample products and viability assessment for button business in Solomon Islands by the expert and the local counterpart (1 M.M.).

- Preparation of a report and a production manuals covering all operation steps by the expert and the local counterpart (1 M.M.).

- Training two persons in operating button manufacturing equipment (1 M.M.).

5. Inputs

5.1 Government inputs

- One counterpart in button products manufacturing and the business viability assessment.
- Two trainees
- Shell processing factory
- Raw material, sub-materials and energy costs
- Local transportation, secretarial and logistic support for the export, including a suitable working place

5.2 UNIDO inputs

- Expert in shell processing and button manufacturing with marketing experiences.	(6 M.M.) US$60,000.-
- Equipment	
* Simple button processing machines (about 3 units)	US$15,000.-
* Training aids (text and test devices)	US$ 2,000.-
- Miscellaneous	
* Printing report and manuals, etc.	US$ 5,000.-
Total	US$82,000.-

PROJECT DOCUMENT (No.13)

Title : Reactivation of SPFC 1/ Facilities

Country : Vanuatu

1. Background

A large-scale commercial fishing activity conducted in Vanuatu was only the operation by SPFC which was established in 1957. Their business was based on transshipping, cold storage, warehouse, fishing support-base for the Japanese longline fleet operating in the West Pacific targeting on albacore. Their major facilities at Palikulo comprised of unloading and transshipping wharves, a 2,340 sq.m cold storage, two slipways, workshops, a fishing gear store and fuel bunking facilities. However, SPFC is not sufficiently utilizing those facilities at present, for example, the cold storage is used for frozen meat product to be exported for Japan or other countries and some part of the facilities seems not to be used for past long time. Most of officials in the Vanuatu Government would like to reactivate the SPFC operation by using those existing facilities and to expect the better operation of SPFC to contribute the National Government.

2. Project objective

The objective of this project is to investigate the present operation condition of the SPFC facilities in order to recommend the right direction for the SPFC business in the future.

1/ SPFC : South Pacific Fishing Company Ltd.

3. Project outputs

Output 1 : A report on reactivation of SPFC including plant design, operation plan and economic analysis.

Output 2 : Persons of SPFC and/or the Vanuatu Government who become to realize the present situation of the SPFC in depth and to consider the realistic future plan for the SPFC.

4. Activities (1.5 M.M.)

- Fielding three experts in civil engineering, refrigeration engineering and fisheries economy.

- Carry out comprehensive field work cn the investigation by the experts in cooperation with the local counterparts.

5. Inputs

5.1 Government Inputs :

- Counterparts/local expert in civil/refrigeration engineering and fisheries economy.

- All necessary costs for local transportation, secretarial supports, offices, and other miscellaneous support activities for the international experts.

5.2 UNIDO inputs

- Experts

* Expert in civil engineering (0.5 M.M.)	US$10,000.-
* Expert in refrigeration engineering (0.5 M.M.)	US$10,000.-
* Expert in Fisheries economy (0.5 M.M.)	US$10,000.-
- Miscellaneous	
Sundries (for printing reports, etc.)	US$ 5,000.-
Total	US$35,000.-

PROJECT DOCUMENT (No.14)

Title : Assistance in Improvement of Smoked Fish Processing

Country : Vanuatu

1. Background

The smoked fish processing project has been started at the Fisheries Training Centre is Santo Island on a trial basis and some of the sample products have been manufactured for the market survey in Port vila and Luganville where such products can be sold at better prices. This project is aiming at assistance to the fishermen living in the outer islands where convenient transportation and ice for fish storing are not available. The sample products have been tested and well accepted by hotels in Port Vila in a preliminary market survey. Stop-up assistance is requested by the Vanuatu Government for improving smoke fish processing.

2. Project objective

The objective of the project is to improve the ongoing fish smoking project being carried out at the Fisheries Training Centre.

3. Project outputs

Output 1 : Sample products from various raw materials and test marketing domestically.

Output 2 : One trained person in marketing.

Output 3 : Manual for various fish smoking.

Output 4 : A report on potential products and business viability assessment based on local situations in Vanuatu.

4. Activities (6 M.M.)

- Conducting training course together with preparation of the operation manual and text books by the expert with cooperation of the local counterpart (1 M.M.).

- Training one person in packaging machine operation by the expert (1 M.M.).

- Trial production of the product and test marketing domestically by the expert and the local counterpart (2 M.M.).

- Training one person in marketing practice by the expert (1 M.M.).

- Compilation of the report on the implementation of the project (1 M.M.).

5. Inputs

5.1 Government inputs

- One counterpart in fish processing
- Two trainees
- Processing facilities and lecture room
- Raw materials, sub-materials and energy costs

- Local transportation, secretarial and logistic supports for the expert, including a suitable working place.

5.2 UNIDO inputs

- Expert in fish smoking practice and technology with marketing experiences (6 M.M.) US$60,000.-

- Equipment
  * Packaging materials US$ 5,000.-

  * Training aid (measuring devices) US$ 2,000.-

- Miscellaneous
  Printing manual, text book and report etc. US$ 6,000.-

Total US$73,000.-

PROJECT DOCUMENT (No.15)

Title : Development of Shark Utilization

Country : Vanuatu

1. Background

Sharks will be fully utilized and processed to various product items such as dried fin, tanned skin (or salted skin as material) fillet meats (chilled and frozen) and liver oil. Shark skin world market is now showing good potential, subsequently salted shark skin must have a material market for the final product and salt-used storing method can be applied easily for the existing shark catching areas and fishermen. Furthermore, shark meat can be sold at higher price in the domestic and export market if the meat is properly handled after catch. FAO YEAR BOOK 1989 shows the world production of frozen shark fillet which is 787 tonnes in 1987. Vanuatu has a potential resource of shark ,its utilization study should be worthy for the national purpose and also for village fishermen. The project focuses on shark skin and shark meat utilization.

2. Project objective

The objective of the project is to develop shark skin and meat processing and to conduct their market survey and business viability assessment.

3. Project outputs

Output 1 : A report on shark skin storing and meat processing trials and business viability assessment.

Output 2 : Skin storing and meat processing trials and product samples to be used for test marketing.

Output 3 : Production manuals covering all of operation stages and the future planning based on the viability assessment results.

Output 4 : One person trained in shark skin processing, storing and transportation process.

Output 5 : One person trained in shark meat handling and processing method.

4. Activities (12 M.M.)

- Execution of shark skin storing trials including material handling/processing practice and sample production by the shark skin handling expert with cooperation of the local counterpart (4 M.M.).

- Execution of shark meat processing trials and sample production by the fish processing expert and the local counterpart (1 M.M.).

- Assessment of business viability on shark skin and meat processing with market survey by the experts and the local counterparts (2 M.M.).

- Preparation of a report on the project implementation and production manual covering all of operation stages for skin storing and meat processing by the experts and the local counterparts (2 M.M.).

- Preparation of market survey report together with business viability assessment results and the future plan by the experts and the local counterparts (1 M.M.).

- Training one person in shark skin processing and storing by the expert and the local counterpart (1 M.M.).

- Training one person in shark meat handling and processing by the expert and the local counterpart (1 M.M)

5. Inputs

5.1 Government inputs

- One counterpart in shark skin handling storing and marketing.
- One counterpart in shark meat processing and marketing.
- Two trainees
- Processing facilities both for shark skin and shark meat processing.
- Raw materials, sub-materials and energy costs.
- Local transportation, secretarial and logistic support for the experts, including a suitable working place.

5.2 UNIDO inputs

- International expert
  * Expert in shark skin storing and tanning with marketing experiences (8 M.M.) US$80,000.-

  * Expert in shark meat processing with marketing experiences (4 M.M.) US$40,000.-

- Equipment
  * Processing devices (tanks etc) US$ 1,000.-
  * Packaging materials US$ 1,000.-
  * Training aid (measuring devices) US$ 2,000.-

- Miscellaneous
  * Printing manuals and report, etc. US$ 5,000.-

Total US$129,000.-

PROJECT DOCUMENT (No.16)

Title : Feasibility Study on Shell and Shell Meat Processing

Country : Vanuatu

1. Background

Vanuatu has already been exporting "button blanks" (26 tonnes/1987, 40 tonnes/1988) and also other whole shells (74 tonnes/1986, 12 tonnes/1987, 16 tonnes/1988). A private sector is actively operating in this field. They are manufacturing quality shell products (button blanks, polished shell and other ornamental items) by skillful technique for export and domestic (tourism) markets, but they are still considering to produce further value added products such as finished button products and to utilize trochus and greensnail waist for inlay work. At the same time, it is understandable that shell meats (mainly trochus) are produced and can be used for shell meat processing in adequate scale although such meats are now being used partially for subsistence purpose and the remainings are in waste.

2. Project objective

The objective of this project is to investigate the feasibility of further development for shell processing and at the same time, for shell meat processing in order to provide the accurate data for proceeding with shell processing at higher level and development of shell meat processing.

3. Project outputs

Output 1 : A report on the feasibility study for expansion of shell processing including actually viability assessment and economic analysis.

Output 2 : A report on the feasibility study for development for shell meat processing including business viability assessment together with economic analysis.

4. Activities (3.0 M.M.)

- Field work and report preparation in the shell processing expansion by the expert with cooperation of the local counterpart (1.5 M.M.).

- Field work and report preparation in the shell meat processing development by the expert with cooperation of the local counterparts (1.5 M.M.).

5. Inputs

5.1 Government inputs

- One counterparts in shell processing
- One counterparts in shell meat processing
- Local transportation, secretarial and logistic support for the experts, including a suitable working place.

5.2 UNIDO inputs

- Expert in shell processing with marketing experiences (1.5 M.M.). US$20,000.-

- Expert in shell meat processing with marketing experiences (1.5 M.M.).		US$20,000.-
- Miscellaneous Printing report and etc.		US$10,000.-
	Total	US$50,000.-

PROJECT DOCUMENT (No.17)

Title : Development of Sea-cucumber Processing
Fresh frozen/Fermented products

Country : Tonga

1. Background

Apart from the dried product (beche-de-mer), fresh sea cucumber are often consumed by South Pacific Islanders, and it is mostly for subsistence consumption. However, in the Kingdom of Tonga, cut-piece of sea cucumber in brine packed in bottle is sold at the market in Nuku Alofa. It is reported that market for these products (fresh frozen and salted sea cucumber) in the Pacific islands societies in Australia and New Zealand is expected provided a quality product are manufactured.

On the other hand, the very specific and value-added product made from sea cucumber is identified for industrialization in Tonga. That is a salted/fermented intestines and/or gonad of sea cucumber for the Japanese market and a favorable product manufactured in Vava'u island has been recognized. This fermented product is so-called "Konowata" in Japan and preferred by the Japanese gourmets, so this product can be sold at higher price (presently ¥50,000 - 70,000/kg = US$330 - 470/kg at retailer shops in Tokyo) in the market. This product can be stored at room temperature and can bear heavy burden of air freight and other expenses. The above mentioned factors will be able to allow Vava'u Konowata as marketable product for Japan.

2. Project objective

The objective of the project is to improve sea cucumber processing other than dried beche-de-mer and to assess the possibility and viability of the processing of Tongan sea cucumber.

3. Project outputs

Output 1 : Samples of products to be test marketed domestically and for export.

Output 2 : A report on potential products, marketing viability, analysis of costs and benefits, and design of suitable business scale based on results of investigation and trial processing and test marketing for both processing of fresh and fermented products.

Output 3 : Persons trained in processing methods and marketing procedures of the products.

4. Activities (6 M.M.)

- Field work in investigation and evaluation of the existing manufacturing processes and products in fresh and fermented forms by the expert with cooperation of the local counterparts.

- Production test in a small scale, sample production for test marketing and business planning by the expert and the local counterparts.

- Preparation of the report on the implementation of the project and test marketing.

5. Inputs

5.1 Government inputs

- One counterpart in fresh/frozen sea cucumber processing and marketing.

- One counterpart in fermented products (Konowata) processing and marketing.

- Processing facilities.

- Raw material, sub-material and energy costs.

- Local transportation, secretarial and logistic support for the experts, including a suitable working place.

5.2 UNIDO inputs

- Expert in fresh/frozen/salted sea cucumber processing and marketing (2 M.M.)	US$20,000.-
- Expert in fermented (Konowata) product processing (4 M.M.)	US$40,000.-
- Equipment Small packaging device and packaging materials	US$20,000.-
- Miscellaneous Printing report and etc.	US$ 5,000.-
Total	US$85,000.-

PROJECT DOCUMENT (No.18)

Title : Assistance in Improvement of Black Coral Processing

Country : Tonga

1. Background

Black coral jewellery and ornamental material is currently being harvested from vast coral forests in the Tongan Waters and three Tongan private firms (two in Nuku Alofa and one in Vava'u) are now producing jewellery and ornamental products for the domestic tourism market and the overseas market. They are doing good work in this field at present, but they are still wishing to improve their own process technique by the latest processing equipment and to obtain the quick information of fashion trend for jewellery products in the world.

2. Project objective

The objective of the project is to improve black coral processing and to provide an information for the world trend of jewellery and ornamental products.

3. Project outputs

Output 1 : A report on improvement of black coral processing covering all of the implementation of the project and the future planning based on the viability assessment.

Output 2 : Introduction of the latest modern equipment

for black coral processing and its operating manual with newly produced samples. (Modern equipment itself, if possible).

Output 3 : The information system design for the international jewellery marketing trends.

Output 4 : Counterpart trained in operation of the modern black coral processing machine and much informed about the international jewellery trends.

4. Activities (3 M.M.)

- Investigation on the existing back coral processing facilities and study on improvement direction of this industry by the expert with cooperation of the local counterpart.

- Production test by using the latest type of processing machine and on-the-job training for the local counterpart by the expert.

- Trials of sample product processing by the expert and the local counterpart.

- Preparation of the report on the implementation of the project and recommendation for the future steps to be taken by the expert with cooperation of the local counterpart.

5. Inputs

5.1 Governmental inputs

- One counterpart in black coral processing and marketing.
- Area for test operation of the new machine and energy costs.
- Raw black coral materials for trials.
- Local transportation, secretarial and logistic support for the expert, including a working place.

5.2 UNIDO inputs

- Expert in black coral processing and marketing (3 M.M.)	US$30,000.-
- Equipment The latest type of black coral processing machine	US$10,000.-
- Miscellaneous Printing report and etc.	US$ 5,000.-
Total	US$45,000.-

PROJECT DOCUMENT (No.19)

Title : Assistance in Development of Smoked Fish Processing

Country : Tonga

1. Background

There are two private firms operating a fish processing and they both have just started processing smoked fish to be consumed in the local market especially catering output at initial stage and to be exported to the overseas markets in the future. In this connection their activities for industrialization of smoked fish processing will be able to take off easily when the practical and technological guidance by the technical assistance is provided.

2. Project objective

The objective of the project is to promote smoked fish processing and to prepare a business plan.

3. Outputs

Output 1 : A report covering potential products, business viability assessment and the recommendation for the future planning.

Output 2 : Processing manual together with layout plan and smoking room design.

Output 3 : Counterpart trained in smoked fish processing and marketing.

Output 4 : Sample products for evaluation and test marketing.

4. Activities (3 M.M.)

- Examination of the existing cperation plan and procedures and business viability assessment by the expert with cooperation of the local counterpart.

- Providing the effective plant layout and smoking room design by the expert.

- Test production and sample product manufacturing in parallel with on-the-job training for the local counterpart by the expert.

- Preparation of the report covering of project implementation and a standard manufacturing manual of smoked fish by the expert and the local counterpart.

5. Inputs

5.1 Government inputs

- One counterpart in fish smoking and marketing.
- Facilities for test processing and sample sales.
- Raw materials, sub-materials and energy costs.
- Local transportation, secretarial and logistic support for the expert, including a working place.

5.2 UNIDO inputs

- Expert in fish smoking with marketing experiences (3 M.M.)	US$30,000.-
- Equipment Some of packaging materials and test (measuring) devices	US$ 5,000.-
- Miscellaneous Printing report and etc.	US$ 5,000.-
Total	US$40,000.-

PROJECT DOCUMENT (No.20)

Title : Development of Smoked Fish Processing

Country : Cook Islands

1. Background

There are potential markets for smoked fish made from tuna and other reef fish in Rarotonga (capital island of Cook Islands) and a small smoking facility was established the catering sector in which domestic consumption can be expected other than that in a common consumer market in Cook Islands. Smoked fish materials are available several outer islands (atolls), for example, tuna and shellfish in Aitutaki, parrot fish, rabit fish and tuna in Palmerston and eels in Mitiaro. Promotion of smoked fish processing activities will assist fishery development in each island (atoll) and finally help the fishermen's life.

2. Project objective

The objective of the project is to develop smoked fish processing in connection with fishery village development to be considered, and to organize the most effective production and distribution net work among the islands (atolls) aiming at profitable industry establishment.

3. Outputs

Output 1 : A report based on results from the studies and assessments under the project including production material, potential products,

quality standard, organization plan for distribution and marketing.

Output 2 : One counterpart trained in fish smoking practice, business viability assessment, product distribution and marketing system.

Output 3 : Sample products for evaluation and test marketing.

4. Activities (6 M.M.)

- Investigation on the present situation of fish smoking activities and providing the action plan based on the results from the investigation by the international expert with cooperation of the local counterpart.

- Providing the standard layout and smoking room design generally meeting the local situation and plan for product distribution and marketing by the expert and the local counterpart.

- Test production and sample product sales and the on-the-job training for the local counterpart by the expert.

- Preparation of the report fish smoking development which enables the government authorities to prepare and to determine the future programme on this subject.

5. Inputs

5.1 Government inputs

- One counterpart in fish smoking, product marketing and distribution.

- Facilities for test production, sample sales.

- Raw materials, sub-materials and energy costs.

- Local transportation, secretarial and logistic support for the expert.

5.2 UNIDO inputs

- Expert in fish smoking with substantial experiences for smoked fish distribution and marketing (6 M.M.) US$60,000.-

- Equipment
  Simple packaging device with packaging materials US$10,000.-

- Miscellaneous
  Printing report and etc. US$ 5,000.-

Total US$75,000.-

PROJECT DOCUMENT (No.21)

Title : Feasibility Study on the Integrated Development Plan for Trochus Shell and Shell meat processing in Aitutaki Island

Country : Cook Islands

1. Background

Under the successful transplantation of trochus shell from Fiji to Aitutaki island. Trochus shell in sizable volume (20 to 45 tonnes) can be harvested for a short period and harvesting operation are strictly controlled by the authorities. This is very specific and advantageous for industrialization compared with other South Pacific island countries, where trochus harvest areas are widely scattered among outer islands/atolls.

Therefore, utilization of trochus shell and meat can be considered integratedly and effective operation can also be expected. In case of shell utilization, trochus shells of Aitataki (Cook islands) are unfortunately evaluated as lower quality material for button blank manufacturing, subsequently trochus of Cook Islands have not obtained good prices in the international shell market for button products. If trochus shell is processed in production area and value-added product (e.g. button blank) can be exported, the above situation will be improved in commercial aspect.

Note : Trochus shell prices delivered at processors' plant in Japan (US$/kg) in 1990.

Fiji	8.70	Solomon Is.	9.30	PNG	9.30
Palau	8.00	Cook Is.	6.00		

2. Project objective

The objective of the project is to assess the possibility and viability and to prepare a feasibility report for the integrated trochus shell and shell meat processing in Aitutaki island. The report will enable the people concerned on both sides (government and private) to determine the future development program in Aitutaki Island. This project will be able to investigate not only in Aitutaki, but also in other outer island where materials supply can be considered and preliminary processing can be carried out.

3. Project outputs

Output 1 : A report prepared based on the results of assessment, investigation and study work under this project.

Output 2 : The future plan to be conducted in order to proceed with this integrated development program.

Output 3 : Standard processing manual for shell and shell meat, quality assurance/control procedure and system plan.

Output 4 : Sample products for quality evaluation and test marketing, distribution study and storing test, etc.

Output 5 : One counterpart trained in shell processing marketing business viability assessment and project planning.

Output 6 : One counterpart trained in shell meat

processing, marketing business viability assessment and project planning.

4. Activities (12 M.M.)

- Fielding an expert in shell and shell meat processing practice and technology for feasibility survey in Aitutaki island with cooperation of the local counterparts (4 M.M.).

- Carrying out comprehensive field work in shell and shell meat processing, product distribution, marketing and business viability assessment by the experts and the local counterparts (4 M.M.).

- Test production and sample product sales. Establishment of production process to meet the local conditions by the experts and the local counterparts (2 M.M.).

- Preparation of a report covering project implementation, processing manuals, product standards quality assurance/control manual and the integrated future plans (2 M.M.).

- The on-the-job training for the local counterparts in each field of shell and shell meat processing covered by this project.

5. Inputs

5.1 Government inputs

- One counterpart in shell processing, product marketing and distribution, business viability assessment.

- One counterpart in shell meat processing product marketing and distribution, business viability assessment.

- Facilities for test production and sample sales.

- Raw materials, sub-materials and energy costs.

- Local transportation, secretarial and logistic support for the experts, including a working place.

5.2 UNIDO inputs

- Experts

  * Expert in shell processing (button blank products) with substantial marketing experiences and project planning (6 M.M.). US$60,000.-

  * Expert in shell meat processing (fresh frozen/bottled products) with substantial marketing experiences and project planning (6 M.M.). US$60,000.-

- Equipment

Small shell processing machine and shell meat packaging device	US$20,000.-
Packaging materials	US$ 5,000.-
Test equipment/measuring devices	US$ 5,000.-

- Miscellaneous

Printing manual planning paper and report etc.	US$ 7,000.-
Total	US$157,000.-

PROJECT DOCUMENT (No.22)

Title : Development of Fresh Water Clam Processing

Country : Fiji

1. Background

Fresh water clams are specifically growing in Fijian fresh waters and have been harvested in a big volume for the past years (approx. 1,300 tonnes in 1988). Fijian people are fond of this shell meat in usual cooking, therefore most of the catch have been sold in the domestic market and some of this clam meat in frozen form are being exported to New Zealand.

Price of this clam is always cheap at the markets (F$0.45/kg in 1990 at Suva Municipal market). Meat and extract have given favorable taste and flavor which are of course preferred by Fijian consumers but will also be meeting the overseas market.

It is noted that the harvesting and marketing operations of this clams have been conducted by Fijian women at all, so the fresh water clam processing project will be able to have aspects for women in development.

2. Project objective

The objective of the project is to assess the possibility and viability of fresh water clam processing (Fresh frozen/bottled/retort-pouched) in Fiji and to prepare the future plan for the industrialization of the adequate product line for the domestic and overseas markets.

3. Project outputs

Output 1 : A report prepared based on the results of investigation, assessment and study works under this project.

Output 2 : The future plan to be considered for proceeding with this development programme.

Output 3 : Manual for processing potential products to meet the utilization of this clam meat.

Output 4 : Sample products for quality evaluation and test marketing.

Output 5 : Counterpart trained in fresh water clam processing practice, business assessment, product marketing.

4. Activities (6 M.M.)

- Fielding an expert in shell meat processing practice and technology for feasibility study and various investigation on fresh water clam resources and nature (1 M.M.).

- Carrying out concentrate field work in shell meat processing in various method, product distribution/marketing and business viability assessment by the expert and the local counterpart (2 M.M.).

- Test production and sample preparation. Establishing production process to meet this material shell by the expert and the local counterpart (1 M.M.).

- Preparation of a report covering the implementation of this project. Operation manual quality standard and the future prospect on the product by the expert and the counterpart (2 M.M.).

- The on-the-job training for the local counterpart through all parts of the project implementation by the expert.

5. Inputs

5.1 Government

- One counterpart in shell meat processing, product marketing, and business viability assessment.

- Facilities for test production and sample sales.

- Raw materials, sub-materials and energy costs.

- Local transportation, secretarial and logistic support for the expert, including a suitable working place.

5.2 UNIDO inputs

- Expert in shell meat processing with marketing experiences (6 M.M.)	US$60,000.-
- Equipment Simple packaging and sterilizing equipment with packaging materials and test equipment.	US$15,000.-
- Miscellaneous Printing manuals and report etc.	US$ 5,000.-
Total	US$80,000.-

PROJECT DOCUMENT (No.23)

Title : Pre-Feasibility Study on Seaweed flour Manufacturing

Country : Fiji

1. Background

The price of dried seaweed (Eucheuma) has always been fluctuating and no body is able to estimate reliable trend in the international market, though the present price (FOB Europe in 1989 : US$700/tonne) is double of that in mid-1987. Therefore, most of producers or sellers of seaweed products have eventually decided to consider producing seaweed flour (formerly called semi-refined carrageenan, SRC). This product should be value added and its demand is now increasing.

Fiji has produced dried seaweed, about 180 tonnes in 1986, but 60 tonnes in 1988. In 1988, the Fisheries Department started to handle directly the extension and buy/sell operation of seaweed. Marketing is handled by the National Marketing Authority. In this connection, if the above seaweed flour manufacturing will be promising by using own cultured seaweed material and the material imported from other South Pacific island countries, it will be desirable for the marine resource-based industry development in this region.

2. Project objective

The objective of the project is to assess the possibilities and viabilities of seaweed flour manufacturing in Fiji using both domestic materials and imported ones from the South Pacific island countries such as Solomon, Tonga and FSM etc.

The study should enable the parties concerned (not only of Fijian authorities and private sector but also of the South Pacific island Countries) to determine the initiation of the commercial development of this seaweed flour products.

3. Project outputs

Output 1 : A report of feasibility for semi-refined carrageenan based on the results of the assessments and studies on manufacturing, marketing, economic and financial analysis.

Output 2 : The future plan to be considered for seaweed flour production based on a organization of seaweed and/or seaweed flour producing countries in the South Pacific region.

Output 3 : Recommendation/suggestion in concrete for the seaweed manufacturing process in commercial scale.

Output 4 : Counterpart who is substantially informed about the seaweed flour manufacturing and marketing.

4. Activities (6 M.M.)

- Investigation of the present situation on seaweed/seaweed flour production in Fiji and other selected South Pacific island countries by the expert in seaweed/seaweed flour manufacturing with cooperation of the local counterparts.

- Investigation of the present situation on

seaweed/seaweed flour marketing in Fiji and other selected South Pacific island countries by the expert in seaweed marketing and economic/financial fields with cooperation of the local counterparts (2 M.M.).

- Preparation of report covering all parts of implementation under this project, future plan and technical recommendation/suggestion by the experts with cooperation of the local counterparts (2 M.M.).

- On-the-job cooperation by the local counterparts for the experts for the above activities.

5. Inputs

5.1 Government inputs

- Counterparts/local experts on seaweed and seaweed flour production/marketing.

- All necessary costs for local transportation secretarial supports, offices, and logistic support for the experts.

5.2 UNIDO inputs

- Experts
  * Expert in seaweed production and seaweed flour manufacturing (3 M.M.) US$36,000.-

  * Expert in seaweed marketing and economic/financial analysis (3 M.M.) US$36,000.-

- Equipment
  Test devices, test agents and measuring tools US$ 5,000.-

- Miscellaneous
  Printing report and etc. US$ 5,000.-

Total US$82,000.-

PROJECT DOCUMENT (NO.24)

Title : Product Improvement of Beche-De-Mer

Country : Fiji

1. Background

Fiji is the biggest export country of beche-de-mer (dried sea cucumber) product in the South Pacific region and the exported value (F$2.85 million in 1988) has contributed 5.6% of the total export. Based on this situation, the Fiji Beche-De-Mer Association was established in March, 1989 in order to improve of beche-de-mer production and marketing. Fiji intends to make more efforts for improving beche-de-mer industry while the current situation of production/export of this product are much better than that in other South Pacific countries.

They are aiming at (1) product quality improvement, subsequently establishment of the international standards, (2) preparation of quality control system, (3) production control maintaining resources and (4) improvement of suppliers' (fishermen's) income situation, and etc.

Technical assistance to the above requirements will be able to accelerate their activities and to help their progress of the industry. Further, quality standards and quality control system to be provided under the project should be applied to the other beche-de-mer producing countries in the region who are most of the south Pacific countries. International organizations in the region such as SPC and FFA are continuing to assist this field and this project should perform the useful results for improvement.

2. Project objective

The objective of the project is to assist in establishing international standards of beche-de-mer products and quality control system which should be also useful for beche-de-mer production in the other South Pacific countries.

3. Project outputs

Output 1 : Report on international standards for beche-de-mer processing and quality.

Output 2 : Report on quality control system and quality control manual for operation of beche-de-mer production.

Output 3 : Counterpart who is substantially informed about the sea cucumber handling and processing into beche-de-mer product.

4. Activities (12 M.M.)

- Investigation of the existing conditions for beche-de-mer production in Fiji and related South Pacific countries and preparation of a complete report on this investigation by the expert with cooperation with the local counterpart (4 M.M.).

- Preparation of draft of international standards for beche-de-mer processing and quality by the expert and the counterpart (3 M.M.).

- Preparation of draft of quality control system and quality control manual for beche-de-mer product by the expert and the counterpart (3 M.M.).

- Discussion with staff concerned of international organization such as FAO, SPC and FFA etc for beche-de-mer international standards for processing and quality (2 M.M.).

5. Inputs

5.1 Government inputs

- Counterpart/local expert on beche-de-mer production (post-harvest technology).

- All necessary costs for local transportation, secretarial supports, offices and other miscellaneous supports for the experts.

5.2 UNIDO inputs

- Expert in beche-de-mer production (post harvest technology) and quality control practice and inspection technique with substantial capability for international activity and discussion (12 M.M.).

  US$120,000.-

- Equipment
  Test/inspection devices and measuring tools

  US$ 5,000.-

- Miscellaneous
  Printing report and draft etc. US$ 5,000.-

Total US$130,000.-

PROJECT DOCUMENT (No.25)

Title : Integrated Development Center for Shell and Shell meat Processing

Country : Regional

1. Background

Various shells (giant clam, trochus shell, turban shell, blacklip, redlipped strombus, blood cockles and fresh water clam, etc.) are living in the waters of the South Pacific island countries and used for commercial production or subsistence consumption, but their utilization levels have still not been ideal in processing and marketing.

Resource surveys for shells have not sufficiently conducted in this region, but approx. 2,000 tonnes were harvested in 1987. Some countries are intending to plan the shell culture program. At this moment, it would be much desirable if the integrated project of shell/shell meat processing covering the countries concern is formulated and implemented aiming at fostering capable persons for the comprehensive development.

Under this project the selected and experienced persons will be educated in higher theoretical course and trained in practice at real manufacturing demonstration together with marketing lectures. Persons graduated in this project will be able to plan and study the suitable project properly on shell/shell meat production meeting each country.

On the other hand, the international experts participated in this project as lecturer or trainer will be also able to make trip to the countries and to execute the necessary field

work. The stock assessment will be conducted by the experts and accumulate the informative data which will be used as a basement of industrialization. The total effects made from this project should be valuable for assistance in the development of shell/shell meat processing in each country.

2. Project objective

The objective of the project is to provide necessary facilities and education staff in shell/shell meat industries development from stock assessment to the marketing and assistance in proceeding with the planning and implementation of the project.

3. Project outputs

Output 1 : Shell processing equipment to be used for button blank, finished button and ornamental articles and the operation manual of those equipment.

Output 2 : Shell meat processing equipment to be used for fresh frozen/chilled products, salted/dried products and bottled/retort-pouched product and the operation manual of those equipment.

Output 3 : Educated and trained persons in shell/shell meat processing, marketing and project planning.

Output 4 : Report prepared based on a resource survey/stock assessment on shells living in the waters of each country in South Pacific region. This report is useful for a basic plan of the industrialization.

Output 5 : Design for information collecting system on the shell product trade and shell meat product trade in the world.

4. Activities (24 M.M.)

- Education and training the persons in shell processing with practical operation of adequate equipment and preparation of the operation manual by the experts.

- Education and training the persons in shell meat processing with practical operation of adequate equipment and preparation of the operation manual by the experts.

- Education and training the persons in shell/shell meat products trade and project planning for industrialization by the experts.

- Field survey/assessment on shells resources in the waters of the countries in the region and preparation of survey report by the experts.

- Investigation of the existing marketing system for shell/shell meat products and making a certain design for marketing information collecting system by the experts.

- All of the above activities to be carried out by the international experts will be done with the local counterparts.

5. Inputs

5.1 Government inputs

- Counterparts
  - one in shell processing/marketing
  - one in shell meat processing/marketing
  - one in information collecting
  - one in resources survey/stock assessment
- Place and building for training with equipment
- Necessary raw materials and sub materials for educational production and energy costs
- Trainees from each country in the region
- Local transportation, secretarial support, offices and logistic support for the experts

5.2 UNIDO inputs

- Experts
  * Expert in shell processing with marketing experiences (4 M.M.) US$40,000.-
  * Expert in shell meat processing with marketing experiences (6 M.M.) US$60,000.-
  * Expert in project planning and economic/financial studies (3 M.M.) US$30,000.-
  * Expert in resources survey/stock assessment especially for shells (8 M.M.) US$80,000.-

* Expert in shell/shell meat product trade and market information system (3 M.M.) US$30,000.-

- Equipment
  * Shell processing equipment US$20,000.-

  * Shell meat processing and packaging equipment with packaging materials US$50,000.-

  * Training aid (test devices/measuring tools) US$10,000.-

  * Book and text papers US$10,000.-

- Miscellaneous
  Printing manuals and reports etc and other sundries US$10,000.-

Total US$340,000.-

Annex 2

Cost Benefit Analysis

As proposed 25 projects can be categorized to several groups based on target products and/or raw materials other than some individual projects, cost benefit analysis is carried out for these categories or individual case.

1. Smoked fish group

   Five projects ; No.1, No.6, No.14, No.19 and No.20 are categorized in this group. Operation model is set up and analyzed on annual operation basis. Detail analysis and comments are shown in the attached paper ; **Analysis Case 1.**

2. Processed shellfish meat group

   Two projects ; No.2 and No.7 are categorized in this group. Operation model is set up and analyzed on annual operation basis. Detail analysis and comments are shown in the attached paper ; **Analysis Case 2.**

3. Trochus button group

   Four projects ; No.3, No.12, No.16 and No.21 are categorized in this group. However, there is a great variety in backgrounds of these projects in respect of present technical level, target processing level, etc. For example, Project No.3 targets initiation of trochus button blank and Projects No.12 and No.16 target level-up processing final button from present button blank.

   Export value of each product based on 1 tonne material is as follows ;

Trochus material	4,000 US$
Button blank	5,000 US$
	(0.25 US$/piece x 200,000 piece/tonne)
Final button	9,000 US$
	(0.45 US$/piece x 200,000 piece/tonne)

4. Handicraft group

   Two project ; No.8 and No.18 are categorized in this group. Considering that retail price of handicrafts depends on processing skill and design, cost benefit analysis for business operation is not easy. However, basic business viability is confirmed with considering the following points ;

1) Shortage of souvenir goods for tourists in many Pacific countries

2) Successful retailing of shell-origin souvenir items (mainly Philippine made) in many Pacific countries.

5. Beche-de-mer group

Two projects ; No.9 and No.24 are categorized in this group. As beche-de-mer marketing is a buyer's market, especially, of Hong Kong, it's very essential for producers to understand and satisfy the product specifications required by the buyer. These projects target increase of export value of beche-de-mer by improving and/or standardizing products' quality. For example, beche-de-mer from Fiji and Solomon Islands were exported to Hong Kong at half value of Singapore's products in 1988. In this sense, quality level-up of the Pacific beche-de-mer will be profitable.

6. Shark utilization group

Two projects ; No.10 and No.15 are categorized in this group. Sharks have been partially utilized by dried fin production. These projects target promotion of utilization of other portions of shark such as skin and meat. In this sense, raw materials are available as by-product of shark fin processing at very low cost. Then, it is very economical to utilize shark meat when consumers accept this meat. When tanned skin is used for materials for handicraft souvenir to tourists, there seems great possibilities to compensate the tanning cost.

7. Individual projects

1) Project No.4 ; Improvement of Chilled Fish Production in FSM

The project is to realize added value on chilled fish landed at Dublon Complex in Chuuk State by improving post harvest procedures. Considering FOB chilled fish price (1.1 US$/lbs.) from Palau to Guam and estimated FOB chilled fish price (1.35 US$/lbs. as 50% of retail price) to Hawaii, domestic retail fish price in Chuuk State at 0.75 US$/lbs. will gain 40 - 50% of added value by realizing export quality by improving post harvest procedures.

2) Project No.5 ; Sponge project in FSM

Though detail production cost for sponge is not clarified, sponge processing business seems to be viable considering its high survival rate in culture in Phonpei and its high retail prices as follows.

Retail price of dry sponge (US$/piece)

Diameter	In France	In Japan
less than 10cm	4.77	10.00
10 - 15 cm	11.30	19.50
more than 15cm	21.20	30.00

3) Project No.11 ; Pearl Oyster Culture and Pearl Production in Solomon

The project is to study its feasibility.

4) Project No.13 ; Reactivation of SPFC facilities in Vanuatu

The project is to study its feasibility.

5) Project No.17 ; Sea cucumber processing in Tonga

The project is to realize added value on processed sea cucumber in Tonga by improving processing and marketing procedures. Especially, as to fermented product of sea cucumber "Konowata", the project is very promising considering its high value in Japan (retail price : 300 - 400 US$/kg).

6) Project No.22 ; Fresh water clam processing in Fiji

The project is to promote export business of frozen materials to Japanese processors. The project is promising considering its retail price in Fiji (0.4 US$/kg) and estimated CIF price in Japan (6 US$/kg).

7) Project No.23 ; Seaweed flour project in Fiji

The project has great potential considering price difference between dried Eucheuma (800 US$/tonne) and seaweed flour (3,400 US$/tonne).

Analysis Case 1 : Smoked Fish Processing Business

1. Background

1) Analysis case is studies commonly for five projects of No.1 (Marshall), No.6 (Palau), No.14 (Vanuatu), No.19 (Tonga) and No.20 (Cook).

2) Business scale is designed as small scale one, as it were, cottage industry.

2. Conditions on analysis

Each condition is set up considering Pacific standard level and the present status as follows.

1) Raw material (wholesale price)

1.2 US$/kg is assumed from 70% value of the existing retail prices of reef fish such as 1.6 US$/kg in Marshall, 1.54 US$/kg in Palau, 1.4 US$/kg in Tonga and 0.6 NZ$/lbs. in Cook.

2) Smoke processing material

1.0 US$/kg for salt and 0.1 US$/kg for smoking wood chips are assumed as Pacific standard level.

3) Labour charge

1.5 US$/hour is assumed as Pacific standard level.

4) Physical input

0.4 US$/$m^3$ for water is assumed as Pacific standard level.

5) Factory supply

250 US$/year is assumed considering depreciation of simple smoke house (estimated initial cost : 1,000 US$)

6) Sales price

3.5 US$/kg is assumed from 70% value of the existing retail price of smoked reef fish such as 2.25 US$/lbs. in Marshall and 2.5 US$/lbs in Palau.

(Case 1)

3. Comments on results of analysis

1) Result

Annual expense	16,095 US$
Annual income	21,000 US$
Annual gross profit	4,905 US$ (30.7% against annual expense)
Profit from operation	3,105 US$ (19.7% against annual expense)

2) Comments

Though profit ratio of 19.3% from annual operation does not seem well enough considering banking loan charge of 15% as Pacific standard level and business risks, this business should better considered viable at the standpoint for developing cottage industry.

COST STUDY

PRODUCT : Smoked Fish

	Volume to be used	Unit Price US$	Amount US$	Remarks
A. Expense Materials				
Raw fish	10,000 kg	1.20/kg	12,000.-	50kg x 200 days
Salt	425 kg	1.00/kg	425.-	5% on materials
smoking materials	2,000 kg	0.10/kg	200.-	10kg x 200days
Packaging			100.-	4 carrying boxes (Circular)
Mtg. exp.				
Labor	1 person	3,000/yr	3,000.-	US$15.-/man/day x 200 days
Water	3,000 m^3	0.40/m^3	120.-	1.5m^3/day
Factory Supply			250.-	Equipment cost & Depreciation
Sub. Total			16,095.-	
B. Income Sales	6,000 kg	3.50/kg	21,000.-	Yield : 60%
Gross Profit			4,950.-	30.7% on expense
Salling Exp.			600.-	Transportation/ Clean up $50/month
Marketing Exp.			1,200	Sales promotion/ Distribution $100/month
Profit from Operation			3,105	19.3% on expense

Note : 1. Product will be sold in the domestic market.
2. This was studied on an annual basis.

Analysis Case 2 : Shell Meat Processing Business

1. Background

1) The analysis case is studied commonly for two projects of No.2 (Marshall) and No.7 (Palau).

2) Business scale is designed as small one because a large capital expenditure is not necessary for at starting up the operation and considering resources protection.

3) Therefore, processing method is simple without a sterilization equipment. The product is preserved with salt and acid treatment.

2. Conditions on analysis

Each condition set up considering Pacific standard level and the present status as follows ;

1) Raw material

6.6 US$/kg is from the existing retail price of redlipped strombus meat (6.6 US$/kg) and giant clam meat (5.0 US$/kg) in Marshall.

2) Sub-materials

1.0 US$/kg for salt, 18.0 US$/kg for lactic acid and 16.0 US$/kg for citric acid are assumed as Pacific standard level.

3) Packaging material

For grass jar (net weight 115gr/jar) with shipping case (12 jars/case), 0.5 US$/jar is assumed as import price.

4) Manufacturing expenses

1.5 US$/hour for labor cost, 0.2 US$/KWH for electricity and 0.4 US$/$m^3$ for water supply are assumed as Pacific standard level.

5) Factory supply

500 US$/year including depreciation of simple capper, small sanitation table/tank and processing tools are assumed as normal in the Pacific area.

(Case 2)

6) Sales price

2.2 US$/jar (net 100gr, FOB) is estimated based on 40% value of the existing retailer price 5.7 US$/100gr in Okinawa market.

7) Selling/Marketing Expenses

The total US$6,000.- for those expenses should be provided to carry out a smooth sales/marketing operations concerning this type of product.

3. Comments on results of analysis

1) Results

Annual expenses	US$43,260.-
Annual Income	US$59,400.-
Annual Gross Profit	US$16,140.- (37.4% against annual expense)
Profit from operation	US$10,140.- (23.5% against annual expense)

2) Comments

Profit ratio 23.5% from annual operation will be allowable in a small scale operation, but at the same time banking loan charge of 15% as Pacific standard level and business risk should be considered.

COST STUDY

PRODUCT : Bottled shell meat

	Volume to be used	Unit Price US$	Amount US$	Remarks
A. Expense Materials				
Shell meat	3,000 kg	6.60/kg	19,800.-	20kg/day x 150days
Salt	210 kg	1.00/kg	210.-	7 % on materials
Lactic Acid	30 kg	10.00/kg	540.-	1 % on materials
Citric Acid	2 kg	16.00/kg	320.-	
Packaging	27,000 Jars	0.50/jar	13,500.-	
In puts				
Labor	3 persons	2,250/yr	6,750.-	US$15.-/man/day x 150days
Energy	7,500 KWH	0.20/KWH	1,500.-	5KWHx10hrsx150days
Water	300 m^3	0.40/m^3	120.-	2 m^2/day
Factory Supply			500.-	Equipment cost + Depreciation
Sub. Total			43,240.-	
B. Income Sales	27,000 JAR (2,250 CTNS)	2.20/JAR	59,400.-	FOB US$26.40/CTN 12JAR/CTN Yield 90% on Raw meat
Gross Project			16,160.-	37.4% on expense
Selling Exp.			2,400.-	Transportation /Clean-up $200.-/month
Marketing Exp.			3,600.-	Sales promotion /Distribution warehousing $300.-/month
Profit from Operation			10,160.-	23.5% on expense

Note : 1. Product will be sold in the local tourism or Japanese markets.
2. This was studied on an annual basis.

Annex 3

SCHEDULE EXECUTED

A. Phase I filed survey

1989

Nov. 26 (Sun)	Lv. Tokyo, Ar. Guam
Nov. 27 (Mon)	Lv. Guam, Ar. Majuro
Nov. 28 (Tue)	Visits to Marshall Island Marine Resources Authority (MIMRA) Visits to Secretary of Foreign Affairs
Nov. 29 (Wed)	Visits to Office of Planning & Statistics Visits to MIMRA Visits to Robert Reimers Enterprises, Inc. Shipping Agency Visits to Majuro Fishing Base (Coldstorage & Inc plant) Visits to Fisherman Coop coldstorage, fishshop (Retailer) and supermarket (Gibson) survey
Nov. 30 (Thu)	Coastal survey 1st check point Enigu 2nd check point Calalin 3rd check point Majuro Bay area
Dec. 1 (Fri)	Visit to JICA/OFCF Office at MIMRA Visit to MIMRA Visit to U.S. Peace Corps Office Supermarket (RRE) survey
Dec. 2 (Sat)	Lv. Majuro, Ar. Pohnpei
Dec. 3 (Sun)	Internal meeting Visit to TEKETIK cold Storage Facilities Visit public fish Market Visit Sea Port Harbor Facilities
Dec. 4 (Mon)	Visit to New Capital Visit to Dept. of Resources & Development Visit Dept. of Technical Cooperation for Development

Dec. 4 (Mon)	Visit Dept. of External Affairs National Fisheries Corp. (NFC) FSM Trochus shell button factory (AHPW INC.)
Dec. 5 (Tue)	Visit to Pohnpei State Government Visit to Conservation & Resources Survellance Marine Resources Division. Dept. of R & D FSM
Dec. 6 (Wed)	Visit to Economic Development Authority Visit to AHPW INC. Visit to Dept. of R & D FSM Visit to Public Fish market
Dec. 7 (Thu)	Visit to Dept. of R & D FSM Final meeting Lv. Pohnpei, Ar. Chuuk
Dec. 8 (Fri)	Visit to Chuuk State Government, Dept. of Resources & Development, Chuuk Maritime Authority, OFCF Office at Dept. of R & D, and DUBLON Fisheries Complex
Dec. 9 (Sat)	Internal meeting
Dec. 10 (Sun)	Visit to OFCF Team Leader of Development Division.
Dec. 11 (Mon)	Visit to Dept. of R & D Dept. of R & D - Office of the Government Office of Planning and Statistics
Dec. 12 (Tue)	Visit to Office of Planning and Statistics Dept. of R & D Lv. Chuuk, Ar. Guam
Dec. 13 (Wed)	Lv. Guam, Ar. Tokyo

B. Phase II field survey

1990

June 31 (Wed)	Lv. Tokyo, Ar. Palau
Feb. 1 (Thu)	Visits to Marine Resources Division and Palau Fishing Authority (PFA)
Feb. 2 (Fri)	Survey at Yano's Market and OH'S Fish Market Visits to Fuji - Suisan Co., Ltd. and Palau International Traders Incorporated (PITI)
Feb. 3 (Sat)	Internal meeting
Feb. 4 (Sun)	Internal meeting
Feb. 5 (Mon)	Visits to Marine Resources Division
Feb. 6 (Tue)	Visits to Marine Resources Division for work up meeting and MMDC Lv. Palau, Ar. Guam
Feb. 7 (Wed)	Lv. Guam
Feb. 8 (Thu)	Ar. Brisbane, Lv. Brisbane, Ar. Honiara
Feb. 9 (Fri)	Visits to Ministry of Natural Resources, Visits to Ministry of Foreign Affairs & Trade Relation Visits to UNIDO Official Division, Solomon Taiyo Ltd. and FFA
Feb. 10 (Sat)	Visits to ICLARM
Feb. 11 (Sun)	Internal meeting
Feb. 12 (Mon)	Visit to Sunbing Enterprise Ltd., ACOR, Western Pacific Shells and QQQ Wholesales Co., Ltd.
Feb. 13 (Tue)	Visits to Solomon Taiyo (NORO base)
Feb. 14 (Wed)	Internal meeting Seaweed Fisheries Project Manager of

	Fisheries Division
Feb. 15 (Thu)	Visits to Melanesian Traders Company
	Visits to JOVC Office
	Visits to Embassy of Japan in Solomon Islands
	Visits to School of Marine and Fisheries Studies
	Visits to National Fisheries Development Ltd. (NFD)
	Visits to DAIDO (Solomon Is) Ltd.
Feb. 16 (Fri)	Wrak up meeting at Ministry of Natural Resources Division
Feb. 17 (Sat)	Internal meeting
Feb. 18 (Sun)	Internal meeting
Feb. 19 (Mon)	Visits to Fisheries Department
	Visits to National Planning and Statistics Office
	Staff of ORSTOM
Feb. 20 (Tue)	Visits to Ministry of Agriculture, Forestry and Fisheries
	Visits to Economic Cooperation Division
	Visits to Part Vila Fisheries Ltd., {NATAI}
Feb. 21 (Wed)	Visits to Fisheries Department Santo
	Visits to South Pacific Fishing Co., Ltd.
	Visits to Santo Fish Market
	Visits to Fisheries Training Center Santo
	Visits to Melanesian Shell Products Ltd Santo
Feb. 22 (Thu)	Visits to Melanesian Shell Products Ltd.
	Visits to Hong Shell Products Co., Ltd.
Feb. 23 (Fri)	Wrak up meeting at Fisheries Department
Feb. 24 (Sat)	Internal meeting
	Lv. Port Vila, Ar. Nadi
Feb. 25 (Sun)	Proceed from Nadi to Suva
Feb. 26 (Mon)	Internal meeting
	Lv. Suva

Feb. 27 (Tue)	Ar. Tongataku
	Visits to Foreign Affairs
	Visits to Labor Commerce and Industry
Feb. 28 (Wed)	Visits to Fisheries Division
	Visits to Survey and Natural and Resources
Mar. 1 (Thu)	Visits to Handcrafted South Seas Jewelry
Mar. 2 (Fri)	Visits to Small Industries Center
	Visits to Maritime Projects Tonga Ltd.
Mar. 3 (Sat)	Internal meeting
Mar. 4 (Sun)	Internal meeting
Mar. 5 (Mon)	Wrak up meeting at Labor Commerce and Industry
Mar. 6 (Tue)	Internal meeting
Mar. 7 (Wed)	Lv. Tonga, Ar. Suva, Lv. Nadi
Mar. 6 (Tue)	Cook Islands
	Ar. Rorotonga
Mar. 7 (Wed)	Visits to Ministry of the Marine Resources
Mar. 8 (Thu)	Visits to Ministry of Foreign Affairs
	Visits to Ministry of Planning & Economic Department.
Mar. 9 (Fri)	Visits to Ministry of the Marine Resources
Mar. 10 (Sat)	Internal meeting
Mar. 11 (Sun)	Hold a meeting with MMR staff
Mar. 12 (Mon)	Lv. Rorotonga, Ar. Aitutaki
	Field Survey
	Habitat of Trochus niloticus and Giant clam farm
	Visits to Aitutaki Counselor House
Mar. 13 (Tue)	Internal meeting
Mar. 14 (Wed)	Visits to Meet Co.
	Visits to Food Land
	Wrap up meeting at MMR.
	Lv. Rarotonga
Mar. 15 (Thu)	Ar. Nadi
Mar. 16 (Fri)	Visits to Fisheries Division

	visits to UNIDO office
Mar. 17 (Sat)	Internal meeting
Mar. 18 (Sun)	Internal meeting
Mar. 19 (Mon)	Visits to TASU Ltd.
	Hold meeting with Rabi Donker at FAO office
	Visits to Satrana Vnilines
Mar. 20 (Tue)	Internal meeting
Mar. 21 (Wed)	Visits to S.S.P. Seaweed (South Pacific) Ltd.
Mar. 22 (Thu)	Visits to Yon Tong Button Manufacturing Ltd.
Mar. 23 (Fri)	Visits to FAO office
Mar. 24 (Sat)	
Mar. 25 (Sun)	Internal meeting
Mar. 26 (Mon)	Visits to Fisheries Division
Mar. 27 (Tue)	Visits to Ministry of Trade and Commerce
Mar. 28 (Wed)	Lv. Suva, Ar. Levuka
	Visits to PAFCO
	Lv. Levuka, Ar. Suva
Mar. 29 (Thu)	Wrak up meet at UNIDO office
	Visits to Embassy of Japan
Mar. 30 (Fri)	Visits to Fiji Trade & Investment Board
Mar. 31 (Sat)	Internal meeting, Market Survey
Apr. 1 (Sun)	Internal meeting
Apr. 2 (Mon)	Meeting with Taraba, at FAO office
Apr. 3 (Tue)	Market Survey
	Actual Processing trial
Apr. 4 (Wed)	Collection of information materials
Apr. 5 (Thu)	Final internal meeting
Apr. 6 (Fri)	Lv. Suva, Ar. Nadi
Apr. 7 (Sat)	Lv. Nadi via Auckland, Ar. Tokyo

Annex 4

LIST OF PERSONS CONTACTED

1. Republic of the Marshall Islands

Mr. John Bungitak	Acting Director, MIMRA (Marshall Islands Marine Resources Authority)
Mr. Steve Muller	Executive Director, MIMRA
Mr. Paul Tonyokwe	Assistant Secretary, Ministry of Resources and Development
Mr. P. T. Fujisaki	Fisheries Expert, JICA
Mr. S. Hiwatashi	Team Leader, OFCF
Mr. J. B. Kabua	Secretary of Foreign Affairs
Mr. M. T. Kaminaga	Under-Secretary of Foreign Affairs
Mr. J. D. Lemari	Chief Planner, Office of Planning & Statistics
Mr. H. M. Gunasekera	Chief Technical Adviser
Mr. R. V. Alfred	Fisheries Officer, MIMRA
Mr. S. Tomijuka	Shipping Agency Manager, RRE Inc.

2. Federated States of Micronesia

1) Pohnpei State

Mr. George Soewin	Business Adviser, UNDP/UNIDO
Mr. Andon L. Amaraich	Secretary of External Affairs
Mr. Marcelino K. Actouka	Secretary of Resources and Development Department of FSM
Dr. William I. MOrrison	Chief Technical Adviser/UNDP, OPS. of FSM
Mr. James T. Movick	Executive Director, National Fisheries Corporation (NFC),
Mr. Bumio Silbanuz	Administrator, Commerce & Industry
Mr. Mike Gawel	Administrator, Marine Resources Department of Resources and Development

Mr. Moses Nelson	Fisheries Specialist, Marine Resources Division FSM
Mr. Richard A. Croft	Fisheries Specialist, Marine Resources Division FSM
Mr. Pedro S. Harris	Executive Director, Economic Development Authority
Mr. Samson Pratruck	Foreign Service Officer, External Affairs
Mr. Tash Ludwig	Chief, Marine Resources, Pohnpei State
Mr. E. Flinn Curren	Fishery Specialist, Marine Resources, Pohnpei State
Mr. Christer S. Friberg	Commercial Fishery Adviser, NFC
Mr. H. Honda	Fisheries Development Adviser, NFC

2) Chuuk State

Mr. Manny Sonis	Administrative Officer, Department of Resources and Development (DRD) R & D
Mr. Mark Mailo	Manager, Chuuk Maritime Authority
Mr. Ruphin Micky	Fisheries Officer, DRD
Mr. S. Kawakami	Team Leader, OFCF
Mr. M. Oikawa	Fisheries Expert
Mr. Marion Henry	Deputy Director, DRD
Mr. R. S. Mori	State Planner, Office of Planning & Statistics

3. Palau

Mr. David K. Idip	Director, Bureau of Resources and Development (BRD)
Mr. Noah Idechong	Assistant Fisheries Officer, BRD
Mr. Seiji Nakaya	OAFIC
Mr. Franny Reklai	Manager, Palau Fishing Authority
Ms. Reina Yano	Yano's Market

Mr. Masashi Kubota	Director President, Fuji Suisan Co., Ltd.
Mr. Hitoshi Kubota	Fuji Suisan Co., Ltd.
Mr. George G. Uy II	Vice-President and General Manager, Palau International Traders Inc.
Mr. Gerald A. Heslinga	Manager, Micronesian Mariculture Demonstration Center, Marine Resources Division

4. Solomon Islands

Mr. Albert Wata	Chief Fisheries Officer, Fisheries Division, Ministry of Natural Resources
Mr. Michael Batty	Fisheries Extension Adviser, Fisheries Division, Ministry of Natural Resources
Ms. Nairy Alamu	Chief of America & UN Section, Ministry of Foreign Affairs & Trade Relation
Mr. John Allen	Chief Technical Adviser, UNIDO
Mr. Masao Nakada	Operation Manager, Solomon Taiyo Ltd.
Mr. Philipp Muller	Director, Forum Fisheries Agency
Dr. John L. Munro	Director, South Pacific International Center for Living Aquatic Resources Management
Dr. Shigeru Shimura	Fisheries Adviser, Japan International Cooperation Agency
Mr. David Boardman	General Manager, Sun King Enterprise Ltd.
Mr. Hudson Leung	Manager, Import/Export ACOR
Mr. Johnson Kengalu	Managing Director, Western Pacific Shells

Mr. Masashi Ikeno	Chargé d'Affaires a.i. of Japan
Mr. Henry F. Quan J. P.	Managing Director, QQQ wholesale Ltd.
Mr. Norikatsu Ise	Noro Base Manager, Solomon Taiyo Ltd.
Mr. Higurashi	Canning Plant Manager, Solomon Taiyo Ltd.
Mr. M. Smith	Seaweed Fisheries Project Manager, Fisheries Division
Mr. Sam Iro	Supervisor, Melanesian Traders Company
Mr. Masaaki Nakamura	JOVC
Mr. Colin C. Brown	Senior Lecturer, School of Marine & Fisheries Studies
Mr. Rob Cumbes	Head of School, School of Marine & Fisheries Studies
Mr. Hiroshi Kida	Acting General Manager, National Fisheries Development Ltd,
Mr. Patson Fulaburi	Manager, DAIDO (Solomon Is.) Ltd.

5. Vanuatu

Mr. Wyciff Bakeo	Director of Fisheries, Ministry of Lands, Minerals & Fisheries
Ms. Drothy Denneth	Fishery Economist, Ministry of Lands, Minerals & Fisheries
Mr. Stan Comles	Planning Officer, National Planning & Statistics Office
Mr. Bruno Markaudise	ORSTOM
Mr. Gilbert David	ORSTOM
Mr. Albert Leodora	1st Secretary, Ministry of Agriculture, Forestry & Fisheries
Mr. William John Bunyan	Desk Officer, Economic Cooperation Division, Ministry of Foreign Affairs & Juridical Services

Mr. Larry Vallance	Fisheries Consultant, NATAI Port Vila Fisheries Ltd.
Mr. Niel Crysler	Senior Extension & Executive Officer, Fisheries Department Santo Office
Mr. Eisei Ishikawa	Managing Director, South Pacific fishing Co., Ltd.
Mr. Georges Joe	Assistant Manager, Melanesian Shell Products, Ltd.
Mr. Jong - Kook, Hong	Director, Hong Shell Products Co., Ltd.
Mr. Brian Mandes	Santo Fisheries Training Center

6. Tonga

Mr. Viela Tupou	Senior Assistant Secretary, Foreign Affairs
Mr. Desh B. Sahae	UNIDO Chief Technical Adviser, Labor Commerce & Industry
Mr. Semisi Fabahau	Principal Fisheries Officer, Fisheries Division
Mr. Taniela Tukia	Physical Planner
Mr. Mickey Guttenbeil	Handicrafted South Seas Jewelry
Ms. Katalina Muti	Black Coral Factory
Mr. Leonard Niit	Captain, Managing Director, Maritime Projects tonga Ltd.
Mr. Lennie Niit	Captain, Maritime Projects Tonga Ltd.
Mr. Mosese Fuko	Director, Fuko Fisheries Enterprises

7. Cook Islands

Mr. David Zoutendyk	Research Officer, USAID
Mr. Kelvin Passfield	Research Officer, Marine Resources
Mr. Toshio Miharu	United Nations Volunteers
Mr. Aukino Tairea	Secretary, Foreign Affairs
Mr. Reuben W. Tylor	Director South Pacific Trust Corporation Ltd.

Mr. Ron Powell	Retired SPC Fisheries Officer
Mr. Julian Dashwood	Secretary Marine Resources
Mr. Ned Howard	Fisheries Research Officer Marine Resources
Mr. John Wichman	Food Land Super Market
Mr. Brett Porter	Meat Co.

8. Fiji

Mr. Surendra Sewak	Director, Fisheries Division, Ministry of Primary Industries
Dr. Tim Adams	Principal Fisheries Officer, Fisheries Division, Ministry of Primary Industries
Mr. Nobuo Itoi	JICA Expert
Mr. Fernando Z. Vicente	Country Director, South Pacific Region, UNIDO
Mr. Gerald T. Russo	Managing Director, TASU Ltd.
Mr. Hugh Walton	Rabi Donker
Mr. Shardha Nand	Owners Representative, Safrana - Unilines
Mr. Simon Henderson	Director/Manager, S.S.P. Seaweed (South Pacific) Ltd.
Mr. Henry Yuen	Director, Yon Tong Button Manufacturing Ltd.
Mr. Nick Tracket	Fisheries Programme Officer, South Pacific Regional Fishery Suppont Programme FAO/UNDP
Mr. Hideyuki Tanaka	Regional Aquaculturist, South Pacific Aquaculture Development Programme FAO/UNDP
Mr. Luke Rokovada	Deputy Secretary, Ministry of Trade and Commerce
Mr. Hideyuki Ohta	Area Programme Officer, Asia & Pacific Programme, UNIDO
Mr. Boris Galat	Industrial Development Officer, UNIDO

Mr. Mitieli Bula Baleivanualala	General Manager, PAFCO
Mr. Jagdish Narayan	Deputy General Manager, Finance/Administration Secretary PAFCO
Mr. Sadao Mimura	(JICA) Management/Advisor Freezer Department PAFCO
Mr. Kimikazu Okamura	(JICA) Management/Advisor Canning Department PAFCO
Mr. Toshio Isogai	Ambassador Extraordinary and Plenipotentiary, Embassy of Japan
Mr. Tomoki Nitta	Second Secretary, Embassy of Japan
Mr. Surendra Sharma	Director, Fiji Trade & Investment Board

Annex 5

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A. General

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Annex 6

Formation and Progress of the Mission Team

1. The Mission Team originally comprised the following two experts from Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC) ;

1) Mr. Yasumasa Matsuzaka,
Team leader/Marine Resources Processing Technologist.

2) Mr. Kenichi Kikutani,
Marine Resources Processing Engineer.

The field survey schedule was split into two phases. Phase 1 survey was conducted by the above two members in Marshall Island and FSM (Pohnpei and Chuuk States) from November 26 to December 13, 1989.

2. Phase 2 survey was carried out from January 31 to April 7, 1990 covering the remaining six countries - Palau, Solomon Islands, Vanuatu, Tonga, Cook Islands and Fiji. In Phase 2, survey Dr. S. McElroy participated in the Mission as regional coordinator staff of the Mission based on the suggestion of the Forum Fisheries Agency.

3) Dr. Seamus McElroy,
Market Adviser, Forum Fisheries Agency

3. After the field survey, the three mission members had a meeting with Mr. F.Z. Vicente, Country Director, South Pacific Region, UNIDO Suva and Mr. B. Galat and Mr. H. Ohta, officer in charge of the project in UNIDO Headquarters to discuss the project findings and reporting at UNIDO office in Suva. Direction for report preparation and a skeleton of the report were finalized and agreed to by the all attendants at the meeting.

4. The scheduled travel itinerary and field work were completed without major problems. Dr. S. McElroy's assistance in the actual execution of both to travel and field work was valuable.

5. In Fiji, Mr. Y. Matsuzaka, Mr. K. Kikutani and Dr. S. McElroy exchanged information and opinions obtained during the trip which was very useful for report preparation. Nevertheless full responsibility for this report is borne by Mr. Y. Matsuzaka. Some editorial assistance on the draft final report also provided by Dr. S. McElroy.

Annex 7

Fisheries Assistance in the Selected Pacific Countries

Tables are quoted from the Report of Joint Fisheries Strategy Mission on Opportunity for Fisheries Development Assistance in the South Pacific by FFA, SPC, UNDD, FAO, USAID and BDDP.

FISHERIES ASSISTANCE TO MARSHALL ISLANDS

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
?	?	Outer Island Fisheries Development	16,620,000	5 years	
?	?	Mariculture laboratory	567,000	2 years	
?	?	Training Programs	175,000	5 years	
?	?	Reactivation of Old Co-operative	61,000	-	
?	?	Foreign Fishing Base	50,000	-	
?	?	Outer Island Rearing Ponds	200,000	4 years	
?	Ongoing	Surveillance/Monitoring	3,790,000	1987-92	Tied compact funds
?	?	Resource Assessment - Majuro	725,000		
?	?	Deepening Channel	55,000	2 years	
?	?	Small Boat Basin	410,000	3 years	
?	?	Resource Development Vessel	635,000	-	
?	?	Ebeye Development Projects	663,000	3 years	
?	?	Project Operations Center	435,000	2 years	

FISHERIES ASSISTANCE TO FEDERATED STATES OF MICRONESIA

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
		National Government Projects			
?	Ongoing	N.F.C. shore facilities development	6,500,000	1985-89	
?	"	Fisheries data system	100,000	1985-89	
?	"	Marine poisoning investigations	20,000	1985-89	-
?	"	Turtle tagging	65,000	1985-89	-
?	Proposed	Resource assessment (boat charter)	1,000,000	2 years	Awaiting funding
?	"	Yellowfin tagging	50,000	1 year	Supplementary work required from SPC
?	"	Aquaculture centre	1,313,000	4 years	Awaiting funding
?	"	Training	500,000	1985-89	" "
?	"	Marine Studies Programme	500,000	1985-89	" "
?	Proposed	National Fish. Co. feasibility study	80,000	1 year	Awaiting fundin
?	"	Fish handling & processinh	150,000	2 years	" "
?	"	Purse seine feasibility study	80,000	1 year	" "
?	"	Sponge culture feasibility study	200,000	4 years	" "
?	"	Green snail culture trials	50,000	5 years	" "
?	"	Finfish culture programme	20,000	-	" "
?	"	Extension officer salaries	150,000	-	Seeking assistance
?	"	Finfish exports programme			Awaiting funding
?	"	Trans-shipment study			" "
?	"	Cannery feasibility study			" "
?	"	Fishing vessel design			Possibly AIDAB
		Kosrae Projects			
Japan	Ongoing	Main fishery complex	546,000	1985-89	Mostly in place
"	"	Pole & Line boat & FAD system	308,000	1985-89	Need more FADs
"	"	Boatbuilding/engine assistance	29,000	1986-89	-
?	Proposed	Secondary fisheries complex	230,000	-	-
?	"	Crab/lobster stock assessment	30,000	1 year	-
?	"	Support for small-scale fisheries	45,000	1985-89	Perhaps USA assistance
?	"	Deep-bottom fisheries assessment	65,000	1985-89	" SPC "
?	"	Seaweed & giant clam culture	170,000	1985-89	First trials failed. Perhaps Japan to help

?	"	Training funds	100,000	1985-89	Possibly USA or Canada
?	"	Tuna longline trials	92,000	1987-89	Not yet funded - USNMFS?
?	"	Container transshipment system	500,000	1986	" " " -
?	"	Skipjack processing complex	-	-	Building in place
?	"	Fresh fish export market development	-	-	-

Pohnpei Projects

?	Ongoing	FAD programme	70,000	1985-89	need more
?	"	Assistance with fish exports	80,000	1985-89	-
?	Proposed	Reef conservation - staff training & equipment	50,000	1985-89	Not yet funded
?	"	Public education on marine conservation	75,000	1985-89	" " "
?	"	Commercial cold storage project	2,039,000	1985-89	" " "
?	"	Fishing boats joint venture	3,325,000	1985-89	Status uncertain
?	"	Turtle conservation	20,000	1985-89	Not yet funded
?	"	Seaweed promotion & extension	192,000	1985-89	" " "
?	"	Marine resource training	150,000	1985-89	" " "
?	"	Ice plant	25,000	1985-89	" " "
?	"	Equipment loans revolving fund	750,000	1985-89	" " "
?	"	Outboard repairs workshop & tech. assistance	110,000	1985-89	" " "
?	"	Marine supplies	85,000	1985-89	" " "
?	"	Prawn farming complex	-	-	Possibly from Taiwan
?	"	Black lipped pearl culture	-	-	-
?	"	Small boat fisheries complex	5,000,000	1988-89	Possibly from Japan
?	"	Processing complex & boats	20,000,000	1987-89	Private bank funding possible (E.D.A.?)

Truk Projects

?	Ongoing	Boat repair facility	100,000	1985-89	Half completed
?	"	Live bait production programme	75,000	1985-89	-
?	"	Outer island bait production	260,000	1985-87	-
?	"	FAD programme	75,000	1985-89	-
?	"	Training	85,000	1985-89	-
?	"	Fish production data collection	120,000	1985-89	Not yet funded
?	Proposed	Fishing co-operatives organization	800,000	1985-89	" " "
?	"	Mariculture re-seeding	235,000	1985-89	" " "
?	"	Pole & line vessels	1,200,00	1986-89	Perhaps from Japan

?	"	Purse seine charter	1,500,000	1 year	" " "
?	"	Ice chest production	70,000	1987-89	" " "
?	"	Harbor facilities	15,000,000	-	" " "
?	"	Purse siner purchase	4,000,000	1989	Depends on charter
?	"	Small-scale cannery	150,000	1989	Perhaps from PFDP
?	"	Dublon fisheries complex	9,000,000	1985-89	Reqd for expansion
?	"	Turtle enhancement programme	5,000	1985-89	Not yet funded
		Yap Projects			
?	Ongoing	FADs programme	125,000	1985-89	Japanese funding?
?	"	Kaday Harbour	750,000	1985-87	-
?	Proposed	Market dock	385,000	1987-89	Japanese funding?
?	"	Airport chiller	8,000	1988	Not yet funded
?	"	Ulithi complex	60,000	1986-87	" " "
?	"	Woleai freezer	5,000	1988	" " "
?	"	Vessel operations	1,000,000	1985-89	" " "
?	"	Giant clam hatchery	200,000	1987-89	" " "
?	"	Trochus survey	5,000	1988	" " "
?	"	Euchenma site survey	7,000	1988	Perhaps from Japanese
?	"	Milkfish fry survey	11,000	1988	" " "
?	"	Fish & lobster survey	32,000	1988	" " "
?	"	Fish survey - data collection	15,000	1985-89	Not yet funded
?	"	Euchenma culture	46,000	1985-89	" " "
?	"	Aquaculture research	495,000	1985-89	" " "
?	"	Fish dryers	100,000	1985-89	" " "
?	"	Turtle enhancement	55,000	1985-89	" " "
?	"	Baitfish production	300,000	1987-89	" " " - depends on tuna trials
?	"	Tuna trials	200,000	1985	Not yet funded
?	"	Fisheries loans	250,000	1985-89	" " "
?	"	Deepwater shrimp pilot project	50,000	-	" " "
?	"	Small boat design & construction	100,000	-	Perhaps from FAO/UNDP
?	"	Medium sized vessel trials (52')	300,000	-	" " Japan
?	"	Fisheries Training Academy	2,000,000	-	-
?	"	Fish market complex	-	-	-

FISHERIES ASSISTANCE TO PALAU

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
CANADA (ICOD)	"	Ocean Resources Management Fellowship	7,000	1986	
CANADA (ICOD)	"	Regional Plan Training Project	45,000	1988	Regional project
DOI	"	Mariculture Center Improvement	280,000	1987-88	Clam Hatchery
FAO/UNDP	Pending	Computer System Development		1988	
FAO/UNDP	"	Long Term Fellowship	10,000	1987	
FFA	"	Marine Resources - Organization view	6,000	1987	
IUCN/SPREP	"	Base Line Survey of National Reserve	11,000	1988	
JICA	"	Turtle Project (Equipment)	125,000	1987	
PFDF	Ongoing	Deep Water Shrimp Survey	*41,000	1987-88	
PFDF	Approved	Training Material on Clams	*45,000	1988	Sub Regional Project
PFDF	Completed	Small-Scale Cannery Feasibility	*45,000	1986	SubRegional Project
SPC	"	Data Collection Evaluation		1987	
SPC	"	Fish Handling Advisory		1987	
SPC	"	Master Fisherman Attachment		1987-88	
?	Proposed	Pearl Oyster Project	?	?	

* Includes required minimum 25% local matching fund

1. INSHORE FISHERIES MANAGEMENT PROGRAMS

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
?	Proposed	a) Management Expert Project	180,000	1988-90	
?	"	b) Fisheries Regulations Advisory	?	1989	FFA or FAO
?	"	c) Resource Surveys	?	1989	
?	"	d) Economic Analysis of Specific Fisheries	?	1989-90	
?	"	e) Recreational Fishing Project	?		
2. ORGANIZATIONAL REVIEW - MARINE RESOURCES					
?	Proposed	a) Economic Review of PFFA Operation	?	1988	FFA
?	"	b) Marine Resources Complex	?	1989	Planning Phase
?	"	c) Fisheries Legislation	?	1988	
?	"	d) PFFA Facilities Improvement	?	1988	
?	"	e) Safety at Sea Scheme	?		
3. MARICULTURE DEVELOPMENT PROGRAMME					
	Proposed	a) Economical Potential of Giant Clam Project	?	1988	
	Pending	b) Review of Overall Operation	?		
4. TRAINING PROGRAMME					
	Proposed	a) Diploma Training	?	1989	
	"	b) Fellowship Training	?	1989	
5. OFFSHORE FISHERIES DEVELOPMENT PROGRAMMES					
	Proposed	a) FAD Development Progamme	?	1988	UNDP/FAO
	"	b) Seamount Surveys	?	1989	

FISHERIES ASSISTANCE TO SOLOMON ISLANDS

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
ADB	Approved	Second Fisheries Development	5,300,000	1987-91	Loan
"	"	Improving National Fisheries Development Ltd.	235,000	1987	Technical Assistance
"	"	Rehabilitation of Sasape Marina Ltd.	74,000	N/A	Technical Assistance
AUSTRALIA	"	Fisheries Research & Development Facilities	630,000	1987-88	
"	"	Refrigeration Spares Project	148,000	1988	AIDAB funded
"	"	Purchase of 2 x 500 t Purse Seine Vessel	3,052,000	1987-88	Grant
"	"	Purchase of 2 x 500 t Purse Seine Vessel	13,194,000	1987-88	Loan from European Financial Investment Co.
"	"	Baitfish Research	373,000	1987-90	Through ACIAR
"	"	Principal Licensing Officer	N/A	1985-88	ASAS Staff
CANADA	Approved	Rural Fishing Groups	58,000	1988-89	Through ICOD
EEC	Completed	Forum Fisheries Building	768,000	1986	Completed
	Pipeline	Village Fisheries Enterprises	555,000	-	Under discussion
"	"	Tuna Tagging Programme	100,410	-	Under discussion. Through SPC.
FAO	Completed	Assistance in Fisheries Legislation	33,000	1986	Completed
"	Pipeline	Feasibility of Establishing Fishermen's Association	30,000	-	Under Review/TCP
ICLARM	Approved	Giant Clam Breeding Pilot project	530,000	1986-89	ICLARM Core funds and support
JAPAN	Approved	Noro Fisheries Development	49,000	1987	-
"	"	Noro Fisheries Infrastructure	5,908,000	1987-90	-
"	"	Coastal Bottom Fisheries Development	470,000	1988-89	-

NEW ZEALAND	Approved	Sasape Marine Ltd.	178,000	1987-89	Expert & training
UK	Completed	Chief Fisheries Officer	300,000	1977-87	Post localised
(BDDP)	Approved	Senior Fisheries Officer	196,000	1986-89	In post
"	"	Extension Adviser	228,000	1986-89	In post
"	"	Fishing Techniques Lecturer	280,000	1985-89	In post
"	"	ICLARM Giant Clam Project - Manager	280,000	1986-88	In post
"	"	Seaweed Project & Manager	280,000	1988-90	In post
"	"	Adviser to CFO	75,000	1988-89	Seeking candidates
"	"	Purse Seine Options Consultancy	92,000	1988	Underway
UNDP	Approved	Artisanal Boatbuilding	38,600	1986-88	Executed by FAO
"	"	Outboard Motors Supply	50,086	1986-87	Executed by ILO
"	"	Development of Rural Fisheries	28,600	1987-89	Executed by FAO
"/SPR	"	Fisheries Equipment Repair	33,500	1987	Executed by FAO
USA	Approved	Cyclone Uma Relief Funding	22,790	1987	-
(USAID)	"	Training Assistance	2,900	1987	-
"	Proposed	National Fisheries Development Ltd. Fleet Maintenance	418,000	1988	-
"	"	Honiara Fish Market	40,000	1988	-
"	"	Fisheries Consultant	20,000	1988	-
?	?	Marine & Fisheries Training	?	?	Not yet discussed within SICHE
?	?	School (SICHE) upgrading	?	?	Work initiated by SICHE
?	?	Assessment of Long Liners	?	?	-

FISHERIES ASSISTANCE TO VANUATU

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
ADB	Approved	Santo Part	5,750,000	1988-91	Loan
AUSTRALIA	Completed	Coconut Crab Study Phase I	98,000	1985-87	-
"	"	Upgrading Natai Fish Market Facilities Phase I	101,000	1986-87	-
"	"	Upgrading Santo Fish Market Facilities	77,000	1987	-
"	"	Promotional Materials	12,500	1987	-
"	Pipeline	Coconut Crab Study Phase II	249,000	1989-91	-
"	"	Fish Handling Leaflet (Airfreight)	2,000	1988	-
CANADA	Approved	Evaluation of UFDP	37,700	1987-88	-
"	"	Extension Offices in Ambae & Malekula	109,380	1987-89	-
"	"	Etelis Project Phase Ii	45,000	1987	
"	"	Advanced Overseas Training Courses	58,640	1987-88	Additional & alternative donor support possible
"	Pipeline	Support for Village Fisheries Meetings	24,300	1987-91	-
EEC (EDF)	Completed	Artisanal Fisheries Development - Volunteer Support	490,000	1984-87	
"	Approved	Village Fisheries Development Programme	210,710	1987-89	Spending balance of funds
"	"	Vessel Grant/Loan Scheme	246,210	1987-91	-
"	"	Establishment of 9 Extension Officers	765,440	1988-91	-
"	"	Establishment of 7 Gear Stores (with Japan)	24,570	1987-90	See also 'Japan'
"	"	Fisheries Extension Service & Training Centre Support Complex	1,386,000	1987-91	Grant
"	"	Evaluation of Fisheries Extension Service	42,600	1988, 1991	-

FAO/ UNDP	Approved	Fisheries Rehabilitation after Cyclone Uma	44,000	1987	-
"	"	Commercial & Industrial Fisheries Management Support	365,620	1987-91	-
"	"	FADs for Fisheries Research	26,500	1987	-
"	Pipeline	Relocation & Upgrading of Santo Boatbuilding Facilities	886,000	1987-88	Through UNCDF
	"	Boatyard Adviser	143,000	1988-91	After relocation project
FRANCE	Completed	Mangrove Study	2,000	1987	Through ORSTOM
"	"	Trochus Study	2,250	1987	-
"	"	Fish Trapping Study	2,000	1987	
"	"	Research Vessel Operational Costs I	9,270	1987	-
"	Approved	Technical Assistance to Aquaculture	122,000	-	-
JAPAN	Completed	Extension Touring Vessels (4)	603,170	1987	Grant aid 7393 million in total
"	"	Additional Vehicles	120,060	1987-88	"
"	"	Research Vessel & Equipment	150,980	1987	"
"	"	Training Vessel & Equipment	168,390	1987	"
"	"	Equipment & Plant for Port Vila Fish Landing	232,400	1987	"
"	"	Chandlery & Tools for Boatyard	28,180	1987	"
"	"	Gear Stocks for Revolving Fund	303,300	1987	"
"	"	Mobile Repair Vessel	176,740	1987-88	"
"	"	Equipment: Plant for Shore Based Facilities	186,700	1987	"
"	Approved	Luganville Store	N/A	1988	-
"	"	Establishment of 7 Gear Stores (with EEC)	24,570	1987-90	See also 'EEc'
	"	Island Fish Preservation Plant & Equipment	276,580	1987-91	-
NEW ZEALAND	Completed	Port Vila Fisheries Marketing Adviser	16,600	1984-87	-
"	Approved	Port Vila Fisheries Marketing Adviser & Dev. Asst.	261,000	1987-90	-

UK (BODP)	Completed	Technical Assistance to UFDP; Managers Field Officer	556,000	1982-87	
"	Approved	Extension Adviser	140,000	1987-89	
"	"	Training Officer	214,000	1988-91	Awaiting EEC project Invitation
"	"	Field Officer	140,000	1988-91	" " "
"	"	Sand Skipper Catamaran Project	45,000	1985-88	
USA (USAID)	Completed	Fisheries Rehabilitation after Cyclone Uma	43,735	1988	
	Approved	Improvement of Office Facilities	66,000	1988	-
	"	New Computer System	128,500	1987-88	-
	Pipeline	Research Equipment	12,750	1988	-
?	?	Identification & Operation Trials of Suitable Long Liner	?	?	Consider at end of Dev. Plan period
?	?	Integrated Research Programme	?	5 years	Possibly funded by France
?	?	Small Inboard Diesel Vessel Construction & Trials	?	?	Needed after Extension Service operational
?	?	Port Vila Fish Handling Expert (Tech. Assistance)	?	?	Needed towards end of Dev. Plan period
?	?	Fish Cannery Study & Trials/Other Product Forms	?	?	Consider at end of Dev. Plan period
?	?	Training - Overseas Study Tours & Short Courses	?	?	Various donors to be approached
?	?	Development of Palekula Fishing Base	?	?	Awaiting Van Govt. decision

FISHERIES ASSISTANCE TO TONGA

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
EEC	Ongoing	Faua Fisheries Harbour	41,000		
FAO/UNDP	"	Fishing Vessel	470,000		
FSP	"	Fisheries Development Project	41,000	1983-88	To be extended
JAPAN	Completed	Deep sea Fisheries Development	8,054,000		
JAPAN	"	Multi purpose Vessel	670,000		Received 1980
JAPAN	"	Artisanal Development - engines etc.	3,356,000	-	
JICA	"	Fish Marketing Development	5,487,000	-	
UNCDF	Completed	Artisanal Fisheries Development Boat	639,000	1985-88	

FISHERIES ASSISTANCE TO COOK ISLANDS

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS
AUSTRALIA	Proposed	M. Biologist	20,000	1988	Short term study of Manihiki Lagoon
CANADA	On-going	FAD materials	25,000	1988	FAD materials for Aitutaki FADs
FAO/UNDP	On-going	Marine Resources Dev. Project	166,000	1986-89	Master Fisherman training. FAD & Fishing equip. Work- boat hull
KOREA	On-going	Training	10,000 p.a.	1982-?	One man for three months in Korea.
	Proposal	Fishing gear	50,000 p.a.	1988-?	Already presented to Koreans 1987. Will hold talks in May.
NEW ZEALAND	Completed	Fish poster	10,000	1986-88	
	Proposed	Delimitation	50,000	1988-89 unclear	Offered hydrography but funding source
USAID	Completed	Computers	50,000	1986-88	
	On-going	Office Equipment and Improvements	14,000	1988	Some Equipment have been purchased
	On-going	FADs	51,000	1986-87-88	Only about ½ of allocation spent. Expanded prog. to outer islands will
	Completed	Workshop Equipment	25,000	1987	soak rest of funds, tools etc.
	Completed (renewal desired)	Research Equipment	38,000	1987-88	Northern group Pe project. (Renewal Research still required.
	On-going	Clam seeding	3,800	1988-89	Funds available but unused.
	On-going	Artisanal fish.	16,500	1987-88	Gear purchased then sold creating revolving fund.
	On-going	Pearl Oyster	41,000	1987-88	Rev. fund set up for pearl farm equip.
	Proposal	Fish market	300,000	1987-88	Purchase equip. & install joint venture

Proposal	M. Biologist	1987-88	D.Zoutnek I.Ded F Post
On-going	Work boat	1987-88	Vessel built Tonga. USAID supply motor. UNDP huli. On line end 1988.
Proposal	Fish boat	1988	Purchase albacore boat USA fish sou Raro.

FISHERIES ASSISTANCE TO FIJI

DONOR	STATUS	PROJECT TITLE	TOTAL FUNDING US$	DURATION	REMARKS POSSIBLE DONORS
?	?	Raviravi prawn farm extension	3,500	-	Possible donor FAO
?	?	Assessment of Fiji Aquaculture	7,000		ADB
?	?	Coral exploitation impact	10,000		SPREP
?	?	Traditional fishing methods	-	-	
?	?	Fresh water fishery dredging impact	-	-	FAO
?	?	Computer links to EDP	-	-	?
?	?	Database set-up	-	-	USAID
?	?	Rural aquaculture extension	-	-	USAID
?	?	Prawn/Fish polyculture trials	-	-	?
?	?	Rural aquaculture manuals in Hindi & Fijian	-	-	FAO/UNDP
?	?	Mariculture Centre on Makogai	-	-	ACIAR?
?	?	FAD deployment & monitoring (yearly)	-	-	JAPAN
?	?	Computer system for satellite imagery processing	-	-	USAID
?	?	Seaweed development in Eastern Division	-	-	NEW ZEALAND
?	?	Prawn feed-formulation	-	?	JAPAN
?	?	Aquaculture demonstration ponds	-	?	JAPAN
?	?	Computer replacements for market survey	-	?	USAID
?	?	Revolving fund for aquaculture	-	-	?
?	?	Lecture theatre and upgrade training hostel	103,000		JAPAN
?	?	Surveys on marine resources (eg. Trochus, Beche-de-mer, Deepwater snapper, Yellowfin etc.)	7,000		SPREP
?	?	Feasibility for marine reserves	10,000		UNDP
?	?	Publication of updated resource profiles	2,000		NZ
?	?	Upgrading of major ports at Lami and Labasa	690,000		AIDAB
?	?	Upgrading of smaller extension stations	345,000		JAPAN

?	?	Revolving fund commercial gear sales section	103,000	USAID
?	?	Upgrade of fisheries store room	70,000	AIDAB
?	?	Replacement tools for boatshed	34,000	JAPAN
?	?	Supply of engines and gear - rural fisheries training programme	345,000	JAPAN
?	?	Upgrade of shore to sea communications room	17,000	JAPAN
?	?	Upgrade licensing and surveillance	7,000	JAPAN
?	?	3 Law-enforcement vessels	41,000	?
?	?	Feasibility and design of multi-purpose boat	28,000	FAO
?	?	Building of above boats, a training course for selected fishermen	207,000	JAPAN
?	?	Upgrade of gear on new 28-footers	21,000	JAPAN
?	?	Fisheries 30-foot service vessel	21,000	AUSTRALIA
?	?	High-power chromoscope and satellite navigation	5,000	JAPAN
?	?	Re-organization of engineering and refrigeration sections	28,000	JAPAN
?	?	Upgrade tools for all engineering sections	34,000	?
?	?	3 Mobile workshops	62,000	?
?	?	Rural-sector training follow-up	7,000	SPC
?	?	10 replacement vehicles	69,000	KOREA
?	?	Mobile hoist for boatshed	28,000	AUSTRALIA
?	?	Upgrade lathe room	28,000	JAPAN
?		Non-commercial fishing gear demonstrations		JAPAN
?	?	Upgrade graphics and printing facilities	7,000	USAID
?	?	Replacement extension and collection vessels	41,000	AUSTRALIA
?	?	Dredging of Wainibokasi River	34,000	JAPAN
?	?	3 (simple) fish markets	41,000	USAID

?	?	Fund for fuel subsidy to fishermen	69,000	???
?	?	Ice-boxes to improve rural fish handling	34,000	JAPAN
?	?	Legal advice on review of Fisheries Act	7,000	FAO
?	?	Assistance on mapping traditional fishing	21,000	FAO
?	?	Prize for "Fisherman of the Year"	1,000	DIPL. MISSION/BUSINESS
?	?	Small outboard-powered boats to assist fish wardens fishing grounds	14,000	JAPAN
?	?	6 tuna vessels for IKA Corporation fleet	1,380,000	JAPAN/EEC
?	?	Expert advice to PAFCO	17,000	JAPAN
?	?	Cannery equipment for PAFCO	138,000	USAID
?	?	Training in export inspection and fish-smoking methods	7,000	FAO
?	?	Subsistence survey	10,000	FAO

CURRENT PROJECT FOR - FISH HANDLING AND PROCESSING IN PACIFIC REGION

1. Fish handling and Processing Officer (1 person)
   1987 - 1993
   Coverage 22 countries

2. Regional Postharvest Facility USP (2 people)
   Training by 2 people 1991 - 1994
   Research directed by SPC, FHPO

3. FAO/UNDP Regional Fishery Support Programme 1990 - 1991
   Economist/Management Consultants (4 M.M.)
   Post-harvest Consultant/Equipment (4 M.M.)

4. FFA Market Adviser (1 person)
   Economist/Marketing Adviser 1989 - 1991 - 1992
   Export/Domestic Market Development

5. UNIDO Short-term Project Consultants
   Fish Smoking
   Trochus Processing and Marketing

6. Other Projects
   Training Centre Santo Vanuatu
   Training Centre Solomon Islands
   Agriculture Training Centre Lae PNG
   USP, IMR (Diploma in Tropical Fisheries)

7. FAO/UNDP Regional Aquaculture Project
   Consultancy services for processing and marketing of aquaculture products - Trochus, Seaweed, Blacklip pearl, etc.
   (Upto 12 M.M consultancy/year 1987 Feb - 1992 Jan)

Source : Prepared by Dr. S. McElroy, FFA