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TRADITIONAL VILLAGE FISHING  
FOOD SECURITY  
AND DEVELOPMENT OF FISHERIES  
IN VANUATU

Gilbert DAVID

Espérance CILLAUREN

Document de travail

INSTITUT FRANCAIS DE RECHERCHE SCIENTIFIQUE  
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MISSION ORSTOM DE PORT VILA

NOTES ET DOCUMENTS D'OCEANOGRAPHIE

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## FOOD SECURITY AND VILLAGE FISHERIES IN VANUATU\*

Gilbert DAVID\*\*  
and  
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### Abstract

The produce from fishing plays an important part in the protein content of the Vanuatu population's diet in that it meets 16% to 18% of their yearly protein requirements. Three major consumer areas have been identified : the urban area, the coastal area and inland area in rural zones. Each one is dependent on the nature of supply and demand, and the particular constraints affecting these two factors. In the country as a whole, imported products (mostly tinned fish) account for 32% to 35% of the fish supply.

In order to give more priority to local products in the protein supply, the Government has introduced an ambitious development programme for artisanal commercial fisheries at village level. The purpose of this paper is to establish whether this programme is likely to improve food security in the country and to outline some prospects of increasing the role of fisheries in population nutrition.

Key words : Coastal economy, Consumer patterns, Dietary habits, Fisheries development, Food security, Pacific Islands, Vanuatu, Village fisheries.

### Résumé

La production halieutique joue un rôle essentiel dans l'état nutritionnel de la population de Vanuatu dont elle couvre 16 à 18 % des besoins annuels en protéines. Trois principales zones de consommation peuvent être distinguées : les zones urbaines, le littoral et l'intérieur des terres des zones rurales. Chacune d'elles présente des spécificités en ce qui concerne la demande et l'offre de produits halieutiques ainsi que les contraintes qui pèsent sur ces deux paramètres. Dans l'ensemble du pays, les produits importés (principalement du poisson en conserve) représentent 32 à 35 % de l'offre moyenne annuelle de poisson.

Dans le but d'accroître la place de la pêche locale dans l'alimentation de la population et d'améliorer son rôle de substitution aux importations de poisson, le Gouvernement du Vanuatu a introduit un ambitieux programme de développement de la pêche artisanale au niveau des villages. Le présent papier dresse un bilan de ce programme et souligne les perspectives qui s'offrent au secteur halieutique Ni Vanuatu pour renforcer la sécurité alimentaire. du pays.

Mots Clef : Consommation, Développement des pêches, Economie littorale, Habitudes alimentaires, Pacifique, Pêche villageoise, Sécurité alimentaire, Vanuatu.

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## Introduction

Like most small island nations in the Pacific, Vanuatu is faced with powerful socio-economic, cultural and population changes. These changes are reflected in the field of nutrition through a combination of six factors (Fig. 1) : rapid increase in number of consumers (1); shift in consumer focal points from a rural environment to urban areas (2), which is followed by a rapid change in dietary habits; a gradual but steady regress of the subsistence sector, which is reflected in a drop in subsistence production per capita (3); inability of the local commercial sector to offset this phenomenon (4); increase in food imports which jeopardises the balance of trade in the country, when it is already heavily in deficit, and which increases the food dependency and the food vulnerability of the country.

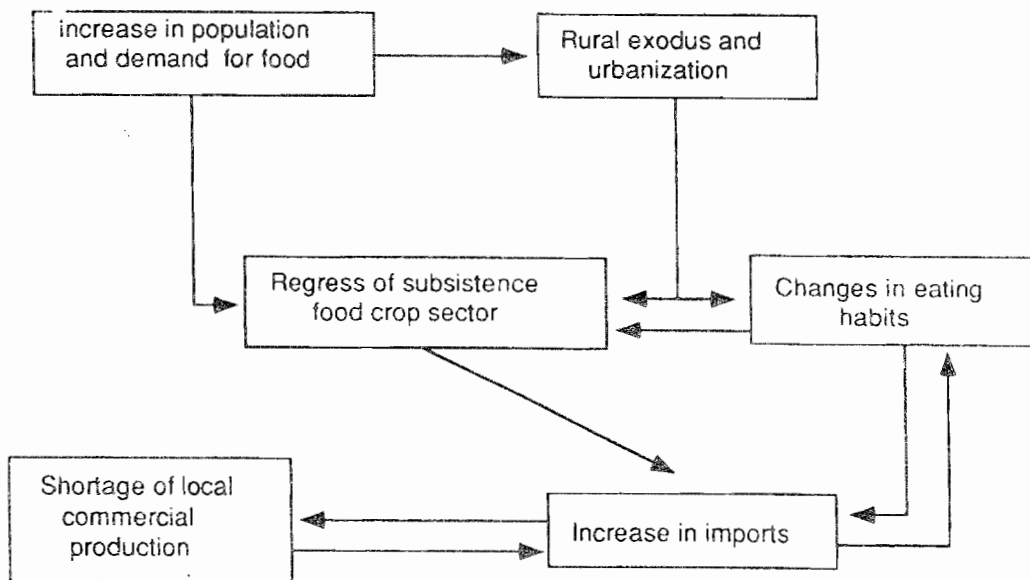


Fig. 1 - Factors jeopardising Vanuatu's nutritional independence

For HEYWOOD (1991) "food dependence occurs when a country becomes dependent on imported food. The greater the proportion of total food consumption which comes from imported food the greater is the extent of food dependence". Food dependency, much like famine or malnutrition, is one of the components of nutritional vulnerability, which we shall define, following a systematic approach, as : "The lack or inadequacy of adaptation responses and regulatory mechanisms of any food-production system to the constraints and unbalances occasionally generated by its environment". Nutritional vulnerability and nutritional security are the two poles of this concept. Nutritional security could thus be defined as the absence of nutritional vulnerability. We shall define it as "the presence in a food-production system of adaptation responses to constraints and external unbalances, through which the population's nutritional needs can be guaranteed in a durable manner." So we see that the concept of nutritional security can be separated from that of food self-reliance, this latter being but a limited variable of the former. Food self-reliance can be defined as "the durable satisfying of the population's nutritional needs through a rational exploitation of the country's natural resources". In a small, economically fragile, nation such as Vanuatu, copra exports and tourism, the two types of economic activity capable of generating the bulk of needed foreign currency, are vulnerable to world economic fluctuations, and have to be backed by food self-reliance.

Extending over 12,200 sq.km, the Vanuatu archipelago is made up of a Y-shaped chain of some eighty mountainous islands located in the South Pacific Ocean (Fig. 2). Most of the islands are of volcanic and coralline origin. They are surrounded by a narrow strip of fringing reefs. There are few lagoons, and the outer reef slope drops rapidly, which means that deep ocean borders the coast. The country is well endowed with soils. About 41 % of the land area of Vanuatu is regarded as being

cultivable and 44 % of this cultivable area is covered by good fertile soils. It is the reason why traditionally the population of Vanuatu is agriculturally oriented. According to the agricultural census of 1983, over 80 % of the population are dependent on agriculture for their food and as the main source of their income (MARSHALL, 1986). In rural areas each household has a garden which provides a large amount of starchy food such as yam and taro, or green vegetables and fruits. Many of them keep chickens and pigs and have their own small coconut or cocoa plantations where they work when they need money. Throughout the archipelago of Vanuatu, agriculture remains mostly subsistence in nature and very often the cash economy still plays a minor role in the rural villages.

Although subsistence agriculture holds the major role in providing the nation's nutritional security, fishing is becoming an essential element, particularly in the supply of proteins. This derives partly from the length of coastline (approx. 3000 km) and the density of the coastal population, which, in 1979, accounted for 74% of the country's rural population (DAVID 1991).

Until 1986, a fleet of tuna long-liners operated out of a base at Pallicolo, in the island of Santo. The fleet belonged to the South Pacific Fishing Company (S.P.F.C), with the Vanuatu government owning 9% of the stock. The vast majority of the catch was put in cold storage and exported to canneries in Japan and the United States. Between 1978 and 1986, 47455 tonnes of tuna were exported, accounting for 26% of the total value of exports for the period (DAVID *et al.*, 1987). Since May 1986, the long-line fishing base of Pallicolo has been totally idle. The tuna-fishing fleet has shifted to Pago-Pago, in American Samoa. Thus the whole of the fishing activity in Vanuatu today rests on coastal fishing. This type of fishing is done at village scale and village level.

We can identify two types of village fishing. The first derives directly from traditional fishing. It makes use of a multitude of devices, craft and techniques, and is aimed at a wide range of fish species, as well as shellfish, octopus, crustaceans (notably lobsters), such as are found in the shallow coastal waters, usually within a depth of 10 meters. The reef flat is the most intensively fished area, providing two thirds of the total catch. The hand-line, the hand-spear, and the spear-gun are, in decreasing order, the most common devices. Gill-nets and throw-nets are still scarce (5% of the gear recorded in 1983), but they are gaining ground rapidly (DAVID and CILLAUREN, 1988). Between 60 and 70% of fishing outings are done on foot, or in underwater free dives. The use of motorised fishing craft remains rare. Most of the fishing expeditions undertaken in boats are done in outrigger dug-out canoes propelled by paddled. This type of fishing activity lacks any kind of structured commercial organization. For this reason, we shall refer to it in the course of this paper as "small scale unstructured village fishing".

The second type of village fishing is more representative of a modern commercial sector activity. The reef flat is the most intensively fished area. It relies on technical specialization - using engine-powered vessels -, on a reduction of the number of species sought, and on an extension of the traditional fishing zone, the new fishing grounds being located along the outer-reef slope at depths between 100 m and 400 m. This type of fishing activity, which receives technical and financial assistance both at production and at marketing levels from Government Agencies as a part of their fisheries development policy, shall be called "artisanal commercial fishing".

This article intends to study the ways in which these two forms of village-level fishing contribute to the food security of the nation. A first part will briefly discuss the major trends in the evolution of dietary habits, in the city as well as in the rural districts, during the last thirty years. In the second part, we will observe more closely the consumption of foodstuff of marine origin. There we will distinguish between the urban area, the coastal rural districts, and the landlocked districts. For each of these zones, we will study the constraints that apply to the balance of supply and demand for the fishermen's catch. In a third part we shall address the issue of development policy in respect of commercial village fishing and examine how this activity can contribute to the development of the population's eating habits and to the country's food security. The last part will suggest certain recommendations aimed at improving the contribution made by village-level fishing to national food security.

The analysis presented herein is based mainly on the results of various statistical surveys carried in Vanuatu between 1983 and 1985, i.e the agricultural census (MARSHALL, 1986 ; DAVID & CILLAUREN, 1988), the national nutrition survey (HUNG, 1983; DAVID, 1987), the Vanuatu / SPC dietary study in 1985 (LUND *et al.*, 1988), the family income and expenditure survey of urban areas (ANONYMOUS, 1986a; SINGLETON, 1987; DAVID, 1991) and the monitoring of landings in the commercial village fishing by ORSTOM and the Vanuatu Fisheries Department (CILLAUREN, 1990a).



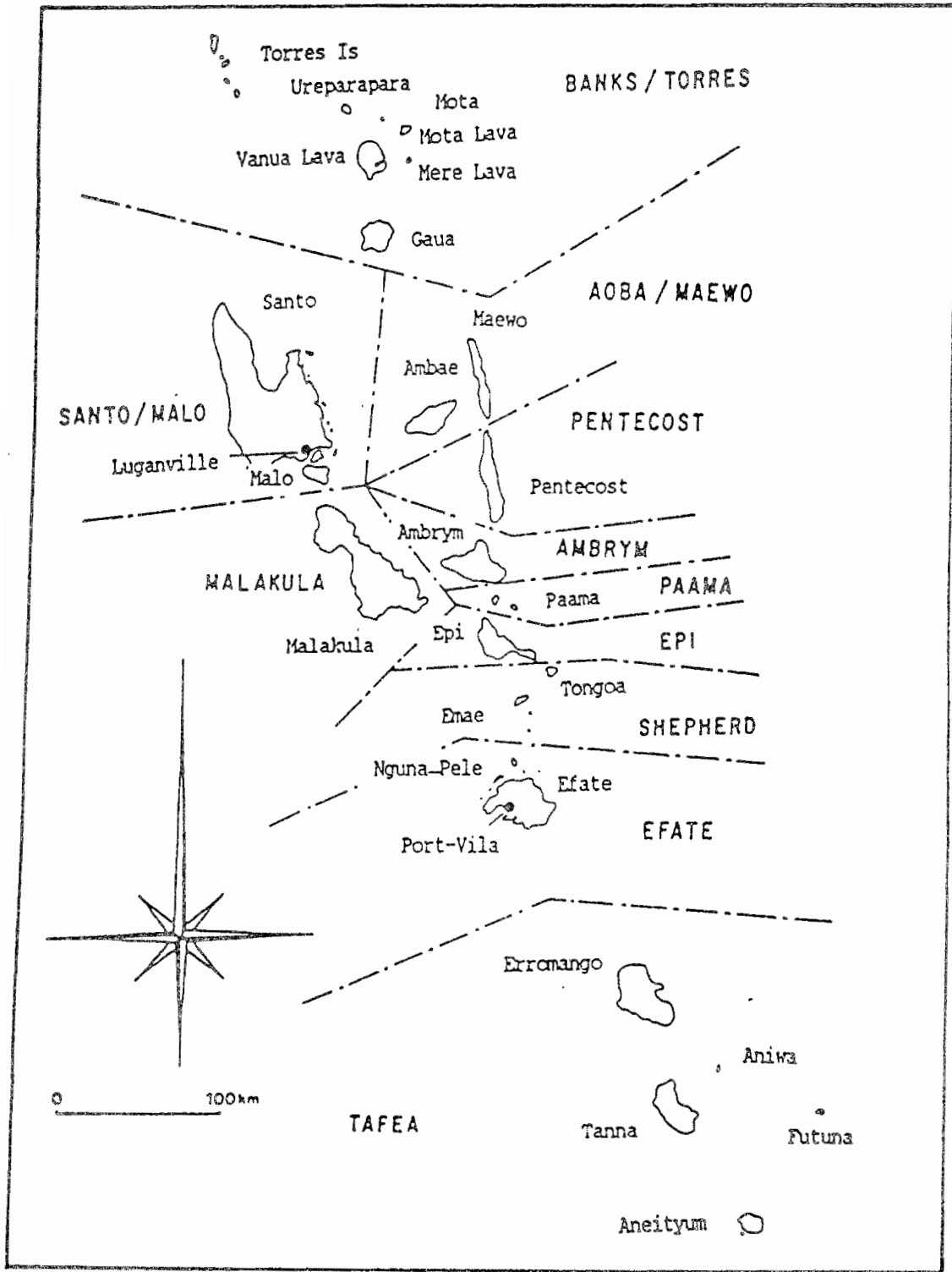


Figure 2 - Vanuatu and its eleven Local Government Regions

## 1. Major trends in the evolution of dietary habits

### 1.1. Rural / Urban and Urban / Rural relationships

With regard to dietary habits, it is important to distinguish between the rural population and the urban dwellers. In town, nutrition is an integral part of the cash economy and a greater percentage of the food is imported from overseas. Outside Port Vila and Luganville, the two urban centres in the country, nutrition still remains, however, linked to the traditional economic structure. Cash economy plays virtually no part in nutrition, based mostly on local produce. Nevertheless, despite these fundamental differences in the urban and rural lifestyles, there are also powerful ties between the two.

It must be remembered that town dwellers in Vanuatu are a fairly new breed, most of them having been born in rural areas. Their original dietary habits, therefore, were influenced by rural ways and their current eating habits are a combination of this heritage and the nutritional changes brought about by urban living, affecting both the frequency of meals and the quality and quantity of their food.

Whereas there is a definite relation in respect of nutrition "Rural environment  $\rightarrow$  Urban environment", the opposite is also true. As a result of cash economy having an increasing impact on village economy, rural patterns of eating are becoming infected with food originating from town. One of the best examples of this is the way the rural population has taken to tinned foodstuffs. In fact, the food link "Urban environment  $\rightarrow$  Rural environment", extends well beyond tinned foods alone on the islands of Efate and Santo, which include Port Vila and Luganville respectively, in the main missionary centres and Council headquarters. Communications and the administrative and religious function of rural villages play a major part in the development of dietary habits.

### 1.2. Changes in town

The main difference to be noted in the dietary habits between the rural sector and the urban areas lies in the poor share of local produce, traditionally originated from subsistence economy, in the daily diet of city people. These products have been replaced by imported foodstuffs, products of Western and Asian agro-food industries. Rice has become the most common carbohydrate. Tinned fish or meat figure quite significantly in the protein intake, while the supply of fresh fish, mollusc and shellfish is very irregular and costly, which is the reason for the low priority given to these products. In the space of ten years or so, the consumption of fresh meat has increased by leaps and bounds, one because of the price, attractive, and two because of the regular availability of the product.

The changes in the diet have also seen a change in the pattern of meals during the day, reflecting a growing 'specialisation' of meals : for instance, breakfast has lost its importance. It is more French in style, with bread dipped in tea or coffee now being the major component, as pointed out by B. JABRE *et al* (1976) and M. HUNG (1983). It is quick to prepare and swallow, no small factor in the case of families with a lot of children of school age. Although much more copious than the previous meal, lunch is also marked by the speed of preparation of the components (tinned meat, fish, rice). However, supper often includes traditional foods requiring longer cooking time, especially root vegetables which are boiled or ground-oven-cooked. Where the housewife is not gainfully employed, she may serve laplap (5). B. JABRE and his team observed, however, that due to the length of time required, laplap is more often than not reserved for Sunday. Without a doubt, the eating habits of ni-Vanuatu living in town are geared to gainful employment and school attendance, two key aspects of a Western life-style.

T.G. MacGEE *et al* (1980) gave seven explanations of the growing significance of imported food in the diet of ni-Vanuatu (6) living in town, namely :

- a) lack of space for establishing family gardens in town, compelling urban households to buy most of their food;
- b) high cost of the local produce on sale at town markets;
- c) low cost of widely consumed imported foodstuffs;
- d) variety of tinned food available at the stores;
- e) children's schooling which, on the one part, influences their tastes towards imported foods, and on the other, disrupts the mother's daily pattern of life and that of her children, inducing in particular the cut-back on breakfast time;
- f) working women, leaving them too little time and availability to prepare traditional meals;
- g) urban life-style which leads to a break with tradition and the introduction of a new diet consisting of a significant portion of foodstuffs which can be made ready rapidly, the classic example being tinned food.

The figure 3 shows the main relations between these various factors and elements.

The rapid increase of the urban population can only accelerate the process of change in eating habits. From 1979 to 1989, Port Vila and Luganville, the two urban centres in the country, went from 9,970 to 19,040 inhabitants and 5,160 to 6,900 respectively, which corresponds to growth rates of 90% and 33% respectively in ten years. In these circumstances, it is becoming more and more difficult for new arrivals to find space available to plant their own subsistence garden and the share of production for self-consumption in urban families' nutrition is tending to drop dramatically.

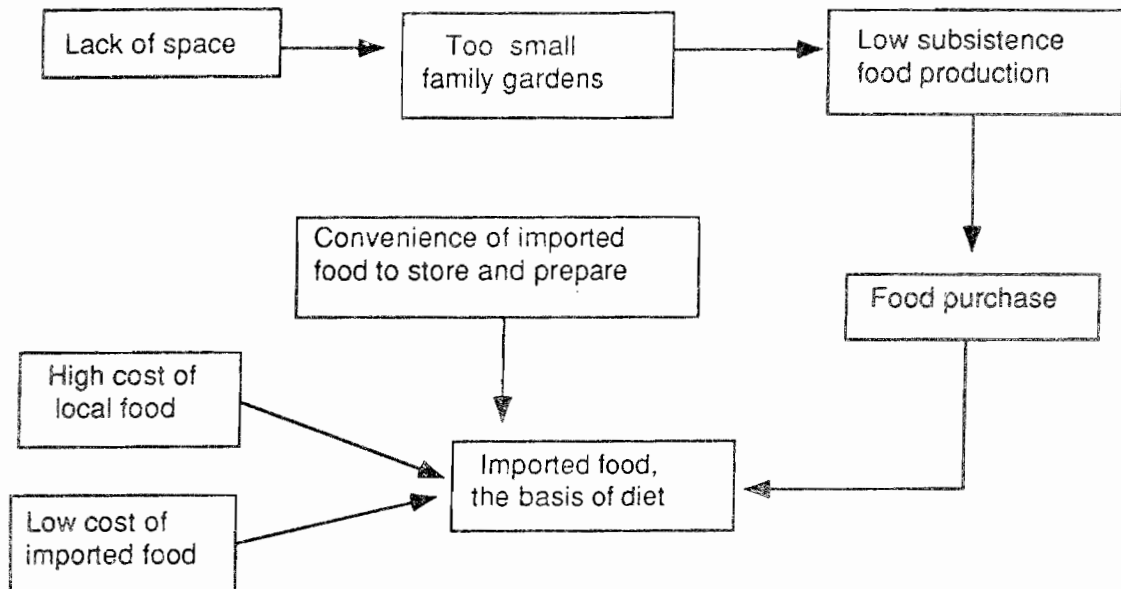


Fig. 3 - Causal relationships showing the major place taken by imported food in the diet of low-income urban families

### 1. 3. Changes in rural areas

In rural areas, the share of imported foods in the daily diet is far less than in town (7). However, it is increasing steadily and gradually a combined diet of local produce and rice and tinned food is taking over from the traditional protein diet which was solely made up of fresh food, especially fish, served with root vegetables, fruit or vegetables from subsistence gardens. Meat consumption has always been severely constrained by supply, or lack thereof, because cattle and pigs are only slaughtered on festive occasions or for custom ceremonies. Thus, the only fresh source of protein which is in regular supply is produce from fishing.

The massive impact of urban consumer patterns is reflected in the shift toward imported foodstuffs and new eating patterns in rural communities in Vanuatu. This is mainly due to the increasing influx of money in the islands. This has been extraordinary over the last twenty years. With the increasingly wide-spread use of money, a solvent demand has developed. This is reflected in the purchase of rice, tinned protein and bread, food known and enjoyed by the islanders through their contact with missionaries, European settlers, and American soldiers during the last world war, and later, through the school kitchens under the Condominium rule, where they figured predominantly on the menu (Fig. 4). As shown by J. BONNEMAISON (1986), school and church, both described by the same term of 'skul', soon became a symbol of modern life, as opposed to 'custom' and tradition. The eating habits acquired at school then took on the prestige attached to the establishment. In many instances, the desire for modernism took shape and reality, whether it be deliberately or unconsciously, by adopting the 'skul' men's food. As noted by P. HEYWOOD (1991, p. 77) "because of their association with expatriates, tourists and urban residents imported foods may be regarded as superior goods even in rural areas. This will often be important in determining the positive attitudes toward imported items".

Vanuatu's rural population is at present going through a population and economic transition stage which will inevitably affect the basic eating habits in the future.

The first factor of change is the dynamics of population growth. Between 1979 and 1989, the country grew by some 31,500 people, from 111,250 to 142,630 inhabitants, or 28 %. The natural growth rate is 28 per thousand, with a birth rate of 42.1 per thousand and a death rate of 13.6 per thousand (BEDFORD, 1989). In the space of 10 years, the demographic pressure on cultivable lands has greatly increased. The average number of cultivable hectares has shrunk from 26 to 22. In 4 out of the 11 regions of Vanuatu, this value is well below the average figure : each household only enjoys 5 to 9 hectares of cultivable land. In an increasing number of settlement areas, population density exceeds the viability threshold of the traditional agricultural system. This phenomenon leads to grave soils erosion, to an increasing malnutrition and to the beginning of undernutrition which compels the population to migrate, which is exclusively towards town, because it is virtually impossible for migrants to move to the numerous underpopulated rural areas (8 ) due to land ownership customs and systems, characterised by the total refusal on the part of the traditional land owners to allow outsiders to settle on their lands. Such refusal , if it is allowed to continue, can only reinforce the tendency to migrate to the city. Thus , it continues a very serious threat to the political and economical viability of the nation.

The other factor of change is the extremely low price of copra, the main economic activity of rural areas, which has gone from US\$ 600 per ton in 1984 to \$ 300 in 1988 and 1989, to an all-time low of \$ 100-150 in the first quarter of 1991 (Anon. 1990). This evolution has two consequences : one, a return to subsistence agriculture and a drop in cash flow in the islands, and two, a search for other, more lucrative commercial activities. This is why the collection of troca shells (*Trochus niloticus*), a mother-of-pearl shell in great demand on world markets, has escalated significantly along the coastlines, and owners of mesh nets or cast-nets are trying to develop small-scale commercial fishing operations. If the negative trend of copra prices continues in the next few months, there is a serious risk that the urban drift towards Vila will intensify yet further.

From this brief review of the changes in eating habits, it appears that food security is a complex issue which cannot be considered separately from the economic, social and cultural background of the country, and this has to be understood at different levels of space : on the scale of the country, the island and the town.

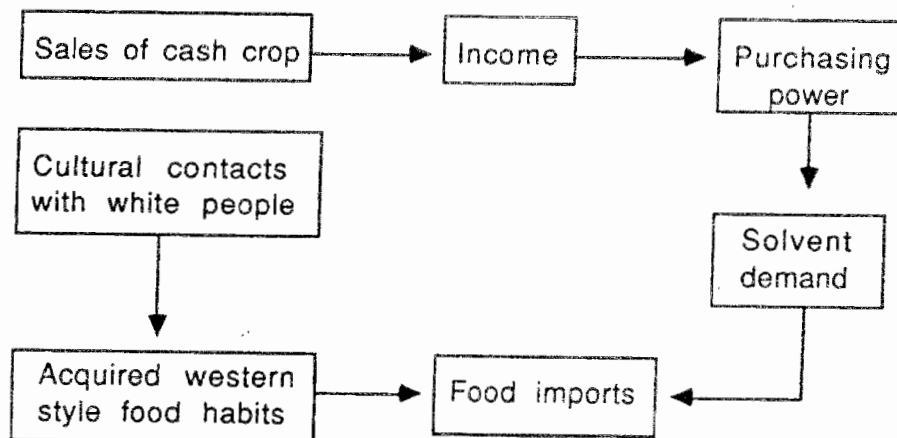


Fig. 4 - Causal relationships showing food imports in the rural areas

## 2. Consumption of fishing produce , Typology of space and constraints

Depending on whether considering imported products or fresh produce from local production, there are significant differences in terms of nature of the product, its origin and the daily quantities consumed or available for consumption between urban areas and rural areas on the one hand, and on the other, within the rural areas themselves, between the coastal areas and inland. Three patterns of consumption are clearly defined, with the consumers having their own particular eating habits :

- rural consumption pattern in coastal areas,
- rural consumption pattern inland,
- urban consumption pattern, the main quantitative aspects of which are shown in Table 1 which represents the supply of marine products in Vanuatu in 1984. In this table, the term "seafood" denotes octopus and marine shellfish, mainly bivalves, gasteropods and lobsters.

Whereas eating habits can be easily distinguished in terms of spacial distribution, not all distinctions can be reflected in this way. In urban areas, differences in income play a significant part. In this case, consumption (C) is related to income (I). Spatial differences then only apply where people of similar income dwell in the same district. Following the typology applied for budget surveys by the National Planning & Statistics Office (Anon., 1986), three classes of income have to be considered :

- households with less than 45,000 vatu per month (US\$450),
- households earning between 45,000 and 100,000 vatu per month (US\$450 to US\$1,000), and
- the wealthier people with more than 100,000 vatu per month. In this class a difference should be made between the ni-Vanuatu population and the expatriates who enjoy a greater purchasing power than the ni-Vanuatu population.

### 2. 1. Urban Consumption Patterns

There are five main typical points (Table 1a) :

- the existence of a tourist-related consumption, to be found in restaurants, in addition to the local consumers;
- the importance of shell fish in the tourist market, with consumption levels 4 to 7 times greater than fresh fish;
- the scarcity of mollusc and shell fish on the local consumer market as opposed to fresh fish with a supply 4 to 9 times greater;
- the significance of consumer income and price of product as a major factor determining local consumption, both in terms of quantities and type of product;
- the high demand for tinned sea produce on the local market, the consumption of which equals that of fresh fish. For the main part, these products consist of mackerel, known throughout Vanuatu by the bislama expression 'tin fis'.

The differences in income among the urban population lead to totally different eating behaviours between the expatriate urban population and the ni-Vanuatu urban population, not only in respect of quantities but also of type of product consumed. For this reason, we will consider these two categories as separate entities.

#### 2.1.1 Expatriate urban consumer patterns

Because of the high purchasing power among these consumers, whether tourists or residents of Port Vila or Luganville, a wide range of produce is available for consumption, the most common being fish and shell fish. As a rule, prices are high. As shown under Table 2a, most of the products consumed come from the rural coastal areas as fresh fish, followed by fish, mollusc and shell fish imported from overseas, either frozen or tinned. There is a small volume of tuna and deep-sea fish consumed out of small-scale game fishing operations. Compared to fresh produce, the consumption of tinned products is insignificant and comprises mainly highly priced goods such as tuna and shell fish.

The major constraint on consumer demand is the lack of availability both of fresh fish and of shell fish. Fresh fish arrivals from the rural coastal zones are fairly erratic and the quantities are often too small. Hotels and restaurants often suffer shortages and the shelves are empty at "Natai", the state-controlled fishmonger in Port Vila which markets the catch from the small-scale fisheries associations formed under the fisheries development programme. The main cause of this lack of supply is the low level of production and the inefficient distribution networks, compelling the consumer to fall back on

imported fish or more often to turn to the local fresh meat which, in addition to its very competitive price, is of excellent quality and regularly available.

### 2.1.2 Ni-Vanuatu urban consumption patterns

The most distinctive trait of urban ni-Vanuatu patterns of consumption is the high consumption of tinned mackerel and a definitely smaller demand for fresh produce. Fresh products from the coastal areas are high value-added products, sold on the urban market at a much higher price than the potential ni-Vanuatu consumers can afford. Population needs cannot be met by the supply of marine produce, which is too expensive having regard to the low purchasing power of the urban population. The only products to which ni-Vanuatu consumers may have access are the smaller pelagic fish (mainly sardines) sold from time to time by the odd fisherman from door to door, or reef fish which is found occasionally in stores. As for production for own consumption, it is extremely restricted because the waters close to urban areas, which is where people go fishing, have been more or less exhausted.

Table 2b clearly illustrates the situation. The high price of fresh fishing produce compared to the consumers income leads to a fierce competition from tinned fish at a lower sales price. And now lower quality fresh meat is competing strongly with tinned fish. In the last quarter of 1984, the large tin of mackerel, 425 g contents, was selling for 75 to 80 vatu in shops in Port Vila and Luganville, i.e. 0.8 US\$. For the same cost, you could get from Natai, the Port Vila Government fisheries market, 400 g of skipjack (*Scombridae*), 320 g of reef fish or grouper (*Serranidae*), 275 g of red snapper (*Etelidae*), 265 g of shark filet. And for the same price, the meat lover could also purchase 400 g of beef stew or 172 g of tinned meat, produced locally under the name 'tin mit' or imported from Australia as 'corned beef'.

Whilst you can eat all of the mackerel out of a tin, the same does not apply to fresh fish, 55% of the body mass being scales, skin, gut and bone (JARDIN & CROSNIER, 1975). In spending 80 vatu, the 'tin fis' consumer ends up with three times as much food as the purchaser of red snapper (Table 3). In addition, depending on the preparation (in oil, tomato sauce or brine), he is getting four to six times as many calories, two to three times as many proteins and vitamins, four to nine times as much iron and calcium. Of all the protein food from the sea available on the market in Vanuatu, the tinned mackerel is therefore the best choice a consumer can make from the point of view of the ratio nutritional value to cost. Tinned fish is a much more economical food than fresh fish and given that 50 % of the working Melnesian population, in the private sector, was earning in 1983 less than 16,000 vatu per month (i.e. 160 US\$), with 25 % getting wages below 9,000 vatu (QUILLE, 1985), it is no wonder that "tin fis" so popular !

Of all the fresh fish sold whole, the most economic choice is undoubtedly the skipjack. As opposed to whole fish, filet does have the advantage of being fully edible. However, at an average cost of 500 to 600 vatu per kilo, its sale price is too high for low-income families to be able to buy it on a regular basis. The only filet readily available to them is shark filet, at 300 vatu per kilo. However, in spite of the attractive price, consumption of shark is low because many ni-Vanuatu consider it a magic animal.

However, price is not the only decisive factor for demand. Other aspects enter into it : the number of outlets selling the product, its flavour, how quickly and easily it can be prepared. Whilst fresh fish is usually better liked by consumers than tinned fish, the other factors undoubtedly make tinned mackerel more appealing.

### 2.2. Coastal rural consumption patterns

There are three main differences between the pattern in coastal rural areas and that of urban areas

- general consumption of marine produce caught locally (Table 1c);
- fairly significant consumption of tinned mackerel, representing 27% to 30% of the consumption of fresh fish;
- the irrelevance of consumer income as a factor having a bearing on the quantity (i.e. quantities consumed); however, income does have a bearing on the choice of consumed product, for instance the consumption of deep-sea bottom-dwelling fish is closely related to solvent demand, i.e. availability of cash, whereas sole self-consumption is generally indicative of low income.

Table 1 : Supply of marine produce in Vanuatu in 1984

## a) Tonnage in urban areas

EXPORTS	IMPORTS			Local Consumption		Tourist Consumption		TOTAL
	Tin fis	Other Fish	Seafood	Fish	Seafood	Fish	Seafood	
3	127.5 - 199	37.5	16.4	144.3 - 183.3	15 - 45.16	40.8 - 85.1	295.6 - 343	677.1 - 909.5

## b) Tonnage for the whole of the rural area

Imported products (tin fis)	Fresh Produce		TOTAL
	Fish	Seafood	
536 -568	1677 - 1774	1364.7 - 1659.7	3569 - 4076

## c) Tonnage in the coastal zone

Imported products (tin fis)	Fresh produce		TOTAL
	Fish	Seafood	
476.5	1536 - 1774	1119 - 1659.7	2704 - 3505

## d) Tonnage inland

Imported products (tin fis)	Fresh produce		TOTAL
	Fish	Seafood	
77.25	14.4 - 150	16 - 298.7	106.45 461.25

Table 2 : Main patterns of consumption of marine produce in Vanuatu

a) Nature and origin of the products included in the supply of marine produce <sup>(1)</sup>

Consumer Sector	Parameter	Nature of Products			Origin of Products		
		Imported	Consumed	Exported/distributed	Imported	Consumed	Exported/distributed
URBAN EXPATRIATE	1	Fresh fish	Fresh fish		Coast	Coast	
	2	Shellfish	Shellfish		Overseas	Overseas	
	3	Tinned fish	Tinned fish			Local (Game fis.)	
	4	Mollusca	Mollusca				
URBAN NI-VANUATU	1	Tinned fish	Tinned fish	Tin. fish	Overseas	Overseas	Overseas
	2	Fresh fish	Fresh fish		Coast	Coast	
	3	Mollusca	Mollusca				
	4	Shellfish	Shellfish	Fresh fish			
COASTAL	1		Fresh fish	Shellfish	Overseas	Local	Local
	2		Mollusca			Overseas	Overseas
	3	Tinned fish	Shellfish	Fresh fish			
	4		Tinned fish	Tin. fish			
INLAND	1	Tinned fish	Tinned fish		Overseas	Overseas	
	2	Shellfis.Mol.	Shellfis.Mol.		Coast	Coast	
	3	Fresh fish	Fresh fish				

b) Constraints

Consumer Sector	Parameter	Constraints affecting supply			Constraints affecting demand		
		Tinned fish	Fresh fish	Shellfish & mollusc	Tinned fish	Fresh fish	Shellfish & Mollusc
URBAN EXPATRIATE	1	Demand	Production	Production	Competition	Lack of supply	Lack of supply
	2		Distribution	Distribution	from fresh	Competition	
	3		Preservation		products	from fresh	
	4		means		(fish, meat)	meat	
URBAN NI-VANUATU	1	Demand	Demand	Demand	Price/Income	Price/Income	Price/Income
	2		Production	Distribution	Competition	Competition	Competition
	3		Distribution		from fresh	from tin fish	from tin fish
	4		Preservation		meat	Lack of supply	
COASTAL	1	Distribution	Production	Export to	Lack of	Commercial	Lack of supply
	2	Demand	Means of	town	supply	supply	Resources
	3		preservation	Resources	Lack of	Own	Lack of
	4		Distribution	Demand	income (2)	consumption	income(2)
			Demand		Price/income	Lack of	Price/Income
INLAND	1	Demand	Demand	Demand	Lack of	Lack of	Lack of income
	2	Distribution	Distribution	Distribution	income	income	Price/Income
	3		Com. prod.	Com. prod.	Supply	Price/Income	Lack of supply
					Price/Income		

1) Each parameter is represented in decreasing order of importance, 1 (the highest) to 4 (the lowest).

2) The expression 'lack of income' means consumer income, not the earnings the fishermen generate from selling their marine produce commercially.



Table 3 : Nutritious value (1) of some protein foods bought in Port Vila in 1984 for 80 vatu (2)

Product	Total weight (g)	Edible content (g)	Energizing content		Protein (g)	Lipid (g)	Glucid (g)	Calcium (mg)	Iron (mg)	Vitamin (mg)
			(kj)	(kcal)						
Tin fis In brine	450	350	2580	620	70	35	0	133	4	29
Tin fis in oil	45	350	3240	775	65	55	0	665	9	31.5
Tin fis In tomato	425	320	2340	560	50	34	12	320	5	25
Skipjack	400	200	1475	350	40	20	0	75	2.5	16.5
Reef fish	320	145	630	150	30	4	0	40	1	9.5
Red snapper	275	125	545	130	25	3	0	35	1	8
Shark fillet	265	265	1155	280	50	6	0	75	2	17.5
Neck of beef	400	400	3065	730	70	50	0	40	10.5	36.5
Corned beef	170	130	1220	290	25	21	0	26	6	9.5

(1) The nutritious content was calculated with reference to the food composition tables prepared by FAO and used by JARDIN and CROSNIER (1975).

(2) The amount of 80 vatu represents the officially agreed purchase price of a large tin of macquerel.

Table 2b shows that the constraints on supply are closely linked to the constraints on demand. Supply is the main factor restricting demand, whereas demand always appears as the constraint impeding expansion of supply. Overall, supply is considered to be quantitatively inadequate, because too low, especially with respect to fresh fish. This inadequacy affects equally commercial demand and own-consumption requirements. In the first instance, the low number of commercial fishermen and low levels of production are to be blamed; in the latter instance, often it is a matter of limited area of the fishing zone and lack of resources therein having regard to the effort put into it. Either way there is the additional problem of preservation and distribution of the marine produce which does not really encourage fishermen to improve their fishing efforts. In the particular case of shell fish, the low volume of supply along the coast (Table 1b) is mainly due to the fact that lobster is sent to the urban markets. As for tinned products, the main constraint on supply stems from distribution problems, due in particular to poor communications and transport facilities in the islands.

Aside from supply, the main constraint on demand in coastal areas is the shortage of available cash among rural households and the resulting low purchasing power. In 1984, the agricultural census gave an estimate of the average annual budget for rural households as being 78,540 vatu (US\$ 785). About 8% of this is spent on buying tinned mackerel; 3.5% on tinned meat and 2% on fresh fish (DAVID, 1991). Such economic constraints undoubtedly represent an inherent obstacle to any improvement of commercial production.

### 3.3. Rural consumption patterns inland

The main traits of rural patterns of consumption inland are as follows :

- own-consumption of marine produce is virtually non-existent;
- income as the major factor determining consumption, which is a logical consequence;
- low consumption of marine produce (Table 1d), because of the low purchasing power among the population;
- consumption of tinned fish as a substitute for fresh produce because of distribution problems inland.

The main constraint on demand stems from the lack of cash income inland, where coconut plantations are scarce by comparison to the coastal areas. The limited range of supply is another constraint. To improve this situation would require:

- increasing production, not only the commercial production from the coastal areas, but also local production for own-consumption;
- developing means of preserving the catch to at least enable the product to keep its quality and appeal during the transport from the landing points to the centres of consumption;
- organising distribution networks in order to reduce transport time.

The last two conditions are very much dependent on the state of communications within the islands. Roads suitable for motor transport are few. Apart from the nation's two urban centres, they are not tarred but are made up of crushed coral. This type of roadway is very vulnerable to erosion by rain, and it isn't unusual for roads which had been perfectly adequate during the dry season to become entirely unmanageable a few months later, by the end of the rainy season. The upkeep of the road network is thus a major expense for the Vanuatu government, and it is frequently neglected on account of other financial constraints. The Public Works department only acts when a road has become completely unuseable.

Out of this brief review of the various patterns of fish consumption and their constraints, some important facts arise:

- a) two main factors of constraint on demand :
  - household incomes and the budget they are prepared to allocate to fresh fish;
  - the competition between fresh fish and tinned fish;
- b) three main factors of constraint on supply :
  - limited nature of production, especially commercial production;
  - lack of means of preserving fresh produce;
  - poor distribution networks.

### **3. Village fisheries development programme**

#### **3.1. Exploitation strategy and monitoring production**

The development of small-scale commercial fisheries (9) has been one of the priorities in the first two Five Year Development Plans (1982-1986, 1987-1991). This policy was implemented in 1982 with the introduction of a development programme for commercial village fisheries : the V.F.D.P. (Village Fisheries Development Programme). The emphasis is on the exploitation of new fishing zones located along the reef drop, using motorised vessels fitted with lines mounted on reels, at depths of 100 to 400 m, beyond the range of the traditional canoes propelled by paddle and well beyond the narrow stretch of fringing reefs where most of the 'traditional' fishing activities are concentrated if there is no lagoon available. Upon the country achieving independence in 1980, these zones, consisting mainly of ichtyosarcotoxin-free fish (10), essentially Etelidae (red snapper), Lutjanidae (sea-perch), Serranidae (grouper), Lethrinidae (emperor) and the Pentapodidae (bream), were still virgin of any form of fishing. Because they are not particular abundant, the exploitation of these stocks must be carefully supervised and managed. BROUARD & GRANDPERRIN (1984) have shown that the maximum sustainable yield (MSY) - which is the maximum quantity of fish that can be taken from a particular stock without altering its demographic balance, so that exploitation may be kept at this level indefinitely - would be of the order of 760 tonnes per year for the whole of the country's usable area, or an average of 1 kg/ha/year. A total of 120 motorized vessels, carrying each three hand reels, and going out an average of 150 times per year, would be sufficient for producing the desired quantities, with each reel being in use 4 to 5 hours at each outing, and expected to bring up an average of 3 kg of fish per hour of use.

In actual fact, the object of the Village Fisheries Development Programme is to set up, alongside the small-scale village unstructured fisheries, a structured commercially oriented sector which would exploit new resources, in a new fishing area, with new or upgraded techniques and modern equipment. To achieve this end requires constituting a new generation of professional fishermen comprised either of 'traditional' fishermen attracted by the profits to be made or, less likely, of 'small-scale businessmen' to whom fishing appeals.

The monitoring of the development of fishing and of marine food production must be an essential component of any future strategy. Through this monitoring, it will be possible to determine the

parameters for dynamic equilibrium, or Maximum Sustainable Yield, which form the basis of any rational resources management. This data will also be used to assess the effects on the fishing fleet and on the resources of the measures taken by the government within their fisheries development policies, and, if need be, to amend or redirect these measures for greater efficiency. Since the launching of the V.F.D.P. (Village Fisheries Development Programme) in 1982, data concerning the development of fishing and production of deep bottom-dwelling fish have been collected by ORSTOM, in close collaboration with the Vanuatu Fisheries Department. At present, the data gathering process is divided into three levels, each corresponding to one of the stages of fish production : landings, rural fish sales, and the urban market. The three questionnaires which make up this data gathering system are shown in an appendix to this article.

The monitoring of the landings covers, depending on the year, 50 to 70% of village co-operative fishing associations. This represents the oldest system, having been in existence since 1982. It is also the most complete. Every time they go out to sea, the fishermen fill in a form indicating the fishing area, the depth at which fish are caught, the duration of the expedition, total catch, and the measurements of all fish belonging to 12 main species. In return the fishermen get tax-free petrol and a sum of 0.5 US\$. Between 1982 and 1989, some 13,000 fishing outings were recorded (CILLAURREN, 1990).

Data gathering regarding the marketing of fish in the rural districts is accomplished using as a base the nation's seven fisheries extension centres. It is mostly concerned with fishing development and fish production within the village fishing co-operative associations located in the vicinity of these extension centres, but it also documents the production costs and the income derived by the fishermen from the sale of their catch. This system has been in place since 1989, and deals with a much smaller number of village co-operative associations than the monitoring of the landings.

Data gathering in the urban zones centers around the two government fish markets at Port-Vila and Luganville. The data consists mostly of the tonnage sold and the selling price of the commercial species.

Together, these three systems of data collection provide information on stocks biology. The entering and processing of statistics is centralized and is organized as follows : entry of data, correction, detection of systematic and random biases, classification, evaluation of dynamic parameters, adaptation to existing models, choice of appropriate predictive model.

Apart from the data collection system, a major problem in the management of the fish resource in Vanuatu and other Pacific Islands archipelago concerns the question of whether determining a maximum sustainable yield for the whole archipelago is a satisfactory method of resource management. In fact, the benthic nature of the deep-bottom dwelling fish, located in an environment of high islands separated by deep seas limiting their extension, may be the reason for the existence of separate stocks each with distinct demographic features dependent on the area which they have colonized (CARLOT, CILLAURREN, 1990). This hypothesis needs to be tested, but its implications for resource management are clear. Although overall fishing activity may decrease or may keep unchanged at the scale of the whole archipelago, occasional intensive periods of fishing activity may occur. These may lead to localised over-fishing due to insufficient renewal of stock, which exhibits a limited migration pattern.

### 3.2. Objectives of the development plan and logical implications

The main purpose of the V.F.D.P. is to develop commercial fisheries at village level, and to achieve four associated objectives :

- to improve the nutrition of rural and urban dwellers;
- to reduce the imports of tinned fish;
- to develop the cash economy in village communities (CROSSLAND, 1984a; LE GAL, 1986);
- to create employment opportunities and cut down the urban drift into Port Vila.

Two logical orientations follow from closer examination of these objectives :

The first would tend toward an extravert economic structure, integrated into the national and international markets, with priority given to exporting overseas and supplying the urban and tourist markets with species of fish with high commercial value. For island economies, this activity would result in cash generated from the capital Port Vila, which in turn would lead to the development of associated commercial activities and provide employment. The species marketed hold a strong appeal and the potential demand from overseas could be seen as quite significant and likely to

encourage further production in the islands, because villagers will realise that fishing can be very profitable. The object then will be to reach a high enough level of supply in order to compete for a share in the international market place and once this has been secured, it will enable the fishing operations to continue over the long term and thus ensure the long term development of the island economies.

Within this trend, two of the four goals which the V.F.D.P. has set itself have been fulfilled. These are the development of a cash economy and the drop in urban drift through employment opportunities. The nutrition objective has only been met in a round-about way. Because the fishing production is entirely geared to the outside market, no direct contribution from the fisheries development can be expected to improve levels of nutrition within the rural population. However, the income generated will enable families to increase their food expenditure and thus significantly compensate for the lack of commercial supply of fresh fish.

Undoubtedly, imported tinned fish is one of the products which is benefiting the most from the increase of available demand. The fourth goal of the V.F.D.P. therefore, i.e. to reduce the imports of tinned fish, cannot be achieved, and is proving to be totally opposed to the logic of the proposed development scheme. The solution to avoid this contradiction is simple : a model of dual development could have been planned, whereby a 'modern' and structured sector devoted exclusively to deep-sea fishing for the urban and export markets would coexist with a commercial sector concentrating on small-scale fisheries. The role attributed to this small-scale fishing, old-fashioned and inexpensive, is to supply island populations with shallow-dwelling reef species. As opposed to the structured commercial fishing, this form of fishing, informal, requires little financial assistance to develop and the action of Government can be restricted to the duty-free sale of lines and nets and to encouraging simple and cost-effective methods of preserving the fish, such as smoking or a combination of salt-drying.

The second development trend is absolutely in opposition to the first one. Self-centered by nature, emphasis is on supplying the rural population with protein from the sea and import substitution of 'tin fish'. Under this scheme, small-scale fishing takes second place after agriculture which, in that it is source of foreign currency, is the actual motor of island economies. Fisheries are therefore very vulnerable to any fluctuation in this sector, particularly variations in the price of copra which is still the main source of foreign currency in rural areas. Under this scheme, therefore, the fishing industry is closely linked to and dependent upon the island economic situation and has virtually no scope for autonomous growth. Because of this, its role in the development of cash economy is limited and its contribution to controlling urban drift is very marginal.

It should be noted, for both development models, that neither consider the improvement of the nutritional status of ni-Vanuatu low-income urban households. This section of the population has been left out of the fisheries development plan, so it is hardly surprising that consumption of fresh fish in this area is insignificant, whereas it draws heavily on tinned fish. Nevertheless, there is no reason why the supply of fresh marine produce at a cheap price cannot be increased, as a substitute for tinned fish, unless the only aim is to fish for deep-sea bottom-dwelling species, the operating costs of which are very high. To solve the problem, simply :

- change targets; in this respect, shallow-dwelling reef fish, the smaller deep-sea species (*Clupeidae* or seiar for instance), and the skipjack caught around the fish aggregating devices offer very interesting prospects;
- restrict the production area of deep-sea bottom dwelling fish to the relevant consumer island, i.e. Efate and Santo;
- organise a mobile collection unit in rural areas in order to provide the fishermen with a regular outlet for their fish and thus stimulate their commercial fishing activities.

Finally, none of the objectives set by the V.F.D.P. would appear to be inherently opposed to the others. Contradictions arise solely out of the choice of focusing fisheries development exclusively on the exploitation of deep-sea bottom-dwelling species along the reef slope. In this regard, the extravert development scheme, tending towards exports and supply of urban markets, which was favoured by the Fisheries Department in the early stages of the V.F.D.P., has been slightly altered to include a form of self-centered development in order to meet the necessity of improving the levels of nutrition in rural communities et reducing the importation of tinned fish. This combination has not proved fruitful so far and the initial development scheme has gradually given way to the second scheme, which is now predominant.

### 3.3. Implementation of the development plan

Set up for an initial duration of three years, the Village Fisheries Development Programme provided for the creation of 25 Fishing Co-operative Associations, to which technical and financial support were guaranteed for the purchase of equipment as well as providing for the training required for its handling and maintenance.

The E.D.F (European Development Fund) is the main backer of the V.F.D.P. As part of its aid to ACP countries between 1982 and 1985, it has provided 73 million US\$, 53% of the 138 million of the total budget for the operation (CROSSLAND, *op. cit.*). Canada also provides a substantial contribution, amounting to 18 million US\$, in the form of salaries for the "C.U.S.O." volunteers who look after the technical training and support of the fishing co-operative associations. Between 1982 and 1986, a dozen or so young Canadians followed each other, working on two year contracts. British and Dutch volunteers are also involved with the V.F.D.P.. Few in numbers during the early years, they are gradually taking over from the Canadians.

The location of these fishing co-operative associations is decided after an in-depth study. Alongside the applications made by motivated candidates, several economic and ecological factors are taken into account. Among these, the most important seem to be the abundance of marine resources within a short distance of the fishing village, good shelter for the fishing boats, and the proximity of a wealthy enough market within easy access. Furthermore, the applicants must both have access to sufficient capital to buy a portion of their equipment cash, and be able to show alternate sources of income, so that they may be able, if need be, to repay a part of their bank loans. They must also agree to enroll in the fishing training courses, lasting four weeks, which are provided at the Fisheries Department Headquarters in Port-Vila.

Once selected by the Fisheries Department, each fishing co-operative association is issued a boat, three or four wooden hand reels and their complete tackle, two outboard motors, one of 25 hp, and the other of 5 hp, to serve as back-up in case of break down of the main one. The boats are either 8.6 meter catamarans, or single hulled boats 5 meters long. In 1984, one of these catamarans, complete with motors and fishing tackle, was worth 9,010 US\$, and the price of the monohulls 5,380 US\$. The boats and the reels are built in the shipyard at Santo, built in 1982 and under the authority of the Fisheries Department. In order to provide for the preservation of the fish caught, 14 refrigeration units were installed. Ten of these are simple refrigerators, costing 1,350 US\$ each, running either on gas or on kerosene. Two fishing co-operative associations have been equipped with ice-making facilities capable of producing 400 kg of ice per day, while two others have had 22.3 m<sup>3</sup> walk-in freezers installed. The ice making plants represented an investment of 10,400 US\$ each, while the cost for each walk-in freezers was 16,600 US\$. On an average, the whole of the equipment for a fishing co-operative association (motor boat, fishing gear and refrigeration equipment) cost between 9,000 and 10,000 US\$. The E.D.F finances 50% and the Vanuatu Development Bank loans 40% in the form of three year loans to the fishermen at the rate of 4% per annum. This leaves only 7% of the total investment to be provided in cash by the users, or 600 to 700 US\$ per fishing co-operative association. It is difficult for a single individual to find such a sum, so the majority of the fishermen pool their resources in the form of either family or village fishing co-operative associations. In the latter case, the whole of the village contributes financially to the creation of the association, of which everyone is a shareholder. The fishermen are then chosen by the chief or by the elders from among the volunteers. In some rarer cases, the association is the fruit of the grouping of several individual fishermen who are not related by family ties, and who pool the whole or a part of their personal capital. The fishermen do not receive a share of the proceeds, but rather a monthly or yearly wage. At the close of each year, any money left over is shared among the association's shareholders.

In order to sell to production of the fishing co-operative associations, two fish markets equipped with substantial cold storage capacity were opened in both major urban centres, Port-Vila and Luganville, by the Government of Vanuatu in 1983 (CROSSLAND, 1984b).

During the first year of the V.F.D.P.'s operation, these fishing associations caught 49 tonnes of fish. Two years later, the production was up to 97 tonnes, representing a doubling of the landed quantities. 55% to 60% of this catch was sold in the fishermen's own villages or in nearby communities. The selling price varied between 1 to 1.35 US\$ per kilo. The rest of the catch was sent to the Port-Vila and Luganville fish markets, where it fetched the equivalent of 2 to 3 US\$ per kilo. The fish is transported by road from the fisherman's dwelling to the nearest airport, then by air to the airports of Port-Vila and Luganville, where it is taken over by the delivery trucks of the Fisheries

Department. During transport, the fish is kept at low temperature in 40 kg insulated sacs. Through agreements between Air Melanesie, the national airline, and the Fisheries Department, the air-freight rates are very reasonable : the equivalent of 0.30 US\$ per kilo, regardless of the distance covered.

The first three years of the V.F.D.P. have been considered by the Fisheries Department as a success (LEGAL, *op. cit.*). The programme was meant to end in December 1985, but considering the programme's popularity, with the Fisheries Department receiving 2 to 3 applications per week for new associations in 1985, it was decided to extend the V.F.D.P. by another four years to mid-1989, date at which a new structure called "Extension Services" was inaugurated.

By 1983, 11 fishing cooperative associations were in operation. They were producing 49 tonnes of fish, i.e. almost 4.5 tonnes each, generating turnovers of between 4500 and 5000 US\$. This is quite a substantial amount for rural areas, bearing in mind that for the same year, the average annual budget for a family was 785 US\$. Fishing therefore appeared to be a particularly viable activity; this impression, circulated through public opinion, led the political leaders on each island of Vanuatu to bring pressure to bear on the Fisheries Department to grant their constituents and electors assistance through the V.F.D.P. By 1984, the initial figure of 25 associations was more than exceeded. Since then, over 200 fishermen's associations have been formed. However, these figures should not be misinterpreted, they in no way indicate that the V.F.D.P. is a success. On the contrary, on the balance, the eight years in which this programme has been in place show it to be a failure. Two facts evidence this .

Since 1983, the average production per association has steadily dropped off. Whereas the number of fishing associations may have increased fifteen times in six years, unfortunately the same does not apply to the fishing yields. Table 4 shows briefly the situation in the landings of commercial village fisheries as monitored by ORSTOM and the Fisheries Department. The overall production figures shown are probably 30 to 50% below actual yields, as the follow-up of operations has only taken into account 50 to 70% of the operational associations, which is no mean feat given the geographical dispersal of the associations and the lack of "auction centres" where landings could be grouped. In 1983, the 11 associations produced on average 4.46 tonnes. In 1988, 75 associations landed 79.3 tonnes, i.e. an average yield of 1.06 tonnes per association. This evolution clearly shows that in 1983, fishermen were close to five times more productive than in 1988.

Table 4 : Development of fisheries production supported by the VFDP (Ref.: Vanuatu Fisheries Department)

	1983	1984	1985	1986	1987	1988
No. of associations	11	23	50	72	59	75
Total yield (ton)	49.1	87.9	97.5	128.9	93.5	79.3
Average production per association	4.5	3.8	1.9	1.8	1.6	1.1

Very few village fishing co-operative associations manage to go beyond the level of three years of operation (Table 5), and the population of "professional fishermen" which were supposed to ensure the long-term success of the fisheries development programme consists only of a few dozen persons. Actually, the V.F.D.P. very early on suffered from its own popularity. As it had been designed, the programme required a strict follow-up of the fishermen in order to teach them fishing techniques, equipment maintenance, fish preservation, and management procedures. The young professional fishermen sent by the NGO's which were meant to assist the 25 fishing associations as planned initially, never exceeded a dozen people and most of the fishermen groups dissolved after a few months of operation because of the lack of technical assistance and appropriate advice.

This failure has been diagnosed as a reflection of the lack of profitability of the fisheries associations, and of the impossibility of ensuring their economic viability (SHEPARD, 1987). The government has endeavoured to take this into account for the implementation of the second stage of the small-scale fisheries development policy, already in place now. This new programme has three objectives.

- . Training of fishermen : A fisheries school has been operating in Luganville (Santo) for the past year, and seven training centres have recently been inaugurated in the main regions of the country.
- . Implementation of a "leasing programme" for fishing vessels, in lieu of the previous funding programme (51% in donations, 42% in bank loans, and 7% own capital). As the EEC withdrew from funding directly the equipment and tools in order to assist with the infrastructure and budget requirements of the programme, the Fisheries school and the new Fisheries Department in Luganville were totally funded by the European Development Fund.
- . Diversification of the fishing fleet, with a view to tailoring the vessels more to the fishermen's needs. Now, sailing outriggers, fitted with 5 hp outboard engines, are being offered to part-time fishermen living along the coast sheltered from the trade winds. These canoes are longer and faster than those proposed originally, and cost a lot less, both to build and to operate. However, for those few motivated and expert fishermen keen to turn fishing into a full-time occupation, there will be vessels in excess of 10 meters long to improve their safety at sea, extend their fishing range, and the time that they can spend on the fishing grounds.

Under this programme, it is essential that these seven professional training centres be established and placed under the direction of qualified professional fishermen who can advise the fishermen and help them maintain and repair their gear. These centres must be equipped with ice-makers and cold-storage space to provide the fishermen with ice and be in a position to purchase their catch from them. This should enable neighbouring associations to begin again on a better footing. In fact, this can be considered as a return to the original plan, on a somewhat smaller scale. It is funded by the EEC, with the accent placed on the management of village fisheries.

Table 5 : Average duration of fisheries projects (1)

Duration (Years)	Number of projects (in %) n=138
7	0,5
6	0,5
5	3
4	4
3	13
2	26
1	53
Mean 1,8	Total 100

(1) Survey done on a sample of 138 projects monitored by ORSTOM between 1983 and 1989.

### 3.4. The results of the development programme

After nine years of village commercial fisheries exploitation in Vanuatu, it appears that fishing activity is in decline and that stocks of deep-bottom dwelling fish are generally underfished. In 1987 and 1988, the level of production in Efate was equivalent to 50 % of the maximum sustainable yield (CILLAUREN, 1989). Given that yields on the whole archipelago have never exceeded 200 tons and have had a tendency to drop off over the last few years, the main consequent objectives set by the V.F.D.P. have not been met.

Generally, whereas employment opportunities have been numerous - bearing in mind that over 200 fishing co-operative associations were created - and could have led to believe that the goal had been achieved, upon considering the life expectancy of the associations (Table 5) it appears that these opportunities were too short-lived to properly stabilise the population and reduce the urban drift. In addition, it could be said that, having known productive fishing expeditions in the first successful years of the V.F.D.P., and got used to enjoying a good income, the young fishermen may well be reluctant to go back to subsistence agriculture or fishing and therefore decide to migrate into town, seeing it as the carrier of the consumer society.

As opposed to unstructured commercial village fisheries, commercial village fishing never really played its role as substitute for imported fish, neither in town nor in the rural areas. A large portion of the catch was sent to the urban markets where it is consumed mainly by expatriates who have the means to buy fish and by tourists, two sections of the population who normally do not eat any or much 'tin fis'. The supply of fresh fish in rural areas has always been small and has never, in any way, been a serious competitor of tinned fish.

In the early years of the V.F.D.P., shipments of fish to Port Vila and Luganville certainly contributed locally to the increase in cash flow available. Because of problems associated with air freight and the price paid to the fishermen by "Natai", this era is now over and commercial village fishing has only a small share in the influx of currency to the islands. But it is still the source of outflow of money, to pay for replacing fishing tackle and refuelling, possibly even ice. Under the present circumstances, therefore, commercial village fishing actually increases the deficit in the balance of trade in those islands of Vanuatu where there are associations.

The assessment of the V.F.D.P. is no more conclusive in the field of nutrition. As we have noted, part of the production is exported to the urban centres where it has hardly contributed anything to those people most in need of it : the low-income ni-Vanuatu population. In rural areas, the lack of communication infrastructure led to fish distribution networks developing mostly within coastal areas only. The additional supply of fish has probably benefited mostly households who had a limited fishing activity for own consumption or none at all, which is one positive aspect. However, the fact that the populations living inland could not take advantage of it is less of a positive point. Of the whole of the population in Vanuatu, it is those who live inland who in fact suffer from the lowest satisfaction of the protein needs and they should be the ones to focus on in priority if the nutrition status of the islanders is to be improved.

## 4. Conclusions and recommendations

The 4322 to 4885 tonnes which represent the supply of fisheries produce for the whole of Vanuatu in 1984 (Table 1) provide 377 to 415 tons of protein, i.e. 16 to 18% of the population protein requirements, estimated to average 50 g per day for the total of 127,800 inhabitants of Vanuatu. Overall, small-scale village fisheries, predominantly for own consumption, cover 61 to 65% of protein supply, as opposed to 3 to 5% from commercial village fishing and game-fishing and 31 to 34% through tinned fish (Table 6). Clearly, small scale unstructured village fisheries, geared essentially toward the operators' own consumption, play a major role in supplying the population of Vanuatu with marine food products. By comparison, the artisanal commercial village fishing, on which bear the best efforts of the government, plays only a negligible role. Imports of tinned fish play also an essential role in supplying the populations with their protein requirements. The amount of protein it supplies is almost equivalent to that of the small scale village unstructured fisheries, 131.5 tonnes versus [145 - 160] tonnes.



Table 6 : Composition of protein supply in the whole range of marine produce for Vanuatu in 1984 (in tons)

Unstructured small-scale fishing			Commercial fishing		Game fishing	Imports	TOTAL
Fish	Shellfish	Mollusc	Fish	Shellfish	Fish		
145-159.9	43.8-54	38.9-49.3	11.5-12.5	0.155	5.54-6.88	131.3-131.96	376.6-414.7
Overall		Fish	Shellfish	Mollusc	TOTAL		
		293.2 - 310	44.5 - 55.4	38.9 - 50.5	376.6 - 414.7		

This result is good news : 131.5 tonnes of protein is a very tidy amount. It is enough to provide the needs of 7200 people per year, at the rate of 50 g of protein per day per person. With a total population of 127800 people in 1984, the daily needs amounted then to 6.39 tonnes. The whole of the tinned fish imports thus were able to support the needs of the whole population for nearly three weeks. But this result is also bad news : from a strictly economic point of view, the importance taken by imported tinned fish in providing the total protein needs of the population can be considered as the reflection of the blatant failure of the country's fisheries to meet the population's needs for fresh marine food products. This results in the necessity to resort to importation, the volume of these imports being a good indicator of how much the output of the various types of national fisheries falls short of what is required. To sum up, 1 kilo of protein being contained in 5.7 kg of tinned fish, or in 11.7 kg of reef fish, the national fisheries can be estimated to fall short by 1447.29 tonnes (123.7 x 11.7). To reduce this shortfall was one of the main goals that had been set for the V.F.D.P. We can see that, by 1984, this goal was far from being reached. The situation hasn't improved much since.

Strangely enough, the large part played by tinned fish in the nutrition of the population serves to emphasize the importance of the role of the small scale unstructured village fishing in providing substitutes for imports. When we consider all marine food products, this type of fishing provides 228 to 263 tonnes of protein for consumer needs. Had these small unstructured fisheries not existed, the country would have had to import 1303.5 to 1504 tonnes of tinned fish in order to provide an equivalent amount of protein, which would have represented a currency outlay 1.6 to 2 times higher than the whole 800 tonnes of tinned fish imported in 1984 (Anon. 1986b). With the landed cost of tinned fish averaging 1.2 US\$ per kg, the small scale unstructured village fisheries saved the national economy 1.57 to 1.81 million US\$ in imports in 1984.

For the sake of comparison, the total solid food imports into the country for 1984 amounted to 11.66 million US\$, out of a total of 68.53 million for all imports. Exports only amounted to a total of 43.95 million US\$ (Anon., *op. cit.*). The added imports in tinned fish which would have been required without the existence of the small scale unstructured fisheries, amounting to 1303 to 1504 tonnes or 1.57 to 1.81 million US\$, would have driven the cost of food imports up by 13.5 to 15.5%, while pushing the trade balance deficit up by 6.3 to 7.4%, from 24.58 million US\$ to [26.15-26.39] million. .

The inability of the Village Fisheries Development Programme to fulfill the objectives for which it had been created leads to questioning the validity of the exclusive support given to the catching of deep bottom species within the development policies for fisheries. This activity calls on techniques and gear that are too new, too foreign to the time and space cultural parameters which are the framework of Vanuatu's village society. The simple addition of large amounts of capital isn't enough to spread these new practices. In the coming years, it would be desirable to integrate the small-scale unstructured village fisheries within the coastal fishing development policies.

This small-scale fishing offers a real potential for development. It is certain, in the coming years, to play an essential role in supplying the local island markets, in improving the nutritional situation of the population, in creating new jobs, and in generating cash income. It would appear feasible to increase the production from small scale unstructured village fisheries at no great cost. The distribution of mesh nets and cast-nets could help. However, having regard to the narrowness of the fringing reefs, the production potential of such zones could well be saturated fairly rapidly along the densely populated shores. Therefore, the development of fishing effort should concentrate more on the

resources available around the reef slope, between 10 and 100 metres deep. The leeward coastlines, being sheltered, would be the most suitable for these activities as fishermen can fish from an ordinary outrigger canoe. One interesting solution to increase fishing efforts could be to encourage the use of sailing canoes, of the type used in Maskelynes islands south of Malekula, equipped with one or two handlines fitted onto reels, and eventually, a small engine to easily travel windward.

Another means of encouraging fishing would be to introduce simple low-cost methods of preserving the fish, such as smoking and salting it. It would provide those fishermen catering to their own need only to take advantage of the occasional surplus of fish, especially the smaller pelagic species, which they cannot turn to profit at the present because they have no way of keeping them. This would enable them to build up a surplus and if they so wish, to start selling it. Because they offer the possibility of selling their fish to a large number of fishermen who do not have much in way of financial means, the process of smoking and salting fish is a key to the development of fisheries and the distribution of fish further inland, as most islands have very poor road systems, if any, because smoked or salted items keep for several days, sometimes weeks, at ambient temperature and can easily be transported on men's back. With regard to difficulties with introducing a new product into the dietary habits of the melanesian population, there seems to be no reason, as SCHOEFFEL (1985) quite rightly puts it, to believe that, with the appropriate information, the villagers would "disdain" smoked fish, which is no more exotic or foreign than tinned fish and moreover, holds all its advantages, namely : low pricing; large scale distribution, smoked fish could be sold like tinned fish in all village stores; easy and quick to prepare, just like tinned fish, smoked fish can be eaten cold or reheated; marked flavour, thus smoked fish could be used as seasoning with root vegetables, rice vegetables or be added to soup or to laplap.

In most tropical countries where smoking and salt drying is done on a small scale, the women are in charge of the processing and marketing of fish. The processing can be done at home, in addition to the women's household chores. In Vanuatu, where women, as a rule, are left out of gainful activities in rural societies, such a system would enable them to free themselves to a certain extent from the yoke of their husbands, especially financially, and thus play a greater economic role in the household and in fisheries development, adding their dynamic efforts and the rationality which they have gained over centuries of running agricultural subsistence activities in Vanuatu.

The small-scale unstructured village fishing can also take its place in the supplying of the urban markets by offering to the less affluent urban families inexpensive products such as small pelagic species (e.g. *Selar* or *Clupeidae*) and mullets. However, this type of fisheries won't be able to supply the urban market in highly priced deep bottom fish, any more than the village commercial fisheries that we have described within the V.F.D.P. Catching these species, targetted to the tourist market, and possibly to the export market, can only be done by a structured commercial sector, using more efficient boats, at least 10 or 12 meters long, and capable of staying more than a day at sea. In view of the current inter-island transport problems, it is recommended that such a sector be confined, at this stage at least, to Efate and Santo, with good access to the two main consumer markets. To supply the urban market, this structured commercial sector may also exploit pelagic fish, mainly tuna fish. The extreme mobility of the shoals is a severe constraint due to the amount of time devoted to following up and seeking the fish. The establishment of fish aggregating devices (FAD's) provides an interesting solution to the problem (CILLAURREN, 1990b). The viability of fishing around an FAD is closely related to the location of the raft, especially in respect of the time required to reach it (CILLAURREN, 1990c). Given the costs involved in manufacturing and installing a raft (3,000 US\$ in 1983), particular attention has to be devoted to the strength of the materials and their assembly, because the zones frequented by tuna, the most appropriate for FAD's, are always very exposed to the winds and the currents (CILLAURREN, 1988). The most commonly caught species arounds FAD's in Vanuatu are the skipjack (*Katsuwonus pelamis*) and the yellow-fin tuna (*Thunnus albacares*). Whereas the yellow-fin tuna is a high price fish, which may be targetted to the urban expatriate market and to the tourist market, it is not the case of the skipjack. A large proportion of the skipjack caught by the village fishing co-operative associations is kept for fishbait to be used for fishing deep bottom-dewelling fish. The skipjack costs less than 1 US\$ per kilo for this purpose, so it is an economically depreciated fish, although a great nutritional value. If the landings of skipjack could be increased for urban market, the price maintained at this low level and a campaign launched to explain its nutritional qualities, this could be a way of developing popular consumption of fresh fish in Port-Vila and Luganville.

Considering its importance within their economy, fishing should naturally be included in any development plan concerning the coastal districts. With this in mind, it is essential that fishing be

considered as an integral part of the coastal economy, and that the relationships between this fishing activity and the other sectors of the economy, particularly agriculture, be the subject of careful studies. One must also remember that fishing is not limited simply to the catching of marine foodstuff, but includes as well numerous economic inter-relationships, the whole forming a complex system. Any alteration applied to one element of the system is highly likely to be reflected, directly or indirectly, on all the other elements. This is shown in very schematic form in Figure 5. The monitoring of these alterations becomes a fundamental concern for the decision maker whose task it is to prepare a fisheries development plan, or to assess the effects of such a plan on an existing village fishery. Out of the 13 elements affecting the fisheries system listed in Figure 5, seven can be measured during the course of statistical enquiries in the field. These seven elements constitute the indicators for internal alterations of the fisheries system. Three further indicators apply to the production system : the number of fishermen, the number of items of fishing tackle, and the frequency of fishing outings. One indicator concerns the resources system : the size of the fish caught, which supplies demographic distribution information on the stock. Three indicators concern the distribution and consumption system : information on landings, selling price of the products, and dietary habits of the consumers.

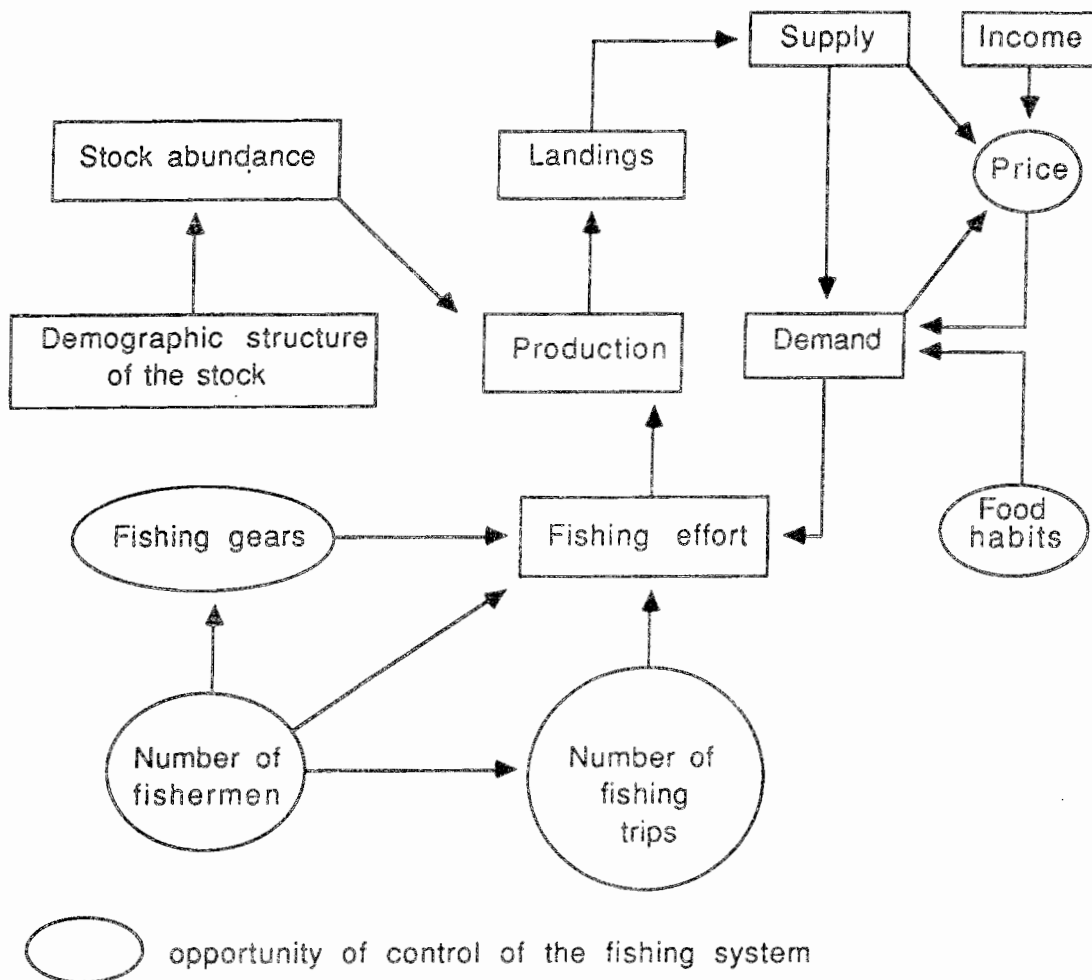


Fig. 5 - Monitoring of the evolutions in the fishing system

Out of these seven indicators, five can be manipulated up or down in order to control the evolution of the fisheries system. Thus, the planner, by making use of taxes and grants, can affect the selling price of fish. Through relevant information being spread through the media, or a well targeted advertising campaign, he may also be able to influence the evolution of dietary habits among the population. Through legislation, particularly through the issuing of fishing licences or the establishing of quota, he may exercise some control over the number of fishermen and the frequency of their fishing trips. Finally, through control of available bank credit, he may direct the evolution of the fishing equipment.

We will conclude this discussion by repeating that we are convinced that in Vanuatu, as in other Pacific nations, village-level fishing offers a real potential for development. The resources are there, as are men and women capable of innovation and adaptation. This potential for development must be tapped for the improvement of nutritional security in the country, by inserting fishing development alongside that of farming and cattle raising. Taking into account the specific socio-cultural aspects of small Pacific island nations, any development model that would be rigidly based on fostering specialization among the fishermen, and that would aim at an in-depth and rapid alteration of their social and economic organization through massive capital investment, is doomed to failure.

Any innovation proposed by the planners can only be adopted if it fits within the individual or communal aspirations and strategies of the "populations to be developed". Development programmes, therefore, must be conceived around the existing forms of village-level fishing activities. Such programmes will require also to be kept flexible and adaptable, so that their goals and their means of execution can be re-targetted according to the reactions of the existing village fisheries system to their application.

### Notes

1) The Pacific nations, together with Africa, constitute the portion of the planet where we observe the highest demographic growth. Out of the following 22 nations and territories of the Pacific - French Polynesia, Federated States of Micronesia, Marshall Islands, Solomon Islands, Tuvalu, Vanuatu, Wallis and Futuna, American Samoa, Cook Islands, Niue, Northern Marianas, Tokelau, Tonga, Western Samoa, Fiji, Guam, Kiribati, Nauru, New Caledonia, Palau, Papua New Guinea, Pitcairn - the first seven double their population in under 25 years, while the last 8 take between 25 and 35 years to do so (Bakker, 1991).

2) In a span of twenty years, from 1980 to 2000, the United Nations anticipate a doubling of urban population in Melanesia and Micronesia. Growth is expected to be slower in the Polynesian nations, on account of the sizable emigration which affects some of them, notably the Cook Islands, Tonga and Western Samoa (Pool, 1991).

3) This evolution can be attributed to a decrease in soils fertility brought on by a shortening of fallow periods, and by the change away from the subsistence agriculture system. Both of these processes frequently occur together. The traditional crops, mostly yam and taro, which normally used the slash and burn method over short periods of one to three years, followed by the land being allowed to lie fallow for 15 to 30 years, are now often being replaced by less labour-intensive crops such as manioc (Thaman, 1991), or by crops which offer in theory a better yield per hectare such as sweet potato (Kuchikura, 1990). Within this new system, the fallow periods are becoming shorter and shorter, not allowing enough time for a layer of tree-humus to accumulate, and for the soil to recover its fertility. In the fallow process, it is the trees which perform the task of soils regeneration. Their roots draw from deep under the soil the nutrients that have been leached there by water run-off, transform them into vegetable matter, and deposit them back on the surface as leaf mould.

4) Smallholder agriculture is a sector which has long been thought to have a major role in the economic development of the small Pacific island nations. The hopes of the various governments have often been disappointed, regarding traditional cash crops activities as well as new agricultural exports activities (Flemming et al., 1991).

5) Laplap is the national dish of Vanuatu. It is in the form of a big pancake made up of grated root vegetable (taro, yam or cassava) mixed with coconut milk and cooked or braised in a ground oven.

6) The term "ni-Vanuatu" denotes the Melanesian inhabitants of Vanuatu.

7) According to the results of the National Nutrition Survey (Hung, 1983; David, 1987), tinned food accounted for 18% of the meals where protein foods were consumed. In the city, 30% of such meals featured tinned products.

8) Out of the thirty major islands of Vanuatu, in 1979 twelve had a density of less than 10 inhabitants per km<sup>2</sup>.

9) As noted by RODMAN (1989, p. 58) "Fishery is the term used to describe a complex system involving, first, fishermen using similar techniques; second, a resource consisting of particular kinds of fish in the same ecological niche; and, third, a market".

10) Commonly called "ciguatera", ichtho sarchotoxicity is caused by a toxin (ciguatoxin) produced by a dinoflagellate, "*Gambierdiscus Toxicus*", found on the outer membrane of the macroscopic algae of coral reefs, particularly the ones occurring in branched and bunched form (TAYLOR, 1985). The intake of *G. Toxicus* by browsing fish leads to a contamination of their flesh and of their organs which then be transmitted to their predators, be they fish or human. In man, ciguatoxin acts mostly on the nervous system and on muscle tissue (HOKAMA, 1985).

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**THE MODERN VALUE OF TRADITIONAL VILLAGE FISHING  
IN FISHERIES DEVELOPMENT PLANNING IN THE ISLAND PACIFIC :  
SOME THOUGHTS ON THE CASE OF VANUATU\***

Gilbert DAVID

**Abstract**

The rational use of marine coastal resources is a priority for the Pacific Islands. Emphasis has often been placed on the development of a commercial structured fishing sector based on the specialization of the means of production and fishing techniques for catching a small range of high commercial value species. After ten years and often more of fishing development in the Pacific Islands this policy can be deemed to have been a failure in many cases. The reasons of this failure can be found in the lack of adaptation of the development programmes to the socio-economic and cultural constraints inherent to village communities and to ecological constraints inherent to the Pacific islands coastal marine environment. Contrary to commercial structured fishing, the traditional village fishing is completely adapted to these constraints, mainly in terms of production modes and resource management. These different topics are discussed through the example of Vanuatu and some propositions are made for the integration of traditional practices in modern coastal resource development programmes.

Key words : coastal environment, commercial fisheries, subsistence activities, traditional fishing, Pacific Islands, Vanuatu.

**Résumé**

L'utilisation rationnelle des ressources côtières est une priorité pour les îles du Pacifique qui pour une large part font reposer leur développement économique sur l'exploitation de leurs ressources naturelles. Les politiques mises en oeuvre portent généralement sur le développement d'une pêche artisanale commerciale structurée à travers la spécialisation des moyens et des techniques de production destinés à la capture d'un petit nombre d'espèces cibles de haute valeur commerciale. Après plus d'une dizaine d'années de mise en application, ces politiques se soldent bien souvent par un échec, dont les causes sont à rechercher dans le manque d'adaptation des programmes de développement halieutique aux contraintes socio-économiques et culturelles des communautés villageoises ainsi qu'aux contraintes écologiques inhérentes à l'environnement littoral des îles du pacifique. Contrairement à la pêche commerciale structurée, la pêche villageoise traditionnelle intègre totalement ces contraintes en ce qui concerne les modes de production comme en ce qui concerne la gestion de la ressource. Ces différents thèmes sont discutés à travers l'exemple de Vanuatu et des propositions conduisant à intégrer les pratiques traditionnelles aux programmes de développement de la pêche côtière sont formulées.

Mots clef : Economie vivrière, Environnement côtier, Pacifique insulaire, Pêche commerciale, Pêche traditionnelle, Vanuatu.

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## Introduction

In Vanuatu, as in many nations of the island Pacific, the development of artisanal fishing in coastal waters represents an economic priority. Small scale traditional fishing had been the object of little research at the time when policies for development of artisanal fishing were formulated. The sketchy knowledge that existed on the subject tended to indicate that here was a low-efficiency type of activity, unlikely to generate a lasting increase in fisheries production. To base a fisheries development policy on small scale traditional village fishing appeared as a dangerous utopia. It was assumed that the challenge facing Vanuatu in developing its fisheries sector could only be met through modern structured methods. This challenge consisted of :

- keeping up with the growing demand among both urban and rural populations for protein food of marine origin;
- improving the trade balance for these marine food products by encouraging exports while minimizing imports of canned fish.

The efforts in this domain were directed toward the opening of new fishing grounds by using motorized craft, equipped with reels, to fish the outside face of the reef wall, at depths of 100 to 400 m, well outside of the effective range of traditional paddle-propelled native canoes, and well beyond the narrow band of fringing reefs where, in the absence of a lagoon, fishing has traditionally been practiced.

During the last decade, considerably more information about traditional fishing methods and fishing development has become available. Also, the various fisheries development projects have produced a certain amount of feed-back. Gradually, the preconceived understanding of traditional fishing that the planners had accepted is beginning to broaden. They no longer view this type of activity merely as "an accumulation of gear and techniques in daily use since time out of mind". The real picture, they are discovering, is more complex. Increasingly, traditional fishing is viewed as a workable system which brings together a resource, a technology (fishing gear and techniques, fish preserving methods), a population (producers and consumers), its social and cultural environment (traditional lore and customs, rules and regulations), and the inter-relationships based on the exchange of goods and information that can cement all these elements together and balance the system<sup>1</sup>. So far as such a "traditional fishing system" exists, there is also a "commercial artisanal fishing system". Fisheries development can only be analyzed in terms of "system". This systemic approach opens up new vistas for research; it turns out to be particularly useful when we wish to compare traditional versus artisanal types of fishing, and the logic that underlies them. It will enable us to address the following questions :

- a) can a better understanding of the traditional fishing system be of any use in planning fisheries development ?
- b) by a reverse approach, is it possible to modernize this system of traditional fishing in order to turn it into a commercially profitable enterprise ?

In other words, can the development of artisanal fishing be based on traditional fishing ?

We shall only deal here with the first of these questions. For this, we shall make use of the results of a program carried out by ORSTOM in Vanuatu since 1983, in close co-operation with the Fisheries Department, under the name "Artisanal Fishing and Subsistence". We shall consider three major topics :

- the role of traditional fishing in the social, economic and cultural environment of the islands, and the limitations that this context imposes on fisheries development;
- the manner in which the fishing grounds have traditionally been governed;
- the extrapolation of this traditional approach to resource management to modern fishing methods.

## 1. The role of traditional fishing in the social, economic and cultural environment of the Islands.

In traditional society, not only the major social events but the whole of daily life is governed by "custom", a generic term that we shall use and understand as meaning "a network of cultural behaviour patterns in human relationships, aimed at preserving the community structure of the villages and guaranteeing its continued existence". In Vanuatu, the village, foundation of all community life, is first and foremost a society of abundance, as the term is used by Sahlings (1976), where gift giving and exchange assume a primary role. It is also a society which is constantly under threat, from either natural or man-made hazards. During the course of centuries, the structure of the village has had to confront three main dangers : famine, war, and social destabilization. It is as a response to these threats that social, economic and cultural behaviour patterns have evolved to become "custom". Fishing, as other aspects of village life, was conditioned by these influences, among which the two most important ones were a rejection of specialization, and a search for social cohesiveness.

### 1.1. The rejection of specialization.

When we study the integration of fishing activities within the island social, economic and cultural context, the most noticeable fact is that, whether island-wide or at village level, fishing is never reserved for specialized individuals. For the fisherman, fishing is never the only activity. The majority of the foreshore population engages in fishing, although agriculture is everywhere the primary survival activity, and the main source of income for rural households. This rejection of specialization, and preference for diversified activity, are one of the characteristics of Melanesian society. It can be explained by the diversity of the available food resources, and by a constant preoccupation with minimizing the risk of food shortages. Since the land, in Vanuatu, is remarkably fertile, the risk of chronic long-term famine is insignificant. Occasional short-term food shortages, however, are always a possibility as a result of a period of drought or of a hurricane, with the smallness and relative isolation of the islands compounding the population's vulnerability to such accidents. For village communities, adapting to these threats has resulted in a systematic search for diversity, in the methods of food production as well as in the diet itself. This concern for diversity can be observed in the planning of the vegetable gardens, and the great variety of traditional foods consumed. Alongside the usual root crops, we find not only the catch of hunters and fishermen, but a whole range of wild forest nuts, berries, fruit, roots and edible leaves which can bridge the gap in cases of temporary shortages of the basic root crops. In a similar manner, the reef flats and the nearby shallows which make up the traditional fishing grounds have traditionally provided a "larder", little used in normal circumstances, but drawn upon in time of need. During these periods of food shortage, fishing was likely to become intensive, but in time of plenty the stock had time to renew itself, with temporary bans on fishing often helping the process along.

Only in the most extreme geographical situations, where high population density, low agricultural productivity due to shortage of arable space, combined with a favourable marine environment of extensive reef flats, seagrass beds and mangroves, does fishing cease to be simply an alternative food supply in time of need to become the main source of food for the population. Traditional lore concerning the maritime environment, the species that populate it, and the means of catching them, is therefore very rich and occupies a place of choice in the culture of the population of these areas. This maritime culture is quite evident in the traditional nomenclature for fish species in the vernacular languages. It is evident in quantitative terms, with all the reef species having at least one name, and sometimes several, in which case the different names correspond to different growth stages of each specie. It is evident in qualitative terms, with the different species named according to their anatomical characteristics, the type of environment in which they are found, or the type of fishing tackle used in their capture. One finds this type of situation mostly on the small islets located close to the shore of the main islands, where for centuries certain tribes have sought shelter from their "mainland" enemies.

So the burden of history still plays a significant role in the importance of fishing among village activities. This influence can be positive, as we have just seen, when it complements ecological determinism. It can also be negative. To a great extent, the settlement of the coastline is the product

of the country's colonial history. Many of the present residents of the foreshore areas came originally from inland villages which they abandoned in the first half of this century, or later still, in order to congregate around the missions, which were all located near the waterfront. Faced with a totally alien environment - the sea - these "bush" people had to invent, in the space of a few decades, a whole new culture adapted to this environment. Very often, the new lore was developed in relationship to the old land-oriented knowledge, and is fragmentary at best : some parts of the marine world and some of its fauna lack names; sometimes one name serves for several species; often the names given to the varieties of fish, squid, shellfish or lobster are taken from those of land plants and animals.

## 1.2. The search for social cohesiveness

This is a type of adaptation which can lead to social destabilization, which can in turn lead to the kind of boredom and caged-in feeling which affects many small isolated communities. Once this destructuring process is begun, it is very difficult to reverse, since there is no longer the possibility of a collective effort to do so. It then leads inevitably to the break down or the scattering of the community, possibly even to the point of total physical destruction of the population, as was the case with the "Bounty" mutineers once they reached the island of Pitcairn.

There are two major factors that may help prevent this very serious danger. On one hand, there is the complexity of social interaction, some of the most spectacular forms of which are the "pig trade" and the "mat trade" practiced by men and women of northern Vanuatu, the famous land-diving of southern Pentecost, the circumcision rites and the Toka celebration of Tanna. On the other hand, there is the strong cohesive force which comes of a tradition of decision making by consensus. This is an extraordinary tool for resolving disputes. Any potential threat to peace and harmony is first expressed orally before it has a chance of turning into active hostilities. It is submitted to the wisdom of the adult men of the village who will discuss it at great length. Handed around the community in a fascinating pattern of speeches, the threat gradually loses its emotional, and potentially violent, character. It is polished and refined through this process of speech making, until a consensus is reached on the necessity for a particular course of action, or for the discouragement of any action, so as to avoid any danger to the survival of the community.

As far as developing artisanal fisheries is concerned, this preventive process against a possible destructuring of village communities, the result of a long evolution of traditional society, often results in powerful obstacles to innovation. Any initiative on the part of the authorities can only be accepted by village society if it fits in with the collective or personal aspirations of the population, and only as long as it isn't perceived as a threat to community peace and harmony. In this context, individual success is regarded with a great deal of suspicion. The motivation for such an economic success, in other words the desire for personal monetary gain, is seen as contrary to the principle of communal economy which looks askance at individual wealth and would prefer to see any income shared among the entire community, and applied to fostering community survival by adding yet another facet to its range of resources and thus lessening its vulnerability to the outside world.

## 2. Traditional management of the fishing grounds

### 2.1. The limitations imposed by the environment

Fishing, in Vanuatu, takes place at the level of the village community. The village provides the triple function of place of residence for the fisherman, centre for the unloading of the catch, and primary consumer market. The location of the fishing grounds is greatly a function of the location of the villages. They are usually situated near the villages, and are limited to the shallower sections of the foreshore : the inter-tidal zone and those areas below the low-water mark that are less than 10 m deep, and to the areas that are sheltered from the prevailing ocean swell. The inter-tidal zone offers the greatest variety to the fisherman. It can be divided into four types of marine environments : the reef flats<sup>2</sup>, the beach, the mangrove, the seagrass beds, and the mouths of rivers. Generally speaking, fishing on these types of grounds depends on two parameters : the presence of fish and its abundance <sup>3</sup>, and the presence of the fisherman <sup>4</sup>. We shall consider each of these two parameters in turn.

### 2.1.1. Factors affecting the presence of fishermen on the fishing grounds

They are essentially of meteorological nature : the state of the sea and the weather conditions, particularly wind velocity and precipitations. They determine the working conditions on the fishing grounds, and therefore shape the fisherman's decision as to whether or not he will go fishing at all that day. The importance of this factor, of course, will not be the same for the inter-tidal zone as for the more distant fishing grounds accessible only by sea, especially considering that the available craft tend to be small and have poor sea-going qualities<sup>5</sup>. It is not unusual for a fresh breeze and a well formed sea to prohibit all fishing activities. Apart from the area of actual breakers, the inter-tidal zone is far less affected by the state of the sea. River mouths are often protected by sand spits. Extensive beaches are usually located inside deep bays. Mangroves and seagrass beds invariably grow in fine sediments, a type of bottom only found in areas well sheltered from ocean swells and wind-produced waves. In such areas, the presence or absence of fishermen is far more influenced by variations in conditions of precipitations and temperature.

### 2.1.2. Factors affecting the presence and abundance of fish life

In all the ecosystems of the inter-tidal zone and of the reef slope we find a great variety of ecological niches, and a marked specialization of the species that fill them, both from the point of view of their feeding habits and of their type of habitat. Over 80 species are fished for just in the mangroves and seagrass beds around the Maskelyne islands, off the S-E point of Malekula (David, 1985). During the course of the inventory of Vanuatu's marine resources carried out by A.I.M.S. in 1988 (Donne and Navin; Williams, 1990), 469 species of fish were identified visually, among which Pomacentridae, Scaridae, Labridae, Acanthuridae, Siganidae, Chaetodontidae were, in order of decreasing importance, the most common. Coral reefs are the ecosystem offering the greatest specific diversity. It is not unusual for over a hundred species to be identified within a single hectare of reef. This great specific diversity goes hand in hand with a wide geographical distribution for any one specie. Suitable biotopes for each specie tend to be small in extent - we use the term of microbiotope -, and often unconnected to each other. The sum of all these microbiotopes constitutes a three dimensional mosaic, with each element holding a micro-population composed of a small number of individuals of the same specie. Because, at the scale of the fishing grounds, these micro-populations are scattered far from each other, there tends to be little migration of fish of the same specie between them. Over a short time period, say a few weeks, each micro-population can be considered as an isolated system, evolving according to its own demographic dynamics. Thus to each of these micro-populations corresponds a micro-stock unit, which is the portion of the micro-population that can be caught by the fishermen's equipment.

Considering their small size, these micro-stock units are vulnerable to over-exploitation by the fishermen, and their numbers per hectare are limited. These two factors, together with the great diversity of the fish biomass, constitute some of the primary limitations to fishing activities. To these we can add seasonal variations in the size of fish populations. This is particularly the case for the small pelagic species like mackerels and sardines (Grandperrin et al., 1982). For the fisherman, there is no way around these limitations ; he must inevitably take them into account in his fishing strategy and his choice of techniques.

## 2.2. Adaptation of the fishermen to the limitations imposed by the environment

### 2.2.1. General considerations

There are three basic concepts that can be used to describe the type of adaptation to the limitations<sup>6</sup> imposed by the meteorological and ecological situation that can affect traditional fishing :

- diversity of techniques and strategies used, whether in terms of species targeted or of biotopes worked;
- low cost of the means put to use, whether in terms of hours spent, of energy, or of cash expense;
- control of the access to the resource.

A total of seven main types of adaptation, based on the above concepts, can be identified (Fig. 1). They fall under two categories. On one hand we see "primary adaptation" to the limitations imposed

by the environment, such as controlled access to the resource as an answer to vulnerability to over-exploitation. On the other hand, we have "secondary" forms of adaptation, derived from the primary responses. In this way, diversification of the equipment is arrived at as a result of the diversification of the target species, itself a primary response to the limitations of the resource. Among these secondary forms of adaptation, we shall make a further distinction between "secondary adaptations of the first order", which are the immediate result of primary adaptation, "secondary adaptations of the second order", which are themselves the result of a secondary adaptation of the first order (in this manner, the low-cost of the means of production is seen as a result of the diversification of these means of production, with this diversity itself being an adaptation to the diversity of target species), and, similarly, "secondary adaptations of the third order", such as the low-cost of the fishing outings, derived from the low-cost of the means of production (see Fig. 6).

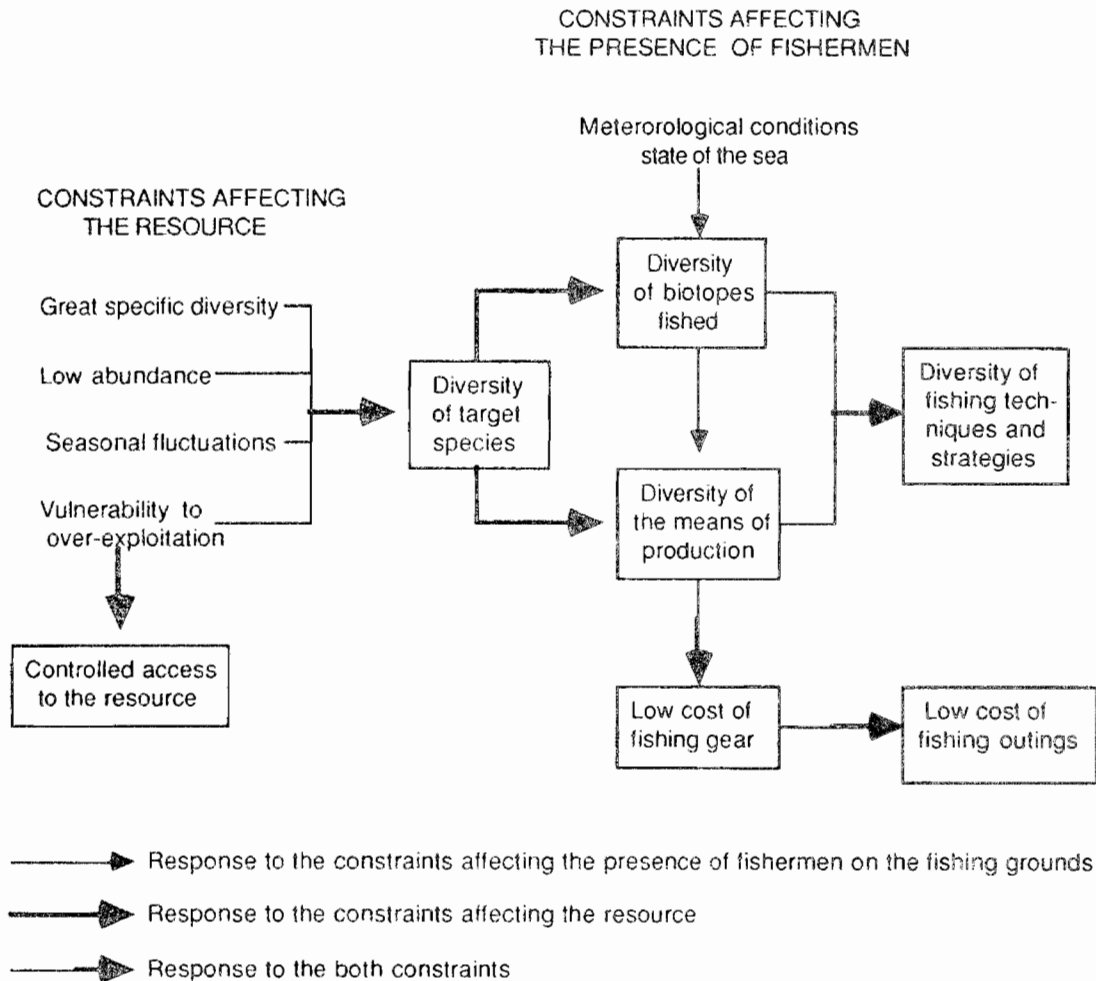


Figure 6. Adaptations of the traditional village fisheries in Vanuatu to the environmental constraints

Among the forms of primary adaptation, we shall make the distinction between responses to limitations affecting the fishermen, and responses to those affecting the resource, such as the diversification of target species that we have just mentioned. It isn't practical to make this distinction for secondary adaptations : while there exist exclusive secondary adaptations to limitations affecting the resource (for instance diversification of the means of production), there are no exclusive secondary adaptations to the limitations affecting the fishermen. On the other hand, there exist secondary adaptations that are responses to limitations on both fishermen and resource, as for instance the diversification of techniques and strategies, or the low cost of fishing operations.

We should also note that certain forms of secondary adaptation resulting from limitations affecting the resource are at the same time primary adaptations to limitations affecting the fisherman. In this way, the diversity of the biotopes that are fished is both a primary adaptation to unfavourable sea and meteorological conditions, and a secondary adaptation to the diversity of target species, itself a primary adaptation to the limitations affecting the resource. This same diversification of target species can also be seen as an secondary adaptation to the limitations affecting the presence of fishermen on the fishing grounds resulting from the primary adaptation to these limitations represented by the diversification of the biotopes put to use.

### 2.2.2. Diversification of target species and biotopes fished

This represents the major adaptation of traditional fishing to the four main types of limitations affecting the resource. It relies on the great specific diversity of the stock, and provides a logical response to the low abundance of monospecific micro-stock units that make it up<sup>7</sup>, and to the seasonal variations that affect it. In this way, when one or more species become scarce, whether from such natural causes as seasonal fluctuations or from over-exploitation, it becomes possible to shift the emphasis of the fishing effort to such other species as have remained plentiful on the fishing grounds. A Vanuatu-wide 1984 survey of 943 fishing outings showed that over 100 species of fish, belonging to 32 families, were commonly caught by village fishermen.

Such a diversity of target species can only be achieved by fishing several different biotopes. This diversity of fished biotopes is common to the majority of artisanal fishermen worldwide when we look at their operations over the course of a whole year. However, if we consider only a single outing, we find this diversity to be far more unusual. We believe this to be one of the special characteristics of traditional fishing in Vanuatu. There, it is usual for a fisherman, during the course of a single fishing outing, to try his luck on the reef flat, on the first few meters of the outer reef wall, and within the different biotope of beach, mangrove and river mouth. This habit of sampling different biotopes offers the best insurance against variations in meteorological conditions and in sea state. When rough seas forbid venturing offshore in canoes, it is always possible to shelter in the mouths of creeks, in protected bays or among the mangroves, and to carry on fishing for one or more target species depending on their abundance and diversity.

### 2.2.3. Diversification of the means of production, and of fishing technique and strategy

The diversification of the means of production is reflected essentially in the diversity of the fishing gear. A wide range of implements is used. The majority are of the throwing or casting type (hand-spears, bow-and-arrow, casting nets, underwater spear guns), or of the passive type (traps, gill-nets, holding pens). This equipment is usually the property of the fisherman. Whereas the materials used in the construction of the devices are usually of industrial origin, the design remains mostly traditional. Generally, they are small in size.

#### *Devices that are specifically made for fishing*

Of all fish-catching devices, hand-held lines are the most versatile. They can be used for trolling or for bottom fishing, either from boats or while wading on the outer edge of the shallow coral flats. Given this versatility, it isn't surprising that they should be the most commonly found type of fishing gear. They account for 55% of all fish catching equipment. Each household owns an average of 2.5 such hand-lines. Their design is very simple : usually, a fish hook is attached to the end of a length of nylon line, which is then wound around a coca-cola bottle. When used for fishing on or just off the bottom, the line is weighted with a stone, or an old flashlight battery.

Line fishing is hardly a traditional fishing technique in Vanuatu, and eye-witness accounts, such as that of J. Garanger (1972, p.109), show that twenty years ago line fishing was seldom practiced<sup>8</sup>. The Banks and Torres island groups in the North of the country are an exception to this. At the close of the last century, the reverend Codrington (1891) noted the manufacture of large numbers of mother-of-pearl and tortoise shell fish-hooks, and of the common use of surface lines for the catching of flying fish. Apart from the Banks and Torres groups, then, the hand-held line can be considered as a



modern development in Vanuatu, and its use began to spread only recently with the availability of monofilament nylon line and steel fish-hooks in the small general stores of the coastal villages.

From 25 to 30% of fish catching equipment still consists of traditional implements. These are hand spears, bows and arrows, and fish traps. Hand spears and bows are used exclusively by men and youths, either on foot, or from canoes. The use of fish traps is reserved for women and girl-children. Spears are the most common type of traditional implement. They represent 20% of all fish-catching equipment, and 74% of traditional equipment. The most frequently seen model is made of a long bamboo shaft, with four wooden spikes, ten to twenty centimeter long, lashed at the end. Over the last few years, the wooden spikes have been getting replaced by sharpened steel ones. Fishing is done on foot, along the intertidal coral flats or tidal channels through marine sea-grass, or from canoes among the edges of mangrove swamps, over the reef at high tide, or, less frequently, offshore in deep water. Alongside these small spears, of which every household owns from one to three, are longer spears designed for catching turtles. These are made of a shaft of heavy hardwood, fitted at the end with a sharpened metal tip. They are tied to a large plastic float with a few meters of rope, so that the flight of the harpooned turtle may be easily followed after the animal has dived.

Still widely used in certain islands, such as Malekula, the bow and arrow technique has completely disappeared in other places. This represents 5% of the fish-catching equipment used in Vanuatu. Its use is exclusively reserved to the men. Generally, bow-and-arrow fishermen are either older men, faithful to the old techniques, or children and youths, for whom the bow is more of a toy to show off their skill than a serious fishing implement. In either case, the bow is usually used while wading on the coral flats. Fish traps as a fish-catching device are disappearing. They are made of flexible sticks, and their use is by now limited to catching small fish on the coastal reef flats, particularly in tidal pools, and at the mouths of rivers.

Although it has been shown that their use was traditional in the Banks and Torres groups for co-operative fishing ventures, and Father Doucere (1922) noted their widespread use in many parts of the country, gill-nets must be classified as modern equipment. The nets currently in use, the materials they are made of, and the fishing methods and strategies used, have very little in common with the traditional nets and methods of the beginning of the century. The most commonly used type of net is imported from Asia. Typically, it is roughly 10 meters long, 1.5 to 2 meters deep, and is made of synthetic fibres. Considering its high price compared to the disposable income of the average rural household, the purchase of a gill-net represents a major investment, one that can only be contemplated by the wealthier households. Thus it is not surprising that gill-nets currently represent only 4% of all fishing equipment, and that the majority of them are found near the urban centres. Fishing with gill-nets is usually considered a man's task. They are used more often by fishermen on foot than during outings with boats. The device is laid parallel to the direction of the flow, in the breakers along the beach, at the edge of mangroves, or where the fringing reef drops off. This is an active type of fishing, the fisherman remaining near his net, ready to haul it in as soon as an interesting catch has been sighted.

Trickier to handle, casting nets are less common than gill-nets, although their purchase price might be up to 40% lower. They represent only 1% of all fishing equipment. Half of the casting nets are found on the island of Efate and the nearby islets. Exclusively reserved for men, they are used on a rising or a falling tide while wading on the coral flats or at the line of breakers off the beach.

Whereas the spread of gill-nets through the fishing community took place in a gradual manner, underwater spearfishing caught on rapidly. At this time, one third of all households engaged in fishing own a spear gun, and spear guns represent 10% of all fish-catching equipment. Alongside the standard western-made spear guns are found some of local manufacture, very rudimentary in design, made up of a metal spear and of a rubber launcher attached to a piece of wood, 10 cm long, against which rests the end of the spear. Snorkels are rare, but all divers use face masks. Spear fishing with a gun is usually reserved for the men, but diving in shallow water for the purpose of gathering shellfish (or, more rarely, crayfish) may be undertaken by women, as long as this is done for subsistence reasons only. This explains why diving to gather trocas and large sea snails, both valuable commercial pearl shells, is still the prerogative of the men.

Fish holding pens are the least numerous of the modern devices. There exist only a few dozens, most of them on Efate. The introduction of this type of equipment in Vanuatu is recent, and can be attributed to immigrants from French Polynesia. A holding pen consists of roughly fifty meters of "chicken wire", about 1.5 meters high, stretched on metal uprights stuck in the coral of the fringing reef, or on wooden poles driven into the mud. The wire mesh being subject to rapid corrosion, this equipment has but a short life span. These Polynesian fish holding pens are an improvement on the older traditional type of traps, which consisted of blocks of coral arranged in circular patterns on the coral flats, and designed to retain water as the tide ebbed. It doesn't appear that this older type is still in use anywhere, but the remains of some can still be seen, such as the ones mentioned by J. Barreau (1956) in Aliak, on the West coast of the island of Pentecost, and which were still visible in 1985. These ruins are only a few centimeters high, and are only able to trap very small fish. This is more in the nature of an amusement for children than a genuine subsistence activity. Another type of construction consists of piling up stones in a tidal pool. At the scale of the pool, the construction acts as a miniature artificial reef. On a rising tide, it attracts small fish which enter it for protection, and they are trapped there at low tide. The pile of stones is then dismantled, and the fish gathered. This type of fishing has also been mostly abandoned, and is only occasionally practiced by women and children.

#### *Multi-purpose equipment and one-time implements*

Alongside implements which can be unmistakably classified as fishing gear, since the catching of sea-life is their main function, we find some devices which can have more than one purpose, and for which fishing is but one of many uses. The most common among these is the ubiquitous bush knife, one of which at the very least can always be found in every rural household. Fishermen often use them to "cut" fish which have been trapped by the ebb in tidal pools, or while wading on the coral flats at night. The bush knife is wielded as readily by women and youths as by men. Less common, and mostly reserved for the women, are steel rods used for catching octopus at low tide, and for looking for shells under rocks. These are often spears from a native spear-gun, when the household owns such a device.

Apart from the strictly speaking fishing gear, and the multi-purpose tools used in fishing, there is a third category of fishing tools which consists of devices used only once : among others, we will note principally coconut fronds and vegetable poisons. Coconut fronds are used as nets for community fishing. Once woven, they can be assembled to form rude nets, ten or so meters long, often used in the Banks islands to drive small fish toward the beach in narrow bays, where they are then killed with bow and arrow, hand spears, or bush knives. Vegetable poisons are derived from the leaves of the foreshore shrubs *barringtonias* and *derrys*, which are either bruised, pounded or shredded before being placed in pools where they poison the whole of the fauna. Very popular during the first half of this century, particularly during the few years following World War Two, the use of explosives - the one-time device par excellence - seems to have mostly disappeared by now, partly on account of the difficulty of supply, and partly because of the government's efforts to ban the practice.

The diversity of the means of production follows logically from the diversity of the target species used in traditional village fishing. Each type of fishing implement is effective only on a small number of species. The vulnerability of any one specie of fish to a particular device depends at the same time on

- its morphology, particularly its shape, its size, and the size of its mouth 9;
- its feeding habits 10;
- its type of habitat : beach, holes in the coral, vicinity of coral heads,....;
- the depth it lives at 11.

To limit fishing gear to one type of implement would amount to ignoring a large number of edible species which cannot be caught with this particular instrument but which could easily be caught by other means. This preoccupation with adaptation to the fluctuations in abundance and vulnerability of the desired species forces the fisherman to own several kinds of tackle, and especially to use more than one during the course of a single outing, which is more remarkable. In the 1984 survey mentioned earlier, during the 943 fishing trips recorded, 10 types of fishing devices were identified, with 7 being used either by themselves or in conjunction with one or more other instruments during

the course of the same outing, and 3 used only together with other devices. The survey recorded 22 methods using two devices together, nine using three, and one using four.

The diversity of the means of production is not simply the direct result of the diversity of target species, but it is also the result of a concern on the part of the fishermen to draw from the greatest possible number of different biotopes, in order to minimize the risk of finding themselves unable to go fishing on account of meteorological conditions or state of the sea (Fig. 1). On one hand, certain types of fishing implements are better suited to certain specific biotopes; on the other hand, according to fluctuations in the environment, it can be a useful to be able to choose between several types of implements in order to take best advantage of a given biotope. In this manner, underwater diving can prove to be a most efficient way to fish the first few meters of the outer reef wall when the water is clear, while that particular technique may be totally useless on the days when the water is muddy, at which time line fishing can become a valid alternative.

By "fishing techniques", we refer here to the use of a fishing device. For any one type of device, there may exist several techniques, varying according to whether the fisherman is or not using a boat, or according to the biotope being fished. Based on this definition, 97 fishing techniques, making use of 39 types of devices or combinations of devices, were identified during the course of the 943 fishing outings of our survey. The biotopes having been deliberately classified into only three categories (outer reef wall and beyond; reef flats, kelp beds and beaches; river mouths and mangroves), this number of identified techniques is grossly underestimated, as the fishermen themselves recognize a much greater number of workable biotopes for their fishing strategies.

#### 2.2.4. The low cost of fishing gear and of fishing outings

It is easy to assess the cost of items of fishing gear when they are manufactured products, bought for cash : the cost is then equal to the market value of the product. This assessment becomes more difficult when we deal with devices made either by the fisherman himself or by members of his family. The "cost" of the device is then determined by the amount of time spent in its fabrication. In either case, the cost of the equipment used in traditional fishing in Vanuatu is invariably low. Generally speaking, the same holds true for housing, agriculture or cattle raising. This is an inherent characteristic of "abundance" societies (Sahlings, 1976). The design of the devices is so simple, and the materials used so common, that their construction is both inexpensive and quick. This allows frequent replacement of the gear. We can add to this the fact that fishing only plays a secondary role within traditional Melanesian society in Vanuatu. Social prestige is acquired by other means. It wouldn't therefore be logical to invest money or effort in sophisticated fishing gear, particularly since the productivity of fishing outings is rather low in any case, from a few hundred grams to 3 or 4 kg at best. When we think of manufactured (= bought) equipment, we must remember that the cash income of rural families is very low in Vanuatu, so that the purchase of fishing equipment represents a low priority in a family's budget, and will only be considered if this equipment is inexpensive.

The same logic applies to the cost of the fishing outing, which goes some way toward explaining why village fishing grounds tend to be of limited size. Indeed, why expend a lot of energy and time in order to fish distant areas, which, in any case, are unlikely to yield a richer catch than the ones nearer the village, provided these village fishing grounds are husbanded with care. Here, we begin to see one of the fundamental aspects of the logic that underlies traditional societies : maximizing the productivity of labour (in this case, the number of fish caught in a given period), rather than maximizing the output of the natural environment, which here would mean the number of fish caught for a given surface area of fishing grounds. From the point of view of the fisherman, it is more logical to limit his fishing outings to the vicinity of the village, where, for a number of short trips of duration T, he can hope to catch a number X of fish, rather than to prospect more distant areas, where journeys of duration 3T will only result in a production of 2 or 3X.

#### 2.2.5. Control of the access to the resource

Given the small size of the fishing grounds, and the sensitivity of the resource to over-intensive harvesting, traditional fishing has often to face the threat of over-exploitation when serious fishing<sup>12</sup> is maintained over long periods of time. For fishing to remain viable, the activity must be regulated.

The traditional solution to this situation is to control access to the resource by means of temporary bans on fishing enforced on the whole village community which owns the fishing grounds. These bans, or taboos, are placed by the community chief during a special "custom" ceremony, and are usually made evident by some sign understood by all, such as a pole stuck in the reef flats. These taboos can be total, in which case they apply to the whole of the useable species, or partial and apply only to the most threatened species. The duration of such interdictions can be highly variable, but it is seldom less than six months and rarely more than three years. Any community member breaking the taboo is liable to a heavy "custom" fine, a deterrent sufficient to make taboo breaking a rare occurrence. The effectiveness of such taboos rests on the fact that the fishing territory is open to the flow of eggs and larvae of fish, invertebrates and shellfish coming from outside. This allows a gradual repopulation of the habitats depleted by over-fishing. This potential for regeneration of fishing stocks, characteristic of the reef environment, is a great asset and offsets its high vulnerability to over-intensive fishing. All species do not have the same potential for repopulating the depleted habitats. Species whose larvae develop in open waters have an advantage when compared with those whose larval stage is mostly spent attached to the bottom. The former, drifting with tides and currents, can cover great distances; the latter can only spread over a small area, and thus can only gradually, step by step, repopulate the depleted habitats from their laying grounds.

Once the temporary ban on fishing is lifted, all members of the village community regain access to the fishing grounds. However, this access remains subject to the permission of the local chief for any outsider to the community. The formality of these authorizations will depend on the legal status of the land to which the fishing grounds belong. The fishing grounds are considered part of village territory, and as such they are viewed with the same feeling of ownership and identification as the land part of the territory<sup>13</sup>. Where the fishing grounds are thus perceived as an extension of the cultivated gardens within the village territory, access to outsiders is very strictly regulated. This access is usually reserved for groups considered as allies. We may encounter two types of situations : one case would be a neighboring group who has placed its own fishing grounds under temporary taboo and requests permission to share the village's fishing resources for the duration of the ban, another case could be an inland group, holder of a landlocked territory, wishing occasional access to the ocean. In both cases, the granting of a fishing-rights agreement will be the occasion of a traditional ceremony to cement the alliance between the two groups.

When the fishing grounds are perceived as part of the non-cultivated portion of the territory, their have a lesser status, and the granting of access to outsiders follows a less formal procedure. In certain villages, this access may even be free to all, at least this is claimed by members of the community<sup>14</sup>. The inalienable relationship between the land and its inhabitants runs so deep in Vanuatu that it would seem extraordinarily for anyone wishing to fish in a territory not his own to fail to inform the rightful owners and seek their permission to do so. Thus, even in cases where outsider access to the resource isn't governed by a set of formal traditional rules and procedures, it is still subject to the traditional usage regarding land-rights common to all Vanuatu, a body of customs which will be implicitly respected.

### **3. Traditional fishing and the development of artisanal fishing**

#### **3.1. Are the two approaches contradictory ?**

After this brief survey of the role of traditional fishing in the social, economic and cultural life of the islands, and the ways by which the resources of the fishing grounds are husbanded, we now have some tangible elements on which we can base an inquiry on how traditional fishing can be used as a foundation for artisanal fishing development.

Only ten years ago, simply to ask the question would have seemed bizarre. As far as development planners were concerned, the only model worth following was that of western artisanal fisheries, who, in the space of fifty years, have progressed from small operations close inshore (day outings using small craft of 4 to 10 meters in length) to deep-sea operations using vessels of over 30 meters capable of staying at sea several weeks. The specialists used to consider this type of evolution as universal, and nations could be classified for modernity by their progress along this path of

development. The islands of the Pacific were rated as the bottom rung of this ladder, and thus the potential for improvement seemed all the greater, provided these countries were given technical and financial assistance by the international funding organizations. The speed with which artisanal fishing was going to develop was understood to be simply a function of the magnitude of this assistance. Given this type of reasoning, what role could traditional (i.e. archaic, practically prehistoric) fishing possibly have, with its ignorance of motorized craft or of refrigeration and its reliance on devices as hopelessly primitive as spears or bows and arrows ?

Since then, experience has shown that the Pacific was not Europe or America, and that models that worked very well in western countries were not necessarily adapted to the islands of Oceania. In spite of the millions of US dollars spent on development, and of the goodwill and dedication of the fisheries experts and master-fishermen whose task it was to introduce, then to help spread, modern fishing techniques among the village communities of the Pacific, the results are far from spectacular. The production of modern artisanal fishing, subsidized by governments, is growing at a very slow pace, and remains to date greatly inferior to that of unsubsidized and unassisted traditional fishing<sup>15</sup>.

The failure of current coastal fishing development policies is not due to chance. It can be explained through the fact that the development model followed is poorly adapted both to the physical limitations inherent to the Pacific island ecosystems, and to social, economic and cultural limitations inherent to traditional village society (David, 1990a and 1991). The first type of limitations cannot be overcome; traditional fishing has adapted to them. If artisanal fishing is to be developed, it too will have to adapt to them if it wishes to succeed. The second type of limitations are very difficult to bypass or overcome. Tradition and culture are still very much alive in rural areas, they are the product of the relationships that society has developed with its ecological environment, and they completely shape this society. No fisheries development project will be able to place itself outside of this context, or be able to afford to ignore it. Thus, any innovation proposed by the development planners will only have a chance of becoming truly adopted if it can fit in with the personal and community aspirations of the "society in need of development". As Johannes (1990) rightly points out, these aspirations usually do not include the increase of the fishing output, the search for maximum balanced catch, or optimum production in economic terms. Yet these are the primary goals usually assigned to any fisheries development policy. So it is essential to reshape the contents of fisheries development planning in order that it be better adapted to this social-economic-cultural context, and, at long last, have a chance of success. The only model currently available is that of traditional fishing, and thus the success of any fisheries development project will depend on using it as a guiding light. This, of course, doesn't mean limiting fisheries development to ancestral techniques or equipment, but rather respecting the philosophy through which traditional fishing has adapted to the limitations imposed by the physical environment, and the spirit in which it has made itself a part of the social and cultural context of island village society.

There is of course another possible approach, which is that of urging the island populations toward a complete divorce from the traditional ways and customs. As territory, culture and racial identity are inseparably linked in traditional society, this requires the "breaking" of the logic which ties these three fundamental elements together. Migration toward the urban centres is the best way to achieve this. A long-term separation from the land of origin, and the daily contacts with other ethnic groups lead to a gradual break down of the sense of identity with the territory. As this identification is the keystone of the triad "culture-territory-racial identity", its loss leads to the loss of the original culture. This traditional culture, powerfully associated with the territory, gives way to the culture of the new habitat - the city -, a culture that is replete with such western values as efficiency, profit motive, and intensification of productivity, all for the sake of a type of development that is reduced to its single dimension of economic growth.

We ourselves refuse to be a part of this kind of logic of cultural destruction, and would much rather see the forging of links between tradition and modernism. We reject an approach that would only retain of modernism its most brutal aspects, the ones that prevail when the only criterion is the constant upgrading of economic indexes.

### 3.2. The contribution of traditional fishing in resource management

Of all the possible aspects of traditional fishing which can inspire development planners, this is the one which shows most promise according to the planners. It was the subject of a major part of the debates during the workshop on the social and economic aspects of fisheries organized by the South Pacific Commission during the 1991 Regional Technical Meeting on Fisheries. Ruddle brought together the various elements with great clarity during the International Conference on the Economy of Fisheries Management in the Pacific Islands, held in Hobart in 1989 under the sponsorship of A.C.I.A.R. . The interest in this subject has a lot to do with the difficulties that the various national Fisheries Departments experience in trying to implement and enforce regulations regarding the preservation and management of stocks when faced with territories as vast as the island groups of the Pacific. They see this form of decentralized resource management at village level as far more effective, backed as it is by traditional chiefly authority and the participation of the fishermen. They see it as an attractive solution to the problems they face at the national level. As far as we are concerned, we only partially share this enthusiasm. To work, village level resource management depends on a very important requirement : the continued respect for the traditional system of authority. This is still usually the case, as long as fishing is limited to the traditional activity for self-subsistence, or to a small-scale commercial pursuit with only the village, and perhaps the neighboring villages, for a market. On the other hand, once the resource has to supply demand at the national and possibly international scale, there is no guarantee that "custom" authority will be powerful enough to enforce respect of the necessary temporary fishing taboos, or even that this authority will have any desire to impose such bans. Once fishing is capable of providing a substantial income to the majority of families, it becomes difficult, in times of tight money, to deny this "manna" to the village community, even if means putting the fish stock in jeopardy. This situation occurs often in the case of trochus shell and of beche-de-mer. With world-wide supply of these products beginning to dry up, and demand remaining high, the prices paid to the producer are usually very attractive. The traditional economic system isn't geared to resist to such pressures. So it isn't unusual for fishermen to succumb to the lure of quick and easy money, and for concern for the survival of the resource to assume a secondary role.

In this type of situation, it is essential that the State be able to control fishing activities. With the decline of traditional authority, too often helpless against the high stakes involved, the State is the only institution who can counteract the logic of the profit motive generated by international demand, by enforcing a regulation of supply at the national level. For this purpose, neither the quota system, nor a system of licensing, are satisfactory. As is so often the case, the simplest solution is the best. It is based on acceptance at the national level of a minimum size for specimens caught, in some cases a maximum size. The Customs Department can then monitor compliance to the size regulations at the point of export; any undersize product is immediately destroyed, and a heavy fine levied against the exporter. In this way, demand will always be for legal sizes, thus allowing the stock the possibility of replenishing itself. In cases where the product undergoes a manufacturing process prior to exporting, such as for trocca shell, monitoring for legal sizes will be done at the place of fabrication. A company that refuses to co-operate in this monitoring would see its export licence cancelled by the government.

The management of the resource has to be flexible and adaptable. Products aimed at the international market must come under nation-wide regulations. On the other hand, products aimed exclusively at the local consumer market can be placed under traditional control at the village scale, provided the regulations can be made to apply to every village. As we can see, there is still a long way to go before a resource management model inspired by traditional methods can be put into practice at national level. To limit the contribution of these traditional methods to fisheries development planning strictly to the problems of controlling access to the resource would be a mistake. Traditional fishing has much more to offer us in this field.

### 3.3. The contribution of traditional fishing to the commercial use of the environment

We think that it is in this sector that traditional fishing has the most to contribute to the development of artisanal fishing. This development, as it has been planned so far, labours under three major handicaps :

a) It is too innovative, and too lacking in flexibility. Every aspect of what is proposed to the fishermen about the new developments is new to them : the resource (deep-bottom species), the type of habitat fished (the deeper portions of the outer reef wall), the boats (single-hulled or twin-hulled motorized craft), the tackle (reel-mounted deep-bottom lines), and such aspects as fishing technique, gear maintenance, book-keeping... The potential of such a model for integration within island society is very low. For this reason, a program of strict monitoring and assistance to the fishermen has had to be organized. Every fishermen's association is regularly visited and checked by an agent of the Fisheries Department, who lives on the island. This agent is in daily radio contact with the headquarters of the Department in Port Vila. Within this system, the only role played by the fishermen consists in the strict application of the directives given by the Fisheries agent. The success of the project, and the eventual spreading of development of the fishing industry throughout Vanuatu, is expected to depend on this faithful adherence to the agent's directives. The economic success of the participating fishermen is then supposed to inspire others to take up commercial fishing, leading to the development of more fishing projects in those islands and districts which are still innocent of intensive fishing. This system of technical support worked correctly for only two years. Designed to help manage 25 fishermen's associations, it soon found itself having to deal with five times the number. The greater part of these associations were then mostly left to their own devices, and, with a few rare exceptions, the experiment ended up in failure.

b) It is too specialized. The whole of the development effort is targeted on a small number of species, on a single type of tackle, a single territory, a single method of product conservation. This is one of the classical approaches to development, with specialization being equated to increase in production, and economy through increase of scale.

c) It is too costly, both in terms of working time and of cash outlay. In 1984, a motor catamaran, complete with twin outboards and all fishing gear, was worth 900 000 Vatus (roughly US\$ 9000). The cost of an ice-making plant was US\$ 10000, and US\$ 15000 for a small cold storage facility. Most usually, the E.E.C., through the European Development Fund, covered 51% of the expense in the form of outright gifts, while the Vanuatu Development Bank supplied 42% in the form of three-year loans at 4% interest. The goal that had been set for the fishermen's associations was an average of 150 fishing days per year, a day representing an 8 to 12 hour trip, with 4 to 5 hours of active fishing. This large investment in work and time was deemed necessary to guarantee the fishermen a reasonably comfortable income, while fulfilling the expectations of the E.E.C., who wanted to see its gifts used to best advantage, and of the Vanuatu Development Bank, who hoped for repayment of the sums borrowed. This calculation fails to take into account that fishing is hard work indeed, particularly when it is practiced from small boats in the kind of well formed sea that is usually found between the islands of Vanuatu. It was long before the fishermen, finding the working conditions too hard and time consuming in comparison with the returns, started to turn their attention back to agricultural pursuits, or, if they continued going to sea, to the transport of goods and passengers, a type of activity generating less income than fishing, but considerably less demanding in time and effort. We see here an excellent example of the principle that we mentioned earlier and according to which the tendency will be toward optimizing return for given effort, rather trying to improve the productivity of the environment.

We will not insist any further on the problems encountered by the development of artisanal fishing in Vanuatu. The subject has been exhaustively discussed elsewhere (David, 1990a, 1991). We have shown that the rigidity, the excessive cost and the over-specialization of the proposed model have been largely responsible for the failures that have been experienced. Given the social and cultural context of the island societies, and the limitations imposed by the environment, the planners should instead turn their attention to concepts of adaptability, of diversity, of inexpensiveness, and of flexibility. These concepts are already at work in traditional fishing, and constitute, as we have seen, its fundamental philosophy.

There is an urgent need for these principles to find their way into the policies that govern the development of artisanal fishing in coastal waters, whether in Vanuatu or in any other nation of the island Pacific that faces similar limitations, both physical and human. This means that development planners must accept the idea of pluralistic development allowing the existence of a high performance sector, engaged in a regular activity, made up of a small number of expensive projects

using sophisticated equipment, aimed at the international export and the tourist markets, while encouraging in parallel the existence of a more informal sector, made up of a multitude of small operators, engaged in a more sporadic type of fishing, using much simpler and inexpensive equipment both in terms of craft<sup>16</sup>, tackle, or conservation methods. In Vanuatu, the simple expedient of introducing such unsophisticated and inexpensive conservation methods as fish smoking and salting<sup>17</sup> would make an increase of production possible. This would offer to those who fish only for their own family the possibility of taking advantage of occasional abundances of certain species, particularly the small pelagic species, which at present they are unable to stockpile for lack of the means of preserving them. In this way they would be able, if they wished, to put away surplus production, and possibly acquire the notion of marketing. Smoking and salting of fish, by offering the possibility of marketing their catch to a greater number of fishermen of modest means, are one of the keys of the development of fisheries, and of the distribution of fish products to the interior of the islands where the road network is often embryonic if not completely absent. Smoked or salted products will keep well for several days, even several weeks, at ambient temperature, and are easier to transport than the fresh article.

In most tropical countries where fish is smoked or salted as an artisanal activity, the work of preparing and marketing the product is done by women. This is done at home as a "cottage" industry, where it forms a part of the women's daily household chores. In rural Vanuatu, where women are generally excluded from participating in income-producing activities, to adopt such a model would give them an opportunity to acquire a degree of economic freedom from their husbands, and to gain a certain economic stature within the family structure. They might bring to the development of the fishing industry an enthusiasm and a form of pragmatism they have developed over centuries of having to master the difficulties of subsistence agriculture in Vanuatu.

## Conclusion

The development of artisanal fisheries is currently in the throes of a crisis throughout the island Pacific. The models followed over the last fifteen years or so by the various Fisheries Departments of the region are being increasingly questioned, particularly by the funding organizations who are wondering whether similar levels of production couldn't be achieved at less expense, or, similarly, whether the same cash outlays couldn't be made to yield better results. What is being reassessed here is the whole concept of development based on specialization and on intensification of production. This type of development is too innovative, too alien to the culture - and its understanding of time and space - of the village society to which the fishermen belong, and the mere injection of massive capital is unlikely to be enough to make it catch on at grass-roots level. The island Pacific is still too heterogeneous, in ecological, economic, geographical, social, and cultural terms for models which have served well in Europe or North America to be useable as-is. Two main lessons can be learned from the failure of the artisanal fisheries development policies in Vanuatu :

- If neither the physical nor the human contexts can adapt to the development model, then it is up to this model to adjust to the physical and human realities of the islands;
- It is impossible to build anything without using what is already there as a solid foundation.

In this particular field, traditional fishing can provide an excellent source of inspiration. It prominently features adaptability, diversity, and flexibility in methods, techniques and strategies; it offers an economy - both in terms of money and of labour - of equipment and energy; it makes use of the diversity of possible target species and of biotopes suitable for fishing. These are general principles that can help guide the development of artisanal fishing in coastal waters.

Yet, the inspiration shouldn't be limited to traditional fishing methods of the Pacific alone. One would like to hope that the type of "North-South" co-operation that is typical of artisanal fishing development in Vanuatu could one day be replaced by a "South-South" co-operation between the nations of the island Pacific and the other countries of the inter-tropical zone. There is no doubt that Fanti or Senegalese fishing skippers have a wealth of experience that they could share with their Ni-vanuatu counterparts. There is no doubt that the women of Vridi, on the Ebrié lagoon of Ivory Coast, famed for their smoked fish, have much that they could teach to the women of Vanuatu and the other island nations of the Pacific.



## Notes

- 1) This concept of "fishing system" has only been used for the last twenty years or so. It was introduced by such pioneers as Rhode Island University's Polnac and Sutinen (1979), or ICLARM's Smith (1979), and became adopted in the South Pacific in the course of regional conferences such as the S.P.C.'s symposium on coastal fishing resources in the Pacific of 1988, or the conference organized in 1989 by ACIAR in Hobart (Campbell, Menz and Waugh, 1989).
- 2). In Vanuatu, an island group devoid of lagoons, coral formations are limited to a narrow band of fringing reefs, offering two very distinct fishing zones : the shallow reef flats and the first few meters of the outer reef slope.
- 3) .By "abundance", we mean the total population numbers of the stock that is fished.
- 4). Generally speaking, the fisherman will take from the stock a quantity of fish varying with the effort that he has expended and his productivity. This productivity is measured as a fisherman's output per unit of time. It will depend both on the abundance of the resource and on the efficiency of the device used, and can be considered as a ratio between the number of target specimens present on the fishing grounds and the number of such specimens caught.
- 5). Most of the outings are done in small outrigger dugout canoes propelled with paddles. Their nautical performance is poor, and they are not well suited to offshore travelling. The few sailing canoes are superior in this regard. They are usually larger than the paddled kind, and can reach lengths of up to 10 meters. The greatest concentration of canoes is found on the island of Malekula, with fully one third of the total canoe population of the whole group.
- 6). These are basically four in number : the great diversity of the stock, the low abundance of monospecific micro-stock units, the seasonal fluctuations affecting these stocks, and the extreme vulnerability of these stocks to over-exploitation.
- 7). It would be risky for the fisherman to target his efforts on a single specie when the likelihood of coming across fish of the target specie is low.
- 8). For a discussion of traditional fishing techniques, the reader would be well advised to consult the work of Anell (1955).
- 9). It would hardly be practical to attempt to catch sardines with a spear gun, on account of the small size of the fish. A net would be far more appropriate.
- 10). There would be no point in hoping to catch a herbivorous fish on a hook baited with shellfish, or in fishing by day for a specie that feeds only at night.
- 11). Trying to capture deep-bottom fish by deploying a vertical float-suspended net would be unrealistic. Diving with a spear gun, or fishing with a hand-line, would make far more sense.
- 12). The yearly number of fishing outings per hectare of useable fishing grounds is a good way of measuring the intensity of the fishing activity. Where this figure is not available, the density of fishermen on the fishing grounds can also be used.
- 13). In the island Pacific, as was shown by Bonnemaïson (1981 and 1986), the notions of territory and of ethnic identity are very much interweaved. "The sense of ethnic identity is based on, and finds its security in, the depth of its rooting to the land and the degree of intimacy it enjoys with a space that it structures, orders and focuses according to its own aspirations and symbolic representations, in other words its territory."
- 14). The reader who might wish to pursue the subject of the various forms of status of the fishing grounds in Vanuatu will be well advised to consult the thesis of B. Vienne (1984) concerning the Banks Islands, particularly chapter 4 : "La Maitrise de la Nature".

15). Thus, in Vanuatu, after ten years of Village Development Fisheries Programme, the annual catch of fish has never exceeded the 200 tonne mark. Traditional fishing, meanwhile, supplies between 1500 and 2000 tonnes per year (David, 1991).

16). The use of sailing canoes, with a small auxiliary engine to help them in going to windward, is certainly the least expensive way to develop fishing in the shallower portions of the outer reef wall, in depths of between 10 m and 100 m, particularly on the leeward side of the islands, where there is shelter from prevailing winds and ocean swells.

17). Readers who might be interested in the application of these techniques to Vanuatu should consult Van Pel (1958) and issue n° 50 of the S.P.C.'s information newsletter on fisheries (David, 1990b).

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## APPENDIX

The appendix on the following four pages shows copies of the questionnaires/forms used by ORSTOM and the Vanuatu Fisheries Department to monitor the production of deep-bottom-dwelling fish, which are the target of the VFDP. As described above, the data-gathering process is divided into three levels, each corresponding to one of the stages of fish production : landings, rural fish sales, and the urban market..

## VILEJ FISING PROJEK

### REKOT BLONG FISING LONG WAN TRIP

Nem blong kampani : .....

Nem blong bot : ..... Hamas man i stap long bot : .....

Deit yu ko aot : ..... Taem yu ko aot : .....

Deit yu kam bak : ..... Taem yu kam bak : .....

Fising eria : ..... Fising depth : .....

Hamas line yu usum : ..... Hamas line yu usum : .....  
long dip solwota long trolling

Hamas kilo fis yu kasem : ..... kg Hamas kilo fis yu kasem : ..... kg  
long dip solwota long trolling

Taem yu start bottom fising : ..... Taem yu start troll : .....

Taem yu stop bottom fising : ..... Taem yu stop troll : .....

Wanem kaen beit yu usum : ..... Hamas kilo beit yu usum : ..... kg

### INCOME

Hamas mane yu kasem long fis sales : ..... VT Nara income : ..... VT

### HAMAS MANE YU USUM

Benzene/oel : ..... Repair mo maintenance : .....

Samting blong fising : ..... Freight : .....

Pay : ..... OI nara expense : .....

Nem blong fis	; Mesament blong fis (length long cm)
Etelis coruscans	
Etelis carbunculus	
Etelis radiosus	
Pristipomoides multidens	
Pristipomoides filamentosus	
Pristipomoides flavipinnis	
Epinephelus magniscuttis	
Epinephelus morrhua	
Epinephelus septemfasciatus	
Lutjanus malabaricus	
Aphareus rutilans	

**REMARKS**

REPUBLIC OF VANUATU

**FISHERIES EXTENSION SERVICE  
RESEARCH UNIT ORSTOM - FISHERIES DEPARTMENT  
GOODS RECEIVED NOTE**

GRN N<sup>o</sup> 2951

Extension Centre ..... Date .....

Fishing Project ..... Prococode .....

Fishing Area ..... Trip Length ..... Hours

PIECES	SPECIES	KILOS	PRICE	VALUE
.....	E. carbunculus (Red Short Tail)	.....	.....	.....
.....	E. coruscans (Red Long Tail)	.....	.....	.....
.....	E. radiosus (Silver Jaw)	.....	.....	.....
.....	P. multident (Large Scaled Jobfish)	.....	.....	.....
.....	P. flavipinnis (Yellow Jobfish)	.....	.....	.....
.....	P. filamentosus (White Poulet)	.....	.....	.....
.....	L. malabaricus (Red Snapper)	.....	.....	.....
.....	A. rutilans (Green Jobfish)	.....	.....	.....
.....	S. rivoliana (Amberjack)	.....	.....	.....
.....	E. magniscuttis (Spotted Loche)	.....	.....	.....
.....	E. morrhua (Brn. Striped Loche)	.....	.....	.....
.....	E. septemfasciatus (7 Banded Loche)	.....	.....	.....
.....	G. unicolor (Dog Tooth Tuna)	.....	.....	.....
.....	T. albacares (Yellow Fin Tuna)	.....	.....	.....
.....	K. pelamis (Skipjack)	.....	.....	.....
.....	T. alalunga (Albacore)	.....	.....	.....
.....	C. hippurus (Mahi-mahi)	.....	.....	.....
.....	M. seheli (Mullet)	.....	.....	.....
.....	S. crumenophtalmus (Mangreau)	.....	.....	.....
.....	Clupea sp. (Sardine)	.....	.....	.....
.....	Mixed Reef Fish	.....	.....	.....
.....	Other Species	.....	.....	.....
<b>TOTAL</b>		.....	.....	.....

Received from Fisheries Extension Service ..... VT.

Signed .....

# "NATAI"

PORT VILA FISHERIES LIMITED  
 P.O. Box 883, Port Vila — Telephone : 23344  
 P.O. Box 211 — Luganville, Santo — Telephone : 36841

<p><b>GOOD RECEIVED NOTE</b> No 11563</p> <p>Date : .....</p> <p>Received from : .....</p> <p>AWB No : .....</p> <p>Bag No's : .....</p>	<p><b>CODE</b></p> <ul style="list-style-type: none"> <li>Grade A - First Grade</li> <li>B - Second Grade</li> <li>C - Third Grade</li> <li>IKE - Killed</li> <li>HIG - Headed &amp; Guttled</li> <li>H/G - Head Off</li> <li>G&amp;G - Gilled &amp; Guttled</li> <li>WH - Whole</li> <li>L - Live</li> <li>D - Dead</li> <li>F - Frozen</li> </ul>
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Description of Goods	Code	Kgs	Price	AMOUNT Vts
<p style="font-size: 2em; opacity: 0.5; transform: rotate(-45deg); position: absolute; top: 50%; left: 50%;">VOID</p> <p style="font-size: 1.5em; position: absolute; top: 60%; left: 45%;">24.1.92</p>				

<b>Total Kgs</b>		<b>Sub Total</b>	
Goods Received Signed : .....		<b>Freight Ded</b>	.....
Approved Payment Signed : .....		<b>Other Ded</b>	.....
Till Cash .....	Cheque No. ....	<b>Total Payable</b>	.....

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**REPRÉSENTATION DE L'ORSTOM**  
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