

Giant clams in the Pacific

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Chapter Seven

WOMEN IN FISHERIES. WHY WOMEN COUNT: PROSPECTS FOR SELF-RELIANT FISHERIES DEVELOPMENT IN THE SOUTH PACIFIC COMPARED TO THE INDIAN OCEAN

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With the notable exception of Penelope Schoeffel's (1984) pioneering report on women in Pacific fisheries, and Leila Gulati's (1984) detailed studies of women in Kerala coastal fisheries, women's role in in-shore fisheries in the Indo-Pacific is relatively unresearched, though some work is now in progress. This essay draws on my field enquiries in Kiribati and southwest India down to 1985. These data show that Kiribati women make a crucial contribution to subsistence and commercial production in the atoll fishing economy.

In what follows the potential for self-reliant development in artisanal fisheries offered by Kiribati women's pivotal participation is emphasised by means of brief comparison to the Muslim-dominated atolls of the Maldives and to the religiously mixed (Hindu, Muslim and Christian) fishing communities of India's southwest coast. In both these latter regions, but for different reasons, women's role in the economic development of the fishery is limited. Indeed, in the southwest Indian case, women's declining contribution to artisanal fisheries is associated with deepening regional dependence on external capital, growing economic impoverishment, pollution of coastal waters, and marine resource depletion (Angle 1983). By way of contrast in Kiribati women's continuing involvement is a major reason why prospects are bright for self-reliant development through ecologically effective and economically parsimonious policies.

THE BASIS OF THE STUDY

Esther Boserup's (1970) classic study of African and South Asian women's role in economic development

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subsequently stimulated a feminist appraisal of androcentric rural development programmes (Dixon 1978; Nelson 1981; Rogers 1982; Jaquette 1984; Mukhopadhyay 1984). These studies have added considerably to our knowledge of the different ways in which, in various African and Indian rural communities, women as well as men contribute to the development process (Sharma 1980; Gulati 1984; Swantz 1985). Nowadays women's important role in food production, processing and post-harvest storage is incontrovertible.

The same cannot be said of women's economic contribution to artisanal fisheries (Thompson 1982). With certain exceptions (Firth 1943; Firth 1975; Gulati 1984(a), 1984(b); Schoeffel 1984) women's work in this field is muted, if not completely obscured (Johannes 1981; Alexander 1982), partly because the term 'artisanal fisheries' is used uncritically. In general the term is taken to mean labour-intensive, shallow-water capture fisheries (Lawson, 1980, 1985; Gopalkrishnan 1984).

My quarrel is not with the assumption that 'artisanal' indicates labour intensive small-scale production. Rather, it is with the cognate assumption that firstly only men fish, or that if perchance women do fish their catch makes an insignificant contribution to household consumption. Secondly, I question the notion that the work of catching fish encapsulates the entirety of labour involved in exploiting a fishery.

The artisanal fisheries considered here are exploited for a variety of purposes - subsistence, social and cash - by both men and women; these fisheries also entail a wide range of work in producing, managing and processing fish resources necessary to livelihood (cf., Wallman 1979). Subsistence production refers to the labour or time and energy expended in making a living; social production denotes the work of investing in social relationships; economic production indicates the labour entailed in making a living for cash (see Brookfield, 1972, 1984; Wallman 1979). Landed fish cannot be translated into subsistence, social and cash or commodity value without additional labour to process and distribute them (Firth 1975). Consequently, a fishery deemed to involve only the work of capture is incomplete, whether regarded from a subsistence or a cash-oriented perspective. Therefore, exploiting a fishery by labour-intensive techniques for subsistence and cash-oriented purposes requires consideration of the work of men and women in processing and

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distributing as well as catching the fish.

For present purposes then, a wider definition of artisanal fisheries will be adopted that accords with actual work practices in catching, processing and distributing fish in many inshore fisheries in the Indo-Pacific. In the fisheries surveyed productive labour involves fish capture, processing by means of gutting, salting and sun-air drying, and preparation for consumption by means of cooking, baking, or roasting and 'smoking'. Distributive labour, on the other hand, involves apportioning to others fresh or dried fish surplus to subsistence needs either in the social form of give-away offerings for which no return is expected, or of gifts for which a return is expected, or in the economic form of fish made ready for cash sale.

The foregoing conception of artisanal fisheries assumes that women as well as men may be involved in various tasks associated with catching, processing and distributing fish for subsistence, social and economic production.

This is the case in Kiribati, the South Pacific island state considered here. As in other atoll economies of the region (Brookfield 1979; Bayliss-Smith 1977, 1978; Schoefel 1984, 1985) Kiribati women's contribution to artisanal fisheries production and distribution is essential to subsistence. Women's continuing involvement in all areas of the subsistence economy, including fisheries, means that most households currently have the capacity to expand labour in one kind of production while maintaining inputs to other sectors. Largely through women's customary role in fishing with nets in reefs and lagoons, as well as in processing and in distributing fresh and dried fish, households are empowered to contribute to the following productive activities: to social production which strengthens the fabric of community life and thus reproduces the social means of existence, to subsistence production which satisfies the material means of existence, and to economic production which secures the cash with which to expand the market-oriented production. Women's contribution is thus a sine qua non of outer-island development in all sectors including artisanal fisheries production processing and marketing.

The potential importance of women's economic role in facilitating flexible development strategies in Kiribati is highlighted if we consider some figures. These indicate the small resource base of

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this island state, and hence the need for relatively labour intensive, low-cost forms of development, at least in the initial stages of capital formation. The figures point up the tiny volume of income relative to total capital inflows, generated by export-oriented activities. In 1985 Kiribati earned \$7-9 million from sales of tuna and copra, and from tuna fishing licence fees (out of an estimated total capital inflow on foreign account in 1985 of over \$26 million. (Fisk 1985 : 7; Government of Kiribati 1985 : 7-9, 17)). On account of Kiribati's narrow resource base, government policy is to promote self reliance on the outer islands. (Government of Kiribati n.d.: 69ff). In addition to strengthening subsistence capacity, it is hoped that outer-island households can expand their cash earning powers (at present limited largely to selling copra and fish as well as to receiving remittances) so as to generate savings for investment in small enterprises (Government of Kiribati : n.d. 71). These ventures should diversify outer-island economies and thus may help moderate the emigration of literate youth to peri-urban South Tarawa. Government believes that economic diversification will strengthen outer-island capacity to develop without excessive reliance on external aid: policies outlined in the national development plan (1983-86) are intended to promote self-sufficiency through economic diversification.

It is in the light of the foregoing considerations that the following account is offered of Kiribati women's work in the inshore fishing economy. These data will be contrasted with material pointing out women's increasingly restricted inputs to artisanal fisheries in the Maldives and south-west India. A concluding section evaluates prospects for self-reliant development in Kiribati, based on recognition of women's as well as men's contribution to artisanal fisheries.

OVERTURES TO CHANGE

In the pre-colonial period the people of Kiribati (known to Europeans as Gilbertese) subsisted on fish, coconuts and - the water lens permitting - giant taro (cyrtosperma known locally as babai) grown in flooded pits (Grimble 1952; Catalla 1957). Titles to coconut palm trees, babai pits, fish traps on the windward side of the reef, and to stretches of lagoon and reef foreshore were often inherited

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cognatically through either parent and their relatives, and distributed among sibling sets (Lundsgaarde 1974; Crocombe 1971; Geddes et al 1982). Cognatic or bilateral inheritance rights thus enabled most, if not all, people to exercise a significant stake in subsistence resources.

The subsistence economy continued largely unchanged in the colonial period. The main economic innovation concerned a terrestrial resource, the coconut palm. People sold to European or Chinese traders those nuts which were surplus to their immediate subsistence and social needs. In exchange for nuts, and later on, dried coconut meat (copra) Gilbertese obtained goods or cash which they then deployed in traditional gift exchange (*bubuti*) and in offerings during important rites of passage and local political ceremonies (Grimble, 1952, 1955). For the most part people were uninterested in systematically investing the cash obtained from the copra trade in improvements to coconut trees so as to increase yields. To the Gilbertese coconut trees were - and still are - a resource to be used primarily for subsistence and social purposes. (Fisk 1985; Government of Kiribati n.d.).

During the run-down to independence in 1979 the colonial government made a more concerted effort to diversify outer-island economies. In the area of artisanal fisheries this took the form of largely unsuccessful attempts to increase output by upgrading techniques for harvesting fish. The post-independence government has been more successful in promoting craft motorisation and gear upgrading. Recently fisheries officials have become interested in exploring appropriate technologies for fish drying; on this matter more will be said later.

Thus far technological change in artisanal fisheries is not very advanced in comparison, for example, to southwest India. In 1984 the Fisheries Division, South Tarawa, organised a survey of three outer atolls and found that between 5 and 7 per cent of fishing households surveyed owned motorised craft; the majority used traditional canoes and gill nets. Depending upon the density of fish stocks in the reef in particular, and people's degree of dependence on fishing for subsistence, a household landed on average between 44 and 85kg during the survey week (Marriott 1984: 6-12). With an outboard motor sufficiently powerful to allow ready access to grounds further off the reef, and with the use of larger nets rather than traditional hooks and lines, yields rose to 90-120 kg per week

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(Mees n.d.:3-4(10). In the outer islands surveyed an average of 1.00 to 1.50 kg of fish was eaten per capita per day (Marriott 1984; 13) compared to 0.45kg, on South Tarawa (Mees 1984:19-20). These figures are supported by surveys of fishing households elsewhere in Kiribati (Mees n.d. 4; 1984:11). The major part of the fish protein consumed was derived from reef fish i.e. snappers, groupers, goat fish (Marriott 1984: 18). At least 46 per cent of cash income in surveyed households came from fishing and the sale of dried or fresh fish surplus to the household's immediate needs (Marriott 1984 : 12).

In the outer islands surveyed reported mean incomes in 1984 from fishing amounted to around A\$25 a week per household (Marriott 1984 : 12-18). Some of this cash was used to buy a limited range of trade goods, but most households used cash obtained by selling copra and fish to pay school fees, island taxes, village committee levies and the like (Geddes et al.1982:68-89).

These data for 1984 may be compared usefully to income figures collected in the early 1970s in two relatively 'advanced' outer islands, Butaritari in the northern tip of Kiribati, and Abemama in the centre. At the time Butaritari households interviewed reported that in addition to money from remittances, copra, handicrafts and babai, mean household income from fishing amounted to A\$0.03 to A\$1.54 a week (Sewell 1983:165). Reported annual household incomes from all sources in Abemama ranged from A\$84 to A\$1218 a year (Watters and Banibati 1984:106-7); in Butaritari household incomes varied from between A\$3.11 to A\$125.2 a week (Sewell 1983: 167). These data indicate there are significant differences between households in the kind and quantity of labour available, which partly account for inequalities in income distribution.

Income inequality is even more marked in peri-urban South Tarawa. Here the economy is largely though not entirely monetised - many households still have access to craft and can secure fish protein from the reef and lagoon, thus reducing the amount of cash expended on food items - and cash incomes are more unevenly distributed than on the outer islands. Households interviewed in 1983-4 reported incomes from fishing that averaged out at A\$20-30 weekly per household (Mees 1984:5-7), or A\$1200 a year. In 1985 south Tarawa households could earn from A\$500 to A\$1800 a year from part time fishing¹. At the top of the fishing income

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scale in South Tarawa in 1985 were less than a handful of households that owned four to five motorised craft each; these households fished full-time for commercial purposes, and their annual fishing incomes may gross A\$25,000 - 50,000 a year².

Other estimated sources of annual (gross) incomes in 1985 range from: A\$1600, seaweed farming in south Tarawa lagoon³; A\$1200, employment as a clerk in a government office on South Tarawa; A\$520, copra selling⁴; \$104, small holder vegetable production on Butaritari⁵. Compared to these latter sources of income, fishing and seaweed farming are relatively rewarding.

The above figures represent earnings in the monetised sector of artisanal fisheries, and should be evaluated in the light of the cost of living in the early 1980s in peri-urban South Tarawa⁶. On the outer islands people live in small communities where everyone is interlocked through a multiplicity of social ties, and many households produce fish first and foremost for subsistence. However, at the same time the volume of fish landed is also intended to allow for people's need to give away some fish to others. Through this strategy people hope to accumulate 'social capital' i.e. good will in the community, which they can draw on in the future when they need extra hands in cutting copra, or financial assistance in paying school fees. Finally, households will also try to catch a larger quantity of fish than that needed for subsistence alone, so as to allow for the need to produce fish to raise cash. The portion left over after subsistence and social needs are satisfied will be sold for cash either immediately, if fresh landed, or preserved and marketed during the rainy season when the supply of fish is less than demand.

It is in this context of a predominantly subsistence economy in the outer islands, where there is also some social and economic production of fish, that we must situate women's economic role in fisheries development.

TRADITIONAL TECHNOLOGY

Fishing

Islanders distinguish several marine zones. The people of Tamana, a reef island that lacks a lagoon

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and is located at the most southerly tip of Kiribati, think of the marine environment as being divided into five overlapping zones. On account of the gradual decay this century in reef tenure (i.e. titles inherited through either parent, which give the right to fish certain areas and to own the produce), today anyone can fish where they wish to so long as they belong to the approved social category. Today all families claim unlimited access, but looked at another way, from the viewpoint of individual members of the household, actual access is limited to persons belonging to specific sex and age groups. Each sex and age group is allocated a proper place or zone in which to fish from boats and with nets, to collect bivalves from the foreshore, to trap and dive for species of fin fish in different areas of the reef, and to collect crustacea and molluscs from coral rocks. In Tamana women appear to be excluded from fishing at the reef edge, though as described shortly women elsewhere do fish in this zone.

The following fishing zones are recognised by Tamana people:

- (a) the beach zone: the sand is visible beneath the clear water. Anyone may fish here with hand nets and from outrigger canoes;
- (b) the reef flats: anyone may fish these;
- (c) the reef edge: this area comprises the grooves or holes in the reef edge between the flats and the narrow shelf in the reef slope. According to the tide young and old men fish here with gear;
- (d) the 'verandah' or 'eye lid': the reef overhang where boys and young men fish with floats, lines, nets and spears;
- (a) the deep ocean: only men fish beyond the reef line. The 'dark' or deep waters are sub-divided into several levels according to ever-increasing depth and people's eventual inability to reach the bottom with even the longest line. Here skipjack tuna, yellow fin tuna, striped tunny fish (bonito) and king fish may be caught (Lawrence 1983:98).

Elsewhere, for example the atolls of Butaritari and Abemama where lagoons are relatively large, women play a greater part in fishing deeper waters. In the 1950s Catalla (1957:124-5) observed women as well as men fishing with hooks and lines on very long poles at the reef edge for an especial species of fish called te reitati (*Cirrhitus*). (Carcasson 1977). Furthermore, women often joined men at night

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on expeditions beyond the reef to catch flying fish. Women and men paddled canoes into the deep ocean on the windward side, where they caught flying fish in dip nets⁷. The value placed on women's contribution is acknowledged in the northern islands, for here a large portion of the catch is reserved customarily for preservation by sun-drying and salting (Catalla 1957:122).

The extent of women's contribution to subsistence fishing and household consumption is indicated in the following data:

- (a) out of an estimated annual catch in South Tarawa in 1982 of 6,000 tonnes, women collected over 1,000 tonnes of shell fish (Marriott n.d.: 7);
- (b) half of the estimated annual catch in South Tarawa in 1982 was landed in the lagoon. There women were observed to spend more hours per day than men with encircling nets and caught the smaller fishes. These are a significant though unreported proportion of the total lagoon catch (Marriott n.d.:7);
- (c) fisheries division officers found that the greater portion of fishing protein consumed in the outer islands surveyed came from the reef. Observations indicate that a significant, though unenumerated, portion of reef fish are caught by women and children (Marriott n.d.:14-17; Schoeffel 1984:9-10)⁸.

These findings highlight the importance of women's fishing contribution to household protein intake and nutritional well-being. Adequate supplies of fish protein on the outer islands help secure a reasonably nourished population. It appears, therefore, that the interdependent labour of women and men in the local fishing economy is the key to self-reliant development, as the work of both sexes contributes to household reproduction whilst also providing some spare capacity for extending subsistence into cash-oriented activities.

Fish processing, woman's especial provenance, is one such activity that non-government organisations in particular are exploring for its income-generating potential.

Fish Processing

With one or two reported exceptions (Watters and Banibati 1984:78-80), it is women's work to salt and sun-dry that portion of the household catch surplus

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to daily needs. Fish preservation is an important part of the household economy. Women's technology reduces waste - as when the catch is in excess of daily consumption - and thus promotes the conservation of precious lagoon and reef stocks. Women's work in curing fish enables the household to raise cash by selling dried fish to neighbours, and if sufficiently proximate, to markets in peri-urban South Tarawa. Preservation also caters for social production, as when women dry prized delicacies and then store them away for future distribution on ceremonial occasions such as marriage and festivals.

Among the several non-ice methods of fish preservation and handling currently in use in the outer islands and South Tarawa the following are representative of women's technical repertoire. These skills were either observed by the writer or reported to her by local women. Ifeka (1986); Catalla (1957:134) and Schoeffel (1984) provide supporting data.

'Dry' Salting

In large fish over 1kg (i.e. the tunas, bonito, and king fish) the head is cut off but not discarded, for it is considered a great delicacy. The fish is gutted, washed and split into two (i.e. butterfly filleted), incised for salting (one incision on the outer, one on the inner flesh), and then salted by rubbing in crystals.

Depending on the species of fish, and flesh texture desired subsequent to the drying process, the fresh landed weight of the fish will reduce between one and two-thirds. Thus, the relatively oily species as tuna and castor-oil fishes may reduce by up to two-thirds their fresh landed weight (which may well include the head, guts, etc); the bone fish (*ikare*) loses up to one half of fresh landed weight; the smaller reef and lagoon fish lose from a third to one half, (King pers. comm. 1985).

Later, the fish are exposed to the sun and air, and placed on bushes, pandanus logs or coconut tree branches where the circulation of air at the skin surface has the effect of providing heat by convection and removing water. Temperature, relative humidity and air velocity are important inputs in the drying process. When the fish is dried to low water content it is hard and dense, and depending

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upon the extent of moisture loss, may take from several minutes to several hours to reconstitute.

Reported shelf life without mould growth or maggot infestation due to fly contact during low moisture evaporation (most likely to occur on sunless days) can extend from a few months to two or three years.

'Wet' Salting

Fish may be preserved by curing in a very salty 'pickle' of extracted fluids. Or they can be soaked in prepared concentrated salt solution poured into a wooden barrel, or other suitable container, and kept there for several weeks.

'Smoking' Techniques

These methods require the use of heat, at least in the initial stages, and subsequent exposure to the sun to achieve further moisture loss. 'Traditional' methods are essentially a variant of food preparation by baking fish wrapped in leaves on hot stones, but with the addition of sun-air drying to further reduce moisture and so extend shelf life. As explained below 'modern' techniques involve the addition of heat and smoke that circulate around both sides of the free-standing filleted fish.

A hemispherical hole is lined with flat stones on which coconut husks are placed and lighted. When the stones are well heated, a basket of fresh coconut leaves containing the fish to be cooked is placed on the stones in the hole. The whole is covered with babai leaves, then with an old mat, and finally with earth. When the odour indicates the fish is cooked as required, the basket is removed - generally after several hours - and the fish dried in the sun. A variant of this baking method produces a Butaritari delicacy, the aua 'smoked' fish. (Ifeka 1986.

A small fish, the aua (sprat) has a flesh somewhat similar in texture and oiliness to the much larger skipjack tuna. Butaritari women catch the fish (aua) by using coconut leaves woven to form a net matting. On bringing the catch from the lagoon, leaves are placed around about 20 of these little fish. Then they are put in a coconut string net and tied together inside a pandanus leaf. About five bundles, containing about 100 fish in all, are

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placed on top of a low-flame, smouldering fire with their heads down and tails up. (See Figure 6). A pandanus mat is placed on top, and the whole left until morning.

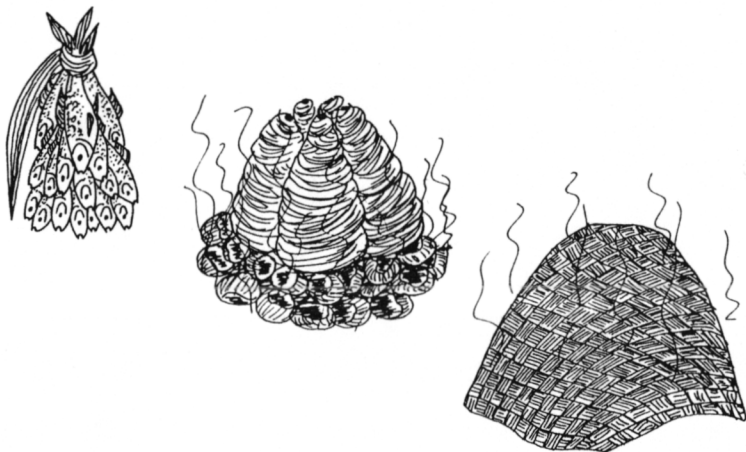


Figure 6 Traditional method of 'smoking';
Butaritari Island

The fish are subsequently dried in the sun for 3-5 days until very hard, when they can last for a year or more.

WOMEN'S TRADITIONAL TECHNOLOGY ASSESSED BY COMPARISON TO THE MALDIVES

The foregoing are some of the traditional (i.e. customary, pre-European) processing techniques still in use among women on the outer islands and South Tarawa. These methods are used by female members of the household in subsistence production to increase food security and nutritional well-being. Indigenous preservation techniques also enable household members to participate in social production or gift-giving between families that contribute to community cohesion.

At the same time non-ice methods of fish preservation described above were selected as examples of techniques which might be extended by judicious

fusing with western fish processing technology. In this way Kiribati women's traditional technical skills could become part of a new 'blended' fish processing technology. Recent trials initiated by local non-government bodies indicate that this technique could produce modest increases in yields sufficient to satisfy inter-island and even limited external demand.

However, this foundation for upgrading yields by 'marrying' women's indigenous fish processing techniques with western technology does not always exist. In the Indian ocean atolls of the Maldives there is at present no significant women's contribution to artisanal fisheries upon which subsistence-supported development could be based, and yet the marine environment of the Maldives is most favourable and does not of itself indicate a very restricted economic role for women.

A detailed survey in the early 1900s by the scientist Agassiz (1903:1-xxxv) of Maldivian atoll geology showed that the 'fragmented landscape' (Maloney 1980 : 178) of this island state contains far more luxuriant coral branching than observed in the atolls of the South Pacific. This finding implies that at the time there were more abundant (and easily accessible) lagoon and reef fisheries in the Maldives. Beyond the reefs, too, Agassiz sighted extensive shoals of sea bream, bonito, the albacores and, in the principal passes to the lagoons, his team observed many shoals of flying fish, masses of micro-algae, various gasteropods, bivalves, large blue shrimps and floating fish larvae. Many fish species would have been then, as is the case today, common to the southerly latitudes of the Indo-Pacific oceans (Randall 1955 :x-ix).

In the remote past the rigours of atoll existence in the Maldives may have facilitated a mutual interdependence between the sexes comparable to that still extant in Kiribati. In the early twelfth century the Dhivehi-speaking peoples of the Maldives were converted to Sunni Islam. Information about peoples elsewhere, for instance hunter-gatherers and swidden cultivators, who produce their own means of material and social existence by very labour-intensive means (Lee and deVore 1969; Collier and Rosaldo 1981) suggests strongly that although the precise impact of Islam on the sex division of labour would have depended in part on then-prevailing conditions in the Maldives, conversion to the conservative doctrines of Sunni Islam probably altered quite radically the sex division of labour on the northern

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and southern atolls.

In the early seventeenth century the French explorer, Pyrard, observed that women assisted men only in weeding and harvesting millet and tubers, while in inshore fisheries they were restricted to smoking the dark-fleshed bonito into the product known for centuries as 'Maldives Fish' (Pyrard 1984: 2(2): 117-8; Maloney 1980 : 279). The women of a household de-gut and fillet the bonito according to custom in a hot dank shed in the back yard. Owing to shortage of salt the most common method of curing used in the past and nowadays is wet-salting; the fillets are boiled in salt water, smoked for two days or more over a fire made with wood collected by the women, dried for two or three weeks until the desired loss of moisture is attained, and then stored in a cool place prior to shipment.

Since 1977 demand for 'Maldives Fish' from the major buyer, Sri Lanka, has declined sharply, though dry-salted tuna produced by men only and exported to the Middle East is increasing in volume and value (Infofish 1983; IFAO 1988; Far Eastern Economic Year Book 1985). However, economic changes associated with the modernisation of craft and fish processing facilities have further limited Dhivehi women's inputs to preparing fish for household consumption and social exchange. Compared to Kiribati women's extensive activities in artisanal fisheries Dhivehi women make a small contribution indeed to subsistence and economic production.

Whereas in the Maldives at present there is no significant women's contribution on which to build appropriate i.e. 'blended' fish processing technology, in Kiribati the interdependence of the sexes in artisanal fisheries means a platform exists for small-scale, self-reliant development through the implementation of 'blended' techniques that are economically sensitive to ecological and social conditions (cf., Clarke 1985).

'BLENDED' TECHNOLOGY

Since the early 1980s, various groups in Kiribati have experimented with appropriate techniques of smoking and drying fish. Their stated intention is to increase the volume of fish cured weekly and so to improve productivity, that is, output per woman hour. They hope also to produce a cured product that conforms more closely to western quality standards and is therefore potentially marketable out-

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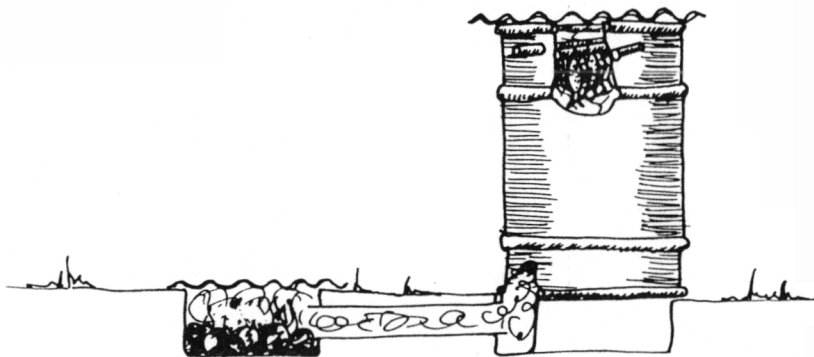


Figure 7. Smoke house, South Tarawa

Innovations include the following:

- (a) the fish are placed in a 'man-made' container or smoke house;
- (b) the fish are separated from direct contact with the fire by being suspended high above low, smouldering embers;
- (c) the fire and heat are kept at a stable temperature for several days so the fish are thoroughly dried and imbued with a 'smokey' flavour and characteristic darkish colour.

Certain technical problems will have to be resolved before these 'blended' techniques can be used more widely. First, the cement fire box cracks in the heat and so interrupts the smoking process.

Second, to ensure a perfectly smoked product, it is necessary to maintain constant heat and air convection against the flesh of the suspended fish; so far this has not been achieved (Ifeka 1986; c.f. Borgstrom 1965; FAO 1981).

Solar Drying

In 1984-85 a non-government organisation installed some trial driers on one of the outer islands. Apparently these have been successful in the sense that dried fish production for sale in South Tarawa has been maintained now for over a year. The driers are made of a wooden or coral brick frame (Figure 8).

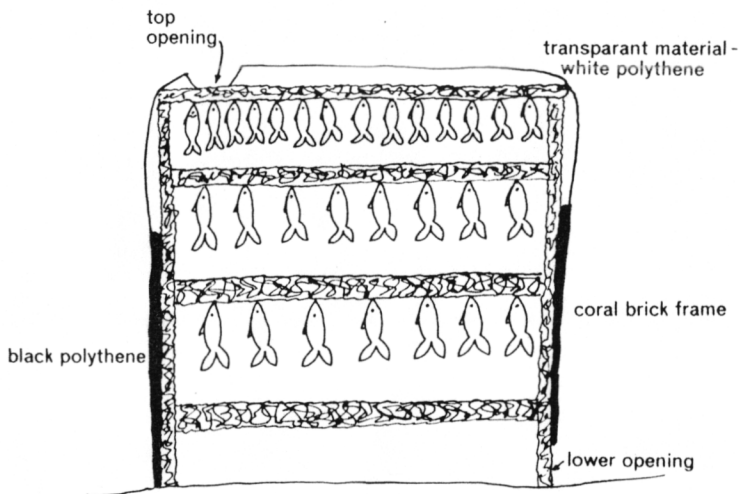


Figure 8. Design for small-scale brick-frame solar drier

Peter King, formerly of Butaritari Island, has commented on solar driers in general. He writes that the frame:

is enclosed on its upper surface by a transparent material which permits solar radiation to enter. The lower surface is a dark coloured material which absorbs the solar radiation and is heated by it. The heated dark material is in contact with the lower layers of air within

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the drier, so they absorb heat from it and rise to the top of the drier...to be replaced by higher levels of cooler air which are in turn heated, and so on. So far the air is simply circulating within a closed system which will eventually achieve equilibrium and prevent further drying of the fish. So the drier must have at least two openings: one at the top for moisture laden warm air to leave the drier, and one at the bottom to allow cooler air to enter, thus creating a draught through the drier. The drying is caused by the air flowing over the fish and absorbing moisture from it; the heat is primarily a means of creating the air-flow. (King, pers.comm. 17.7.86).

Trial driers on the outer island in question have a holding capacity of approximately 40kg. About 86 goat fish may be dried at any one time on three racks (Ifeka 1986).

Other types of low-cost solar driers used elsewhere in the Third World include the polythene sheeting tent. This could cure 3kg of fresh fish per m^2 /day (ICLARM, 1981). These, however, share some of the technical disadvantages of the solar drier built with a wooden or coral brick frame and covered with black plastic sheeting (See Figure 9)

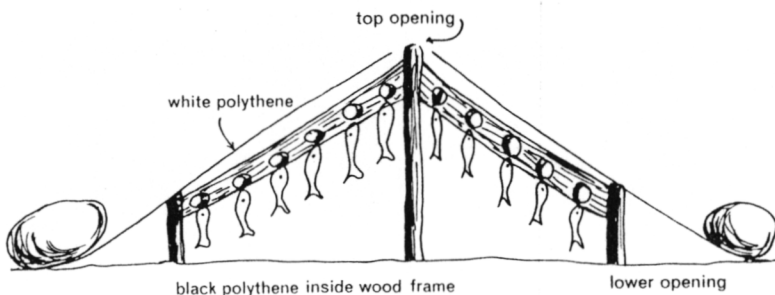


Figure 9 Design for small-scale polythene tent solar drier

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Technical problems include:

- (a) the plastic sheeting is liable to become brittle and tear;
- (b) the inside temperature drops when the sheeting tears, so the fish retain moisture;
- (c) in changeable weather and with 100 per cent undamaged tent, the internal temperature can be difficult to maintain at some degrees higher than the outside temperature so that the air flow is maintained and drying continued;
- (d) in the wet season inside temperatures are relatively low and air flow is slower. If the insect screening over the openings gets torn and flies enter, the internal temperature is insufficiently high to kill them. A mechanical fan could keep flies off the fish to prevent infestation, and also increase air flow to maintain the drying process.
- (e) it is unclear that drying in solar driers will eliminate the risk of flies attacking fish unless it is also heavily salted. Of course most people prefer to eat less rather than massively salted fish.

Some people in Kiribati believe that the proposed new technology will be advantageous to women processors because in their view solar driers:

- (a) save women's labour time;
- (b) avoid fly infestation by direct contact;
- (c) facilitate faster drying;
- (d) enable use of less salt so the product suits modern palates;
- (e) entail no energy costs as they use a 'free' renewable resource;
- (f) are relatively easy to set up in the community.

Obviously the new technology will have different effects on the sex division of labour and women's economic role in artisanal fisheries depending on the local environmental, economic and social system. The nature of the impact entailed is shaped also by the extent and effectiveness of monitoring and management mechanisms. Nevertheless, one possible scenario is indicated in accounts of recent events among fishing castes living along India's Malabar and Konkan coasts; here largely unsupervised technological change undermined women's traditional economic autonomy and deprived many of a productive role whilst giving some women new (dependent) roles as day labourers in prawn-peeling sheds.

TECHNOLOGICAL CHANGE ASSESSED BY COMPARISON TO
SOUTHWEST INDIA

Whether they belong to the better-off and credit worthy net and boat sub-caste or the poorer boatless, hook and line fishing sub-caste, Muslim 'Mopplah' (i.e. Mappila) women de-gut, de-head and preserve fish landed by their menfolk by means of dry and wet salting techniques. (Mathur 1977:293). Craft motorisation schemes directed towards Mopplah men have benefitted some of the boat Mopplahs who, equipped with outboard motors, are able to reach newly discovered prawn grounds in deeper waters offshore.

Women of the poorer, fish and line communities have been incorporated as processing outworkers into the new, technologically advanced and capital intensive inshore fishing economy. In return for minimal pay women shell and winnow prawns for merchants of the boat-owning sub-caste. Working for cash for outside men in their own homes poor Mopplah women have lost the capacity to produce dried fish for social production. They are unable nowadays to shape household decision-making vis-a-vis the distribution of surplus fish. As in the Maldives, Mopplah women's work in this area is increasingly devoid of influence-conferring powers.

In fishing communities along the Konkan coast, in Goan territory, the situation for women is likewise sombre (Ifeka 1985; Ifeka and Chiragakis 1985). Traditionally Hindu women of the fishing sub-castes played a part in artisanal fisheries; once their work included net making, sail repairs, fish salting and drying, and of course marketing. (Muslim women, though, had and have a very circumscribed economic role, living as they do in virtual seclusion in households whose menfolk are arch-conservative practitioners of Sunni Islam.) Today, though, increasing control by outside capitalist interests over inshore fishing, processing, and marketing has reduced most Hindu women to small-time sellers of fish at wayside markets, in other people's houses, and to fish headloading for a few paise (c.f. Braganca Pereira 1940; Soeiro e Brito 1966).

Women of Christian fishing castes still glean the foreshores and tidal flats of Goa for crustacea, molluscs and small fishes trapped in tidal pools. However in Quilon district, Kerala, the 'factorisation' of prawn processing and winnowing in conjunction with the development of fish processing 'out-work' has had the effect of removing fish

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- 4 Copra producer's income: conservative estimate based on current low copra prices.
3-4 nuts = c.1 lb of copra.
1 bag (rice/flour) of c.350 nuts = 100 lb copra.
At 10c per lb (i.e. 26c per kg) 1 bag of nuts = A\$10.
Assume modest size plantation, low proportion bearing good sized nuts on account of prevailing drought (in 1985): A\$520 (gross) per annum.
- 5 Vegetable grower's income: Income arrived at by assuming, as was the case in 1985, that the grower will sell to buying agent vegetables at 20c per lb. If the grower maintains production at 510 lbs per annum he will gross an annual income of A\$104. (King, pers. comm. 1985).
- 6 Retail commodity prices late 1985, South Tarawa. These are government regulated.
- | | |
|----------------|----------------|
| flour | 32c per lb. |
| rice (calrose) | 34c per lb. |
| kerosene | 35c per litre. |
| salt | 25c per lb. |
| sugar | 35c per lb. |
- Fresh fish prices, late 1985, south Tarawa.
- | | |
|------------------|-----------------|
| skipjack tuna | A\$1.10 per kg. |
| violet squirrel | A\$1.21 per kg. |
| spangled emperor | A\$1.08 per kg. |
| bonefish | A\$1.04 per kg. |
- 7 As Schoeffel notes, it is less that women are not allowed to fish from outrigger canoes or motorised craft, and more that they are not encouraged to do so, and therefore often lack the knowledge that most men have of the art of fishing from canoes (1984:9-10). Nevertheless a Butaritari woman told me in 1985 that some especially adventurous women do join the men on nightly fishing trips, and if necessary they can sail canoes themselves.
- 8 Bayliss-Smith reports that in Batiki, Fiji, in the 1970s 'women's fishing methods are usually the more productive' yielding 0.5kg per hour or an annual female catch of 6 metric tonnes per annum. This represents 37 per cent of the islanders' protein intake (Bayliss-Smith, 1978:116). Women spent 5.3 hours per week in subsistence fishing; men 3.8 hours a week (Bayliss-Smith, *Ibid*). See also Bayliss-Smith, 1980.
- 9 In the early to mid 1970s Kerala fisherfolk consumed on average a mere 15kg of fish per capita per annum (Gulati, 1984(a):5). Compare this figure to an estimated annual per capita fish consumption in Kiribati of between 157.50kg to 525kg. (See Mees 1984:20).

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