

TRADITIONAL VILLAGE FISHING IN FISHERIES DEVELOPMENT PLANNING IN VANUATU

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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 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 lasting increase in fisheries production. To base a fisheries development policy on small-scale traditional village fishing appeared a dangerous option. It was assumed that the challenge facing Vanuatu in developing its fisheries 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 and 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 100-400 metres, well outside 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 practised.

During the last decade, considerably more information about traditional fishing methods has become available. Moreover, the various fisheries development projects have produced a certain amount of feedback. Gradually, the preconceived understanding of traditional fishing that the planners had accepted is beginning to broaden. They no

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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.¹ So far as such a 'traditional fishing system' exists, there is also a 'commercial artisanal fishing system'. Fisheries development can only be analysed in terms of 'systems'. This systemic approach opens up new vistas for research; it becomes particularly useful when comparing traditional versus artisanal types of fishing and the logic that underlies them. It will enable us to address the following questions. Can a better understanding of the traditional fishing system be of any use in planning fisheries development? By a reverse approach, is it possible to modernize this system of traditional fishing to turn it into a commercially profitable enterprise? In other words, can the development of artisanal fishing be based on traditional fishing?

We shall deal here only with the first question. For this, we shall make use of the results of a programme 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:

- 1) 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;
- 2) the manner in which the fishing grounds have traditionally been managed; and
- 3) the extrapolation of this traditional approach to resource management to modern fishing methods.

THE ROLE OF TRADITIONAL FISHING IN THE SOCIAL, ECONOMIC AND CULTURAL ENVIRONMENT

In traditional society, not only the major social events but also 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 pat-

terns, 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 Sahlins (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. In response to these threats, social, economic and cultural behaviour patterns have evolved to become custom. Fishing, as other aspects of village life, was conditioned by these influences. The two most important influences were a rejection of specialization and a search for social cohesiveness (figure 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 the 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 is one of the characteristics of Melanesian society. It can be explained by the diversity of the available food resources and by a preoccupation with minimizing the risk of food shortages. Because 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 from drought or 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 methods of food production as well as in diet itself. This concern for diversity can be observed in the planning of 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

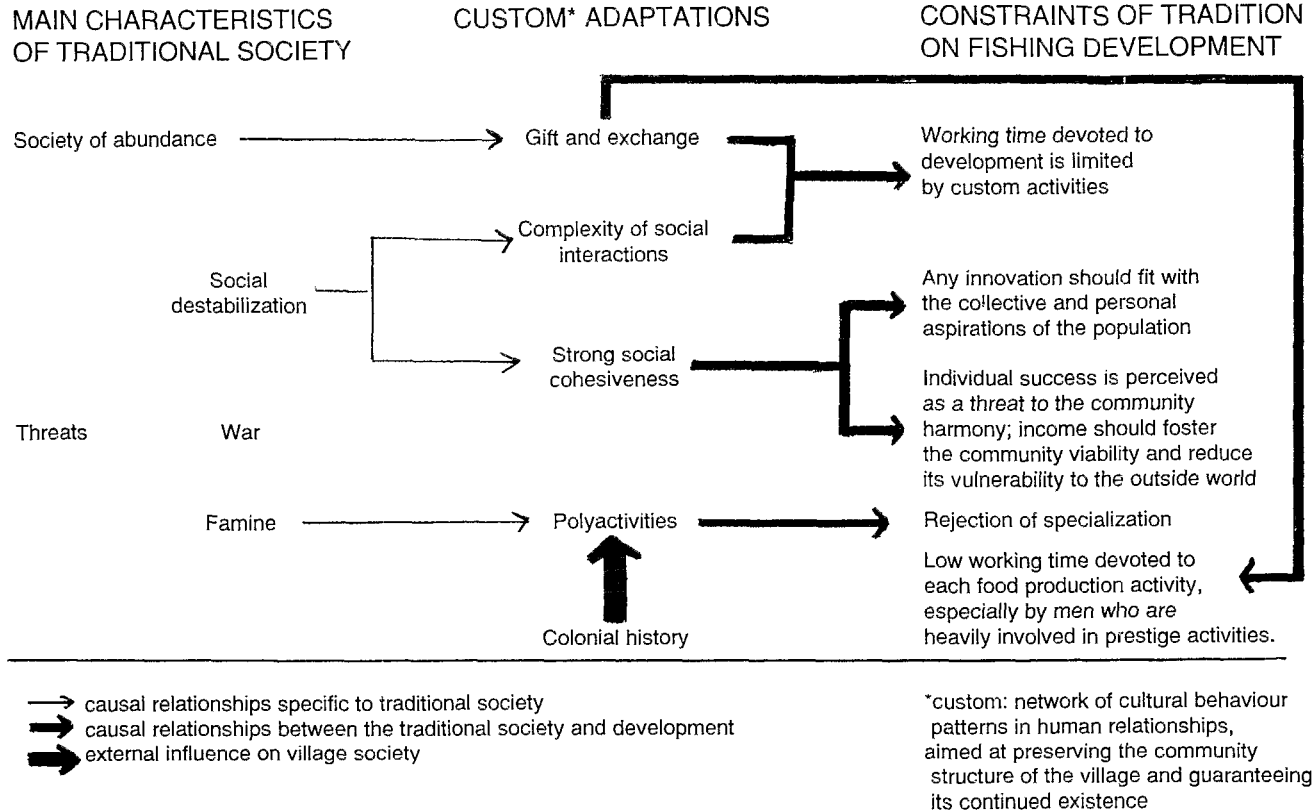


Figure 1. The sociocultural logic of the traditional village system and its constraints on fishing development.

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, with high population density, low agricultural productivity due to shortage of arable space, a favourable marine environment of extensive reef flats, seagrass beds and mangroves, does fishing cease to be simply an emergency food supply and 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. 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 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, 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 (figure 1). Many of the present residents of the foreshore areas came originally from inland villages which they abandoned in the first half of the twentieth 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 names given to varieties of fish, squid, shellfish or lobster are taken from those of land plants and animals.

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 claustrophobic feeling which affects many small isolated communities. Once begun, this destructuring process is very difficult to reverse because the possibility of collective effort to do so no longer exists. It leads inevitably to the breakdown, 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 practised 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 from 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 (figure 1). 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 is not 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, thus lessening its vulnerability to the outside world.

TRADITIONAL MANAGEMENT OF FISHING GROUNDS

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 to a large extent a function of the location of the villages. They are usually situated near the villages, and they 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 metres 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 five types of marine environment: the reef flats,² the beach, the mangrove swamps, the seagrass beds, and the rivers mouths. Generally speaking, fishing on these types of ground depends on the presence and abundance of fish³ and the presence of the fisherman.⁴

Factors affecting the presence of fishermen on fishing grounds

These factors are essentially of meteorological nature: the state of the sea and the weather conditions, particularly wind velocity and precipitation. They determine the working conditions on the fishing grounds, therefore shaping the fisherman's decision whether or not to go fishing 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.⁵ 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 precipitation and temperature.

Factors affecting presence and abundance of fish life

All the ecosystems of the inter-tidal zone and of the reef slope have 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 in the mangroves and seagrass beds around the Maskelyne islands, off the south-east point of Malekula (David 1985). During the course of the inventory of Vanuatu's marine resources carried out by AIMS in 1988 (Done & Navin 1990, 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 100 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 species. Suitable biotopes for each species tend to be small in extent (we use the term 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 species. 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 species among them. Over a short 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, particularly for such small pelagic species as mackerels and sardines (Grandperrin 1982). The fisherman has no way around these limitations: he must inevitably take them into account in his fishing strategy and his choice of techniques.

Adaptation of the Fishermen to Limitations imposed by the Environment

General considerations

Three basic concepts can be used to describe the type of adaptation to meteorological and ecological limitations on traditional fishing: 1) diversity of techniques and strategies used, whether in terms of species targeted or of biotopes worked; 2) low cost of the means used, whether in terms of hours spent, of energy, or of cash expended; and 3) control of the access to the resource. A total of seven main types of adaptation, based on the above concepts, can be identified (figure 2). 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. Thus, diversification of equipment is 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 distinguish further among 1) secondary adaptations of the first order, which are the immediate result of primary adaptation; 2) secondary adaptations of the second order, which are the immediate result of a secondary adaptation of the first order (thus, 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, 3) similarly, secondary adaptations of the third order, such as the low cost of fishing outings, derived from the low cost of the means of production (figure 1).

Among the forms of primary adaptation, we shall distinguish between responses to limitations affecting the fishermen and responses to those affecting the resource. It is not practical to make this distinction for secondary adaptation: although exclusive secondary adaptations to limitations affecting the resource exist (for instance diversification of the means of production), there are no exclusive secondary adaptations to the limitations affecting the fishermen. On the other hand, secondary adaptations exist that are responses to limitations on both fishermen and resource, for instance diversification of techniques and strategies or the low cost of fishing operations.

Certain forms of secondary adaptation resulting from limitations

CONSTRAINTS AFFECTING THE PRESENCE OF FISHERMEN

CONSTRAINTS AFFECTING THE RESOURCE

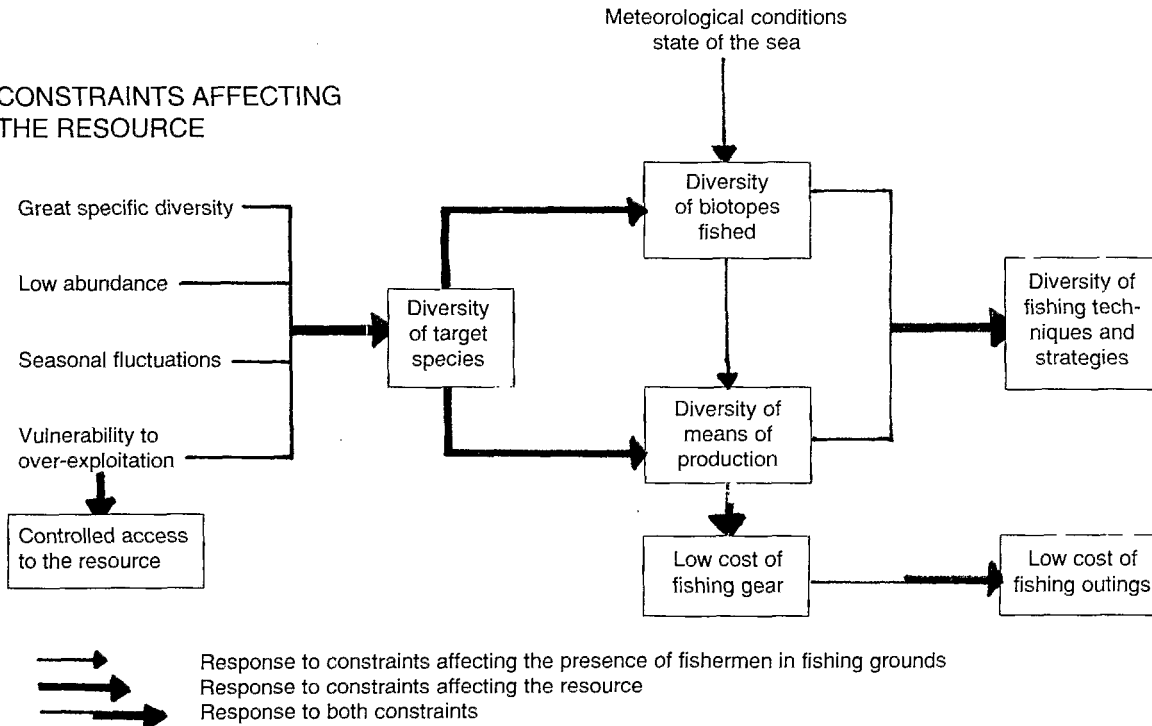


Figure 2. Adaptations of the traditional village fisheries in Vanuatu to the environmental constraints.

affecting the resource are at the same time primary adaptations to limitations affecting the fishermen. Thus, 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 a secondary adaptation to the limitations affecting the presence of fishermen on the fishing grounds resulting from primary adaptation to these limitations represented by the diversification of the biotopes used.

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,⁶ and to the seasonal variations that affect it. Thus, 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 metres 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.

Diversification of means of production and of fishing technique and strategy

The diversification of means of production is reflected essentially in the diversity of fishing gear. A wide range of implements is used. The majority are of the throwing or casting type (hand spears, bows and arrows, 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 designs remain mostly traditional. Generally, they are small in size.

Devices specifically made for fishing

Of all fish-catching devices, hand-held lines are the most versatile. They can be used for trawling or for bottom fishing, either from boats or while wading on the outer edge of shallow coral flats. Given this versatility, it is not surprising that they should be the most commonly found type of fishing gear, accounting for 55 per cent 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 a torch battery.

Line fishing is hardly a traditional fishing technique in Vanuatu, and eyewitness accounts, such as that of Garanger (1972:109), show that 20 years ago line fishing was seldom practised.⁷ The Banks and Torres groups in the north are exceptions to this. At the close of the last century, 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 flyingfish. Apart from the Banks and Torres groups, then, the hand-held line can be considered as a modern development in Vanuatu. 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 per cent 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 girls.

Spears are the most common type of traditional implement. They represent 20 per cent of all fish-catching equipment, and 74 per cent of traditional equipment. The most frequently seen model is made of a long bamboo shaft, with four wooden spikes, 10-20 centimetres long, lashed at the end. Over the last few years, the wooden spikes have often been replaced by sharpened steel ones. Fishing is done on foot, along the intertidal coral flats or tidal channels through seagrass, or from canoes along 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 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 metres 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 per cent of the fish-catching equipment used in Vanuatu. Its use is exclusively reserved for 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 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 of which they are made, and the fishing methods and strategies used, have very little in common with traditional nets and methods. The most commonly used type of net is imported from Asia. Typically, it is roughly 10m long, 1.5-2m deep, and 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 be contemplated only by wealthier

households. Thus it is not surprising that gill-nets currently represent only 4 per cent of all fishing equipment and that the majority 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 he sights an interesting catch.

Trickier to handle, casting nets are less common than gill-nets, although their purchase price might be 40 per cent lower. They represent only 1 per cent of all fishing equipment. Half of the casting nets are found on the island of Efate and the nearby islets. 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 per cent of all fish-catching equipment. Alongside the standard Western-made spear guns are found some of local manufacture, very rudimentary in design, made of a metal spear and of a rubber launcher attached to a piece of wood, 10cm 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 women may dive in shallow water for the purpose of gathering shellfish (or, more rarely, crayfish), as long as they do so for subsistence reasons only. This explains why diving to gather trochus and large sea snails, both valuable commercial shells, is still the prerogative of the men.

Fish-holding pens are the least numerous of the modern devices. Only a few dozen exist, most of them on Efate. Their introduction is recent and can be attributed to immigrants from French Polynesia. A holding pen consists of roughly 50m of chicken wire, about 1.5m 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 a short life-span. These Polynesian fish-holding pens improve 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. This older

type does not appear to be in use any longer, but the remains of some can still be seen. J. Barrau (1956) mentioned the presence of some in Aliak, on the west coast of Pentecost; they were still visible in 1985. These ruins are only a few centimetres high and are able to trap only very small fish. This is more amusement for children than 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; it is occasionally practised by women and children.

Multi-purpose equipment and one-time implements

Alongside implements which can be unmistakably classified as fishing gear, because the catching of sea-life is their main function, some devices have many uses of which fishing is but one. The most common among these is the ubiquitous bush knife, at least one of which can be found in every rural household. Fishermen often use them to kill fish which have been trapped by the ebb in tidal pools, or while wading on the coral flats at night. Women and youths wield bush knives as well as 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 gear used only for fishing, and the multi-purpose tools used in fishing, a third category of fishing tools consists of devices used only once, 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, often used in the Banks Islands to drive small fish toward the beach in narrow bays, where they are then killed with bow and arrows, hand spears, or bush knives. Vegetable poisons are derived from fruit of *Barringtonia asiatica* and root of *Derris trifoliata*, which are either bruised, pounded or shredded before being placed in pools where they poison the whole of the fauna. The use of explosives was very popular during the first half of this century, particularly during the few years following World War Two. They are one-time devices par excellence. Their use has declined, partly because of the supply

difficulties 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 for a small number of species. The vulnerability of any one species 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;⁸ its feeding habits;⁹ its type of habitat (beach, holes in the coral, vicinity of coral heads); the depth at which it lives. 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, especially to use more than once 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 1 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 2 devices together, 9 using 3, and 1 using 4.

The diversity of the means of production is not simply the direct result of the diversity of target species; it is also the result of the concern of the fishermen to draw from the greatest possible number of different biotopes, in order to minimize the risk of finding themselves unable to fish on account of meteorological conditions or state of the sea (figure 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 useful to be able to choose among several types of implements to take best advantage of a given biotope. Thus, diving can prove to be a most efficient way to fish the first few metres of the outer reef wall when the water is clear, although this particular technique may be totally useless on days when the water is muddy, at which time line fishing can become a valid alternative.

By classifying fishing techniques, we refer to the use of a fishing device. For any one type of device, several techniques may exist, varying with use of a boat or with 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 3 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.

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. 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. Moreover, fishing plays only a secondary role within traditional Vanuatu society. Social prestige is acquired by other means. It would not therefore be logical to invest money or effort in sophisticated fishing gear, particularly because the productivity of fishing outings is rather low in any case, from a few hundred grams to three or four kilograms at best. In terms of manufactured (i.e., purchased) equipment, we must remember that the cash income of rural families is very low in Vanuatu (78,500 vatu (US\$800) per year in 1984). The purchase of fishing equipment represents a low priority in a family's budget; it 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 to fish distant areas which, in any case, are unlikely to yield a richer catch than ones nearer the village, provided these village fishing grounds are husbanded with care? This is fundamental aspect 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, the number of fish caught for a given surface area of fishing ground. From the point of view of the fisherman, it is more logical to limit 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 of fish X , rather than to prospect more distant areas, where journeys of duration $3T$ will only result in a production of $2X$ or $3X$.

Control of access to the resource

Given the small size of 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 fishing¹⁰ 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—applicable to the whole of the useable species—or partial—applicable only to the most threatened species. Their duration 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, thus 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. 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 the village territory; as such, they are viewed with the same feeling of ownership and identification as the land part of the territory.¹¹ Where fishing grounds are thus perceived as an extension of the cultivated gardens within the village territory, access to outsiders is very strictly regulated, usually reserved for groups considered as allies. A neighbouring group may place its own fishing grounds under temporary taboo and request permission to share the village's fishing resources for the duration of the ban. Alternatively, an inland group, holder of landlocked territory, wishing occasional access to the ocean, may request permission of the coastal village. In both cases, the granting of fishing rights will be marked by 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, they have 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 as claimed by members of the community.¹² The inalienable relationship between the land and its inhabitants runs so deep in Vanuatu that it would seem extraordinary 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 is not 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.

TRADITIONAL FISHING AND DEVELOPMENT OF ARTISANAL FISHING

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 to base an inquiry of how traditional fishing can be used as a foundation for artisanal fishing development.

Only 10 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 50 years, have progressed from small operations close inshore (day outings using small craft of 4-10m in length) to deep-sea operations using vessels of over 30m 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; thus, the potential for improvement seemed all the greater, provided these countries were given technical and financial assistance by 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 with Western countries were not necessarily suited to the islands of Oceania. In spite of the millions of U.S. dollars spent on development and in spite 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 it remains to date greatly inferior to that of unsubsidized and unassisted traditional fishing.¹¹

The failure of current coastal fishing development policies is not due to chance. The development model followed is poorly adapted both to the physical limitations inherent in Pacific island ecosystems, and to social, economic and cultural limitations inherent in traditional village society (David 1990a, 1991). The first type of limitation cannot be overcome; traditional fishing has adapted to those limitations. If artisanal fishing is to be developed, it will have to adapt to the limitations if it is to succeed. The second type of limitation is 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 to afford to ignore it. Thus, any innovation proposed by the development planners will have a chance of becoming truly adopted only if it can fit the personal and community aspirations of the society in need of development. As Johannes (1989) 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; thus, the success of any fisheries development project will depend on using it as a guiding light. This, of course, does not mean limiting fisheries development to ancestral techniques or equipment, 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.

Of course another possible approach is urging the island populations toward complete divorce from the traditional ways and customs. As territory, culture and ethnic identity are inseparably linked in traditional society, this requires disrupting 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 daily contacts with other ethnic groups lead to a gradual breakdown of the sense of identity with the territory. As this identification is the keystone of the triad "culture-territory-ethnic 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. We would much rather see forged links between tradition and modernism. We reject an approach that would retain only the most

brutal aspects of modernism; the ones that prevail when the only criterion is the constant upgrading of economic indices.

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 they believe shows most promise. 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 (1989) 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 ACIAR. The interest in this subject has much 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 traditional authority. This is still usually the case, as long as fishing is limited to the traditional activity for 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 on a national and possibly international scale, there is no guarantee that custom authority will be powerful enough to enforce respect for 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 *bêche-de-mer*. With world-wide supply of these products beginning to decrease and demand remaining high, the prices paid to the producer are usually very

attractive. The traditional economic system is not geared to resist such pressures. It is not 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, the state must 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 which 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 trochus shell, monitoring for legal sizes will be done at the place of fabrication. The government would cancel the export licence of any company that refuses to co-operate in this monitoring.

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 level, 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.

The contribution of traditional fishing to 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:

1) It is too innovative, and it lacks flexibility. In Vanuatu, every aspect of the proposal to fishermen about 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 an island society is very low. For this reason, a program of strict monitoring and assistance to 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 of 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 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 free from 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 this number. The greater part of these associations was then left mostly to their own devices. With a few exceptions, the experiment ended in failure.

2) It is too specialized. The entire development effort targets a small number of species, 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.

3) 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 vatu (roughly US\$9000). The cost of an ice-making plant was US\$10,000, and US\$15,000 for a small cold storage facility. Most usually, the European Communities, through the European Development Fund, covered 51 per cent of the expense in the form of a grant, while the Vanuatu Development Bank supplied 42 per

cent in the form of 3-year loans at 4 per cent 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 8-12 hour trip, with 4-5 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 European Communities, which wanted to see its grants used to best advantage, and of the Vanuatu Development Bank, which hoped for repayment of the sums borrowed. This calculation fails to take into account that fishing is hard work indeed, particularly when it is practised from small boats in the kind of well-formed sea that is usually found around the islands of Vanuatu. It was not 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 mentioned earlier, according to which the tendency will be toward optimizing return for given effort, rather than trying to improve the productivity of the environment.

We will not expand further on the problems encountered in 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, 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 of a small number of expensive projects using sophisticated equipment, aimed at the international export and the tour-

ist markets, while encouraging in parallel the existence of a more informal sector, made 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,¹⁴ tackle, or conservation methods. In Vanuatu, the simple expedient of introducing such unsophisticated and inexpensive conservation methods as fish smoking and salting¹⁵ would enable increase of production. This would offer to those who fish only for their own family the possibility of taking advantage of occasional abundances of certain species. This applies particularly to the small pelagic species, which at present people are unable to stockpile for lack of the means of preserving them. In this way people would be able, if they wished, to put away surplus production and possibly acquire the notion of marketing. Smoking and salting fish, by offering the possibility of marketing their catch to a greater number of fishermen of modest means, are the keys to fisheries development and of 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 fresh ones.

In most tropical countries where fish is smoked or salted as an artisanal activity, women prepare and market the product. They do so at home as a cottage industry, where it forms part of their daily household chores. In rural Vanuatu, where women are generally excluded from participating in income-producing activities, adopting such a model would give them the 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 enthusiasm and the pragmatism that they have developed over centuries of mastering 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 15 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 could not be achieved at less expense, or, similarly, whether the same cash outlays

could not 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. The injection of massive capital is unlikely to make it succeed 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 usable here. 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 the model must be adjusted 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 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.

The inspiration should not be limited to traditional fishing methods of the Pacific alone. One would 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 among the nations of the Island Pacific and the other countries of the inter-tropical zone. No doubt, Fanti or Senegalese fishing skippers have a wealth of experience that they could share with their Ni-Vanuatu counterparts. No doubt, the women of Vridi, on the Ebrie lagoon of Ivory Coast, famed for their smoked fish, have much that they could teach 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 20 years or so. It was introduced by such pioneers as Rhođe Island University's Polnac and Sutinen (1979), or ICLARM'S Smith (1979). It was adopted in the South Pacific during the course of regional conferences such as the South Pacific Commission's symposium on coastal fishing resources in the Pacific of 1988, or the conference organised in 1989 by ACIAR in Hobart (Campbell et al. 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 metres of the outer reef slope.

³ Abundance means the total population numbers of 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. It can be considered as a ratio between the number of target specimens present in the fishing grounds and the number of such specimens caught.

⁵ Most of the outings are done in small outrigger dug-out 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; they can reach lengths of up to 10 metres. The greatest concentration of canoes is found on the island of Malekula, which has fully one third of the group's total canoe population.

⁶ It would be risky for the fisherman to target his efforts on a single species when the likelihood of coming across fish of the target species is low.

⁷ For a discussion of traditional fishing techniques, see Anell (1955).

⁸ Attempting to catch sardines with a spear gun would hardly be practical on account of the small size of the fish. A net would be far more appropriate.

⁹ There would be no point in baiting a hook with shellfish to catch a herbivorous fish or in fishing by day for a species that feeds only at night.

¹⁰ The annual number of fishing outings per hectare of useable 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.

¹¹ Bonnemaïson (1981, 1986) explained that the notions of territory and of ethnic identity are interwoven in the Island Pacific: "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".

¹² Regarding fishing grounds in Vanuatu, see Vienne (1984) concerning the Banks Islands, particularly chapter 4 "La Maîtrise de la Nature".

¹³ Thus, in Vanuatu, after 10 years of the Village Development Fisheries Programme, the annual catch of fish has never exceeded the 200 tonne mark. Traditional fishing, meanwhile, supplies 1500-2000t per year (David 1991).

¹⁴ Sailing canoes, with a small auxiliary engine to help them going to windward, are certainly the least expensive way to develop fishing in the shallower portions of the outer reef wall, in depths of 10-100 metres, particularly on the leeward side of the islands, where there is shelter from prevailing winds and ocean swells.

¹⁵ For application of these techniques to Vanuatu, see Van Pel (1958) and David (1990b).

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