

RESEARCH REPORTS IN THE ECONOMICS OF GIANT CLAM MARICULTURE

Working Paper No. 13

Reef and Lagoon Tenure in the Republic of
Vanuatu and Prospects for Mariculture
Development

by

Dr T'eo I. J. Fairbairn

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T'eo I.J. Fairbairn²

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¹ Research for this paper has been undertaken as a part of Australian Centre for International Agricultural Research (ACIAR) Project 8823, "Economics of Giant Clam Mariculture".

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The technical feasibility of culturing giant clams for food and for restocking tropical reefs was established in an earlier ACIAR project. This project is studying the economics of giant clam mariculture, to determine the potential for an industry. Researchers will evaluate international trade statistics on giant clams, establish whether there is a substantial market for them and where the major overseas markets would be. They will determine the industry prospects for Australia, New Zealand and South Pacific countries, and which countries have property right factors that are most favourable for commercial-scale giant clam mariculture. Estimates will be made of production/cost functions intrinsic in both the nursery and growth phases of clam mariculture, with special attention to such factors as economies of scale and sensitivity of production levels to market prices.

Commissioned Organization: University of Queensland.

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TABLE OF CONTENTS

	Page No.
Abstract	1
1. The Background	2
2. The Legal Framework	7
3. Reef Tenure and Property Rights	8
4. Sharing Arrangements	13
5. Institutional Aspects	13
6. Giant Clam Mariculture: Prospects and Approaches	15
7. Conclusion	18
8. Acknowledgement	18
9. References	19
List of persons consulted in Vanuatu	21
Previous working papers	22

Reef and Lagoon Tenure in the Republic of Vanuatu and Prospects for Mariculture Development

ABSTRACT

Property rights to the Republic of Vanuatu's extensive reef and lagoon areas are held by traditional land owners. current legislation confers on indigenous customary owners of land, ownership and usage rights of areas extending out to the sea-side of offshore reef, although in practice, many villages claim rights over sea areas that extend beyond the legal limit. In effect, therefore, reef areas are seaward extensions of land over which landowners – usually those adjoining the reef - can claim ownership. Notwithstanding individual ownership rights, reefs and lagoons remain predominantly common property where all members of a given village are free to carry out fishing and related activities. However, overall control of village reef and lagoon areas is usually the responsibility of the village council, comprising village chiefs and elders, and in some cases, an area council composed of leaders from several villages.

Vanuatu is endowed with many possible reef and lagoon sites that appear suitable for the development of clam and other forms of mariculture. In effect, to develop a major mariculture project, whether commercial or predominantly village subsistence, a developer would need to approach the appropriate village authorities to seek approval of a project. In the case of individual villages, these authorities are normally the village council and chiefs and the individual reef owners. The approval by these authorities will ensure acceptance of the project by the village as a whole, as well as its co-operation during project implementation. Adopting the right approach in explaining the nature of the project to villagers and proof of the project's viability are vital prerequisites for success in winning local support. Equally important, as emphasised by many village leaders interviewed, is the need to draw up an agreement between the host village and the developer, laying out specific project objectives, mode of operation and terms and conditions of the project.

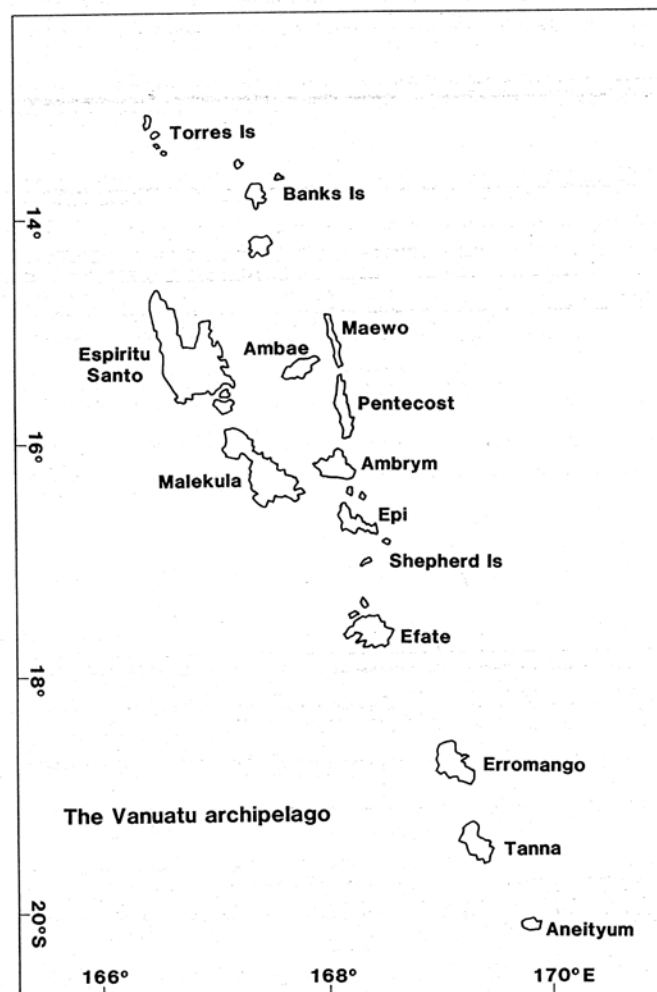
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Reef and Lagoon Tenure in the Republic of Vanuatu and Prospects for Mariculture Development

1. The Background

The Republic of Vanuatu is situated in the Western Pacific ocean, between 12 and 21 degrees S latitude, and 166 and 171 E longitude. It is a Y shaped archipelago comprising 80 islands, which extend about 800 km, north to south. The land area of the group totals 12,000 sq km and its closest island neighbours are New Caledonia to the south, Fiji to the east, and Solomon Islands to the north-west. From Efate island, Vanuatu's main island and administrative centre, the distance to Sydney (to the south-west) is around 2,250 km.



Map 1: An overview of the Republic of Vanuatu

Population is currently an estimated 143,000 and is expanding at an average rate of 2.9 per cent annually. Indigenous Melanesians or, Ni-Vanuatu, comprise 94 per cent of the total; the remainder being European, Chinese and other Pacific Islanders. Over half of Vanuatu's population is located on three islands - Efate with around 30,000, Esprito Santo with 28,000 and Malakula with 20,000.

Vanuatu has a dual economic structure with a substantial subsistence sector co-existing with the modern cash economy. The proportion of the population that depends, to some degree, on the traditional subsistence economy is estimated at 80 per cent. The cash economy is dominated by primary activities, notably copra and beef, and by services such as government and tourism. Gross national product is estimated at US\$850 per capita.

Copra is the leading export product and in 1988, the value of this product totalled US\$9.0 million, equal to 45 per cent of total export earnings. Most of the remaining export earnings are accounted for by beef, cocoa and forest products. Like most other Pacific island countries, Vanuatu has, in recent years, recorded considerable trade deficits in its balance of payments, with the cost of imports far exceeding export earnings. These deficits have been largely offset by foreign aid receipts. Beef and copra, with coffee and cocoa, hold the greatest potential for expanding exports.

National development planning was inaugurated in 1982 and the country's second national plan, covering the period 1987-1991, was published recently (Government of Vanuatu, 1990). This latest plan lays out a set of development objectives, strategies and programmes for implementation during the plan period, as well as the leading constraints that have to be overcome. The plan's major objectives are to:

- achieve an increased degree of economic self-reliance based on natural resource development;
- accelerate human resource development for increased Ni- Vanuatu participation in, and control of the economy;
- increase productive utilization of the country's natural resource base as a means of generating viable and sustained economic growth;
- achieve more even patterns of regional and rural development (Government of

Vanuatu, 1990, p. 7).

Fisheries, both coastal and oceanic, are viewed as a major area for development. According to the development plan, government policies in fisheries are:

- to maximise fisheries' contribution to the economy;
- to stimulate increased production for both domestic and overseas markets;
- to lessen the dependence on imported canned fish (Government of Vanuatu, 1990, p. 246).

These objectives are to be realised primarily by tapping the fisheries potential of outer reef slopes and ocean as well as that of reefs, lagoons and rivers.

Responsibility for implementing government policy in fisheries lies with the Fisheries Department, established in 1978, which is part of the Ministry of Agriculture, Forestry and Fisheries. The Department's work to date has largely focused on efforts to:

- establish coastal fisheries as a commercially viable activity;
- determine resource availability;
- promote technical training;
- improve fishing techniques;
- investigate certain aquaculture possibilities.

Prominent in the Department's work to date have been effort to promote a Village Fisheries Development Programme (VFDP) in an attempt to foster commercial fishing among rural communities.

Insofar as aquaculture is concerned, in practice, efforts to realise its potential have been limited. (The current development plan, see p. 252, draws attention to past failures in attempts to culture oysters and to develop a small-scale shrimp farm on Efate under private initiative.) Present involvement in aquaculture on the part of the Fisheries Department is restricted to the maintenance of a small trochus hatchery at its headquarters in Port Villa, although the Department has recently recruited an aquaculture officer. Serious efforts to

promote other forms of aquaculture, including giant clams, have yet to be made.

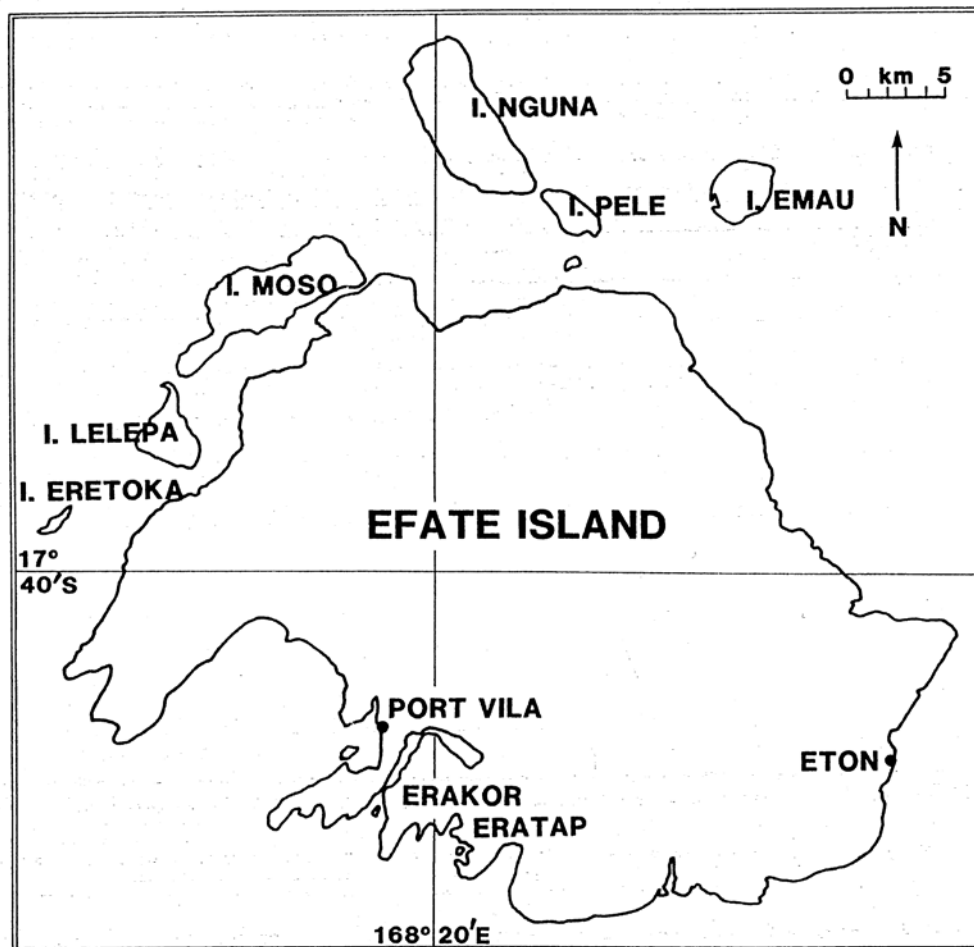
The trochus hatchery has only recently been established under a small grant from FAO. It is essentially a pilot project undertaken as part of a region-wide programme to foster trochus in the region. The aim of the project is to establish a regional hatchery from which trochus seedlings can be made available to interested island countries. Present facilities are limited to two breeding tanks.

Useful information on Vanuatu's marine resources has recently come to light and this information may provide a basis for a more active effort to promote aquaculture in the country, including giant clam culture. The information is contained in a recent publication entitled, "The Marine Resources Survey of Vanuatu" (Done and Navin (eds), 1989) and represents the results of surveys on selected reef sites by a team working under the auspices of the Australian Institute of Marine Science, Townsville. The survey results relate to a variety of reef aspects, including coral reef and seagrass beds, benthic communities on coral reefs, availability of bech-de-mer, extent of crown-of-thorn starfish infestation, and the status of giant clams.

In relation to giant clams, the survey found that only *Tridacna maxima* was common to all island sites surveyed (13 in all) but that the stock of other giant clam varieties was patchy or absent (Zann and Ayling 1990, p. 95). The survey recommended that measures be taken to reintroduce *T. gigas*, which was found to be practically extinct, and to protect stocks of *Hippopus hippopus*, which had apparently been heavily exploited.

The purpose of this study is to describe reef and lagoon tenure in Vanuatu and associated traditional forms of sharing arrangements. The study is part of a larger research project entitled *The Economics of Giant Clam Mariculture*, which is funded by ACIAR and coordinated by Professor C.A. Tisdell, the University of Queensland. For purposes, of collecting basic information, I visited Vanuatu during the period 20-26th May, 1990.

In describing the nature of reef and lagoon tenure in Vanuatu, I have relied heavily of the results of field visits to three villages on Efate to collect basic information. These villages are: Eratap, Eton and Erakor and in each village discussions were held with local chiefs and elders.



Map 2: Efate Island, Vanuatu's main island and site of its administrative centre, with offshore islands. This map indicates the general location of Eratap, Erakor and Eton.

Eratap village is located south-west of Port Vila - a distance of around 20 km. The village has a population of 300, divided into four clans with a head chief and four "assistant" chiefs. Eratap's economy is based on copra and cocoa and the sale of fish and trochus to the Port Vila area.

Eton lies on the south-east coast of Efate about 45 km from Port Vila. With a population of 250, the village has a single clan and one chief. Copra is the main crop supplemented by the sale of fish, trochus, green snail and lobsters.

Erakor has a population of around 1.250 and is one of the largest villages of Efate. The village lies a short distance south of Port Vila and is within the Port Vila urban boundary.

There are four clans but only one chief, and the village economy depends heavily on wage earnings derived from Port Vila, fishing and the collection of crabs and lobsters

2. The Legal Framework

Ownership of reef areas in Vanuatu resides with the customary owners of land. This pattern of ownership is formally enshrined in the country's Constitution adopted in 1980 (with the advent of independence). According to the Constitution, all land in Vanuatu belongs to customary land owners, and this ownership carries with it the right to own adjacent reef and other near-shore areas (see Sections 71 and 72 of the Constitution). According to the Land Reform Regulation (No. 31) of 1980 (subsequently embodied in the Land Reform Act - Revised Edition - 1988(a)), "land" is defined to include: "improvements therein or affixed thereto and land under water including land extending to the sea side of any offshore reef but no further" (Government of Vanuatu, 1980, p. 4). This means that legally, customary ownership of land extends to the outer edges of fringing reefs.

Fishing rights on reef and lagoon areas are governed by custom. However, in practice, although ownership resides with customary land owners, reef and lagoon areas of a village are open to all members of that village for fishing and related purposes.

Ownership of mineral (including oil and gases) and other inorganic materials is not clear, but can be presumed to be owned by the state. This presumption follows from the interpretation of land under the Land Leases Act of 1983 (No. 4) which defines "land" as: "land above mean high water mark but does not include minerals and other workable and removable substances" (Government of Vanuatu, 1983. p. 2).

Matters pertaining to fisheries development in Vanuatu fall under the Fisheries Act (No. 37 of 1982). This Act provides for national "control, development and management of fisheries in waters over which Vanuatu has established fisheries jurisdiction" (Government of Vanuatu 1982, p. 1). These waters apply to the various territorial zones lying within the country's exclusive economic zone. The Act is primarily concerned with the control and development of commercial fisheries, both local and foreign, and with licensing requirements. It makes no specific provisions for mariculture or other forms of aquaculture development.

However, the Act provides for the Minister of Agriculture, Forestry and Fisheries to regulate

activities on reef and other near-shore areas. This is contained in Part 4 (General) of the Act conferring upon the Minister power to make regulations in various areas of fisheries not inconsistent with the Act (Government of Vanuatu 1982, p, 13). Section (m) of Part 4 of the Act refers to aquaculture development as well as the taking of coral, the setting of fishery fences, and the taking of aquarium fish. Insofar as actual regulations relating to aquaculture development are concerned, it appears that to date, no such regulations have been promulgated.

3. Reef Tenure and Property Rights

As noted above, all coastal areas extending to the outer edge of fringing reefs belong to indigenous customary owners of land. This ownership pattern derives from ancient custom and has more recently been formalised in the country's Constitution and a variety of land legislation. Such ownership implies recognition of the rights of individual landowners on reefs and lagoons, and village-wide ownership of the right to fish and to undertake related activities on these reef areas. On the latter aspect, this right amounts to the exercise of common property rights by all members of a village on customary reef areas and lagoons of his or her village.

The ownership rights of customary owners in a village are formally recognised but the precise reef areas over which these rights apply are not always clear. Ownership rights are most clear-cut in cases where authority over village land is held by a single person who is often the head chief. In this case, the entire reef area falls under the control of a single owner. Reef ownership is also unambiguous in isolated coastal locations where a single landowner controls the adjoining reef. Such an owner need not necessarily be a chief. Ownership of reef and lagoons is least straightforward in areas characterised by multiple reef ownership reflecting possibly complex land ownership patterns. Particular difficulties can arise in villages where land and reef ownership is under dispute.

Formally, reef and lagoon areas over which customary ownership prevails extend from the shoreline to the outer edge of fringing reefs. However, many villages lay claims to sea areas that lie beyond these boundaries - out to the "horizon". Such claims are often associated with sea areas that lie between the reefs of a particular village and those of a nearby offshore island.

Several instances of villages claiming additional sea areas toward the horizon came to my notice during fieldwork. Thus at Eton village, respondents informed me that the village's seaward boundary was taken as the outer edge of the fringing reef plus an additional 50 metres. At Eratap village, the villagers claimed the reef areas up to the reef edge (a distance of around 200 metres) plus an additional 100 metres beyond - an area which contained four small offshore islands (Eratap, Emal, Ekadum Lep and Ekadum Rik) belonging to the village. On Uripiv island, lying offshore on the north-east side of Malakula island, the six villages on the island owned land on the nearby island of Uriv and therefore were able to claim sea rights beyond the reefs of the home island.

The establishment of village claims beyond the reef dates back to antiquity and, no doubt, was influenced by the particular circumstances of each village. Such factors can only be guessed at but may include: the pressure of population on existing reef areas, narrow reef zones and a capacity to exploit deep sea resources.

Insofar as the lateral boundaries of village reef and lagoon areas are concerned, in most cases it appears that such boundaries are fairly well established and have been determined over time through customary means (including warfare). Essentially, such boundaries are normally set where the land owned by one village gives way to land owned by another. However, the legal standing of these customary reef boundaries is not clear, and in some cases, these boundaries have come under dispute, possibly because of a lack of precision of customary means of demarcation.

As most villages in Vanuatu lie some distance away from neighbouring villages, these lateral boundaries often extend well beyond the immediate vicinity of the main village settlement. For example, at Eton village, the lateral boundaries of its custom reef area extends over an estimated distance of 35-40 km on both sides. For Eratap, the lateral extension of reef area is 20 km in one direction and five in the other.

In Vanuatu, as is common with many other South Pacific countries, readily identifiable natural objects are used to demarcate land and reef boundaries. In the case of reef areas, the kind of natural objects commonly used have been pointed out by Iwakiri (1983) and Fairbairn 1990(a), among others. An example that came to hand during my field visit to Vanuatu was that of Eton village whose land and reef boundaries were represented by large rivers on either side of the village.

The reef and lagoon areas of some of Vanuatu's small offshore islands are characterised by an absence of designated reef zones under the control of individual villages. In such cases, the entire reef areas surrounding the island are common property in which all island residents can fish regardless of which village they come from. An example is the small island of Uripiv noted above; here the residents of the five villages on Uripiv can fish anywhere on the surrounding reefs.

The customary authority (or authorities) in each village that can exercise overall control over reefs and lagoons and associated resources is not always apparent, and there appears to be significant differences throughout the country in the manner in which reefs are controlled and managed at a village level. However, in general, the exercise of this function involves several entities and groups, notably, the village council, the local chief (or chiefs), and the landowners. In some cases, an area council – a body of village leaders representing several villages – also plays an important role. Apparently, it is not always easy to determine how much power over reef matters is exercised by each of these groups and some overlapping and blurring of authority is apparently quite common. In general, however, the paramount authority is the village council.

As the traditional head of a village, the chief still plays a significant role in village life. He, along with lesser chiefs (commonly referred to as "assistant chiefs"), is still the leading figure and authority in the village council a group composed of chiefs and other village elders who act as a kind of local government body at the village level. On matters relating to reef and lagoon usage, the principal chief can still exert considerable influence, either as an individual or through the village and area councils, and in practice, he is often the dominant influence. The authority of the chief (or chiefs) can be particularly strong where he himself is a substantial landowner and with similarly substantial claims to reef areas. For example, the principal (and sole) chief of Atavoa village on Ambae island owns all land on that village and, consequently, claimed ownership of the entire reef area of that village.

In almost all cases the village council is the principal custodian of reef and lagoon areas among village communities. In general, the village council exercises authority over the overall use of reefs and lagoons, including any major commercial development that may be envisaged. The authority of the village council, in some cases, also extends to "customary" sea areas that the village may have claimed beyond reef and lagoon zones, as noted previously Aspects of reef usage and development that normally fall under the jurisdiction of

a village council include: the imposition of fishing bans (*tabu*) on village fishing grounds (perhaps, for conservation or restocking purposes); settling disputes with neighbouring villages over poaching and related matters; enforcement of fishing regulations imposed by government; and control over the exploitation of reef materials and beach sands. As discussed later in this report, the village council is also the key group for handling matters relating to the granting of fishing rights to outsiders and for negotiating leasing arrangements for the use of village reefs.

Area councils can also play an important part in determining reef usage and development, especially where the interest of several villages is involved. According to respondents, the support of an area council is crucial in certain areas of reef developments. Thus, at Erakor village, respondents pointed out that village support for a major mariculture development on its reef and lagoons would depend on the reaction of its area council. (In this case, the supremacy of the area council was somewhat unusual but arises from the fact that, because of its size, Erakor village was large enough to justify the formation of its own area council.)

The special rights of customary landowners whose land adjoins the reef have been noted – rights that are recognised by both custom and legislation (although many such customary areas are currently under dispute by rival claimants). These include the right to lease reef sites belonging to them, normally subject to approval by the village council (and possibly the area council) and chiefs. In many cases, they may also include an exclusive right to use sea areas close to land for special purposes, including the mooring of fishing crafts, the erection of fish traps and the establishment of breeding areas for clams and other shellfish. They may also lay claim to the ownership of sand and other useful materials that may be found on his reef area.

Fishing on reef areas of each village is restricted to the people of that village who, in general, enjoy equal rights in these waters. Fishing by neighbouring coastal villagers is disallowed although apparently, there is some flexibility on this matter. Should people from neighbouring villages wish to fish on the customary reef areas of another village, they must first inform the reef-owning village, and in most cases, must secure the permission of the village council. It also appears that reciprocal arrangements are sometimes made between adjacent villages allowing inter-village fishing, but these arrangements now appear to be rare.

Permission authorising outside fishing is normally a matter for the village council. Whether or not the council decides to grant permission depends on many factors which may include: a

wish to assert and reinforce a village's authority over its reef resources; the need to enforce any village regulations that may have been made to control fishing activity; and the need to promote the conservation of reef resources. A council may also be influenced by commercial considerations, for example, the wish to extract some financial benefit from outside exploitation of its reef resources.

Villagers are becoming increasingly aware of the commercial worth of their reef resources. At Erakor village, for example, I was told that outsiders are not allowed to fish unless permission has been granted and a fee paid. This applies not only to fishermen from neighbouring villages but to outsiders in general. Thus, at the time of my visit, Erakor was hosting two outside fishermen: one from the island of Malakula, who was fishing for beche-de-mer, and another from Pentecost, who was collecting trochus. The former was being charged fee of 12,000 vatu per year and the latter 2,000 vatu per year. (At the time of fieldwork, 100 vatu was equal to approximately Aust.\$1 .10.)

The enforcement of village bans on fishing by neighbouring villages is not without difficulties owing to the often extensive spread of a village's customary reef waters. Villagers now employ a variety of means to discourage poaching on their reef areas. Thus, both Eton village and Erakor village regularly use the radio as a means of warning others against fishing on their reef areas. Public notices are also installed, usually on adjacent land borders, for the same purpose.

Where encroachment does occur, the offender is told to leave. However, where infringement is considered serious, it is likely to be brought up before the village council and, possibly, the area council, for resolution. A final resolution may call for compensation by one village to another, possibly based on traditional means such as the presentation of pigs and kava.

Many villages on Vanuatu are located in land without direct access to reefs and this situation and its implications for reef tenure and fishing rights is not without interest. In general, such villages have no claims to fishing rights on coastal areas, but in practice, many have gained access by coming to an understanding with the people of the coastal village or by some other means.

In some cases, access to coastal waters derives from kinship connections which are sometimes associated with the fact that the inland village was originally settled by people from the coast. Here, traditional rights to fish on customary reef areas have been maintained

despite the change of location. In most cases, however, the right to fish on coastal waters is one that has been developed from traditional times and perpetuated by the ability of these villages to stay on good terms with one another.

Maintaining such a relationship calls for the observance of various customs, usually involving a payment for the right to fish. This payment normally takes the form of a presentation of traditional gifts such as pigs, kava, taro and other valued items.

A variety of other reciprocal arrangements is also found. One such arrangement that came to my notice was in Tanna where some of the coastal villages permit fishing by people from inland villages in exchange for the right to hunt on land belonging to the inland villages.

4. Sharing Arrangements

Fishing in Vanuatu is largely undertaken on an individual basis. It appears that group or communal fishing was never a strong tradition in Vanuatu as compared with many other Pacific island countries such as Western Samoa and Fiji. What group fishing did occur in the past has probably been weakened over time as a result of increasing contact with the monetary economy. However, several instances of group fishing came to light during fieldwork. Such fishing usually involved small groups of from two to five people, and is frequently undertaken on special occasions.

As practised at Eton village, fish trapping takes place in rock pools found on reef platforms, and involves from two to five men. The fish trap is formed by pieces of old cloth held together by tree branches and implanted with poles on the reef floor. Fish are trapped as the tide recedes and then stunned for catching by applying a poison made from a local vine. The catch is shared among the participants.

5. Institutional Aspects

Fisheries Department

The Fisheries Department plays a key role in the development of commercial projects in fisheries and fish licensing. The Department is responsible for servicing fisheries projects for purposes of obtaining a fishing licence and for advising the Minister in charge of fisheries on the merit of proposals. These projects may relate to fishing activities, processing and

marketing. In carrying out this task, the Department normally liaises with other Ministries including that concerned with business development. Where a proposal involves the use of land and reef areas, the Department must also liaise with the Department of Land.

Under the Fisheries Act, the Department of Fisheries is responsible for issuing fish licences. The Act provides for the issue of two kinds of licences: a local licence and a foreign licence. A local licence applies to fishing boats over 10 metres in size and a fee of 5,000 vatu is charged. In the case of a foreign fishing licence, government approval for the project is essential. Government's decision is based on a recommendation from the Minister in charge of fisheries. A fishing licence - whether local or foreign - has to be renewed annually.

The Fisheries Department is the key organisation for servicing enquiries on fishing prospects in Vanuatu and for providing basic assistance in the development of such projects. The particular functions involved are outlined in a later section of this report.

Co-operatives

Co-operatives play an important role in the economy of Vanuatu and have the potential to play a useful role in promoting productive projects at the village level, including the development of clam mariculture. There are presently 180 co-operatives in operation, all in retailing and some in produce purchasing and marketing (e.g. copra and trochus). These co-operatives, typically having from 20 to 50 members, appear to be particularly strong in remote areas including outer islands. Turnover per co-operative is as high as 120 million vatu and most have been able to grant rebates to members on a regular basis. Some also have accumulated substantial cash reserves.

Four regional co-operative associations have been established (the first in 1987) to which individual co-operatives can join. These associations are: Tanna, Ambrym, Malakula and Ambae. A national co-operative federation was founded in the 1970s but is not presently very active. Advisory services to individual co-operatives can be secured from the Co-operative and Rural Business Development office in Port Vila.

According to informants, co-operatives can play a useful role in the development of mariculture projects, including giant clams. This role stems from the fact that co-operatives are well organised and well run in many villages and several have been able to accumulate substantial funds which could be invested in mariculture projects. Some of these co-

operatives, for example, in Santo and Malakula, are apparently looking for new areas in which to invest funds and diversify away from their core trading activities.

The Development Bank of Vanuatu

The Development Bank of Vanuatu provides a development loan facility which can be tapped for purposes of developing a major mariculture project. Any loan submission for such a project would be considered on its merit, and Development Bank support would be expected if the project can be shown to be potentially viable. Bank finance can be made available to villages for purposes of acquiring an equity in the venture given that villages usually lack other means for mobilising capital funds.

6. Giant Clam Mariculture: Prospects and Approaches

As with many other archipelagic countries, Vanuatu is endowed with reef and lagoon areas suitable for giant clam cultivation and related forms of mariculture. According to field respondents, the best reef sites for purposes of clam development are: selected reefs on Espiritu Santo, the northern reefs of Efate (and also the eastern side of Port Vila), and several locations on Malakula. The reef areas of several small islands were said to provide an excellent natural environment for clams. These small islands include Banks Islands, north of Vanuatu, and the Shepherd Group on the east-central side of the country.

A suitable site for a major giant clam project, however, requires more than favourable reef or lagoon conditions. Other requirements include access to local population centres, reasonably good physical infrastructure (roads, airstrips, port) and the availability of basic services such as electricity and fresh water. For Vanuatu, the availability of a reef or lagoon area that is free of dispute among rival land owners is also important.

Several of the favoured natural locations noted above can be ruled out as possible major giant clam sites because of their extreme isolation and undeveloped infrastructure. This applies to Banks Islands and other remote locations which are disadvantaged by the absence of basic facilities. Difficulties can also arise in reef and lagoon areas close to Port Vila because of the heavy concentration of population and attendant pressure on these reefs.

Selected sites on Santo, northern Efate and Malakula perhaps offer the most attractive locations for mariculture development. All these areas have access to village populations as

well as to transport and related services. On Malakula, two locations are said to be particularly attractive for clam development - Uripiv island on the north-east coast and the Maskelynes Islands on the south-east coast: As noted earlier, Uripiv is an offshore island with extensive bays and reefs between it and another adjacent offshore island (Uriv). The Maskelynes Islands consists of 10 offshore islands surrounded by large reef and lagoon areas. These islands lie only a short distance away from the main island of Malakula where port and air facilities are available (at Lamap).

The choice of a suitable project site can also be influenced by the pattern of land and reef ownership. From the viewpoint of negotiating a site, and even managing the project at a later stage, there is some advantage in choosing a somewhat isolated bay area under the control of a single landowner. A further advantage can also accrue where only a single family, or at most a few families, live on the adjoining land. This situation can facilitate the policing of the mariculture project.

The development of a major giant clam, or other mariculture project for that matter, on the customary owned reef and lagoon areas of Vanuatu calls for a careful selection of project site and fulfilment of certain licensing requirements. It also requires the developer to ensure that he approaches the village authorities in the proper way to obtain access to reef sites and to secure the co-operation of the village.

Assistance in choosing a suitable reef or lagoon site for a clam or other forms of mariculture can be obtained from the Department of Fisheries. This Department can assist in liaising with the village chiefs and village councils for purposes of discussing various aspects of a proposed project, including technical and financial aspects, the extent of village interest, and areas of possible participation by villagers. This Department can also assist a developer in matters relating to land and reefs (e.g. seeking clarification from the Ministry of Land whether the reef area is under dispute), and in negotiating with village authorities over a lease. In the case of commercial projects, the Department can also facilitate the securing of a business licence from the Ministry in charge of Industries should it be decided to proceed with the project.

In setting the stage for a major mariculture project, a critical step is to carry out discussions with the village chief (or chiefs) and the village council (and, in some cases, the area council). It is essential to win the support of these village groups which are the owners and

custodians of the reefs and lagoons belonging to a village. Winning this support calls for a developer to fully explain the purposes, rationale and operational features of a proposal, and to spell out how such a project could bring tangible benefits to the village.

The support of the particular landowner in whose reef area the project site is to be located is also essential. However, such support is likely to be forthcoming once the village council has approved a project.

Village leaders interviewed seemed to think that it would be necessary to draw up an agreement between the village and the developer setting out specific terms and conditions of a project. Such an agreement would specify project objectives, mode of operation, the extent of local participation, project duration and ways of compensating the village for the use of reef facilities. The leaders saw such an agreement as essential in order to minimise possible misunderstanding between the participating groups.

Any such agreement would need to give specific recognition to the claims of the village as a whole (as represented by the village council) and those of the owner of the project site. In practical terms, this might mean that fees paid for the use of reef sites be paid to both the village council and to the individual owner. The respective claims to other possible benefits likely to flow from the project (e.g. employment) would also need to be covered.

It may be necessary to draw up a separate agreement with the reef owner, and this will depend on the circumstances of each village. Such an agreement is probably necessary where a reef owner controls isolated reef areas and where he is expected to play a particularly active part in running and operating the project.

My discussions with villagers suggest that there was considerable interest in the possibility of establishing a major clam project in their villages. The indications were that local support would be given provided that the viability of such a project could be demonstrated and that the expected benefits to the village appear as being both tangible and positive. On the kind of practical benefits they expected from a project, the villagers emphasised such aspects as the creation of employment opportunities, money incomes (including fees from leases) and the chance to restock and regenerate their reefs and lagoons.

It would appear, therefore, that if the right approach was adopted to promote the project among the villagers and if the project could be shown to be viable, the support and co-

operation of the villagers can be expected to be forthcoming. Adequate discussions with village leaders through the village councils to explain the nature and purpose of a project are particularly important. Apart from paving the way for project development such co-operation is vital for the effective policing of project site to protect them against encroachment from other villagers: As pointed out by one villager, once an agreement was reached with the village council, "the village people will look after the project in the right way".

7. Conclusion

In Vanuatu, the ownership of reef and lagoons resides with indigenous customary land owners as do the fishing rights on these coastal areas. The ownership and usage of these reefs and lagoons are governed by custom. Unfortunately, detailed information on customary forms of reef tenure and usage is not readily available but it does appear that reef tenure is characterised by considerable variation from one village to the next. However, in practice, it appears that while ownership rights on reefs reside with land owners (normally owners of adjoining land), the principal authority over village reef and lagoon areas is exercised by the chiefs and village councils and in some cases, the area councils. For fishing and related purposes the reef area of a village is effectively common property, in the sense that normally all members of that village can enjoy equal rights.

A vital requirement in efforts to establish a giant clam project, or any other form of mariculture for that matter, is to gain the support of the village council and chiefs as well as that of the particular landowner who controls ownership rights over the reef area in question. Provided the proposed project is presented and developed in the right way, and is shown to be viable, the support of the village leaders and that of the village as a whole is likely to be forthcoming. From discussions with village leaders on the possibility of developing a major clam project, much interest was shown in drawing up an agreement that would clearly set out terms and conditions, and what was expected from each party to ensure a successful outcome.

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Edwin Kalafau, Chief and Member of Local Government Council, Eton Village.

Pierre Onel, Erakor Area Council Secretary, Erakor.

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Felix Nguyen, Technician, ORSTOM.

Moses Amos, Fisheries Biologist, Fisheries Department, Ministry of Agriculture, Forestry and Fisheries.

Augustine Garae, Director, Development Bank of Vanuatu.

Siwa Siwatibau, Director, ESCAP, Pacific Operations Centre (EPOC).

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