

THE ROLE OF WOMEN IN POST-HARVEST FISHERIES ACTIVITIES IN VANUATU

by

Gilbert David
Centre ORSTOM
Port-Vila, Vanuatu

Introduction

Post-harvest fisheries activities, especially those involving preservation of products over several days, are an essential component of fisheries development in small Pacific Island nations. Indeed, what is the point of catching fish if it becomes unfit for human consumption because of the lack of appropriate means of conservation, and consumers refuse to buy it?

Up till now, the emphasis in most small-scale fisheries development plans prepared recently for the South Pacific has always been on cold storage of produce. This technique is quite satisfactory, as long as the fishermen are able to obtain the necessary fuel and spare parts to operate the refrigeration units and are competent enough to maintain the equipment and solve any breakdown problems. These conditions are not always readily met, as was noted by consultants from the South Pacific Commission in the course of a region-wide survey of small Island nations in 1984 (Preston & Vincent, 1986). Moreover, cold storage equipment is expensive both to purchase and to operate. Therefore, it is hardly surprising that this method of conservation is not commonly used in fishing villages in the South Pacific.

Where cold storage appears impracticable, it would be useful to encourage other methods of conservation which are not as involved or expensive. From the experience of African countries, it is clear that smoking and a combination of salting and drying techniques are perfectly appropriate for implementation at village level in inter-tropical countries.

As a rule, these methods are seldom applied in the Pacific. Smoking fish was a common practice in Vanuatu until the beginning of this century, particularly in Malakula, where a naval doctor observed in 1911 that 'fish is eaten mostly in its raw form or smoked... smoked fish and baked yam being used as food reserves on journeys' (Oliveau, 1911). In the space of 50 years, the method of smoking fish has completely died out. Would it be possible to re-introduce this technique in Vanuatu and add fish salting and drying? How could the fishermen benefit from these methods? This question will be considered after the main techniques likely to be introduced or re-introduced in Vanuatu have been briefly outlined. Another question, that of the role of women, will then be considered. In most countries where small-scale smoking of fish is commonly practised, the women are responsible for such tasks. In African countries, fishermen often sell their catch upon landing to their wives, who then smoke the fish and re-sell it for their own benefit. This system of processing and marketing fishing produce is often more lucrative than the actual fishing activity and has enabled many fishermen's wives to become real businesswomen who now drive around in Mercedes Benz cars, hence their nickname 'Benz-Mamas'.

Can this African example be reproduced in the South Pacific, particularly in Vanuatu? How can ni-Vanuatu women become involved in post-harvest processing and marketing of products from village fisheries?

These are the questions which this article attempts to answer.

Fonds Documentaire ORSTOM

Cote: B * 17205 Ex: 1

Fonds Documentaire ORSTOM



010017505

Outline of techniques for smoking, salting and drying fish

Smoking

Smoking procedures vary, depending on the size of the fish. The simplest method is used for small pelagic or reef fish.

Once they have been washed, the fish are laid, whole, on screens (usually made of metal wire), over the fire. Laure (1974) noticed that along the Cameroon coast, small pelagic fish are 'placed vertically, head down, in rows divided by sticks'. Firstly, they are subjected to an intense wood fire which, because of the high temperature (150°—180°C), causes the flesh to dry out very quickly and the fats in the surface tissue to melt away (Besançon, 1965). During this process the fish soon lose up to one third of their weight (Laure, 1974). Then follows a second stage, lasting between one and three days, in which the fish is subjected to the effects of dense smoke originating from the slow burning of green dampened wood. 'After a day, the fish are turned over, then scattered, lying flat... From time to time, the top fish are moved underneath and vice-versa' (Laure, 1974).

Average-sized fish must first be gutted and scaled and if possible, the heads should be removed, in order to prevent any risk of contamination by bacteria and enzymes. They are then cut into slices, fillets or large pieces before being placed over the fire. Because the product is thicker, smoking takes longer; but afterwards, the fish keep better.

The main effect of the smoke on the fish stems from the increased temperature from the burning wood. It is the temperature which causes a substantial drop in the water contained in the tissue. This falls from an initial 60—70 per cent of the live-weight (Jardin & Crosnier, 1975) to 30—40 per cent in the case of average-sized fish and to 10—20 per cent in small pelagic fish and other small fish (Laure, 1974). Overall, smoking the fish causes a weight loss of some 60—70 per cent. The actual smoke has little impact, since it only affects the surface of the flesh. It has some anti-oxydisation and sterilisation effects, caused by the volatile phenols and the formaldehyde which it contains (Besançon, 1965). Its main attraction is from the consumer's point of view. The smoke covers the fish with a pleasant tasting brownish film.

In respect of the Cameroon coast, Laure (1974) noted that if properly smoked, the fish could keep for several weeks. This leads us to believe that smoking could be feasible in Vanuatu where the climate is less humid¹. Under ideal conservation conditions, the fish is carefully stored in baskets, protected from the weather, in a dry and airy place. Another way is to store it on a tray over the kitchen stove/fire. After a few weeks, when the fish begins to be attacked by fish-eating insects, it has to be smoked again to extend the time of preservation. The water content in the fish then drops yet again.

In French Polynesia, EVAAM (Etablissement pour la valorisation des activités aquacoles et maritimes) identified a combined salting and smoking technique for average-sized fish cut into fillets (Yen and Neagle, 1985). The advantage of this system is that it substantially reduces smoking time to only a few hours. However, it requires large amounts of salt, which leads to fairly heavy manufacturing costs, especially when salt can only be bought at high retail prices.

When Van Pel (1956) came to Vanuatu, he tried out an equally interesting formula, which had the additional advantage of costing nothing. The fish must first be cleaned, gutted, scaled, and if necessary cut into pieces. It is then put into a cooking pot to cook for half an hour in a mixture of sea-water and coconut water, with proportions varying from three-quarters sea-water and one quarter coconut water to equal quantities of each. After cooking, the bones are removed from the fish, and the flesh is reduced to tiny morsels which are spread over a metal

¹ Average annual rainfall is 4,150 mm at Douala, on the Cameroon coast, where for 234 days in the year, the rainfall exceeds 0.1 mm. In Luganville, the annual rainfall is 2,923 mm, with rainfall in excess of 0.1 mm for 194 days in the year. Port Vila is less humid, with only 167 days of rain and an average rainfall of 2,160 mm per year.

plate to be smoked. A low temperature (approximately 40°C) is used for smoking, which lasts for 24 hours. Coconut husks, placed at 80—90 cm away from the plate, are used as fuel. The resulting smoked product is stored in a sealed container, such as a bottle or a cabin biscuit tin, where it will keep for over six months without any significant deterioration to the bacteriological quality of the flesh, despite frequent, although brief, periods of exposure to the atmosphere. The smoked fish pieces are ideal for use in soup or *laplap*, which is then impregnated with their typical flavour.

Drying and salting

Used as the sole means of preserving fish, drying fish in the open air produces only indifferent results in humid tropical or equatorial countries, where the relative humidity factor is too close to saturation point. The only favourable time for drying is the winter season when the trade-winds blow; but, in that case, the sun presents a problem, because 'by drying out the surface layers of muscle very quickly, it prevents the water held inside from evaporating' (Besançon, 1965). To produce the desired results, drying has to occur in the shade, in a clean and well aired area, away from domestic animals such as herds of cattle, as these attract insects which cause the quality of the fish to deteriorate rapidly. Given its structural simplicity, its low cost and other benefits, especially those related to hygiene, the solar drier represents a considerable step forward by comparison with traditional air drying (Camu *et al*, 1983; Curran & Trim, 1983; Salleh Ismail, 1983).

The use of a combination of salting and drying to preserve fish (Dagbjartsson, 1983, Summardi *et al*, 1983) which originated in South-East Asia, has attracted interest in a number of Pacific Islands countries, such as Fiji, Papua New Guinea (Bollard, 1979) and French Polynesia, where it has been in use for several years now (Yen and Neagle, 1985). Salting is always done before drying as it accelerates the dehydration process in the tissues. The tissue dehydration occurs through osmosis under low oxygen conditions, which has the advantage of impeding the action of the bacteria and enzymes found in the fish flesh. The most common salting process consists of packing alternate layers of salt and fish tightly in a large container, such as wooden barrel or a concrete vat. It is followed by drying, either in the fresh air or in a solar drier.

As a rule, combining the salting and drying processes enables the fish to be kept longer than when they are smoked, i.e. for several months, provided the contents are protected from humidity. Given a relatively reasonable cost of production, involving mainly the purchase of salt, the price of salted and dried fish is very competitive on the local markets. For instance, Bollard (1979) observed that in Papua New Guinea, a fillet of tilapia, salted and dried in the villages along the Sepik river, was being sold at half the price of tinned mackerel imported from Japan.

Feasibility of introducing fish smoking, salting and drying methods in Vanuatu

So far, there has been no large-scale experimentation in Vanuatu with drying, salting and smoking local fish for sale in the rural villages, although Carleton (1982) recommended in his consultancy report that these techniques be developed for processing production surpluses.

Of the three processes outlined above, smoking appears to be the simplest to implement. Given the abundance of fuel-wood and the ni-Vanuatu's expertise in smoking copra, re-introducing fish smoking would not appear to present any problems in Vanuatu, provided it is supported by a dynamic information campaign and technical advice from field officers operating in each region. With regard to possible difficulties in introducing a new product into the local dietary habits, there seems to be no reason, as P. Schoeffel (1984) quite rightly puts it, to believe that, with the appropriate information, the villagers would 'disdain' smoked fish, which is no more exotic or foreign than 'tin fis' and moreover, holds all its advantages, namely:

- Low pricing: thanks to the abundance of fuel-wood, the cost of smoking should be minor compared to the cost of fishing;
- Large-scale distribution: smoked fish could be sold like 'tin fis' in all village stores;
- Easy and quick to prepare: like 'tin fis', smoked fish can be eaten cold or re-heated;
- Marked flavour: thus smoked fish could be used as a seasoning with root vegetables, rice or vegetables or be added to soup or to **laplap**.

The above comments on nutritional novelty also apply to dried fish, or salted and dried fish. However, introducing drying and salting methods would probably be more difficult to implement from a technical point of view than smoking, to which the villagers are already accustomed. Therefore, it would be useful if an extension programme on such techniques could be included in the Fisheries Development Programme and aid funds made available for solar driers and salting units as they already are for refrigeration units. Distribution of coarse sea-salt at duty-free prices would also be an important consideration, in order to minimise the production costs of salted fish.

Potential benefits of introducing smoking, salting and drying techniques for fish in Vanuatu

The encouragement of widespread use of smoking, salting and drying methods is important, both economically and nutritionally.

Nutritional benefits

From a nutritional point of view, smoked, salted or dried fish has a higher content of protein, mineral salts and vitamins for equal weights than fresh fish (Jardin & Crosnier, 1975). When added in small quantities to starchy foods such as tubers, bananas or breadfruit, the traditional staples of Pacific Island people, it facilitates the assimilation of plant protein through the sulphur amino-acids it contains and its rich lysin content. Most plants contain protein, but as they lack specific amino-acids, they cannot be fully assimilated by the organism. So only 35—45 per cent of the protein content of leguminous seeds is used. Adding a few grams of smoked, salted or dried fish to a plate of these seeds is sufficient to increase the quantity of proteins assimilated substantially, thereby achieving what nutritionists call the protein-added supply (Kayser, 1970).

While generalising the use of smoking, salting and drying fish in the South Pacific is of nutritional benefit, it also presents economic advantages for fishermen and women living in coastal villages.

Economic benefits

- For professional fishermen who send their catch to the market regularly and have no cold storage facilities available, these techniques would not only enhance the value of the fish marketed as fresh fish and remaining unsold, but also substantially extend distribution networks. At present these are limited to the vicinity of landing stages and, in the case of fishermen owning a vehicle and selling their produce at the roadside, to villages close to access roads.
- Fishermen who use refrigeration facilities will find that smoking and drying techniques are fast and flexible to implement, thus enabling them to by-pass any breakdowns in their equipment and obtain added value for their unsold goods.

— Where the fishermen fish to satisfy their own needs only, smoking, drying and salting would enable them to make the most of the occasional abundance of small pelagic fish, which they cannot do at present because they lack the means to preserve their catch. They could then build up a surplus and, if they so wished, sell it.

On the whole, smoking, drying and salting techniques seem to be well suited to improve the value of fish caught by outrigger fishing and fishing on foot, especially cast-net fishing. They represent simple and relatively cheap means of processing fish, in keeping with such low-cost fishing techniques. They can provide a large number of fishermen who lack financial resources with an opportunity to market their produce and as such, they are a key tool in the development of fisheries and marketing networks inland into the higher regions, where roads are far and few between, if any.

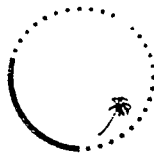
Benefits for the women

As mentioned earlier, in most tropical countries where small-scale smoking, drying and salting of fish is carried out, women are responsible for processing and marketing the produce. In the interest of economic efficiency, the Vanuatu public authorities would be well advised to adopt this system. They could benefit from the fact that in rural areas, women, confined to household

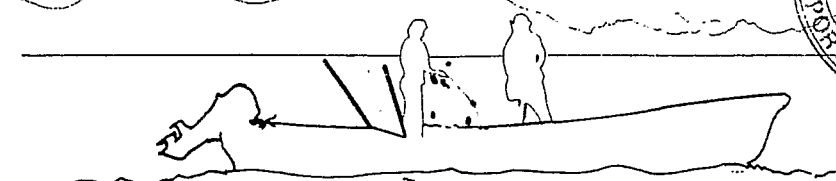
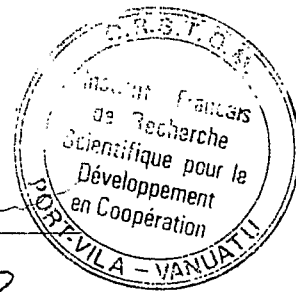
- Dagbjartsson, B. (1983). Production of salted and dried fish in the Maldives. *In* : The production and storage of dried fish. *FAO Fisheries Report*, 279, Rome: 58—62.
- Jardin, C. and Crosnier, J. (1975). *Un taro, un poisson, une papaye*. South Pacific Commission, Noumea, 476 pp.
- Kayser, C. (1970). Physiologie. Historique et fonctions de nutrition. *Ed. médicales Flammarion*, Paris, 1411 p.
- Laure, J. (1974). Valeur nutritionnelle de produits de la pêche conservés artisanalement au Cameroun et au Tchad. *Travaux et Documents de l'ORSTOM*, 36, 79 p.
- Oliveau, Dr. (1911). Quelques observations personnelles sur l'ethnographie et l'anthropologie des Nouvelles-Hébrides. *Bulletin de la Société d'Anthropologie de Paris*, T.2, Série 6 : 335—353.
- Preston, G.L. and Vincent, M.A. (1986). Refrigeration for small-scale fisheries in Pacific Island countries. South Pacific Commission, *Technical paper*, 188, 43 pp.
- Salleh Ismail, M. (1983). Solar dryers for fish. *In* : The production and storage of dried fish. *FAO Fisheries Report*, 279, Rome : 81—84.
- Schoeffel, P. (1984). Women in the fisheries of the South Pacific: some development barriers and opportunity. *Proceedings of the International Conference on 'Women in development in the South Pacific'*. Vanuatu Centre for International Relations, Republic of Vanuatu, 32 pp.
- Summardi, J.A., Wahono, Putiati, Imam, S. and Darius. (1983). Dried fish in East Java, Indonesia. *FAO Fisheries Report*, 279, Rome : 101—108.
- Van Pel, H. (1956). A survey of fisheries in the New Hebrides with preliminary recommendations for their development. South Pacific Commission, Noumea, New Caledonia, 27 pp.
- Yen, S. and Neagle, W. (1985). Seafood Processing in French Polynesia. *SPC Fisheries Newsletter*, 32 : 31—34.



435



SOUTH PACIFIC COMMISSION



FISHERIES NEWSLETTER

NUMBER 50
JULY — SEPTEMBER 1989

Contents	Page
(1) SPC activities	2
(2) News from in and around the region	12
(3) Fisheries science and technology	18
(4) Abstracts	21
(5) The role of women in post-harvest fisheries activities in Vanuatu by Gilbert David	23
X (6) Why Paul Mead chose the boat he did by Robert Gillett	29
X (7) French Polynesia—connecting with the South Pacific by Gildas Borel	34