

# GIANT CLAM FISHING ON THE ISLAND OF TUBUAI, AUSTRAL ISLANDS, FRENCH POLYNESIA: BETWEEN LOCAL PORTRAYALS, ECONOMIC NECESSITY AND ECOLOGICAL REALITIES

## INTRODUCTION

Located south of the Tropic of Capricorn some 670 km southwest of Tahiti, Tubuai is part of the Austral Islands group. Tubuai is a high island located between the islands of Rapa in the southeast and Raivavae in the northwest. It is volcanic in origin and has a land area of only 45 km<sup>2</sup>. In contrast, the lagoon, which is enclosed by a coral reef, has an area of 88 km<sup>2</sup>. Fishers collect *Tridacna maxima*, a bivalve mollusc known locally as *pahua*, from the lagoon. This edible giant clam, which is found throughout much of the Pacific<sup>2</sup> is strictly protected and is listed in Appendix II of the CITES agreement<sup>3</sup>. Only Pacific Islanders still have the right to collect giant clams and in French Polynesia, regulations permit the harvest of specimens of more than 12 cm in size.

Although giant clams have been widely harvested in most island groups of French Polynesia, particularly in the Society Islands, *T. maxima* is still abundant in the eastern Tuamotu Islands and Austral Islands where significant-sized populations remain (Gilbert 2005). Nevertheless, the recent decline in stocks in a few Tuamotu island groups and in the Austral Islands is a cause of concern for the Ministry of Marine Affairs. This article is a

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follow-up to three fact-finding trips to the island of Tubuai where giant clams have become a significant source of income for a small segment of the population.

In addition to discussing the harvest of giant clams, the trade channels used, and income generated, this article provides another example of the "gap" between local views, economic reasoning and scientific claims regarding resources — a gap that makes it difficult to agree on a common approach to the management of the clams.

## STATUS OF GIANT CLAM HARVESTS ON TUBUAI

The issue of *T. maxima* harvests on Tubuai is complex; it is difficult to determine who exactly collects giant clams, how often they do so, and in what quantities. However, it is well known, at least on Tubuai, that many people harvest them. In addition, according to inhabitants, the *pahua* belong to everyone and breed in large numbers, from the beach out to the reef. Some believe that the *pahua* can even move about on the sandy bottom, rather like the migration of rock lobsters in the Caribbean.

On Tubuai, giant clams are regularly harvested by the general population for subsistence purposes (Chabouis 1965). Of the island's 1979 inhabitants, 323 people, often heads of families, hold professional farmer/fisher cards, which are required by the government. Nevertheless, certain families fish more than others and are recognised as "good" giant clam fishers. About 10 families of fishers are more heavily involved in collecting *pahua*. Almost all giant clam fishers are located in the township of Mahu in the southern part of the island (Fig. 1)

## EFFICIENT ARTISANAL FISHING TECHNIQUE

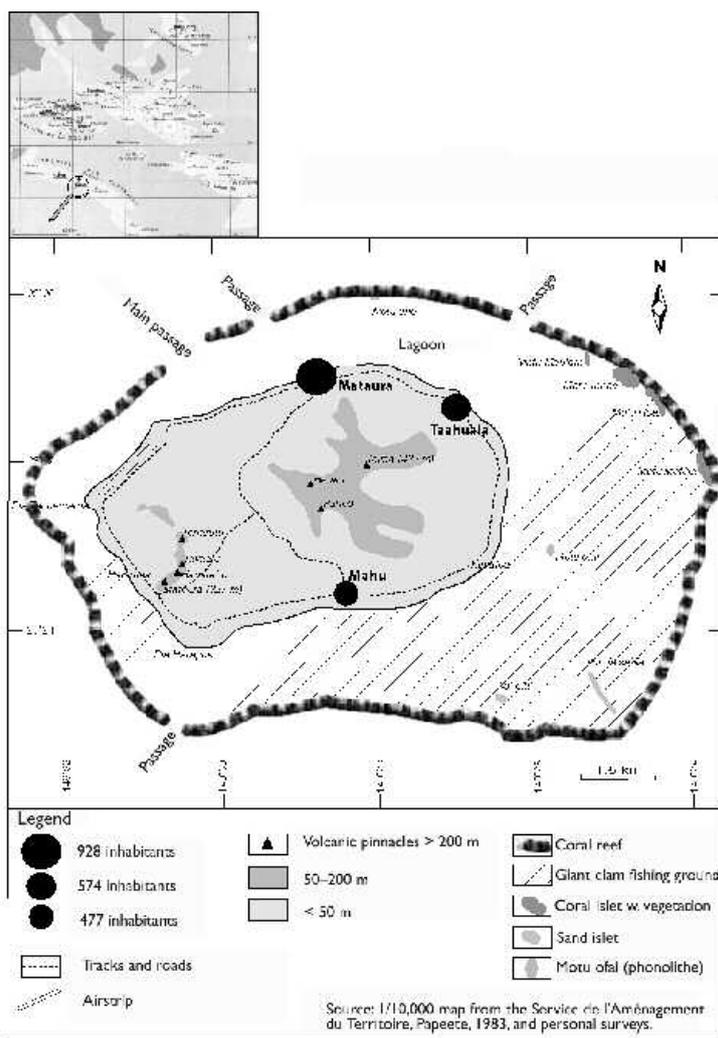
All fishers basically use the same technique to collect *pahua*. They travel by boat to the middle of the lagoon, out to the coral heads or to the reef, and insert the end of a t-shaped metal bar, about 60 to 70 cm long, between the two halves of the giant clam's shell. They then rapidly lever the bar to detach the clam from its coral base. Some fishers use what they call a "hook" to detach the clams. This tool, which is similar to a gaff, is a flat metal pole about 60 cm long, one end of which is curved back. The hook is sometimes attached to the end of a two-metre pole, enabling fishers to detach clams from the surface down to depths of two metres. According to some reports, the hook has the advantage of pulling the *pahua* off the rocky base without damaging it (Larrue 2005). The hook is derived from a traditional sickle-shaped wooden tool that made it possible to remove giant clams from corals without damaging them.

Normally, the clam meat is supposed to be extracted onboard the vessel and cleaned in the

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<sup>2</sup> The geographical distribution of *Tridacna maxima* covers the western tropical Pacific, the Red Sea and the coasts of East Africa (Rosewater 1965).

<sup>3</sup> Washington Convention – Convention on International Trade in Endangered Species.



**Figure 1: Tubuai and its lagoon, showing the giant clam fishing areas.**



**Figure 2. A touque of giant clams (*Tridacna maxima*). These clams (>19 cm long) were collected from Haramea. A touque is the local unit for giant clam sales, and represents 20 kg of *pahua* meat (i.e. 100 to 140 giant clams).**

lagoon before being piled into a makeshift container, locally called a *touque* (Fig. 2). The *touque* is the basic unit for giant clam fishing and represents about 20 kg of meat. *Touques* are made from old paint cans or plastic buckets. A *touque* can hold between 100 and 140 giant clams (i.e. around 5 to 7 *pahua* per kilogram of meat, a quantity that obviously varies depending on the size of the clam).

Clam fishers' yields are based on the number of *touques* filled per hour. This number varies depending on the fishing site (abundance of the clams, accessibility, swell, water depth), the size of the clams harvested (12 cm or more), and how experienced the person is at harvesting clams. These parameters therefore modify fishing yields considerably. In fact, depending on these variables, filling a *touque* with giant clams takes between one and two hours of fishing time. According to our surveys, on average it takes an experienced fisher 90 minutes to fill a *touque*. This time includes both collecting the clams and cleaning them before packing them in the buckets.

Today, this artisanal fishery seems to be gaining in popularity, and this has implications for conserving the resource, especially as the income earned through giant clam fishing is relatively substantial.

#### QUANTITIES HARVESTED AND PAHUA FISHERY INCOME

As far back as people can remember, giant clams have been harvested on Tubuai, which implies that *T. maxima* has formed part of the normal diet in the Austral Islands for many years. Nevertheless, while people did fish for giant clams in the past, this was done mostly to meet local food needs. Today, however, although many people continue to eat *pahua* on Tubuai, except for Seventh-Day Adventists who

consider giant clams to be *tabu* (prohibited), the clams have become a significant and even vital source of income for many fishers.

According to estimates, fishers on Tubuai harvest 1940 *touques* of clams per year (i.e. 40.64 tonnes of meat representing about 243,840 giant clams)<sup>4</sup>, with an overall economic value on Tubuai of some XPF 19,400,000<sup>5</sup>. In addition to this quantity, giant clams are occasionally harvested by the local community for food and by a few "unregistered" *pahua* fishers. Except in rare instances, no fisher works alone; rather they fish in groups of two to seven people, often from the same family. Giant clams can be harvested all year round on the island of Tubuai, but the price of a *touque* varies (between XPF 8000 and 10,000) depending on three factors:

1. Geography: in Mahu, a *touque* generally sells for XPF 8000, while it can reach as much as XPF 10,000 around Haramea.
2. Climate: the state of the lagoon (e.g. heavy swell and low temperatures) affects fishing trips and can result in price increases. During the Southern Hemisphere winter, the price of a *touque* is about XPF 10,000 all around the island.
3. Economy: according to a few fishers, the price of a *touque* also varies depending on fishers' needs for ready cash. The same fisher might sell a *touque* for XPF 8000 at the beginning of the month and for XPF 10,000 at the end of the month if he needs money. Similarly, the frequency of fishing trips also depends a great deal on how much fishers feel they need money. We noted, as we will explain in

further detail below, that fishers are not "in a rat race for income" but fish on an "as needed" basis (i.e. they do not go fishing if they feel that they still have enough money).

Not all fishers are at the same economic level. In fact, depending on the person, the number of *touques* collected each month varies from 1 to 45, bringing in monthly incomes of between XPF 16,000 and 360,000, respectively. All the fishers interviewed work to fill orders, some of which are placed on a regular basis whereas others are changeable or occasional. This situation reflects the existence of several commercial channels for *pahua* on Tubuai.

In addition to these regular fishers, there are also associations and religious groups that carry out large-scale, one-off harvests for specific events. This is particularly the case for the Mormon community, which every year in April, sends about 27 *touques* to Tahiti to finance travel costs for their young people. Some local people said that in April 2005, the association *Ia tauturu ia na* shipped out nearly one tonne of giant clams harvested in one day by 11 people.

A preliminary study carried out on Tubuai by the Fisheries Department indicated that giant clam resources would be endangered by harvests of more than four tonnes of meat annually (Gilbert, op.cit.). Therefore, even if there were errors in the models used to set that threshold, the difference between the maximum quantity recommended to ensure the sustainability of this resource and the quantities actually collected locally (i.e. more than 10 times greater than the replacement threshold) is such that there can be no doubt that the giant clams are currently being overexploited.

Only a few fishers, who at present have little involvement in obtaining income from *pahua*, have reported that the number of giant clams is declining everywhere around the island and has been for the past five or six years (i.e. since commercial channels have increased).

#### WILL INCREASING COMMERCIAL CHANNELS KILL THIS PRIZED RESOURCE?

On Tubuai there are two major channels, or origins, for the giant clam fishery: 1) fishers fill orders from Tubuai's "non-fisher" population, and 2) fishers respond directly to requests from Tahiti. It is also possible for certain fishers to use a hybrid system (i.e. one based on a combination of both local demand and orders from Tahiti). There are also additional minor channels.

#### Origin of demand for giant clams

The first channel consists of orders from people on Tubuai who order one to four *touques* of *pahua* from certain families. When the fisher has enough orders, he goes fishing. Payment is made directly by local customers to fishers, with no middleman involved. This is probably the most visible channel. Questions then arise about where local orders end up: Why do people on Tubuai order giant clams? Do they eat them themselves, sell them, or send them as gifts to family on Tahiti or Rurutu?

In fact, people on Tubuai who order clams from fishers say that they do so to send them to relatives on Tahiti. This case often involves "gifts" for festive occasions, but certain families buy *pahua* from relatives who are still living on Tubuai. Whatever the situation, this process is based

<sup>4</sup> Estimate based on an average of 120 giant clams/*touque*.

<sup>5</sup> Pacific franc; XPF100 is equal to EUR 0.840 and USD 1.09

more on a form of "the exchange of friendly services" than on commerce. Nevertheless, there may be cases where this system of family solidarity should be verified as some people place orders with fishers every month, supposedly to "send to their relatives".

We consider that there are two possibilities: either their relatives on Tahiti eat practically nothing but *pahua*, or they resell these giant clams to hotels and restaurants. Alternatively, the shipments are not based on aspects of kinship at all but rather are direct responses to orders from hotels and agro-food industries on Tahiti. Within this first channel then, there are people on Tubuai who act as "middlemen" (i.e. they place orders with fishers and resell the giant clams to contacts in Tahiti: restaurants, food vans, major hotels, exporters, supermarkets, etc.).

The second channel consists of fishers working directly on orders for people in Tahiti. This channel is less visible and is extremely difficult to obtain reliable information on. In principle, the fishers involved ship the orders to Tahiti but do not leave Tubuai. In a very few instances, fishers such as those who live on Mataura, supply *pahua* to the few snack bars on the island.

According to island elders, in the past people harvested *pahua* to sell on Tubuai. At the time, this simply involved sales for local consumption by people on the island, often during festive occasions. People harvested about three *touques* of giant clams per day and sold the *pahua* for XPF 100/kg, which was very little income for work they considered tedious. Fishers today are satisfied to see a *touque* sell for XPF 8000–10,000. Obviously the current situation bears no relationship to the time described by

the elders when there was no commercial channel worthy of the name on Tubuai.

One of the first "official" commercial giant clam operations on Tubuai was linked to the initiative of a *popaa*<sup>6</sup>, who in 1990 sent giant clams to Tahiti on a regular basis. A middleman there received the *pahua* and supplied hotels, restaurants and supermarkets on Tahiti. The clams were packaged to meet the health standards required for large retail stores. The quantities of *T. maxima* sent equalled about 500–600 kg of meat per month. At the time, the fishers who worked for the restaurant owner each harvested 50 kg of meat in four or five hours of fishing. This was apparently the maximum yield and so the people who fished had the reputation of being good giant clam fishers. Today, that person no longer conducts this business, but others have taken over the work.

On Tubuai there are only two ways of shipping goods: by boat or by plane. The plane makes an average of four return trips a week. Giant clams are shipped by air for urgent but costly orders. The cost of air freight is high: XPF 6000 to send one *touque* (20 kg) of giant clams from Tubuai to Tahiti. People who say that they are sending their giant clams to relatives often do so by plane. However, this is quite expensive for a family shipment when the local cost of the *touque* is added in, XPF 16,000 for one *touque* shipped to Tahiti.

Given the prohibitive cost of air freight, a large proportion of exports appear to be carried by boat except when shipments are urgent. Although the boat makes only two return trips a month, the low shipping costs compensate for the inconvenience. When shipped by boat, the giant clams are packaged in flour sacks that

hold about two *touques*. The cost of shipping one sack is XPF 1000, which is one-twelfth the air freight cost. An employee in charge of registering all items loaded onto the ship *Tuhaa pae*, estimated that slightly more than 40 *touques* of *pahua* are shipped each month from Tubuai to Tahiti, which equals about 800 kg/month. According to our informant, Raivavae exports much more, about 2000 kg/month. However, we think this is an underestimate, since a single Tubuai family specialising in giant clams harvests an average of 45 *touques*/month, which equals 900 kg of meat. Given this information, the Tahiti Fisheries Department is trying to clarify the situation by obtaining better estimates and — with the support of local authorities — has set up controls for this purpose through the Rural Development Service on Tubuai.

#### *A sensitive local situation*

It is not always easy to obtain information about giant clam fishing on Tubuai because it is something of a "secret fishery" that islanders do not discuss readily with "outsiders". In fact, there are no written records on the giant clam fishery and the Mayor's Office has no information or reports on it. Giant clams account for significant financial revenues for fishers, and are even an essential source of income for some. Only a few fishers dared to respond to the embarrassing question — Is income from *pahua* vital for your family or is it just extra income? — by admitting that this income was essential for their households. People are afraid to say that *pahua* can generate increased levels of income out of fear that the Territorial Government will want to tax it.

Given this setting, the information we did obtain tended to show that the issue of possibly

<sup>6</sup> Local name for people from metropolitan France.

managing giant clams is a source of conflict. In addition to work by the Fisheries Department, local authorities (the Mayor's Office, Municipal Council and Council of Elders) have for several years been discussing the possible implementation of a *rahui*<sup>7</sup> on giant clams. On the island, the authorities are aware that the *pahua* is subject to commercial-level operations. However, it was at the specific initiative of the Tahiti Fisheries Department that discussions about this matter recently resumed. In short, the Mayor's Council, assisted by the island's "wise men", is divided on this matter.

According to a few members of the Council, a *rahui* must be put in place to ensure the survival of the giant clams, but much hard work still needs to be done to convince everyone of this. According to several reports, managing *pahua* stocks by means of a *rahui* is vital to conserve these resources. However, many islanders believe that there are never-ending supplies of *pahua*.

It is particularly noteworthy that, contrary to expectations, the old people, fishers or members of the elders, are for the most part against the *rahui* although they are supposed to be the guardians of tradition and resources. A few elders stated that there has never been a *rahui* on giant clams on Tubuai and they do not understand why there should be one now. In general, *pahua* fishers between the ages of 30 and 45 do not seem to be particularly opposed to a *rahui*. Many are fathers with children but, more importantly, they are better informed than the old people about a possible decline in the

resource. These adults seem to be more concerned with the future of *pahua* for their children. However, this is not the case with the elders, who seem to want to profit as much as possible from the resource without really worrying about the future. While some people do not want to hear anything about a *rahui* on giant clams, they would like a *rahui* to be put on the price: No less than XPF 20,000 per *touque*.

Half of the Mayor's Council is still in favour of a *rahui*, while the other half is against it. Given this conflict, the role of the elders must not be underestimated. In invoking the fact that no *rahui* on giant clams exists in oral traditions, it is apparent that the effect of their opinions is to swing the situation in favour of uncontrolled fishing.

#### LOCAL CONCEPTS ABOUT THE PAHUA FISHERY ON TUBUAI

Faced with apparently increasing commercial exploitation, we felt that it was important to find out whether the people of Tubuai attributed any symbolic importance to giant clams that could be used to limit harvests.

#### The sociocultural position of giant clams

The giant clam is apparently a food that people are most likely to eat during festive occasions. It is very commonly eaten at weddings, during a *ma'a*<sup>8</sup> or during the *heiva*<sup>9</sup>. According to fishers, it is much less commonly eaten during regular meals "because collecting *pahua* is a lot of work". In contrast to Raivavae, which has a few legends about giant clams (Lherbier 1944), Tubuai

has none, and the bivalve itself is not subject to any prohibitions<sup>10</sup>. According to elders, *pahua* have never held any kind of symbolic meaning on the island, unless it has been forgotten. Apart from the ban on bringing the shells back to land, they do not know of any specific prohibitions relating to *pahua*. However, the giant clam is known locally as *te metua vahine o te miti* (the mother of the sea), which reveals that it was traditionally considered important within the rest of the ecosystem. And, and in former times, priests used giant clam shells for religious rituals on the *marae*<sup>11</sup>, again indicating the giant clams' significance (Audran 1926).

What is perhaps more interesting is that during a *rahui*, the prohibited area was delineated by necklaces of giant clam shells attached to the trees at the boundary of the *tabu* zone. These areas were monitored by people called *toohitu*, "guardians of the sea". During the *rahui* on giant clams, the sea was divided up, and each part had a name. However, the elders can no longer recall the names. When the *rahui* was removed, people would go out fishing together, which would ease tensions between families. Traditionally, giant clams were harvested with pointed sticks made from the wood of the *aito* (*Casuarina*) root, and the meat was removed with bamboo "blades" (Gilbert, op. cit.).

Apart from this sketchy and largely irrelevant information, we were not able to gain any other information on the sociocultural position of giant clams on Tubuai. This suggests that it would be difficult today to base a *rahui* on any kind of symbolism in an effort to protect the

<sup>7</sup> *Rahui* is the traditional system for managing lagoon resources. Sites were closed to fishing for a set time or a ban on harvesting specific species was imposed until such time as the ban was removed by the Council of Elders or wise men.

<sup>8</sup> *Ma'a* refers to a traditional Tahitian meal with food steamed underground in a traditional oven, but also to a social or family gathering.

<sup>9</sup> *Heiva*, which used to be called *tiurai*, is a long period of festivity during July.

<sup>10</sup> Except for Seventh-Day Adventists who do not eat it.

<sup>11</sup> *Marae* are religious edifices and traditional sacred sites. They usually consist of different levels of raised platforms built from stone, on which diverse ceremonies were practiced.

resource by referring to tradition. On Tubuai, the only symbolism that giant clams currently seem to have can be summed up in terms of financial value.

### Is the *pahua* endangered on Tubuai? Fishers' responses

People are increasingly attracted to the income generated by *pahua* fishing. The islanders consider that the giant clams belong to everyone, and individuals are free to harvest as much as they like, as long as "they're not afraid to get their feet wet going out to get them".

When first asked about their purpose in fishing for *pahua*, many fishers responded "to send to relatives in Tahiti". People may not respond truthfully either because they are afraid of being taxed on this fishery or because the authorities on Tahiti might put restrictions on the collection of giant clams. At present, fishers are suspicious of territorial authorities and of what is being said about the decline of giant clam stocks. Fishers also challenge certain scientific information that was poorly understood during meetings with the Fisheries Department. For example, they do not agree that a period of five years is needed for giant clams to reach their "adult stage". Fishers think that clams reach this adult stage in two to three years. However, there is some confusion in their minds between the adult stage, which — from an ecological point of view — corresponds to sexual maturity, and the legal fishing size of 12 cm. In fact, fishers believe that the adult stage corresponds to the authorised size for collecting giant clams.

Almost all fishers interviewed had been harvesting giant clams for 15 to 20 years and sometimes longer. They said that they had not noticed any decline in stocks, with some saying that there were now more giant clams than

before. According to the Rural Development Service Officer on Tubuai, "There are giant clams everywhere around the island, except between the airstrip and the pass". This informant also said that the shellfish is recolonising areas it had disappeared from between Mataura and the first motus (islets) in Mahu.

In fact, fishers do not believe that stocks are declining as scientists claim. In addition to the reasons mentioned above, they think that collecting giant clams is not harmful to the renewal of the resource for two main reasons. The first is based on a cultural argument or recourse to tradition — which is oral and therefore difficult to verify — that claims people have harvested giant clams for many generations without destroying the stocks.

The second is linked to practices. In the past, custom dictated that giant clam shells were never brought back to land (except for specific uses related to religious rituals). They had to be thrown back into the lagoon they had

been taken from. This *tabu* had two bases: 1) to avoid cluttering the beaches with piles of shells that could cause injury, and 2) to allow "reproduction of the shells". This practice is still in effect and the Tahiti Fisheries Department encourages fishers to follow it.

Many fishers think that the shells come back to life in the lagoon. Some fishers said that they had noticed that after six months, the shells that they had thrown back into the lagoon "came back to life", allowing renewal of the giant clams. In this regard, some "newly arrived" fishers who did not respect this *tabu* were strongly criticised by the community for bringing giant clam shells back to the land. Since then, everyone has been expected to respect the prohibition and are persuaded that they are promoting giant clam reproduction when they leave the shells in the lagoon. Nevertheless, as can be seen in Figure 3, not everyone is following the prohibition. According to one fisher on Tubuai who was still living on Tahiti in 1950, there were as many giant clams between Paea and



**Figure 3: Opening giant clams with a knife on the beach. Theoretically it is "prohibited" by custom to open *pahua* on the beach and to leave the shells there. This ban has also been issued by the Tahiti Fisheries Department, which advocates throwing the empty shells back into the lagoon to facilitate settlement of juvenile giant clams.**

Papearii as there are on Tubuai. If there are not many giant clams on Tahiti now "this is indeed because people brought the shells back to land".

Secondly, fishers think that cleaning the giant clams in the lagoon "releases" and scatters the shellfish's eggs, which then develop into new specimens. As with the miraculous "resurrection" of the shells, this is not the case. According to the Fisheries Department, at most this process might stimulate and speed up reproduction in nearby giant clams by releasing pheromones that act as sexual stimuli. In no case do the eggs thus released develop to term.

Given the current state of affairs, therefore, fishers do not see the point of setting up protection zones for giant clams since they do not believe that their fishing habits are a threat to the resource. Their opinion is supported by the fact that there are still significant numbers of the shellfish in nearly every part of the lagoon. However, although they feel that giant clam stocks are not actually endangered, opinions seem to be divided. Some fishers have noticed that the number of giant clams has declined all around the island. Based on what they have observed, the few fishers willing to admit this are not against the idea of an updated and well-adapted *rahui*. For the moment, they are in the minority. However, it is important to note that this group consists of fishers who are not dependent on income earned from giant clams, which allows them a certain measure of detachment. This is not the case for fishers who are more heavily involved in sharing the proceeds from the sale of giant clams.

### Tabu zones

Given the situation described, we tried to find out if certain ancient beliefs linked to the French Polynesian concept of *tabu* and sacred sites still exist, particularly regarding possible forms of traditional management of giant clam stocks.

However, traditional customs, including those relating to the sacredness of sites and fishing practices, seem to have disappeared from Tubuai. Even the *marae* are no longer given any special attention and are generally overgrown by vegetation and treated with indifference<sup>12</sup>. For example, in Haramea, a 1.2-m phonolite still standing on the ground, and locally called "the ringing rock", was once used to call people together, but to the best of our knowledge, no one remembers its precise history. According to legend, the island lost its navel, which was carried off to Maiao<sup>13</sup> by the bird guardian who was disappointed in the behaviour of man. No one remembers the exact reasons behind this disappearance and it is rare to find a person who can still tell the entire history of Motu Ofai, the only phonolithic volcanic island in the lagoon.

In practice, the local communities fish all around the island, except in those spots where the geomorphology of the lagoon is not suitable for harvesting giant clams. When they want to collect giant clams, fishers from Mataura go by boat in the direction of Haramea or the first *motus*, Mautaro and Toéna, 6 km offshore from Mataura. This entails fuel costs and probably explains why there are very few *pahua* fishers in Mataura. In Tamatoa/Mahu, people go directly out from where they live and fish in

front of their houses a few hundred metres into the lagoon and all the way out to the reef. In Haramea, the fishers we encountered said that they also went across from their homes to the lagoon and out to the reef. Many said that they had been harvesting giant clams for 20 to 30 years and had not noticed any decline in the *pahua* stock.

It appears that fishing areas are no longer prohibited to permit renewal of resources. The community has no recollection of the last time a *rahui* was used on Tubuai. Furthermore, some elders themselves say that these bans never involved giant clams. Nevertheless, according to a few reports, the *motu pahua* are the result of long-term dumping of giant clam shells by the elders. According to these reports, it was traditionally forbidden to get rid of the shells elsewhere in the lagoon. The gradual build-up is supposed to be the origin of the *motu*<sup>14</sup>. Today it is difficult to clarify matters: is this a simple myth that has become part of the collective memory or is it the surviving traces of historically based facts?

In terms of traditional lagoon resource management, the old practices have been "forgotten". The islanders know that the *rahui* system was used on Tubuai, but very few people know exactly when the system was abandoned. Thus, there are no longer any areas temporarily closed to *Tridacna maxima* harvest, either in fact or in the memory of oral tradition.

### CONCLUSION

There is little awareness of a possible decline in *pahua* and many fishers seem to be convinced that this resource is inexhaustible, or

<sup>12</sup> Except by a few people who are trying to maintain the island's cultural heritage.

<sup>13</sup> A high island in the Society group.

<sup>14</sup> This version appears rather far fetched to us and we think that it is more likely that this pile of shells is the result of the lagoon's own natural selection or hydrodynamic segregation processes.

at least that is the impression they gave. However, we did note that near the village of Mahu — in the very area where the largest number of giant clam fishers can be found — some 120 to 140 *pahua* are needed, on average, to fill a touque. On the Haramea side, 90 to 100 giant clams are enough to fill one. Although large giant clams continue to be harvested near Haramea, it does seem that the fishers in Mahu are now harvesting large *pahua* from younger generations. In addition, several fishers admitted that they had to go into increasingly deeper waters to find large giant clams.

Certainly there are still large numbers of *Tridacna maxima* on Tubuai, but if the commercial sector continues its uncontrolled growth, we believe the situation could quickly become critical. A few indigenous people share this opinion and tend to favour putting a *rahui* in place. According to them, giant clams will go the same way as *remu* seaweed<sup>15</sup> if no

bans are implemented. But most importantly, vestiges of oral tradition seem to be used by certain elders as a shield to protect their economic interests. In fact, many of them are directly involved in obtaining revenue from the giant clam fishery. The existing gap between the local portrayal of the situation, economic reasoning, and scientific claims makes joint management of giant clam resources very difficult. In addition, this fishery is vital for numerous families on Tubuai, whose standard of living is one of the lowest in French Polynesia.

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<sup>15</sup> This type of seaweed was harvested in large quantities by the community and sold with no control measures. Today it has almost disappeared.