

Fishing in Four Villages

In four villages described above, several types of fishing activities are undertaken. Some are intensively conducted as a routine others used to be or are employed only occasionally. Due to my short stay in each village, I could not obtain quantitative data on the frequency and catch of fishing activities. Table 4 is a brief summary of fishing techniques employed in each village.

Table 4 Fishing Techniques employed in Four Survey Locations

Village	Sp	B	Po	W	P	L	G	C
Port Olry	○	○	○	○	○	○	○	○
Uripiv	○	○	○	○		○	○	
Makatea	○		○				○	
Anelghowhat	○		○				○	

Sp: Spearing; B: Bow and Arrow; Po: Poison Fishing; W: Stone Weir;
L: Line Fishing; G: Gill Net; C: Cast Net

As for the traditional types of equipment, stone weirs appear to have been in common use. In Emae, a large stone weir (tu pwopwono), made of piled coral stones in a U-shape in the shallow lagoon, has been constructed. It is village-owned, and a communal fish-drive is organized. A large catch is expected annually around a yam harvest season (i. e., April) when a big low tide occurs. Similar types of stone weirs were also used elsewhere in the archipelago; i. e., nawor arutuwe in Uripiv, and neheichi in Aneityum, respectively.

Poison fishing is rather an universal strategy which can be manipulated in the freshwater as well as the saltwater. In the Pacific, seeds of Barringtonia and roots of Derris are important materials for extracting poison. David mentions existence of poisonous leaves in Vanuatu, but he did not provide detailed information. According to my interviews, both kinds of plant are employed for reef fish. In Aneityum fish poison (nenou) is conducted both by Barringtonia and Derris. In Emae (tutufa), only Derris is employed whereas on Uripiv and Port Olry (mapi) Barringtonia is exclusively used. Difference in use might be partly due to the availability of material plant on different island flora, and the close distribution of these two plants and techniques need to be further examined. Nets made of plant fibres are said to have been

employed for catching turtle and fish in Aneityum, but have been replaced by the introduced materials. Also, three types of fish trap are known in Aneityum but the details are unknown. In Vila, I also witnessed a cage trap brought from Ambrym Island. This may be used in freshwaters for catching shrimps and small fish.

As the modern fishing technique, several types of nets such as gillnets, cast nets are widely employed for catching reef fish. In particular, in Port Olry, at least 20-30 sets of gill net were owned by household and used for reef fishing. Spearing is one of the commonest technique which is manipulated by men. Line technique is also common, and in line with increasing demand for procuring high quality food fish and because of their being free from ciguatera toxin, bottom line technique is now gaining its popularity among local fishermen in these few years. This aims at demersal species such as red snapper and sea bream inhabiting 300 to 400 meters deep. Reels are important secondary gear to wind up and down line of a few hundreds metre long, but some local fishermen have given up to purchase it because of its high price.

Sex Division of Labour

In terms of sex division labor, marine exploitation seems to be men-oriented. For instance, in many societies the sea is regarded as men's activity area whereas land or garden is as women's part. In other words, men procure animal protein and women do carbohydrates. Such a division may be over-simplified, because there exists ethnographically various cases where women are included into maritime activities. In the Pacific where reefs and lagoon systems exist, littoral and shallow water zones are foraged by women and children for procuring daily recipes whereas off-shore waters and deep coral seas are exploited by men. A famous exception is a Trukese case of Central Caroline Islands of Micronesia where women engage in communal reef fishing whereas men work for gardening.

I examined sexual division of fishing activities according to four survey locations. Categories can be elicited into five, based primarily on Murdoch's classification [MURDOCH 1981] as follows:

- A: Performed exclusively by males
- B: Performed mainly by males, but females can also attend
- C: Equal or equivalent contribution by both sexes
- D: Performed mainly by females, but males can also attend
- E: Performed exclusively by females

Based on these divisions, individual fishing techniques are

classified according to informations from four villages and shown in Table 5.

Table 5 Fishing Activity and Sex Division of Labour

Work Type	A	B	C	D	E
Fishing Type					
Underwater Spearing	*				
Underwater Speargun	*				
Bow and Arrow	*				
Net Fishing	*				
Trochus/Greensnail	*				
Coconut Crab Collecting	*				
Troll Line	*				
Bottom Line	*				
Hand Line		*			
Stone Weir			*		
Poison Fishing			*		
Coconut Rope Sweep			*		
Octopus Spearing				*	
Shellfish Collecting					*

It is apparent that most of fishing activities are done by men. While octopus spearing is assigned as women's work, underwater spearing is men's part. Similarly, trochus and green snail collecting are done by male divers and shellfish collecting on the beach is women's important work.

On the other hand, processing, cooking, and sales of marine products in urban and local markets fall almost fully into women's work. Women's minor role in the production and dominant status in the marketing and consumption spheres, on the other, should be kept in mind.

CULTURAL ASPECTS OF MARINE RESOURCE USE

How marine organisms in the sea are served as useful resources varies considerably according to cultures. It is manifested not only in the cognitive realms, i.e., classification and folk knowledge, but also as actual behavioral patterns in the fishing techniques employed, distribution and consumption of marine resources, cooking, taboo observance and so on. In order to understand such a cultural diversity of resource use, several aspects of the native knowledge and behavior on marine resources are described. Examples are drawn from studies in four selected villages.

Native Ideas on Marine Resource

A general name for marine resources in Aneityum is numu or mu which includes shellfish (nesungamo), sea crabs (numu dalenget: crawling numu), fin-fish (numu sungan: numu with meat), sea-weeds (nelom), sea urchin (nevai and nuwocheu), octopus (nith), cuttlefish (nobechuw), squid (noni), Nautilus sp. (namu), and turtle (nahou). Nesungamo, numu dalenget, numu sungan, nelom, and nahou include further sub-categories. Most of marine life included within numu category are used as food, excepts beche-de-mer (nesiahao).

In Makatea of Emae Is., a general name for marine organisms is nea tai (things of the sea), and it includes fish (ika), shellfish, octopus (feke), spiny lobster (ula), sea urchin (sawaki and watuke), sea algae (rimu), turtle (fouu), and beche-de-mer (makasun). All of these are also served as food.

In Uripiv, a generic name for food in the sea is mesal whereas that for land is nanen. Mesal includes fish (nai), and things on the reef (nal), the latter of which containing a variety of shellfish, sea algae, sea urchin, lobster, octopus, crab, turtle and so on.

Classification of marine resources are first, essentially hierarchical among societies examined; it is arranged from unique beginner to life form, and generic/specific categories at two or three levels. For an example, in Aneityum numu (marine life), numu sungan (fish), and neju (tuna) are interrelated in a hierarchical network as shown in Figure 6. Generic categories such as neju correspond to genera family or species in the Linnaean biological classification. Secondly, distinction between reef species and those of off-shore habitat appears to be common. In case of fish, prefix in shows that fish inhabit reef (in) such as in-mora and in-ieber, for instance. The idea to distinguish

food resources of the sea from terrestrial ones and to give an independent category is also found [cf. TITCOMB 1972; AKIMICHI 1981].

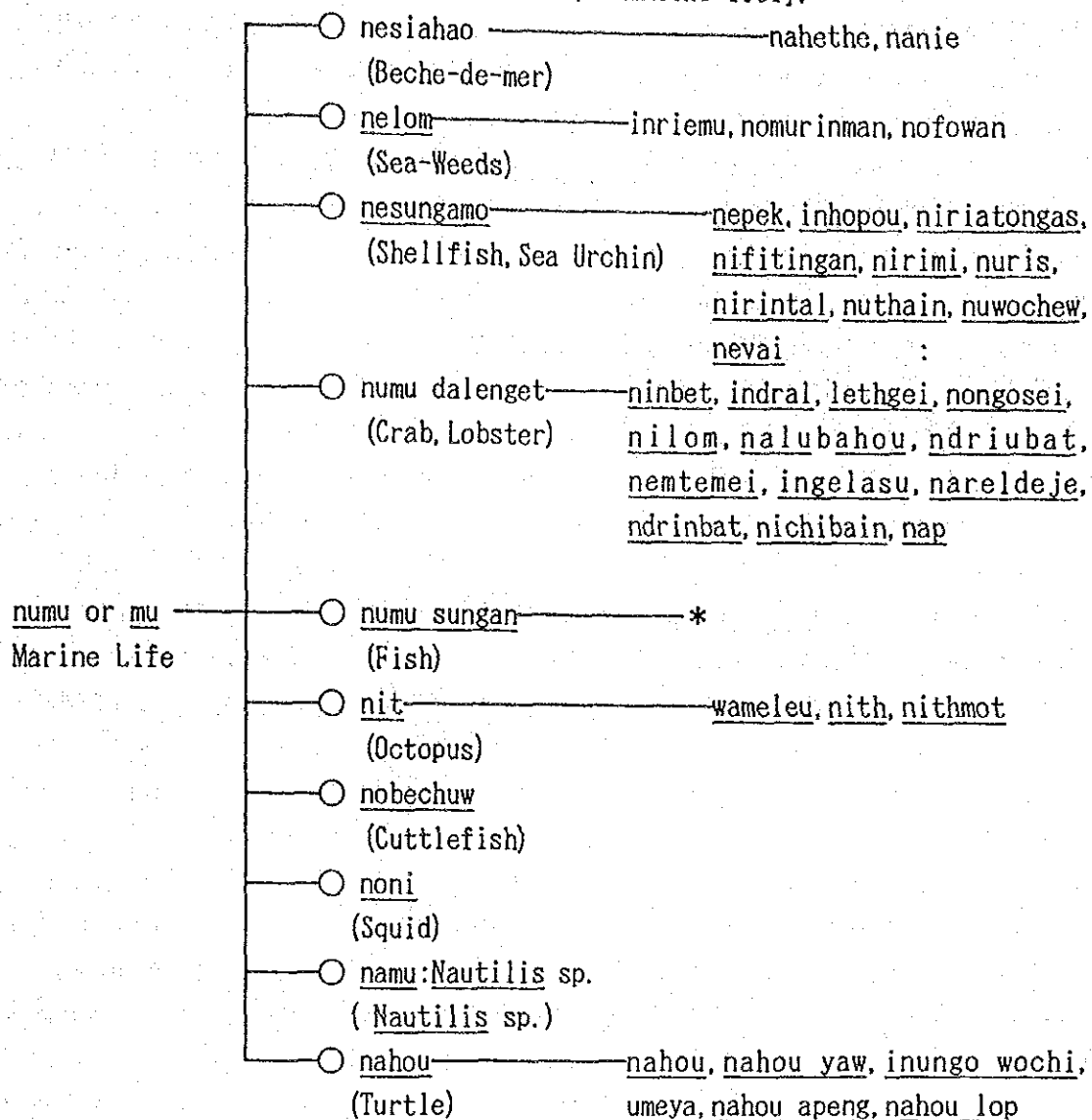


Figure 6 Classification of Marine Life in Aneityum

* : Include generic/specific categories at least shown as follows:

nepu geu, nar, nopom, nichilo, ndupumu, inuwaichi, waneneth, nouna, dadao, dageth, nekka, mayinbak, namataili, nipuchina mesei, nolai, nongon hat, naichi ngao, nekuro, nagaunet, nobon, nerop, nejeu, in-mobo, in-mathao, in-luwu, in-mokom, in-mal, in-mora, nowat, in-ieber, nem thaichi, nethom, mamoa, nupupou, nopuei, in-rekthania, nachaji, nagen dinevnev.

Edibility and Toxin

In Uripiv 's case, mesal and nanen are categories related to both biological and food domains whereas nai and nal are those related to biological ones, rather than food. Given a variety of marine resources,

there lies distinction between edible and inedible items of food in which numerous factors and logic are involved to distinguish between the two [AKIMICHI 1988]. Taboos on fish and anomaly of animals can be two good explanations to these [LEACH 1964; DOUGLAS 1957], but also certain biological reasons are often related.

Here, occurrence of ciguatera toxin in Vanuatu waters will be specifically mentioned as one of the biological factors to limit resource use by the people. Ciguatera is a kind of food poisoning caused by eating certain kinds of fish and animals from the sea. It brings about several physical symptoms such as dullness, skin itching and lashing, vomiting, headaches, but rarely causes death. Geographical distribution of ciguatera is widespread in the coral reef environments, but its occurrence is not uniform, but localized, to considerable degrees. Biological mechanisms involved remain to be in discussion and no definite explanation has been made so far.

In Vanuatu, ciguatera poisoning is very commonly found. Informants of my survey villages could identify specific kinds of fish as poisonous, among of which sea perch (Lutjanus spp.), jacks (Caranx spp.) are major groups. People used to discard them. Such poison is known as kalo in Port Olry, aru-eci in Uripiv, ekona in Emae, agen in Aneityum, as far as my study areas are concerned. Curing techniques are also known to remedy this sickness in case of accidental consumption. A list of poisonous fish species assigned by the people are shown in Appendix A.

According to the people in Emae, ekona or fish poisoning is associated with growth of specific kinds of corals (tuputupu fou) between April and December. Similarly, the Aneityum islanders recognized that poisoning of fish is derived from their feeding on soft corals which also causes itching on divers' skins. In any case the existence of ciguatera toxin in Vanuatu waters become one of the inhibitory factors in the development of coastal fishing and fish marketing.

Taboos and Specific Values on Fish

Despite abundance of edible fish, people often place taboos on eating certain kinds of fish, and in some cases, invest particular values on fish [FIRTH 1930, 1931; ANDERSON 1972; AKIMICHI 1981]. Sharks and sting-rays are often marked as forbidden to eat, and pregnant women or the sick cannot eat certain kinds of fish, for instance. Such ideas and practices are disappearing under the contemporary settings.

For an example, in Port Olry both sharks (tigaboke) and sting-rays (navali) are eaten. Similarly, on Makatea, sharks (mango) and sting-rays

(fai) are eaten whereas on Uripiv sharks (bae) and sting-rays (nui) are not eaten by all the villagers. This is due to traditional taboos, but the native explanation for this was not ascertained. In Aneityum, pregnant women cannot eat turtle, and small hermit crab. Native explanation to this is based on sympathetic magic and it associates the movement of turtle (moving around) and hermit crab (uneasy motion) with that of foetus in the uterus. Consumption of such animals is believed to cause still-birth or death of foetus in the belly. Flying fox is also forbidden for pregnant women. This is because of the association of flying fox's hanging behavior with the manner of difficulty in delivery.

During the ceremony and feasting, special kind of fish is often offered to specific persons or groups. On Uripiv, at the time of yam harvest, wedding ceremony and birthday of children, natiw fish (Naso unicornis), blue parrotfish, and bulbul welum fish (Hemipteronotus pavo) are dedicated to village chiefs. In Aneityum, heads of turtle and big fish are preferentially given to chiefs. Also on Makatea, when a big fish or turtle are caught, head of fish or a whole fish, forearms of turtles (re lima re honu) are offered. Offering of fish to chiefs and kings is also reported elsewhere in the Pacific [cf. TITCOMB 1972; AKIMICHI 1984].

Even from these few instances, it is suggested that symbolic association of fish species with people's religious ideas and taboos, as well as respect toward chiefs are important. The penalty for the violence of taboos and ignorance of them may often be social and ritual sanctions to those who commit them. Outsiders are not the exception, as a rule.

Cooking

Traditionally, fish and other kinds of sea food used to be processed by the use of various cooking methods. Cookery of fish and other marine organisms includes grilling, baking, eating raw, earth oven roasting, smoking, and so forth. To grill or bake fish on fires or using ashes is the commonest one. Use of earth oven is also a common technique. This is a kind of roasting food in a leaf wrapping, using heated stones and corals. In Vanuatu, earth-oven is prepared, especially in providing food for a number of people, i.e., feasting and ceremonial occasions. It is called laplap. Usually, the bulk of food which includes grated banana and taro as well as fish and meat, with a coconut milk flavour, is cooked in banana leaves wrapping.

Bamboo container is often used for roasting. Raw fish with lemon juice is preferred in some areas. Smoking does not seem to be common, but

in NATAI Fish Market in Vila smoked shark fillet was sold at the price of 750 VT per kg.

Table 6 Cooking Method of Fish and Other Marine Life

	Port Olry	Uripiv	Emae	Aneityum
Ash				*
Stone/Coral	*	*	*	*
Earth Oven	*	*	*	*
Raw		*	*	—
Smoking	—		—	—
Bamboo				*
<u>Laplap</u>	*	*	*	*

Blank shows that it was not ascertained.

It should be noted that fish and other marine life are generally used as daily cuisine while pigs, as well as other kinds of animals such as cattle and chicken are prepared for ceremonial and feasting occasions. This is not only for cultural significance attached to pork, but also due to the practical need for preparing a large amount of meat at one time. Lack of the lagoons and absence of big netting techniques also limit supply of the bulk of fish for consumption.

SEA TENURE IN FOUR VILLAGES

In Japan, sea tenure developed most conspicuously in terms of its complexity and historical/regional diversity. Although sea tenure in the Pacific area had not been reported in the anthropological documents and reports unlike land tenure issue which is one of the major topics for the social anthropological studies, reports and cases have come to be accumulated during this decade. This trend appears to be seen worldwide particularly after the claim of 200 nautical miles when coastal small-scale fisheries in many parts of the world have become to be shed light on.

In Vanuatu, studies on sea tenure are absolutely retarded, and even a monograph has been published, if compared with other south Pacific countries such as Solomon Islands, Papua New Guinea, for instance. This may be partly due to that fishing in Vanuatu were thought to be secondary

subsistence and has less potentials for development. As already pointed out in this paper, fishing in Vanuatu is characterized by the exploitation particularly of reef zones and benthic species. It suggests that sea tenure has nonetheless importance, as reefs and lagoons are reported as focus of sea tenure in many Pacific areas. In Melanesia, for instance, ownership of reefs and lagoons on a tribal basis is common. In north Malaita, Solomon Islands, the Lau people claims ownership over the extensive barrier reefs [AKIMICHI 1978]. On a small Island of Ponam, Manus Province in Papua New Guinea, the territorial sea is divided into many ecological zones and these are further sectioned into smaller ones, each of which are accordingly possessed by clans [CARRIER 1981]. In a Fijian society matangali is a basic unit of ownership of land and sea.

Broadly speaking, the situation in Vanuatu is similar. The sea is generally owned or regulated under certain types of rules. Reefs and lagoons are, for instance, owned by clans or a village as a whole and vice versa. Patterns of ownership and regulation vary according to the villages and areas concerned. Ideas and reason for such regulations are not unified. Here, I exhibit some examples of customary practices on the use of the sea and their changes in Vanuatu.

In general, reefs are owned by village, clans and groups of people within a community while access to deep waters seem to be free. Boundary of ownership is also defined as the boundary of each village. In Aneityum, the reef is generally called in but more specifically as moje (reef flat or lagoon). Seaward slope which often provide good fishing grounds is moje jom. Sea areas from the coast to as far as moje jom are considered as belonging to the island. However, the surrounding sea beyond the reef and as far as the people can sea land (in-beke) from a canoe at sea is thought to be looked after by themselves and termed as namelvei. Between the neighboring distant two islands, there lies an intermediate zone beyond namelvei, which does not belong to both of the islands. This mid-sea area is called nanau. In case of Aneityum nanau is situated to the north, beyond of which Tanna Island is. However, the sea to the south where no island is found, is called dubowanau by the Aneithum Islanders (Figure 6). This is just an example, but similar ideas on the division of the sea may be also found in other parts of Vanuatu.

In the past, ownerships of reefs in areas where I visited had their socio-cultural significances and permission to enter others' areas was normally requested, although it was a sort of reciprocal transactions, rather than strict rules.

Even at present, gift exchange becomes an important social media to

enable the people to use fishing territory belonging to others. For instance, in Uripiv of Malakula Is., yams, bananas, and taro in a coconut woven basket were used as a present to owners in taking authorized permission to fishing (ere suwol re nanen; food for thanks). In Emae such a food gift is called silitunu sia kavenga. In Aneityum those who wish to use fishing grounds of others used to bring taro as a payment (nemtan: pay for). Such gift exchanges are not, however, restricted only in marine resource use but also are operating within other economic, social and ritual contexts.

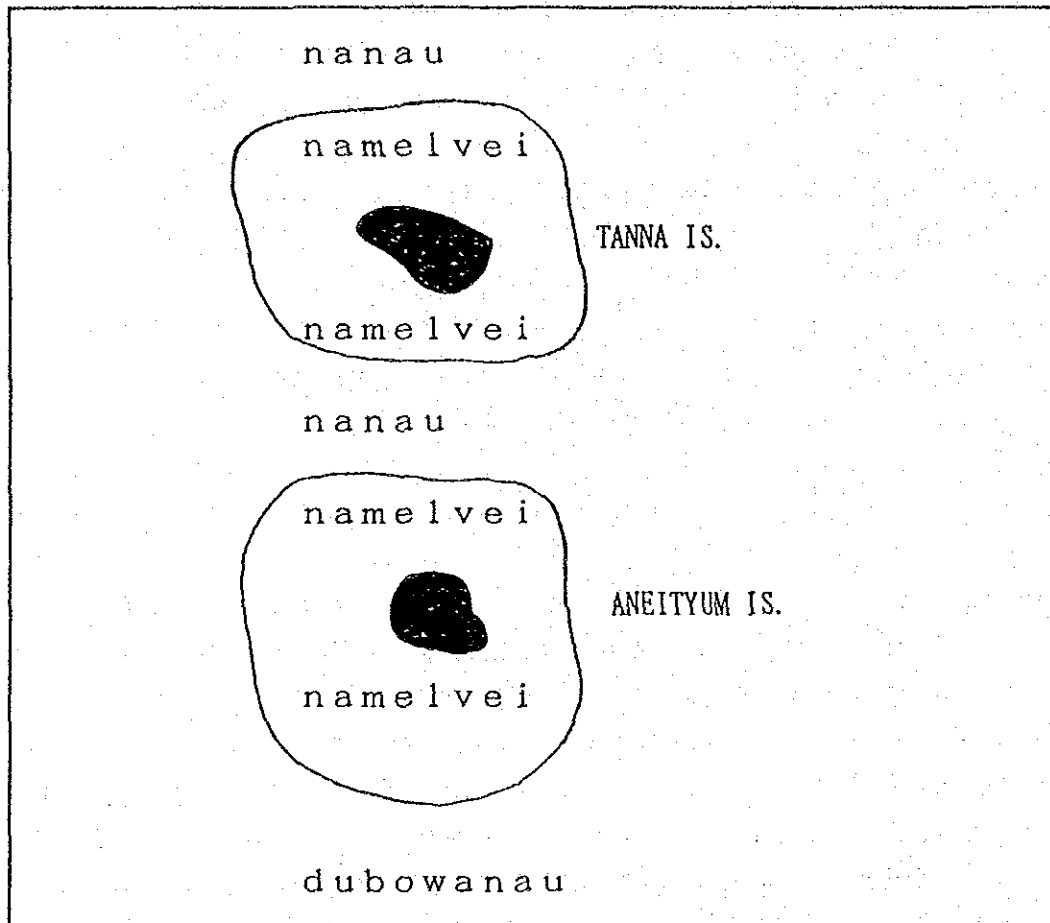


Figure A Schematic Map of Sea Areas of Aneityum and Tanna

Closing fishing grounds and banning to use certain types of fishing gear used to be and are also common tenuring behavior of the people even at present. For instance, in Emae reef fishing was banned for over a year (tapu ai fangota or sigolo; taboo) and in lifting such a tabooed period, a festival is undertaken (sangotfia re sigolo). Tapu is a Polynesian word which denotes forbidden. Fangota is a generic name for reef harvesting including collecting shellfish, poking octopus and dividing and netting and so on.

It seems to me that traditional type of sea tenure is composed of two aspects: one is the relatively loosely structured system of permission. Once given a gift or proposal, fishing was allowed as a result on request. Such reciprocal activities were widespread not only in fishing but also found in scenes of daily and ritual life of the people. The other is, on the contrary, the strict and village-based limit to access to particular fishing grounds during certain period of time. This was imperative to all the villagers and its claim was sometimes ritualized, rather than intended for ecological conservation. Thus it can be explained as having social function to strengthen chief's or bigman's political leaderships.

These two aspects do not, however, remain the same as it were, but have been changing under the contemporary settings. For instance, as due to the introduction of market economy and more practically since after the price of crayfish and Trochus shells have increased, regulations are often claimed in order to prevent over-fishing. For an example, in the Banks Islands, Trochus collecting was banned for three years. In Port Orly permission is required to collect trochus shell in the nearby islands of the village, and spiny lobster is completely banned to exploit due to the overfishing which occurred in the past several years. In Aneityum night-time diving was banned for harvesting spiny lobster quite recently in 1987. Collecting green snail was also banned for a year. This was agreed among the chiefs of the island and intended for conserving shell resource. Although it is not ascertained when this shell has come to be intensively harvested by the village people, ideas to conserve shell resources appears to be modern, rather than traditional.

These conservation means aimed for preventing resource depletion on the one hand but these need further consideration on the other. As villagers intend to obtain cash as much as possible, they tend to over-exploit using new techniques and tools such as speargun, nylon nets, and diving apparatus without any permission of and gift to owners of the sea. Banning or limit to access by chiefs and village leaders does not mean recognition of ideas of resource conservation, but of leaderships itself. By claiming crisis of resource depletion of the village-owned, leaders can obtain new type of respect and leadership. Although similar in appearance, conservation ethics is quite distinct between the so-called traditional and the modern phases. Decline of traditional reciprocal ideas and chaos of the traditional socio-economic network in the village thus give rise to this changes. Understanding of this must be important for policy makers and resource conservationists.

These regulations differ village by village which makes it difficult for the policy makers of the government to consider regulations and rules applied nationwide. In Vanuatu, size regulation is such a trial given to certain benthic species; coconut crab, spiny lobster, flat lobster, Trochus shell, Green snail, and Trumpet shell (Table 7). The penalty for collecting and selling under-sized resources is 100,000 VT charges. This regulation started since 1984. Unfortunately villagers are generally not accustomed to measure size of animals they catch. However, as size regulation is practically one of the important conservation measures, this should be promoted through educational and as a part of development program. Resources which has less or least commercial values should also be considered in terms of size regulations. However, the detailed information as to the use of such resources are absolutely lacking. Need for regulation is often realized only after such species are labelled as endangered. Aside from green snail, trochus and trumpet shells, conservation of Tridacna needs urgent research. Types of species of regulation in terms of size, fishing grounds, season and so on in other Pacific countries, and Okinawa (Japan) should also be examined.

Table 7 Size Regulation of Marine Resources in Vanuatu

English	Bishulama (Pigin)	Minimum Size
Coconut Crab	Krab Kokonas	9 cm
Spiny Lobster	Naura	22 cm
Flat Lobster	Flat Naura	15 cm
Trochus Shell	Trokas	9 cm
Green Snail	Grin Snel	15 cm
Trumpet Shell	Pupu Sel	20 cm

Source: Department of Fisheries, Ministry of Lnd, Mineral and Fisheries, Republic of Vanuatu 1984

Regarding possibilities of aquaculture of certain marine species, a few notes will be described. It has become apparent from recent studies that in many parts of the Pacific aquacultural activities have been traditionally undertaken, although scale being different from large-scale aquaculture of milkfish and mullet in Hawaiian Islands, to a temporary conservation of captured turtle within a fence in the shallow waters. In Vanuatu, however the idea to conserve resources intentionally appear to be

meager. Exceptionally in Aneityum I learned that the villagers used to stock harvested giant clam within an encircled coral rocks in the shallow lagoons. This is called niraheth and utilized during rough seas. Giant clam garden is also reported in Manus [JOHANNES 1982; AKIMICHI n.d.].

Also, it should be noted that there are educational potentials to villagers on the business of aquaculture. When we visited Aneityum Dr. Yamaguchi's explanation as to the biology of green snail stimulated villagers, and they wished to know more about it for the future. This simply suggests that local campaigning on the resource conservation and education about it will surely enhance potentials of future development and conservation.

FISHERIES ECONOMY IN TRANSITION

A Small reef fish is consumed personally by individual fishermen while deep-sea snappers are air-freighted to the town market or even to overseas countries. Thus, consumption patterns and flow of individual marine products vary according to the kind of target species concerned and depending on their economic values and gross economic condition of individual village. Below I will describe several aspects of fisheries economy, focussing on economic value difference of each marine resources or species.

Commercial Fishing and Marketability

Table 7 shows names and prices of fish dealt in the government-owned Natai Fish Market in Port Vila and Santo Fish in Luganville. Despite the existence of a variety of fish in the areas, only a few of them are registered as marketable. Also, there exists relatively small differences in the market value of each fish species. Among of all, live lobster attains the highest price (500 VT per kg), and coconut crab as 300 VT per kg. Unit price of fish remains constant throughout the survey period and it varies slightly between 170 and 120 VT according to the kind of fish. While the proportion of catch by weight shows great differences; major catch are demersal species in deep waters such as poulet, loche, snapper and sea bream, all of which are caught by bottom lines. Pelagic species is not a major target. Moreover, absence of reef fish in the list suggests that it is possibly due to the toxicity of them.

Where fishing industry is still under the developing stage, unit price of fish was fixed as constant regardless of the kind. In a government-owned small enterprise in Lakatoro, fish taken by a bottom line as well as by trolling around the island waters on the previous night were stored in an iced container of the office. All the fish were sold by the same unit price (200 VT per kg), although the consumer had pay 400 to 600 VT for one fish. In one example, 79.8 kg of fish were sold in a few hours.

Small-Scale Dealings

Although being small-scale, various types of economic activities are included, besides the above-mentioned. Through various types of organization such as small market, private company, middlemen, and even through interpersonal relations, different sets of marine

resources are manipulated. Although data was not systematically collected, such economic activities are mentioned below, based on the type of activity, and depending on the kind of marine resources.

a. Local Market

At the open market area in the town of Port Vila, women engage in sales of vegetable food. It includes cassava, banana, coconut, sugar cane, roots of kava plant, fruits, nuts and greens. While fish and meat, fresh and frozen, as well as tinned meat and fish, are sold at either NATAI or supermarkets in town. Land crab (150 VT per four), and bivalve shells are also sold at the market. One of the commonest kinds of shells or kokiyas cost 100 VT within a small basket.

Corners and alleys behind main streets are often occupied by a group of people all-day long to sell vegetables. Coconut crab and land crab are often sold here in a coconut-leaf woven basket. Similarly in Luganville, vegetable food are sold at the open market. Coconut crab and land crab are sometimes on sale whereas fresh fish is dealt with at Santo Fish. In Lakatoro of Malakula Is., local market is open twice a week, and similar dealings occur. Here, a basket of tiny shells, which is 1 to 2 cm in size and weighing about 2 kg in total, were sold at 100 VT. Other items of animal food include mangrove crab, mangrove shells, land crab and so on (Appendix I).

Apart from these food resources, varieties of empty shells are displayed for sale. In particular, at the open market of Vila numerous kinds of shells, sometimes processed as necklaces and ornaments are sold for tourists and collectors. It should be noted in these local markets that benthic species are commonest items for sale as these are unlikely to be perishable, and easy to harvest, compared with fin-fish. A list of marine resources on sale at the local markets are summarized in Appendix II.

b. Middlemen

Status and role of middlemen in fisheries economy seems less explicit in Vanuatu. This is simply because of the underdevelopment of marketing system in the country. In Luganville I have come to know that two Chinese merchants work as middlemen to deal with dried beche-de-mer and shells of green snail and Trochus. One bag of Trochus and green snail can carry 50 kg of shells, and several bags are constantly collected from neighboring islands. Status and role of middlemen should be carefully examined in the future.

c. Personal Contract

Fishermen sometimes personally contract to restaurants and hotels in Vila and Luganville for sales of sea food. Deep-sea snappers, lobsters, oyster shells, mangrove crab and coconut crab are preferentially purchased by them, as these sea food are important for French and Chinese cuisine. These contracts are made either locally or between towns and the distant islands by air-freighted. A manager of one Chinese restaurant in Vila complains that he cannot expect constant arrival of fish due to the failure in transportation and lack of fishermen's enthusiasm. I could not get overall trend of such engagement as its nationwide problem.

e. Shell Factory

A private factory in Vila to produce buttons from green snail and Trochus is under working. Many native workers are engaged in processing, manufacturing and trading shells in this factory. Unfortunately, information as to routes of purchase and the rates of production and the like were not obtained. Fisheries authorities concerned should consider the status of this industry for both the development and conservation of shell resources.

f. Gift

I have witnessed that skewered meat of Tridacna shells were air-freighted from Aneityum to Tanna, the nearest island located in the north. They say this is a gift to friends in Tanna where Tridacna shells are scarce. There is no evidence to demonstrate if such gift exchange is common practice and if trochus is not available in Tanna. This matter, however, may be analyzed as a secondary topics for the present issue.

g. No-Man Market

In Vanuatu it is a common finding alongside of roads that vegetable food with a price notice are displayed on shelf. Those who wish to buy them can take out by paying the amount of money as asked into a small container. At such no-man markets, various kinds of empty shells are often sold. For an example, on the west coast of Efate Is. they sell large Tridacna, green snail, cowries of different species at the price of 100 VT each.

Although attended only during a short time, a wooden shelf to display land crabs in a coconut-leaf basket was observed at the air field of Emae Is. A girl watches there during check-in time and the

arrival of a small aircraft.

From these instances it is apparent that flow of marine resources in the economical terms are complex, and that each economic channel works more or less independently, rather than operating as a unity. Such chaotic character does not however imply negative impression to the development. On the contrary, the development program should be done with its economic diversity kept as much as possible and still enhancing economic potentials of each sector. Fisheries economy should not be focussed on one or two aspects; village and export for instance. As we have seen, local market, urban market, even non-man market have their own economic and social significances. Contracts between hotels and restaurants and individual fishermen involve unique but fragile problems. Given autonomy of development in each economic endeavour, it requires considerable amount of further research and implementation. During that process, some of minor economic activities might be dismissed. To what degree is village fisheries considered will perhaps decide the future of the fisheries economy.

CONCLUSION

Based on my field work in four villages as well as a brief study of economic aspects, I will describe below two important conclusion of my study.

(1) Village fisheries

As I mentioned in the introductory note, village has been the socio-economic unit in the island world of Vanuatu. Not only for the further studies but also practical implementations, village becomes important unit. A diversity of cultural and socio-economic conditions should be taken into account in Vanuatu. Recognition of such a diversity also guarantee proper development.

(2) Marine Resource Management and Conservation

In Vanuatu, marine resource management should be viewed basically in line with three different types of resources; benthos, reef fish, and deep sea species. Tiny reefs and reef drops abunds in benthic resources. Conservation and appropriate ideas on harvest of these benthos such as shellfish, spiny lobsters should most urgently be considered. Strict regulation should be applied to harvest of shells such as trochus and green snail. But the fact that foreign investment and poaching have unfortunately urged people to keep on exploiting such vulnerable resources remains to be the neck point for the better solution. Governemnt should consider this as a serious issue.

Despite lack of extensive reefs and lagoons in most part of the archipelagoes, reef fish has certain importance as food fish. However, ciguatera poisoning reduce local consumption and sales. Campaigning on ciguatera-free reef fish for the marketing seems difficult in terms of cost-benefit and judging from the people's general attitude. Establishment of rural-urban cold-chain marketing in the future may become the priority solution to this. Fisheries for reef fish will henceforth be recommended mainly for local consumption as a source of protein where the people understand ecology and identification of ciguatera-free fish, and even curing against food poisoning.

Deep-sea species have become to gain higher and higher commercial values. Although it may increase gross national export values, it does not mean the welfare of the local people simultanesouly. Aid to village fishermen on this fishery has two aspects; one is the possible increment of cash income of the local fishermen. But it is anticipated that before gaining sufficient results, resource depletion might be brought about. Lack of freezers and transportation also frustrate local fishermen as

there is no way to sell fish of high commercial value even when given a good fishing tackle and outboard motor boat from the government. Ten or twenty years of master plan on the national development to establish electricity and road construction will be recommended, for instance.

As for the aquaculture of fish and benthos, several species have been considered so far. New conservation ethic with low cost and investment and with minimum environmental hazards are being pursued worldwide. In less populated islands of Vanuatu educations and campaigns to certain experimental endeavours for the aquaculture (cf. maliculture of green snail, as recommended by Yamaguchi) are important whereby autonomic management is expected by villagers. In summary, different procedures and implementations according to types of marine resources are most important measures for the development.

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Appendix I Poisonous Fish in Selected Villages

1. Aneityum

Gymnothorax spp., Sphyraena jello, Plectropoma leopardus, Epinephelus spp.*,

Lethrinus spp.*, Lutjanus bohar, Lutjanus russelli*, Plectorhynchus spp.*, Caranx spp.*, Chaetodon spp.*, Balistidae spp.*

2. Emae

Gymnothorax sp., Plectropoma leopardus*, Cephalopholis spp.*, Giganthias immaculatus*, Lethrinus miniatus*, Lethrinus spp.*, Lutjanus monostigma*, L. gibbus*, Therapon jarbua*, Caranx spp.*

3. Uripiv

Plectropoma leopardus, Epinephelus tukula*, E. malabaricus*,
Lethrinus spp.*, Lutjanus bohar, L. monostigma, L. rufolineatus,
L. gibbus, L. rivulatus, L. spp., Plectorhynchus spp., Alectis chilia*,

*: Shows poisoning occurs often, but not always.

Appendix II Price of Fish at Santo Fish (Luganville) in 1989

Common Name	Scientific Name	Price for Purchase ¹⁾	Price for Sale
Poulet		170	320, 590 (fillet)
Sea Perch		170	
Snapper		170	320, 590 (fillet)
Bream		150	300
Loche		120	
Amber Jack		120	
Grey Jobfish		120	
Sardine		120	
Dog-Toothed Tuna		120	
Mahimahi		120	
Mangro		120	150
Paddle Tail		120	
Rainbow Runner		120	
Kingfish		120	380 (slice)
Mixed Fish		90-120	
Lobster		500 ²⁾	
Coconut Crab		250-300	

¹⁾ One VT corresponded roughly to Japanese Yen ¥134 at the time of the survey.

²⁾ Small sized one is 300 VT per kg.

Appendix III A List of Items sold at Local Markets

Name of Item	Price VT	Weight kg	
shellfish nasesu, bilici	100	2.0-2.5	Norsup
Mangrove Clam	100	2.0, 2.5	”
Mangrove seluwok	100	2.3	”
Clam Shell kokeas	100	1.3	”
7加#1 nail	50	1.0	”
nail	100	2.0	”
Mangrove Crab	500	1.4	”
	300	0.95	”
Fish (any kind)	200	1.0	Lakatoro
Skipjack	440	2.2	
Poulet	520	2.6 (2)	
Bream	600	3.0 (3)	
Taro	100	6.8, 7.3	
Kava	150/kg in Norsup, 250/kg in Santo		

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< A Basic Survey Report on the Development of Fisheries in the Pacific
Island Area >

Fishery in Pohnpei

by Toshio Asakura

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I. Basic Facts about Pohnpei

Pohnpei's modern history began with frequent contacts with western civilization at the dawn of the 19th century. During the past 100 years it has always been placed under foreign rule: by Spain (1887 to 1899), by Germany (1899 to 1914), by Japan (1914 to 1945), and by the USA (1945 to 1987). An outline of the state of things in Pohnpei during this period can be learned from a history covering the period from the first touch with foreigners to 1890 (Hanlon, 1988), a study of the process of acceptance of Christianity (Nakayama, 1984), an investigation into changes in the system of landholding (Sudo, 1986), a monograph about the nature in the island and the life of its inhabitants and Japanese immigrants when it was under Japan's rule (Imanishi, 1944), and anthropological studies by American scholars. In addition to these, there have been many reports made public on the traditional chief system and its transformation, which even to this day has some influence on the people's life here (Riesenberg, 1968; Shimizu, 1982; Nakayama, 1986; and others).

At present Pohnpei forms the Federated states of Micronesia with three other states of Truk, Kosrae and Yap. Although it has made its first step as self-governed constitutional democratic nation under an agreement for free alliance with the USA, the "mini nation" with a population of only 95,000 (as of 1986; 30,000 in the Pohnpei State) surrounded by the sea has many difficulties to overcome for real independence in government and economy. The islands have no prominent resources or industries; they rely on aids of the USA. Their economy is quite an unhealthy structure showing considerable imbalances between production and consumption at home and

between exports and imports in trade (Shimizu, 1981).

The federal and state governments are located in Kolonia, where 22 percent of the total population of Pohnpei concentrates (government officials, etc.). Village inhabitants mainly live by agriculture and fishery. Farming is mostly carried out on a home work basis. They raise breadfruit, yam, and banana for their own supply. The production of copra, which is their main cash crop, has decreased during the past several years, while cultivation of pepper is now being planned (Society for the Study of Overseas Agriculture, University of Osaka Prefecture, 1981, 1984). Commercial pig breeding was once attempted but has turned out unsuccessful (Okuma, 1989). In addition there is another negative factor to be noted: The younger generation has a large share of the population, with a high rate of increase. All these affairs work together to make their economic independence difficult.

Hope is entertained in tourist development now, but no satisfactory preparations in social terms have yet been made for it. In September, 1987, a round-the-island road was constructed, causing a shift from transportation by boat to automobile. The pavement, however, is somewhat defective, and many islanders are reported to run into more debts for buying an automobile. Statistics show that about 800 boats and outboard motors were owned in 1986 in contrast to 3,000 automobiles. In April of this year, provision of electric poles round the island was started. However, the present power generating capacity of the island falls short even of the demand from the Kolonia district alone.

Today's Pohnpeian society is a hybrid of traditional and modern systems. The chief system from old times and self-sustaining

agricultural economy still exist, into which democracy and monetary economy introduced from the USA have been grafted. Under this co-existence of the old and new systems in government and economy, a First Five-Year Project was mapped out in 1985 (Japan Micronesia Society, 1986) to search for a new way for real independence.

II. Fishery in Pohnpei

(1) Historical Outline

Pohnpei is one of the largest islands in Micronesia. Blessed with abundant food and water and with a good natural harbor protected by reef, Pohnpei was prosperous as a port of call for whaling ships in the 19th century, when whaling in the Pacific Ocean was flourishing.

During the period under Japan's rule, a large number of Japanese immigrants promoted fishery and the production of dried bonito and canned fish meat as well as the cultivation of sweet potato and the refining of sugar. In 1942 Pohnpei had 30 motored fishing vessels, 716 fishermen, and 203 people engaged in the processing of marine products. The catch of bonitoes marked a record level of 4,064 tons in 1937. In 1935 the Fisheries Experiment Station of the South Seas Agency transplanted golden lips from the Arafura Sea. This enabled advances of Japanese pearl culturists into Pohnpei, but the Pacific War stopped this business before any success could be made.

Afterwards Micronesia was placed under the mandatory administration of the United Nations. The USA held it as an area of its strategy, took no positive steps to raise industries, forbade

inflows of foreign capitals, while the islanders of Pohnpei themselves were reluctant to develop the fishing industry of their own. For these reasons fishery has made no substantial progress there. In 1962 Pohnpeians formed a fishermen's cooperative association, but this system seems to have been unsuitable to them.

In the second half of the 1970's, introduction of the 200 nautical mile system and movements for racial independence caused more emphasis to be laid on the development of fishery resources. However, it did not necessarily contribute to the development of the local fishing industry. Private Japanese fishing ventures talled advanced, due to such factors as the weak infrastructure, restrictions posed by the district administrations, lack of commercially exploitable fishery resources other than bonito and tuna and over production of cultured pearl worldwide. In 1978 a dried-bonito plant with a daily processing capacity of five tons was constructed by foreign capital including investment by Japan, and bonito fishing was resumed accordingly. At present, however, it is closed (Kataoka, 1985:41-62).

The Micronesian sea area is known as one of the richest bonito and tuna fishing grounds in the world. Fishing licence fees from foreign countries operating in this area account for a large part of the revenue for the Federated states of Micronesia. As other nations in Micronesia are showing increased interest to their tuna resources as the key to the development of their economy, the Federated States of Micronesia, to which Pohnpei belongs, has appropriated 32 percent of its development budget to the development of fishery resources in its First National Development Project (for 1985 to 89). To achieve this goal

there are many hurdles to overcome including adaptation to local conditions, fund raising, and distribution of resources and incomes. For successful development, it is necessary to win understanding of local inhabitants, take suitable steps to protect the natural environment, change the concept of economic activities from consumption-centered to production-centered, and pay good wages to technical workers. In these circumstances development should be promoted by stages in consideration of the scale of economy and priority of execution (Matsuda, et al., 1986: 102).

At this juncture the State of Pohnpei has made a First Five-Year Development Plan of its own (for 1987 to 1991) laying special emphasis on the development of marine resources. This plan has the following five objectives :

- 1) To increase employment and income earning opportunities in activities related to marine resources development;
- 2) To increase domestic protein intakes from locally cultivated marine products;
- 3) To reduce dependence on imported canned and frozen marine products;
- 4) To ensure that renewable marine resources will be available for harvest by future generations; and
- 5) To encourage the export of marine resources only in such a manner that these four goals can be attained as planned.

(2) Current Condition

The catch of fish by Pohnpei is much less than that by Truk and Palau (which are also located in the Micronesia area). In Pohnpei about 100 tons of fish are supplied to the market every year (see Table 1).

A. Subsistence fishery (mainly in villages)

This type of fishery can be illustrated by chart as in Fig.1. For convenience's sake, let me divide it into three elements— fishers, consumer, and the relation between the two — and analyze each of them.

a. Fishermen

Pohnpeians have traditionally made living by agriculture and fishery. Daily supplies of protein are provided mainly through fish. Subsistence fishermen work almost always inside a lagoon or reef. Catches of fish for subsistence registered in 1986 are categorized in Table 2. Reef fish accounted for 84 percent of total catch, pelagic fish 10 percent, crabs 5 percent, and others 5 percent.

Use of the surface of lagoon or reef is under control by the relevant community (see Table 3). Traditional methods of fishing include trolling, spear fishing, mangrove-crab hunting, gill netting, NAHIK fishing, bottom fishing, fish poisoning, fish drive, cast net, hook-and-line fishing, reef gleaning, and PALU AHI (Fishing Calendar, 1989). Today use is made mainly of imported nets and other fishing implements made of synthetic fiber, plastics, etc. Typically a boat or canoe equipped with a small outboard engine is used for trolling or handline fishing of reef fishes, shellfishes, lobsters, mangrove crabs, and other products.

The lagoons in Pohnpei are narrow and shallow. There are no commercially valuable fish but a variety of fish. Same fish has different names by size. This seems to be related to their custom of distribution of catch according to ranks in the village hierarchy. Some kinds of fish are referred to in the legends and there is the taboo that the fish of totem of the

tribe must not be eaten. Thus fish has been closely connected with the traditional life of the islanders.

Banning of fishing in the spawning season and other traditional fishing self-restrictions are observed still at present. Islanders say, however, that the numbers of fish and shellfish around them are decreasing. This appears to be attributable to the pollution of environment, rather than to reckless fishing.

Fishing cannot be done cheaply in Pohnpei. The villages are located at relatively inland parts of island and the shores are surrounded by mangrove trees. It thus takes time to gain access to the sea. Besides expenses are required including those for buying fishing gear, canoes and boats, and fuel. Because of this, many people buy fish at market or canned foods substituting fresh fish. They tend to go fishing for pleasure rather than for earning bread.

b. Relationship: changing from "giving" to "selling"

Since the catch of fish by one fishing usually exceeds the amount consumable by a single family, without any equipment like a refrigerator, it has been customary that harvests are distributed among members of the community. They say that they have had felt that fish cannot be an item of trade.

Now, however, fish is often sold, because fishing costs much for gear and fuel and there are only a limited number of fishermen left on the island. A questionnaire conducted on 53 vocational school students gave the result that 41 percent of them catch fish by themselves, 22 percent get from other people free of charge, and 37 percent buy.

c. Consumer

Now let me turn to the place of fish in the eating habits of the islanders (Society for the Study of Overseas Agriculture, University of Osaka Prefecture, 1984: 13-34) seen in the results of questionnaire mentioned just above. About 65 percent of them eat fish once or twice a week, 27 percent four or five times a week, and 7 percent everyday. The reproduced menus for three days up to the day of question show that they ate much fish including canned fish. It should be noted, however, that this questionnaire was conducted in Kolonia. It is unlikely that villagers eat fish so often.

They cook fish in various ways, but like sliced raw fish ("sashimi") best and fried fish next.

The number of answerers who named fish as their top favorite from among the eight alternatives of animal protein food is the largest next to that of those who mentioned chicken. About 66 percent of 53 answerers counted fish within their top three favorites, while 70 percent mentioned canned fish only as their sixth or lower favorite. Thus they like fish, but not canned fish.

In spite of this situation, people are tending to take animal protein in the form of canned fish and corn beef instead of raw fish. Anders studied the importance of foods for the islanders by comparing data gathered by Bascom in 1946 and results of his own survey in 1971. According to this, canned bonito and canned tunny were ranked high in 1971, while they were not included in the data of 1946 (Anders, 1973: 168). This change appears to be attributable to the fact that rice, canned fish, and many other foreign foods were introduced and canned fish could be obtained

easier and at lower prices than raw fish.

This shift from fresh to canned fish naturally concerns nutritional problems. It has been pointed out that although it causes no problem concerning the intake of protein, canned fish containing more fat and salt is by no means healthy (The 1987/88 National Nutrition Survey of the F.S.M., 1989: 62). It was in this connection that the 4H Club took the initiative of launching life-style improvement campaigns including the food phase.

There is one factor deserving special mention about the eating habits of this island. It is the feast called "kamadipw" (Shimizu, 1985). It is no exaggeration to say that the islanders live for kamadipw. It is held several times a year, where they are treated to pork roasted on hot bebbles and other dainty dishes. This treat of pork is connected with social prestige and pigs are raised in this context. This is one of the reasons why they find it difficult to value pigs on commercial terms. Kamadipw sometimes involves dinners from the first fishing of sea turtles and migratory fish in the season or first fishing with a new canoe or fishing net (Table 4). I had chances to witness two funerals during my stay in the island. On the third day of a funeral people are supposed to come along with fish, and I saw a fairly large amount of fish brought in.

It appears that while the traditional living cycle was maintained, the islanders' daily life was geared well to the kamadipw, resulting in a balanced system of eating. The on-going process of modernization has made maintenance of traditional living cycle increasingly difficult.

The largest problem of subsistence fishing is how to

secure fresh fish at lower cost than canned fish. To help overcome this difficulty, we will be required to offer material aids including the fitting of boats and outboard engines of low fuel consumption for fishing itself, provision of refrigerators to store fish in every village, and distribution of fresh fish to the urban areas.

B. Commercial fishing (mainly in urban areas centered around Kolonia)

This fishing system can be illustrated as in Fig. 2.

a. Fishermen

A breakdown of the catch of fishes by type of fish is shown in Table 5.

The EDA (Economic Development Authority) regards those who go fishing 80 days or more a year as fishermen and estimates the number of them to be around 20. During the period of our survey we studied how many transactions a fish dealer made to buy fish by counting its receipts of payment. It transacted with an average of three or four groups of fishermen a day, with the maximum number of transaction reaching 11. A group consists of seven or less fishermen, and these groups sell fish to different dealers. We calculate from this that there are not over 100 people who sell fish to market on a regular basis. The supply and demand structure of fish shows that there is more demand than supply. This, too, indicates that there are not so many fishermen in the island. Gasoline costs 1 dollar and 35 cents per gallon, and usually 18 gallons of gasoline is consumed in a single fishing. If poor catches continue twice or three times, they cannot cover even the gasoline cost, or worse suffers a loss. It seems that

fishing as an occupation is not especially attractive here unless one likes it.

Commercial fishermen sell fish mainly to the fish market and sometimes directly to restaurants.

<Fish markets>

As of 1987 eight dealers in the villages and 14 dealers in Kolonia had a licence for trading fish, of which seven constituted a public market. For doing business in the public market a monthly fee of 20 dollars is required.

In 1986 the market (5 to 7 shops) handled 46,500lbs of reef fish, 77,300lbs of pelagic tuna, 1,400lbs of lobsters, and 10,700lbs of crabs. Twice a day it works: on the morning when fish caught inside the reef in the night is brought in, and about noon when fish caught outside the reef in the morning is supplied.

Table 6 lists the kinds of fish brought into the market (Goodwin, 1983: 207-210). Reef fishes are ranked into three classes by kind. That is, they are bought in at 90c, 70c, and 50c, and sold at 1\$10c, 95c, and 70c, respectively. Untill several months ago tunny and bonito were bought in at 1\$ and 75c, respectively, and sold at 1\$25c and 1\$. Recently, however, smaller catches have pushed up the prices by 25 cents. During the period from November to April, fishermen go fishing less often to plant yam and kava("sakau") for the kamadipw. A shop owner told me that because he could buy only 1,000 to 3,000lbs of fish per month during this period, he raised prices one rank higher. During the period from May to July, many people go fishing for making money, and in June and July the catch of fish amounts to 9,000 to 10,000lbs, which exceeds the capacity of their refrig-

erators. In such cases fish dealers have their fish stored in the refrigerators of the EDA at a charge of 5c per lbs per month or peddle fish about the villages. In this supply and demand structure marked with seasonal imbalances, the market appears to be in a stronger position than the fishermen. The word of a fish dealer tells of it; he said that they would buy fish even when it is in excess. Consumers, on their part, seem obliged to put up with the situation that they can get fish when there is fish on the market, but cannot when there is not.

<Restaurants>

Restaurants bought in 2,200lbs of reef fish, 4,600lbs of pelagic fish, and 2,700lbs of crabs in 1986. There are two restaurants managed by Japanese, and one of them provided a "sushi" corner last year. It buys in bonito, yellowfin tuna, and other fishes. Since it needs fresh fish of high quality, it buys from the market or the EDA when there are good ones there. Fishermen must keep their fish refrigerated at least by ice.

b. EDA (Economic Development Authority)

The EDA consists of four departments (see Fig. 3), and the Fishery Department put three fishing vessels into operation as of April, 1988 (Table 7). Fish caught by them is sold in a proportion of 30 percent to schools and hospitals, 40 percent to the market, and 30 percent to export. To the schools the EDA sold 21,200lbs of reef fish in 1986 and 51,200lbs in 1987, and 29,600lbs of tuna in 1986 and 22,100lbs in 1987 all for school lunch use. To the hospitals it sold 4,800lbs of reef fish and 7,600lbs of tuna in 1986. This purchase is financed by the USA. but the last few years have seen decreasing scale

of the US aids and a change from cooked fish to canned fish. The EDA trades with one specific dealer of the market. Now it also deals in exports, selling fishery products to Guam, Japan, Hawaii, and other parts of the Pacific area. The fall in the amount of exports in 1987 from the previous year (see Table 8) was caused by the loss of the specific dealer who was specialised in fish exports. Other marine resources handled by this authority include seaweeds and trochus shells (see Table 9).

The EDA also has a division to operate a complex of the refrigerators, chillers, and ice plants provided by Japan three or four years ago. Not only fish but meat, daily products and vegetables are also stored in these facilities. Ice is made in quantities of one to two tons every week day and 10 tons on the week end. These refrigerators and chillers are indispensable in Colonia, although villagers cannot share in the benefits of them.

c. MRD (Marine Resources Division)

This division is responsible for the protection of Pohnpei's marine resources. It carried out a survey of marine resources just a few years ago. According to the results of it, the marine resources are decreasing. It is essential, however, that surveys should be made regularly on a long-term basis. It also makes campaign posters for the protection of resources, but its result is far from being satisfactory.

To help develop Pohnpei's subsistence fishery, emphasis should be laid on the protection of the marine resources and monitoring program. In view of this, it is desirable to designate the MRD, rather than EDA, to our counterpart.

III. Problems

(1) Importance of Subsistence Fishery in Local Economy

Let us briefly review the history of Pohnpel's local economy. When it was under Japan's rule, the presence of Japanese immigrants contributed to the formation of a good market for crops raised by the islanders, and a way of earning money, though little, while keeping the traditional style of life was open to everybody. Placed under the rule of the USA, however, they lost the market for their crops. For young people growing under an American educational system finding a place in a governmental office became a major means of earning cash. The permeation of such monetary economy have driven and accustomed the islanders to easy ways of living and to new values.

Against this background, people tend to believe that it is better to buy fish at the market or canned fish than to catch by their own effort and it is wiser to buy fresh or canned fish by money earned independently of fishing which requires a boat, gasoline, and time.

To achieve self-reliance in economy, they should first of all have awareness and means of developing an industry they can manage to run by themselves. Consuming fish from their own supply instead of eating imported canned or frozen foods is not merely an issue of taste or nutrition. It is an important economic problem.

(2) Maintenance of Marine Resources and Aquaculture

In the Pohnpeian sea area bonito fishing vessels of the USA, Japan, South Korea, Taiwan, and other nations are operating. The natives complain that their catch of bonito and jack trevally

("oarong") has recently declined, but it is not so serious as to hinder their system of subsistence fishery at present.

However, it is equally true that the problem of overfishing can be brought to general recognition only when it becomes very serious. It is therefore desirable that the marine resources such as bottom fishes are surveyed by specialists on a continual basis, along with thoroughgoing campaigns for environmental protection to the islanders.

Turning to aquaculture, Americans and Japanese have until now attempted the cultivation of pearl and black pearl, but none of them have yet succeeded in it as an enterprise.

At present some Japanese living in the island have started the cultivation of giant clams. The feasibility of cultivating lobsters is being studied by Taiwanese, and that of cultivating button shells for use as core of cultured pearl by a jewelry dealer in Hong Kong. Furthermore, cultivation of a kind of eucheuma belonging to rhodophycophyta (*Eucheuma alvarezii* DOTY) has just begun under leadership of the Fisheries Bureau of the government. Concerning this program, Ajisaka has reported like this: Labor can be obtained easily in Pohnpei; the island has such good natural conditions as protected lagoons with rich and nutritive minerals supplied from the land with abundant rainfalls; on top of that cultivation of sea weeds does not require any sophisticated technique or material; all these factors show that it is promising as an enterprise; and at present cultivation of gracilariaceae (*Gracilaria crassa*, *G. coronopifolia*) is also being planned (Ajisaka, et al., 1986: 53-56).

For commercialization feasibility study is required.

But first of all biological surveys for maintaining the resources should be further promoted.

(3) Some Suggestions for Aid

Difficulties involved in the development, and aid programs therefore, of an island society spreading over a wide area having a small population and little industrial capitals have been pointed out already. Here I will concentrate on some of the characteristics of Pohnpeian society in somewhat an indirect way of suggestion for our assistance in the future.

a. Federal government, state government, and chief

The administration of Pohnpei is under dual control by the federal government of the Federated States of Micronesia and the State of Pohnpei. The states are confronted by different problems of their own, and the force of each state seems to work stronger than that of the Federated States in affairs relevant to the profit of that particular state. In the case of foreign aid, the counterpart of negotiation cannot be unified easily, often causing complicated problems. Besides the chiefs still hold strong power against the background of the traditional system; they like attending public hearings and checking the administration. In social life of the people, too, they are very influential. The philosophy of "respecting honor" is deeply rooted in their mind.

b. Constructing good infrastructure

No success has yet been registered by the Americans and Japanese who tried the cultivation of pearl and other products here. One of the reasons for their failure was that they operated individually. For successful enterprise, the

infrastructure to support their business should be strengthened and improved.

Likewise, to help develop fishery of Pohnpei, integrated approach to the development of the whole society of the island should be considered, including the establishment of a development bank, improvement of the international airport, roads, and hydraulic power generating facilities, and systematization of the sanitary, educational, and broadcasting facilities. These were once planned for realization under American trusteeship, but had barely been put into practice. Such improvements of the infrastructure will also contribute to the development of other industries including tourist and agriculture, which in turn will lead to larger consumer demand and stimulated distributions. In direct connection with fishery, it will be necessary to expand the harbor, improve the processing and storage facilities, and relocate the marketplaces.

c. Japanese in Pohnpeian society

The people of Pohnpei generally look with favor on Japan. When it was placed under the latter's rule in 1914, many Japanese immigrants entered the island and produced sugar cane and copra and less popular puddu rice and dried bonito. Such developments of the island's resources did not have direct bearing on the life and economy of the local people. In contrast to this, today's Pohnpei, being aided by the USA, has no such production activities that would grow into a promising industry, and some people view the good days under Japanese rule with nostalgia. In those days a good many Japanese married natives and had children. Now they and other Japanese live in the local society deeply rooted. It is

said that shops owned by natives are often "eaten up" by their relatives and only those managed by Japanese or American wives are successful. In fact, we witnessed that stores managed by Japanese were going well.

Because of this historical background and the present condition, the islanders tend to think of Japanese in connection with success. They expect much from Japan.

The local Japanese are not organized politically, but have a system of cooperation in cases something important or unusual happens. For instance, they extended a helping hand when a Japanese fishing vessel was captured and, on another occasion, cooperated in negotiations for the use of land by Japanese. They have a good knowledge of the local language and customs, which is their strongest advantage in negotiation.

d. Labor

It is reported that the natives, accustomed to their traditional style of working, are not good at complex jobs and everyday work on a regular basis. Against this background a Japanese employer of natives have devised some techniques, obtaining fairly good results. First he pays not by time but by work, and second he sets a goal and confirms the results in order to increase the will to work -- particularly for young employees.

In conclusion, let me mention one more thing. To the Pohnpei society aids for pig breeding and pepper cultivation have been extended until now. But they were offered separately, not in a coordinated, and integrated manner for a long-term objective with a view to raising the standard of living of the whole society. Experts are required who will stay in the island for survey and

other work for many years.

There are loud cries in Pohnpei for prompt dispatch of a successor to Mr. Ishikawa, an expert official of the JICA, who died in the course of his duties to place orders for refrigerators, ice boxes, and high-efficiency outboard engines of low fuel consumption for use in the villages. It is most important that local people are trained by such leaders as Mr. Ishikawa.

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Fig.1

A. Subsistence fishery

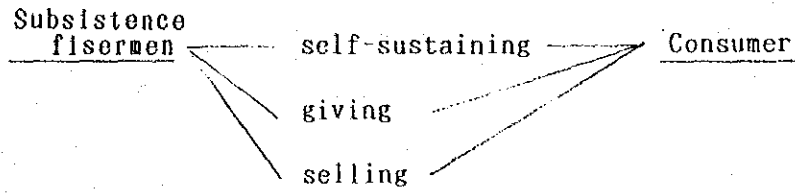


Fig.2

B. Commercial fishing

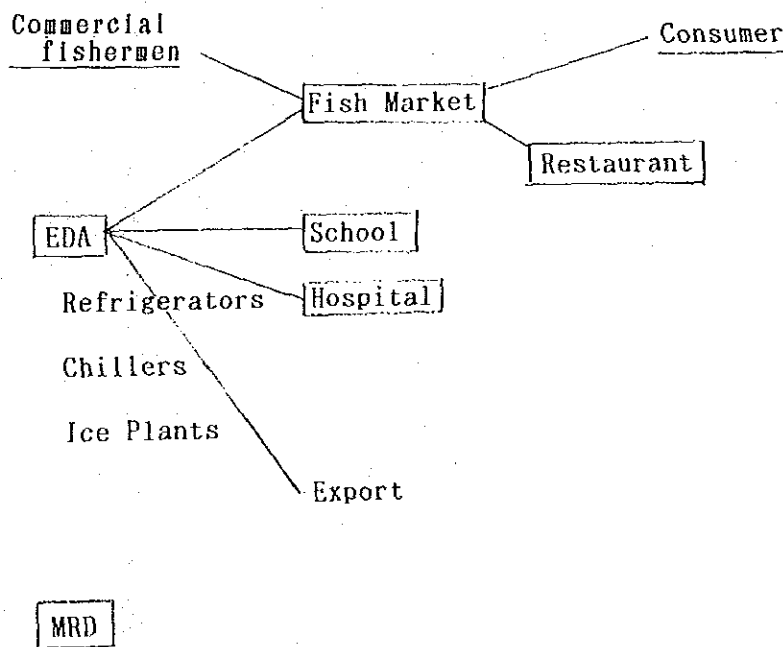
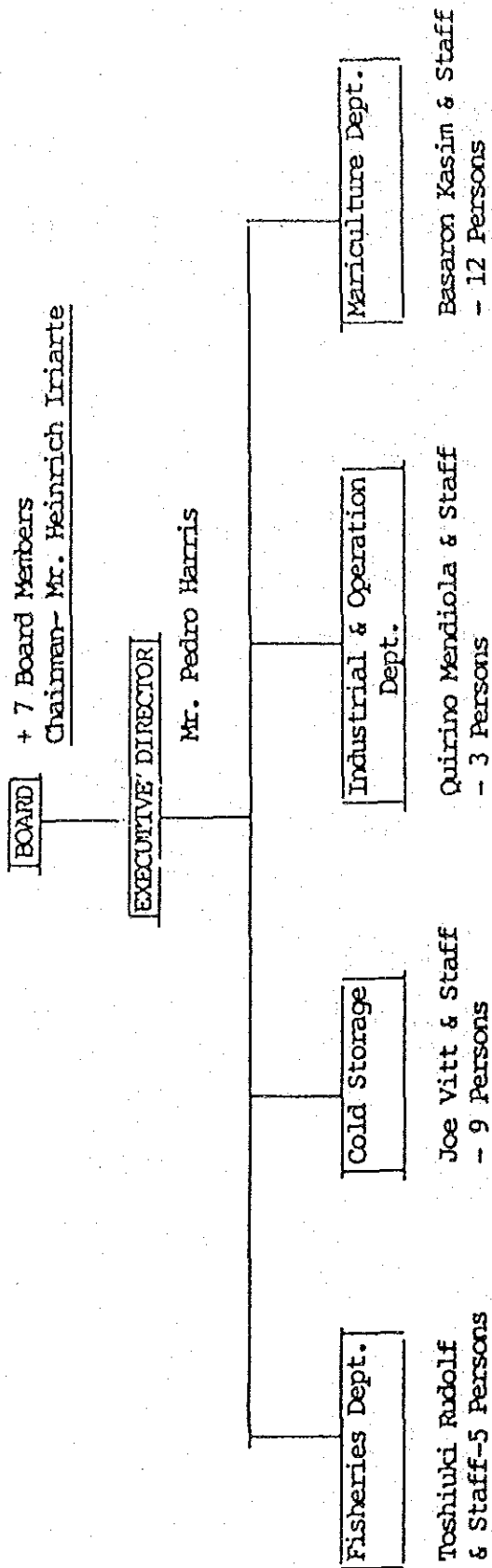


Fig. 3 ORGANIZATION CHART



ANNUAL BUDGET- Approximately US \$200,000.00 Per Annum

Table 1. 1980年の地域別漁獲高

	高瀬貝		カニ・ロブスター		魚類		その他(1)		合計	
	トン	1,000 ドル	トン	1,000 ドル	トン	1,000 ドル	トン	1,000 ドル	トン	1,000 ドル
バラオ	110	65	2	5	220	193	1	1	333	264
ヤップ	18	26	5	14	20	29	8	20	51	89
トラック	40	36	1	2	1,133	1,219	0	0	1,174	1,257
ボナベ	-	-	7	19	47	78	0	0	54	97
コスラエ	-	-	-	-	-	-	-	-	-	-
マーシャル	0	0	0	0	80	111	0	0	80	111
計	168	127	15	40	1,500	1,630	9	21	1,692	1,818

資料. 1980 Trust Territory of the Pacific Islands. Dept. of State, U.S.A.

注1. その他は主に貝とカメである。

注2. バンキャンブの水揚げ高 (3,495トン) および転積量 (4,184トン) を含まず。

注3. ヤップ, トラック, ボナベ, コスラエの漁獲高は, 実際の漁獲高の35~40%しかあらわされていない。

[Kataoka, 1985]

Table 2

Estimated Catch Destined for Subsistence 1)
1986

Item	Estimated Percent of Catch for Subsistence
Reef Fish	84 %
Pelagic Fish	10 %
Mangrove Crabs	5 %
Others	5 %

Note 1: Based on provisional data & estimates

Source: Pohnpei State Department of Conservation
& Resource Surveillance, Division of
Marine Resources
Pohnpei State Economic Development Authority

Table 3 Sea Tenure Patterns in Micronesia

	Island	Utilization of Sea			Unit of Sea Tenure	Unit of Land Tenure	Type of Sea Tenure	Controlled by
		Lagoon	Reef	Open Sea				
1.	Palau (vo.)	++	-	-	co.	ma-li.		village council
2.	Ponape (vo.)	++	-	-	co.	ma-li.	Type I. community	village chief (kng)
3.	Satawal (r. re.)	+	++	+	co.	ma-li.		chief of sea
4.	Ulul (at.)	+	+	++	co. & cl.	ma-li.	Type II. community & clan	paramount chief
5.	Marshall (at., r. re.)	++	++	-	co. & cl.	ma-li.		paramount chief
6.	Mortlock (at.)	++	++	-	cl.	ma-li.		paramount chief
7.	Truk (vol.)	+	++	-	cl.	ma-li.	Type III. clan	paramount chief
8.	Ulithi (at.)	+	++	-	cl.	ma-li.		paramount chief
9.	Yap (vol.)	++	+	+	fa.	pa-fa.	Type IV. family	chief of village, fishing, sea

Table Note:

Importance: co. = Community ma-li = Matri-lineage vol. = Volcanic island.
 Primary = ++ cl. = Clan pa-fa. = Patri-extended family r. re. = Raised Coral Reef island.
 Secondary = + fa. = Family at. = Atoll
 Not used = -

[Sudo, 1984]

Table 4 機会による祭典の分類: 主として人民の生活に関するもの

一生の生活	一年の生活	不定期の生活
1. <i>K. Korwoarwoand</i> (婚姻)	1. <i>K. Wou</i> (祭典の祭典)	1. <i>Kapas Atwar</i> (称号の披露・返礼)
2. <i>Kamwoang Kasapw</i> (妊娠八ヶ月)	2. <i>Wad Woanukmw</i> (石焼き焼めぐり)	2. <i>Umwon Koanoat (Sak)</i> (<i>Kawawi</i>) (去秋の祭典)
3. <i>Umwon Neilik</i> (出産)	3. <i>K. Soumas En Kowsapw</i> (字長の祭典)	3. <i>Kesikpwong</i> (新夜祭典)
4. <i>Pilen Dikdi</i> (授乳)	4. <i>K. Pentinti</i> (家族の祭典)	4. <i>Umwon puar</i> (二度焼きの石焼き)
5. <i>Umwon Mucurilik</i> (死)	5. <i>Kēdisol</i> (イシムル奉止めの祭典)	5. <i>K. Alukmwuhr</i> (出迎え者への祭)
6. <i>Kalamwon</i> (一年後)	6. <i>Mwahn Par</i> (回遊魚の初漁)	6. <i>Welienlit</i> (名賀の回復・誇示)
	7. <i>Mwomo Dahr</i> (回遊魚の初漁)	7. <i>K. Kamwurmur</i> (出立ち・別荘)
		8. <i>K. Kapel</i> (族からの帰還)
		9. <i>Welienlit</i> (定数からの帰還)
		10. <i>Isimas</i> (祭典の落成)
		11. <i>Kapidolong</i> (母屋の落成)
		12. <i>K. Tomw</i> (遊舞の祭典)
		13. <i>Kaling</i> (共同労働の返礼)
		14. <i>Katepik</i> (新造カヌーの初漁)
		15. <i>Laidkapw</i> (新しい漁網の初漁)

(K.: Kamadipwin)

[Shimizu, 1985]

Table 6

Fish & Shellfish Caught in Local Waters 1)
1986

Type	Quantity (short tons)	Landed Value (\$000's)
Reef		
Reef Fish	195.0	273.0
Mangrove Crab	6.4	15.9
Lobster	.7	1.4
Others	2.3	23.0
Pelagic 2)		
Yellowfin	32.4	61.6
Skipjack	19.8	37.7
Mahimahi	6.2	11.9
Wahoo	8	1.5
Marlin	5	9.5

Note 1: Based on provisional data & estimates
2: Pelagic = deep sea

Source: Pohnpei State Department of Conservation
& Resource Surveillance, Division of
Marine Resource
Pohnpei State Economic Development Authority

Fish & Shellfish Caught in Local Waters 1)
1987 2)

Type	Quantity (short tons)	Landed Value (\$000's)
Total	226.0	401.3
Total Reef	171.6	292.5
Reef Fish	156.1	218.5
Mangrove Crab	7.6	19.0
Lobster	3.0	6.0
Others	4.9	49.0
Pelagic (Deep Sea) Fish	54.4	108.8

Note 1: Based on provisional data & estimates
2: Only for the months of October to December

Source: Pohnpei State Department of Conservation
& Resource Surveillance, Division of
Marine Resources,
Pohnpei State Economic Development Authority

Table 6

APPENDIX ONE

COMMERCIAL FISH SPECIES OF PONAPE

ENGLISH NAME	PONAPEAN	SCIENTIFIC
Barracuda(s)	Nahliam	<u>Sphyraena langsar</u> " <u>bleekeri</u>
Castor-oil fish	Deikenepeng	<u>Ruvettus</u> sp.
Dolphinfish	Kohko	<u>Coryphaena hippurus</u>
Drepanid, Spotted	Seng Seng	<u>Drepane punctata</u>
Eel(s), Mangrove	Mwasao	*not observed*
Eel(s), Moray	Lapwed	<u>Gymnothorax</u> sp.
Goatfish	Epil	<u>Mulloidichthys</u> <u>vanaccolensis</u>
"	Iomo	<u>Parupeneus indicus</u>
Goatfish	Merep	<u>Upeneus arge</u>
"	Mwompwon	<u>Parupeneus cyclostomus</u>
Grouper(s)	Sawi	<u>Plectopomus truncatus</u> " <u>melanoleucus</u>
"Bass-Grouper	Mwalusulus	<u>Cephalopholis argus</u>
"Rock Cod	Mwanger	<u>Epinephelus merra</u>
Herring	Saip	<u>Herklotsichthys</u> sp
Jack Trevally	Oarong en pwong	<u>Caranx sexfasciatus</u>
Jack Trevally, Blue	Oarong large = Tehp	" <u>melampygous</u>

ENGLISH NAME	PONAPEAN	SCIENTIFIC
Mangrove Jack	Ikem	" sp.
Yellotail Scad	Lahd	<u>Atule mate</u>
Mackerel-Pike	Samna	Scambridæ
Milkfish	Eki	<u>Chanos chanos</u>
Mullet	Pehioang	Mugilidae
Mullet, Shark	Ah	<u>Crenimugil labris</u>
Needlefish	Dahk	<u>Tylosurus</u> sp.
Parrotfish, Green	Mwomwmei	<u>Scarus sexuttatus</u>
" Blue-Chin	Pahme	<u>S. ghobban</u>
" Humphead	Kemeik	<u>Bulbometopon muricatus</u>
" Blue	Mahu	<u>Scarus jonesi</u>
" Yellow-tailed Brown	Lawi	<u>Cetoscarus bicolor</u>
" Bicolor	Lidoi	<u>Scarus rubroviolaceus</u>
" generic	Kilikil Umoula Pedilik Umwun Kidel Pworu	
Pompano	Pedihdi	<u>Selar crumenophthalmus</u>
Porcupine fish	Sei	<u>Diodon hystrix</u>
Puffer fish	Wahd	Canthigasteridae
Rabbitfish	Kioak	<u>Siganus doliatus</u>
"	Kompani	<u>S. vulpinus</u>
"	Mahr	<u>S. puellus</u>
"	Palapal	<u>S. punctatus</u>
Rabbitfish	Seteu	<u>Siganus corallinus</u>
"	Umule	<u>S. canaliculatus</u>

ENGLISH NAME	PONAPEAN	SCIENTIFIC
Rabbitfish	Pwerinmwomw	
Rudderfish	Keriker	<u>Kyphosis cinerascens</u>
Sailfish, generic	Dekilahr	Xiphidae
Silverfish	Kasapal	<u>Gerys kapas</u> " <u>abbreviatus</u>
Snapper, Blue Striped	Tehnseu	<u>Lutjanus kasmira</u>
Snapper, Mangrove	Asimel	" <u>Argetimaculatus</u>
Snapper	Ikiepw	<u>Lethrinus kallopterus</u>
Emperor	Medi	" <u>lentjan</u>
Emperor	Samwei	" <u>ramak</u>
Red "	Kihr	<u>Lutjanus baricus</u>
Red "	Kihr en Eiwel	" <u>bohar</u>
"	Likomwei	" <u>fuliflamma</u>
"	Pwahlahl	" <u>gibbus</u>
"	Pwehu	" <u>semicinctus</u>
Squirrelfish, Bigeye	Thensiou	<u>Myripristis murdjan</u>
" Long-Jawed	Sara	<u>Adioryx spinifer</u>
" (Soldierfish)	Mwuhn	<u>Myripristis adjustus</u>
Surgeonfish, Black	Toamwoarok	<u>Acanthurus qahm</u>
" , Brown	Pakas	" <u>xanthopterus</u>
" , (Convict-Tang)	Letipwel	" <u>triostegus</u>
" , Striped	Wakapw	" <u>bleekeri</u>
" , Yellow-Eyed	Doarop	" <u>aliala</u>
Sweetlips	Koail	<u>Plectorhynchus celebrus</u>
Diagonal-Banded	Kehng	<u>P. goldmani</u> <u>chaetodontoides</u>

<u>ENGLISH NAME</u>	<u>PONAPEAN</u>	<u>SCIENTIFIC</u>
Tang, Unicorn	Pwulaik	<u>Naso unicornis</u>
Unicornfish, smooth headed	Pwulangking	" <u>lituratus</u>
Triggerfish, Ocean	Lioli	<u>Canthidermis sobaco</u>
" (Humu-Humu-Nuku Nuku-a-puaa)	Pwuhpw	<u>Rhinacanthus aculeatus</u>
Tuna	Weliwel	<u>Thunnus thynnus</u>
" , Dog	Manguro	<u>Gymnasarda unicolor</u>
" , SKipjack	Kasuwo	<u>Katsawonus pelamis</u>
" , Yellowfin	Karangahp	<u>Neothunnus macropterus</u>
Wrasse, Napoleon	Merer	<u>Cheilinus undulatus</u>

[Goodwin : 19]

Table 7 EDA BOATS

<u>Name of Boat</u>	<u>Length</u>	<u>Arrival Year</u>	<u>Aid or G/S</u>	<u>Fishermen</u>	<u>Catch</u>	<u>Weekly</u>
EDA -1	30'	1987	G/S	6	450 lbs.	2
EDA -2	30'	1987	G/S	6	450 lbs.	2
MISS POHNPEI	28'	1986	G/S	5	200 lbs.	2
MISS SENNYAVIN	28'	1986	G/S		Anchor & Waiting Parts	
USURAFN	28'	July, 1989	Fishery Aid	4	Just Started	

ALL BOATS ARE VERTICAL LINE
(SOKOZURI GYOHO)

DEPTH: 30-180 HIRO --NGAHP - Local Language

29/August/89 -- EDA-Mr. Toshiuki Rudolf

G/S: KIZAI KYOYO

Table 8 Fish & Shellfish Exports
1983 - 1987

Year	Quantity Exported (lbs)	
	Fish	Crabs & Lobsters
1983	11,012	906
1984	20,168	2,334
1985	23,228	8,325
1986	30,806	16,823
1987	14,400	3,828

Source: Air Micronesia

Table 9 Other Marine Resources
1981-1987

Year	Seaweed (lbs)	Trochus Shells (short tons)	Fish Aggregate Devices
1981	-	107	-
1982	-	69	7
1983	-	- 1)	1
1984	-	149	1
1985	312,186	-	1
1986	250,000 2)	89	7
1987	22,000	-	-

Note 1: No trochus seasons in 1983, 1985 & 1987

2: Includes EDA & Government seaweed farms

Source: Economic Development Authority
Pohnpei State Department of Conservation & Resource
Surveillance, Division of Marine Resources

JICA