

**SOCIO-ECONOMIC STUDY OF SMALL-SCALE FISHING
IN THE ATOLL OF TIKEHAU**

**ETUDE SOCIO-ECONOMIQUE DE LA PECHE ARTISANALE
DANS L'ATOLL DE TIKEHAU**

G. BLANCHET

Centre ORSTOM de Tahiti, B.P. 529, PAPEETE, POLYNESIE FRANCAISE

ABSTRACT

Outside of copra production which suffered heavy losses from the series of cyclones that hit Polynesia in 1983, Tikehau's main resource derives from artisanal fishing. The method of catching fish has been handed down by tradition, using an elaborate "park" system of traps staked in shallow waters near the pass or the channels where lagoon and ocean meet.

Heirs to the stone parks abandoned in the early sixties, these traps are now 30 in number and belong to about a dozen fishermen. This is generally a family affair and only rarely calls for paid labour.

Once simply practiced to supplement copra production and supply individual needs, little by little fishing has become a specifically commercial activity. The catch was first taken to the neighbouring island of Makatea where phosphate deposits were being exploited, later to the bustling urban centre of Papeete.

Nowadays the catch always goes to the Papeete market, on a small coaster equipped with ice-boxes, or else on a recently acquired, twin-engine plane. However, after a spectacular rise in the early seventies, the amount of fish sold has declined sharply, and it seems doubtful that an accelerated effort could reverse the trend.

RESUME

En dehors d'une production de coprah compromise par une succession de cyclones en 1983, la principale ressource de Tikehau est le fruit d'une pêche artisanale traditionnelle. Elle est effectuée à partir de pièges fixes disposés à faible profondeur aux alentours de la passe et des chenaux où communiquent le lagon et l'océan.

Héritiers des parcs en pierre tombés en désuétude au début des années soixante, ces pièges au nombre d'une trentaine appartiennent à une douzaine de personnes. Leur exploitation se fait à une échelle familiale et ne recourt qu'exceptionnellement à une main d'oeuvre salariée.

Naguère exercée en appoint de la production de coprah et à des fins d'autoconsommation, la pêche est peu à peu devenue une activité spécifique à vocation commerciale dont le produit est évacué vers l'atoll voisin de Makatea, pendant l'exploitation du gisement de phosphates, puis vers l'agglomération de Papeete.

Aujourd'hui, les captures sont toujours destinées au marché de Papeete où elles sont acheminées par un petit caboteur équipé de glacières, et depuis peu, par un bimoteur affecté au transport aérien des marchandises. Mais les quantités vendues, après une progression spectaculaire au début des années soixante-dix, ont fortement décliné, et il paraît douteux qu'un effort de pêche accru puisse opérer un retournement de tendance.

31 JANV. 1989

INTRODUCTION

The atoll of Tikehau lies some 167 miles NE of Papeete in the Northern part of the Tuamotu Gambier archipelago, at a latitude of 15° South and a longitude of 143°10' West. Two thousands hectares of dry land are strung together in an oval-shaped ring which communicates with the ocean through a shallow pass. It belongs to the same administrative district as the neighboring atolls of Rangiroa and Mataiva and the island of Makatea. Low ton cargos, still referred to as schooners, and based in Papeete, bring passengers and merchandise to and from the atoll. And as of 1977 Air Polynesie airline offers weekly flights on a Twin Otter plane.

Two hundred seventy-nine inhabitants were counted in the October 1983 census. Aside from a number of scattered farmers and fishermen, most people live in the Southwest portion of the atoll in the village of Tuherahera on the islet or motu of the same name. Agriculture and fishing are the principal activities. Three quarters of the atoll's active male population work in copra production, which was close to 600 metric tons in 1960 and averages only 355 tons/year between 1970 and 1980, and currently accounts for less than 3% of French Polynesia's total output. On the other hand, the sale of fish has gone up considerably, from 33 metric tons in 1960 to 237 ten years later. Between 1970 and 1980 sales reach a yearly average of 324 metric tons. This represents 15% of the Territory's small scale fishing and employs a fifth of the island's workers. After having approached the 500 tons level in 1973, sales dropped gradually to 200 tons in the 1980s. In contrast, copra production rose sharply after a pricerise to double, just before the cyclones in 1983, only to plummet then. In 1984, tonnage from the lagoon is ten times higher than from the coconut groves: 240 metric tons as against 24.

FISH TRAPS

Just as in the surrounding atolls, fishing is practiced with the help of fixed traps installed at low depths in areas where fish pass (1). Formerly made from coral fragments, their number have increased in the early 1960s thanks to government support and the substitution of chicken wire for the coral piles. Numbering 37 in 1963 (Echinard, 1972), 25 were counted in 1976 (Territorial fishing Service). As of July 1984, 22 were registered as being in working condition, with 10 others destroyed by the cyclones and still evident owing to several half-sunken stakes. As well as the increase in traps their location has also changed over the years. In 1963 two thirds were spread out along the inner crest of the reef near copra islets and a third were near the pass. Today they are largely found around the borders of the village and the pass. This development coincides with the end of

seasonal migration of copra workers around the atoll, and can be explained by the growing communications opportunities.

The general physiognomy of the traps can be summed up as follows: two funnel-shaped arms, the rauroa, lead to a heart-shaped chamber, the aua, that extends towards the back or on the side into a secondary chamber, the tipua, with which it communicates through a narrower opening. As the fish arrive they are guided by the collector arms towards the entry chamber and from there to the adjoining chamber, which serves as a fish-pond and is closed when the catch is large enough or when it is time to bring in the harvest.

Traps are set up at a depth of around two meters and are made of wire net panels held up by stakes 1.7 meters apart, two thirds of which are of wood and a third of galvanized iron. They generally have an opening angle of 65° and the arm built against the bank is 50m long, the one built towards the outside 30m. They cover a ground area of 1,200 m².

These figures are influenced by the morphology of the lagoon and pass floors and the specific use the trap is meant to serve. Near the pass the floor drops down sharply and water currents accelerate so that traps must be more solid, and need to be installed deeper down, under more difficult conditions. The arms are shortened, the opening angle becomes sharper and wood replaces iron in the stakes, which are closer together, wider in diameter and often consolidated by electric cable stays. Wire netting is reinforced and doubled along the chambers which are also larger due to the placing of traps at locations well stocked with fish and at hand of the place where the collecting schooner uses to stay. Traps are much less compact inside the lagoon. Stakes are made of 'kahaia' wood (*guettarda*) and are often more than 2m apart. Arms spread out like tentacles and seem to be out of proportion with the holding capacity of the chambers or fish-ponds. Some traps built along the shoreline have arms over 100m long opened at an angle greater than 90° and cover between 3-4,000 m² of ground. Only slightly exposed, they require less maintenance, last longer and cost less. For example, their wire netting only needs to be changed once a year as opposed to once every six months in the pass.

A trap's location has an effect on its overall cost price. Theoretical replacement value, calculated from 1984 prices, is on the average around 315,000 Pacific francs, but goes from 100,000 for a beach trap to over 1 million for the main pass trap which includes a series of three ponds. Taking into account the fact that most of the support stakes are of wood and most have been salvaged, average cost price is no more than 180,000 Pacific francs. Damage caused by the cyclones to the atoll's fishing material was valued at 9 million Pacific francs, 4.5 of which for fish catching installations - 41 were designated as victims of disaster and 33 received partial or total reimbursement. Using an estimated unit cost price of 166,000 Pacific francs, 14 owners were reimbursed

at a rate of 100% for the first trap, 75% for the second, and 50% for the third (2).

FISHERMEN

In 1984 some 30 fishermen were counted as active and a further half-dozen retired. Of these active numbers a third are devoted exclusively to fishing, while two thirds are involved in agricultural or others activities as well. Ten people own the traps currently in operation (not counting two fishermen who have not yet restored their installations since the cyclones) and the 30 people registered take care of them. The man who manages the pass fishery, the only enterprise which deserves the name, owns 7 traps which he looks after along with several other people under his orders. Another fisherman owns four, while most have but one or two which they run with the help of a close relative or an associate, plus additional workers for fish collecting and packaging.

The average age is 33, the youngest being 15 and the oldest 69. Breakdown by birthplace shows that half were born in the Society islands (Windward and Leeward islands) and half in the Tuamotus. The youngest were born on the atoll, but going back two or three generations, we find they all have outside origins, probably imposed by a high rate of in-breeding and rather strict rules of exogamy. This would explain why, having no direct access to land and consequently to copra production, they sought a living from the sea. Eight of these fishermen are mainly farmers and copra producers today because their wives are natives of the atoll and own pieces of coconut groves. Another dozen or so do part-time farm work for others, following the 50/50 sharing rule. Another dozen exclusively fish and do it or have been initiated into it within the framework of the fishery installed near the pass.

THE PASS FISHERY

This fishery dates back to the early 1930s when its promoter, an employee of the Compagnie Française des Phosphates de l'Océanie (CFPO), a native of the Leeward Islands working in Makatea, decided to go into the fishing business and set himself up on the island to catch fish and sell it to Makatea. Up until the late 1950s, between 2 and 2.5 metric tons of fish were sent monthly there. In 1960, an official organization for commercializing Tuamotuan lagoon fish was created in Papeete, thus greatly changing the situation and from then on exports were directed towards Tahiti.

This is still the case in 1984 and the fishery is now run by the creator's grandson, after having been passed on to his son. It includes 7 traps: 5 set up in series on a projection of the coral plateau on the West border of the pass, and 2 face them on the opposite side. The two traps situated on either side of the reef slope can be connected

together with a large polyamid twisted net. It is 31 mm meshsize, about 200 m long and 5 m high, and set in place every month at full moon and during the shift of current. This operation must be done quickly otherwise the net will be carried away by the flowing waters (an unfortunate incident which happened two years ago to a fisherman who wanted to extend the arm of one of his traps). After various efforts and trials, a series of galvanized pipes was laid down longitudinally at the bottom of the pass and attached to coral blocks in order to resist the current's tow. At the right moment, scuba divers attach the net to these pipes, with prominent stakes at each end serving as fixing points. The net may stay in place several days, laid flat by the current and because floaters are removed from the middle section to let boats pass. When the current dies down, the net straightens up again and buoys are put back in place to render it effective.

Six or seven fishermen work full-time keeping the operation going. Almost all are related together and work under difficult conditions. Handling the net, constructing and upkeeping the traps demand prolonged periods of time in the water at a depth of around 5 meters, in the midst of violent currents, and sometimes high swells and choppy seas. Sales from the fishery account for about 70% of the atoll's commercial fish production but may fluctuate greatly from year to year as witnessed by the doubling of quantities sold between 1983 and 1984.

The growth of the enterprise clearly demonstrates a will and determination to develop the catching capacity through a rationalization of methods used, firstly by placing the traps in line along the borders of the pass, then adding a net on to the arm the farthest from shore to increase collecting power, and finally covering the whole width of the channel with a net. These efforts go hand in hand with the search for adequate diving material - purchase of diving suits, air tanks and small compressor. The manager's dynamic spirit is also reflected in a desire for diversification which today leads him to take a serious look into the possibilities of black pearl culture, which is coming in its own these days.

Because of its location, success and the length of time it has been there, the fishery plays a leading role in the area - most fishermen in the atoll have worked there at one time or another and learned the techniques used - and wire netting became widespread in the 1960s after having been introduced at the fishery. Because of the volume of its production and the consequent negotiating power, it acts to fix prices and to determine the number of visits made by the schooner.

However, its dominant position does not shelter it from criticism when times get rough. Since the cyclones, the closing of the pass, even just a few hours in the month, creates a certain resentment with other fishermen who see this as a sign of unfair competition, a way of diverting

the fish from their traps, catching them with the net or keeping them from entering the lagoon. Other problems tend to fade into a kind of village-pass opposition, which overlaps that between an organized and more or less institutionalized fishery and individual fisheries of a more informal style. By way of example, several village fishermen recently formed a short-lived association with an air-carrier from Papeete to get alternative access to the commercial market (Blanchet and al., 1985).

FISHING ORGANIZATION

Beyond these emotion-charged relations, a specific organization governs the fishing trade, as much by custom as by modern legislation. In the present context, the weight of tradition is most evident in the only collective trap located near the pass. Communal rules always preside over its management (3), but the early practice of redistribution based on need has vanished giving way to a more formal equality. Thus a new manager must be chosen every year from a list of candidates, open to all and registered in the Mayor's office.

Tradition also intervenes in the selection of sites and attribution of locations determined by long observations and oral transmission of gathered information. Twenty out of Twenty-two traps have been set up on sites that were used before and are still periodically rebuilt. As a rule, each fisherman may install himself where he sees fit. But the most coveted spots are appropriated, independently of ownership of the ground and according to the use that is to be made of them (4). Should a fisherman stop using a site but wish to hold to the space, he keeps several poles in place to stake out his claim. In fact, the customary rule is that a space that goes unused for 6 consecutive months and where no visible signs of appropriation remain, may be considered vacant and can be taken by whoever should so desire.

Parallel to this, the traps are subject to modern legislation regulating temporary occupation of public maritime domain. A first decree issued in 1971 concerns sites allowed within the scope of a growing urbanization process extending along the sea side in the Society Islands. Another decree issued August 1978 extends to fishing establishments, and a decision made in 1981 fixes the sum to be paid for locations reserved for fish catching. Today only the pass fishery has taken steps in this direction, and in 1983 obtained authorization in due form. This authorization is revocable if not used for a period of 3 months or more, after giving 2 months notice.

The overlapping of law and tradition in the field of fishing installations gives an idea of the importance of outside relations for the fishermen, and especially with the administrative capital of the Territory. After the cyclones, the Territorial Agency for Reconstruction (ATR), created specifically to deal with the situation, reimbursed 33 traps, 27 speed boats and 37 outboard motors. In an effort to meet the most urgent needs it pur-

sued a policy of redistribution more than of formal equality. For this reason certain fishermen among the main owners were sorry not to have received a more substantial overall compensation. Nevertheless, the quick response in helping those badly hit by the disaster allowed fishing to pick up again and return to normal just one year after the cyclone passage.

FISHING YIELD

When the fish schooner arrives, the fishermen head for their traps and proceed with the packaging of their catch into more or less homogenous fish-strings ('paquets'), around 3 kilos each, which will be bought for 180 Pacific francs a piece (130 for the more common types - *vete* or *Mulloidichthys*). The schooner remains near the pass, only entering inside the lagoon for catches of over 200 fish-strings. In 1984, the boat paid more or less regular weekly visits, increasing during periods of high production and diminishing during the slack season (June to October). Two copra ships also made alternative stops every three weeks, carrying the fish caught by the copra workers. Fish brought to and sold at Tahiti's municipal markets came to 235.5 metric tons at year's end instead of 140 tons in 1983. To which may be added the 4.5 tons flown in by an air-carrier from Papeete, which over a period of six months provided regular air transportation after signing a contract with a half-dozen fishermen (5).

Commercial fishing thus attained the figure of 240 metric tons, corresponding to 17 million Pacific francs. By means of comparison, the State paid around 22.5 million in public services (6), and copra brought in 1.3 million. It will take some time before copra production again reaches the level it was before the cyclones, (24.5 million Pacific francs in 1982) at which time the effects of public aid will gradually cease from being felt. Ten million Pacific francs were paid out in 1984 in the form of salaries to some 30 copra workers assigned to restore the coconut groves.

Just as in the early seventies, fishing seems again to be called upon now to play a predominant role. A partial redirection of the atoll's inhabitants to this activity seems inevitable. This is starting to happen and is encouraged by financial assistance from the Territorial Agency for Reconstruction (ATR). The question remains - how far can development go? In the present state of things, it is hard to say, for we do not have sufficient information to determine whether the limiting factor lies in the resource itself, in the fishing effort, the commercialization, or in each of these stages.

NOTES /

(1) this is an ancient technique widespread in the South Pacific islands, as well as in the Philippines and Indonesia. Other fishing methods - using gillnets, handlines, spears and underwater harpoon guns - are practiced for local consumption or to add to the catch from the traps when the schooner passes.

(2) Estimates made by EVAAM (Etablissement pour la Valorisation des Activités Aquacoles et Maritimes) and used as a basis for compensations granted by the Territorial Agency for Reconstruction.

(3) Formerly, anyone could have access to the communal trap as long as he participated in its maintenance, only took what he needed and did not sell the fish collected.

(4) As François Ravault pointed out, a distinction must be made between property below land and property above land whose existence is related to installations of various sorts with certain rights attached to such installations lasting as long as they do.

(5) Due to insufficient supply, the air-carrier had to discontinue its route at the end of October 1984 and switch its activities to other atolls.

(6) including coconut grove restoration, and not including pension and retirement allowances.

BIBLIOGRAPHY

BLANCHET G., CAILLAUD L., PAOAAFAITE J., 1985 : un aspect de la pêche artisanale en Polynésie française : "les pièges à poissons de Tikehau". ORSTOM, Papeete, Notes et doc. Océano. no25, 116p.

ÉCHINARD M., 1972 : la pêche dans le lagon en Polynésie par le système des parcs à poissons. In : Jnal Sté Océanistes no 37, tome XXVIII, p.345-363

EMORY K.P., 1934 : Tuamotuan Stone Structure In : Bernice P. Bishop Museum, bull. no118, p.23-27

MORIZE E., 1984 : contribution à l'étude d'une pêcherie artisanale. In : l'atoll de Tikehau, premiers résultats. ORSTOM, Papeete, Notes et doc. Océano, no22 p.35-80

RAVAULT F., 1984 : note sur les problèmes fonciers posés par le passage des cyclones en Polynésie française. ORSTOM, Papeete, 8p.