



Issue 17 – December 2007

WOMEN IN FISHERIES

information bulletin

Editor's note

Welcome to this issue of the *Women in Fisheries Bulletin*, which highlights gender roles in coastal fisheries, women's fishing activities in urban and rural communities, and gender issues in development.

We start with two articles on gender issues. Mecki Kronen and Aliti Vunisea report on gender roles in coastal fisheries across 17 Pacific Island countries and territories. Changing patterns in women's fishing participation included the use of motorised boat transport, fishing at night, fishing for income and diving for invertebrates or finfish. Women were also generally responsible for processing and transporting finfish and invertebrate produce to the local market, to buyers and to agents or middlemen. Women's participation in marketing should be accounted for and considered in fisheries management. Aliti Vunisea discusses institutional influence on gender roles in the Pacific. Traditional, cultural, religious and market institutions have tremendous influences on men's and women's division of labour in Pacific Island societies.

There are two research reports on the *Anadara* fishery in this bulletin. In the first report, Lilian Fay-Sauni, Veikila Vuki, Samasoni Sauni and Temakei Tebano compare women's participation in *Anadara* fishing in the urban areas of Kiribati and Fiji. The importance of the *Anadara* fishery in alleviating poverty in urban areas in Tarawa and Suva was clearly shown. The second report on *Anadara* fishery is a case study by Alifereti Tawake, Veikila Vuki and Bill Aalbersberg. The specific case study was on the role of *Anadara* fishery in sustaining a rural community in Fiji.

In a short article, Johann Bell demonstrates that fish continues to play an important role in food security in the Pacific Islands. In Amanda Vincent's article, she stresses the need to invest in micro-credit schemes. Setting up micro-credit schemes for women in poor coastal fishing communities will certainly help support conservation efforts and prevent overfishing. This scheme needs to be supported in the Pacific Islands to empower women, alleviate poverty and support conservation efforts in the region.

A conservation network, Pacific Islands Marine Protected Area Community (PIMPAC), was established two years ago. In describing its recent activities, Meghan Gombos addresses the unique challenges in managing marine protected areas in the Pacific Islands and the role PIMPAC plays in finding solutions to these challenges.

Naina Pierri and Man Yu Chang show the great struggles women experienced in Brazil. The courageous fisherwomen in Brazil mobilised themselves to create their own national organisation. The process took

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three years and in their efforts the women were able to define and make known their priorities. Ramya Rajagopalan reveals the many issues faced by seaweed collectors in the Gulf of Mannar in India. Women who collect seaweed have an uncertain future and struggle to access the only livelihood they have known.

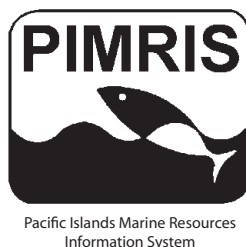
This issue of the bulletin discusses topics on women's fishing and women's contributions to sustaining households. I welcome any feedback on the articles in this issue and encourage you to submit articles about women and community fishing issues from your country or from your region.

Veikila Vuki

PS: All issues of the *SPC Women in Fisheries Information Bulletin* as well as many other publications related to coastal fisheries are available, in pdf format, on SPC's website at: <http://www.spc.int/coastfish/>

Cover picture: Lady selling mud crabs at a local market in Papua New Guinea. Image: Mecki Kronen ©.

PIMRIS is a joint project of five international organisations concerned with fisheries and marine resource development in the Pacific Islands region. The project is executed by the Secretariat of the Pacific Community (SPC), the Pacific Islands Forum Fisheries Agency (FFA), the University of the South Pacific (USP), the Pacific Islands Applied Geoscience Commission (SOPAC), and the Pacific Regional Environment Programme (SPREP). This bulletin is produced by SPC as part of its commitment to PIMRIS. The aim of PIMRIS is to improve the



availability of information on marine resources to users in the region, so as to support their rational development and management. PIMRIS activities include: the active collection, cataloguing and archiving of technical documents, especially ephemera ("grey literature"); evaluation, repackaging and dissemination of information; provision of literature searches, question-and-answer services and bibliographic support; and assistance with the development of in-country reference collections and databases on marine resources.

Women never hunt – but fish: Highlighting equality for women in policy formulation and strategic planning in the coastal fisheries sector in Pacific Island countries

Mecki Kronen¹ and Aliti Vunisea¹

Introduction

Despite Whiting's statement that "women never hunt" (1941, quoted in O'Brien 1984), it is generally acknowledged that Pacific Island women have traditionally participated in, and are becoming increasingly involved with, coastal fisheries. The fact that fishing is one of the cornerstones of people's livelihood in Pacific Island countries and territories (PICTs) may serve as an explanation. Traditionally, the sea has provided food and items for bartering and exchange. Today, marine resources are still crucial to people in PICTs, a region that is believed to have the highest average per capita consumption of seafood in the world. Marine resources also provide the basis for income generation and make a vital contribution to national revenues.

Socioeconomic development is demonstrated not only by changes in lifestyle, nutrition and economic systems, but also by changes in gender roles. While traditionally both men and women participated in the provision of food and shelter for the family, their roles were much more defined than they are today. Education, availability of improved fishing techniques, migration of household members (to generate cash income elsewhere), weakening of traditional social networks, shortages of resources, and lack of cash to compensate for decreased subsistence production have all prompted changes in gender roles, notably those of women. According to Bennett (2005), "any major change in the economic environment of the fishing-dependent community can have a dramatic effect on the ability of the women to be active agents of change". This is because the income received by women from their activities must be spent on household upkeep. This is in contrast to men, whose income is considered in many fishing societies as theirs to spend as they wish. Bennett argues that this difference provides

"a real economic and financial incentive for women to innovate" in order to ensure that all their needs (housing, health, education and nutrition) are met (Sen 1999). While the role of women may have substantially changed — this is not only visible in the urban context of PICTs but also increasingly in the rural context — the real question is how far these changes have been acknowledged and are being considered in national policies and, in the framework of this paper, fisheries management.

Patricia Ngamata Tuara asked in 1995, "Why should the contribution made by women to fisheries management and development be taken into consideration?" In reply she pointed out that "unless the role of all marine resource users is taken into consideration, the aim of promoting sustainable development cannot be realized".

There are many examples that indicate the early recognition of the need to include women in fisheries policy or development strategies in the Pacific. For example, Papua New Guinea has been developing a policy for women since the early 1970s, although it took until 1989 to establish a national women's policy for fisheries (Commonwealth Secretariat 1990) and subsequently a Department of Fisheries and Marine Resources (DFMR) programme for developing the role of women in fisheries. This is but one example; comparative case studies could be made not only across the Pacific Islands region, but also elsewhere in the world. Scientific and technical international conferences are held on women in fisheries, and all international and major regional institutions have accommodated women or gender in fisheries. But apparently a policy that satisfies all institutional requirements, takes into account the range of activities from national to community level, and is not only effective but also acceptable to all, is yet to be found.

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For instance, Omoto (2004) gives five examples of various sets of indicators or checklists that have been devised to measure the core role of women in developing countries, including:

- World Bank indicators (2003);
- the UNDP Human Development Report (2003), which provides a gender-related development index (GDI) and gender empowerment measure (GEM);
- GenderStats (World Bank Group 2003), an on-line database of gender statistics and indicators;
- Special Target Group of Development Projects, Women in Fishing Communities, Guidelines, a checklist prepared by FAO (FAO 1988); and
- “Meeting information needs on gender issues in inland and small water body fisheries”, a paper that presents a guideline for a cross-disciplinary examination of gender in inland fisheries (Seki and Sen 1994).

As Omoto notes, most of these checklists provide national level data and statistics, and are too broad in scale and too generalised to provide information on women’s activities at the community level. And, in the case of the checklist by Seki and Sen (1994), although the guidelines are cross-disciplinary and address household and community levels, they are limited to a single case study and do not allow for regional or international comparison.

Following this broad line of argument, we use some experiences and data collected in the framework of the European Union-funded PROCFish/C (Pacific Regional Oceanic and Coastal Fisheries Development Project, Coastal Component) project that is being implemented by the Secretariat of the Pacific Community (SPC) to:

- highlight some differences between men’s and women’s participation in coastal fisheries;
- provide some reasons for such differences; and
- point out some implications for fisheries management, and perhaps some linkages to national policy.

This paper does not provide an exhaustive analysis of gender roles in coastal fisheries across the 17 participating PICTs², but instead, highlights some of the major roles that women play in coastal fisheries, and the implications of these roles for fisheries management planners, policy advisers and strategic planners.

Methodology

The experiences and data used in this paper were sourced from the PROCFish/C socioeconomic field surveys and database. Data collection was mainly done using fully structured and closed questionnaire surveys that targeted households and adult (≥ 15 years of age) fishermen and fisherwomen who target finfish and invertebrates. The same set of questionnaires and methodological approach were used in each of the communities surveyed. Although the socioeconomic field surveys did not specifically investigate gender roles, but instead assessed the current user level of reef and lagoon resources, most of the information gained from the surveys can be broken down by gender participation.

Four rural coastal communities are usually selected in each of the 17 participating PROCFISH/C countries. Each community represents a population that is high dependent on reef and lagoon resources, as well as major fisheries environments and habitats within the country concerned. To date, field surveys have been successfully conducted in 15 of the 17 participating PICTs. Due to the progress of data entry and verification, data from 12 countries are readily available and were used for this paper: Cook Islands (2 sites), Federated States of Micronesia (Yap, 2 sites), French Polynesia (5 sites), Kiribati (4 sites), Nauru (1 site), New Caledonia (5 sites), Niue (1 site), Papua New Guinea (4 sites), Samoa (4 sites), Tuvalu (4 sites), Vanuatu (4 sites), and Wallis and Futuna (3 sites).

Below, we show fishing trends that are applicable to most countries. Consequently we have selected a few indicators and used average figures for each indicator and community. We do not use the name of each community but have simply numbered all sites in each country considered in this paper.

The indicators selected include:

- The number of women and men per household who are finfish and invertebrate fishers
- Average annual catch per fisher and gender and per selected habitat targeted
- Average catch per unit of effort (CPUE) per gender and per selected habitat targeted
- Women’s and men’s participation in gleaning and diving invertebrate fisheries
- Objectives for gleaning and diving invertebrate activities by gender
- Average annual catch per fisher and gender and per selected invertebrate fishery.

2. The Secretariat of the Pacific Community (SPC) has 22 Pacific Island members. Of these, 17 participate in the EU-funded Pacific Regional Oceanic and Coastal Fisheries Development Project, which is implemented by SPC. The 17 Pacific Island countries and territories include: Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna.

Results

Who fishes for what?

The results depicted in Figures 1, 2 and 3 show that women rarely go fishing exclusively for finfish. However, compared with men, women play a major role in the exclusive collection of invertebrates (Fig. 2). A

comparison of fishermen and fisherwomen who both fish for finfish and collect invertebrates, suggests that the percentage of men participating in both activities at some stage in time, is generally higher than that of women. In about 15% of the communities we surveyed, 30–50% of fisherwomen fall into this category, but the participation of fishermen accounts for 35–55% in more than 50% of all survey sites (Fig. 3).

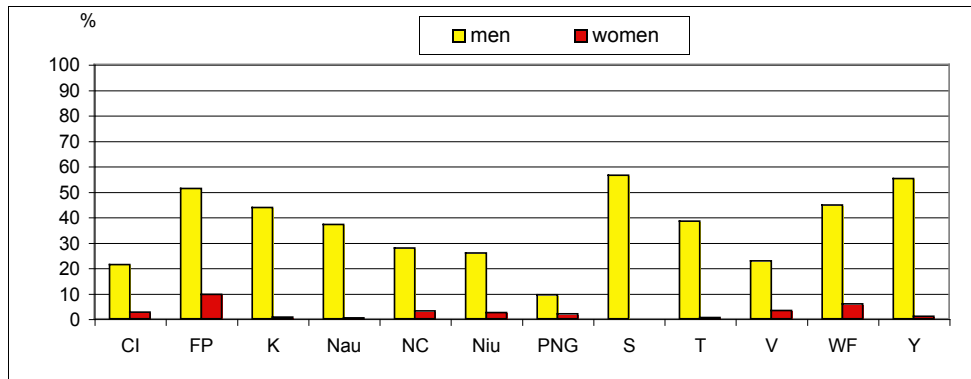


Figure 1. Percentage of fisherfolk who engage exclusively in finfish fishing by gender and household (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

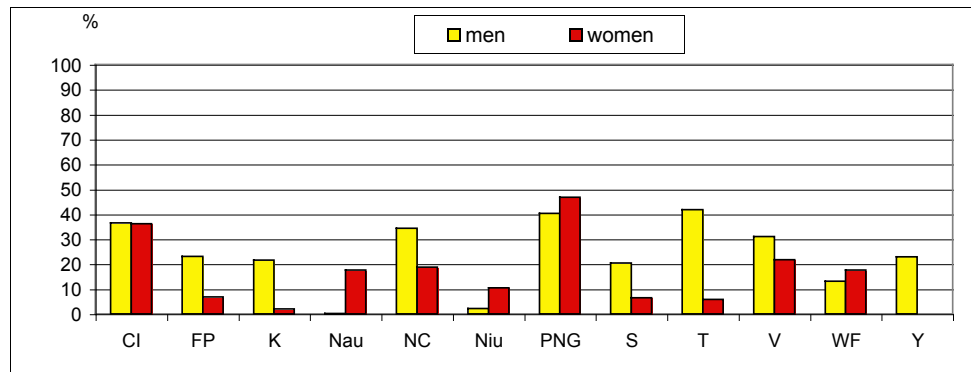


Figure 2. Percentage of fisherfolk who engage exclusively in invertebrate collection by gender and household (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

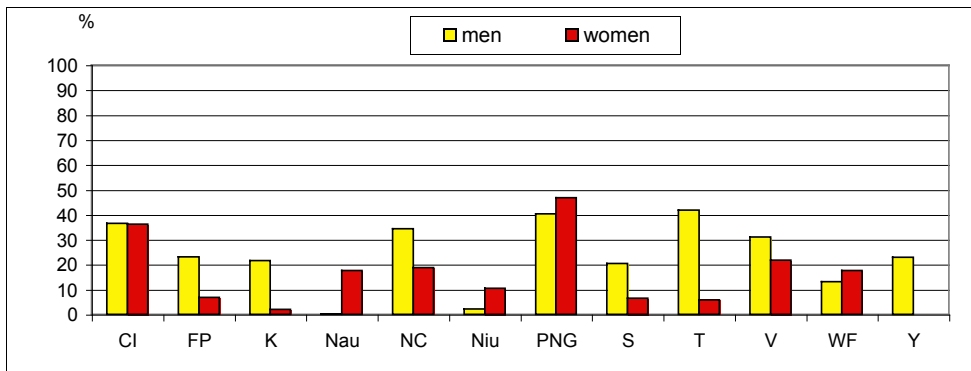


Figure 3. Percentage of fishers by gender and household who catch finfish and harvest invertebrates (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

Average annual finfish catch

The average annual catch per fisher and gender by habitat can be used as an indicator of the differences in:

- resource status,
- fishing objectives (subsistence versus commercial),
- gender roles, and/or
- a combination of any of these three parameters.

For consistency, we compare here only the three major habitats that exist in most, if not all, of the sites surveyed: sheltered coastal reef, lagoon and outer reef. Sites where any of the three habitats are missing were not included in the analysis.

A comparison of Figures 4, 5 and 6 suggests that the highest annual catches are reported from the outer reef habitat, followed by the sheltered coastal reef. The lowest catches come from lagoonal environments. Possible explanations for this could be that

resources at the outer reef are in better condition compared with resources in the other two habitats, and/or fishers target the outer reef for commercial rather than subsistence purposes, and hence aim at higher annual productivity.

The surveys also show that women’s participation in outer reef fishing is almost non-existent. This is due to time restrictions: women must tend to household and family chores, and there are very often restrictions in the (necessary) use of motorised boats to reach the outer reef. Women tend to fish more in the sheltered coastal reef and lagoonal habitats. Concerning the generally higher annual productivity of fishers targeting the sheltered coastal reef, the average annual catches by women are generally much lower than those by men. In the catches from lagoonal habitats — by comparison the supposedly least commercially oriented fishing and/or the least favourable in terms of habitat quality — women’s annual catches are often comparable to those reported by men.

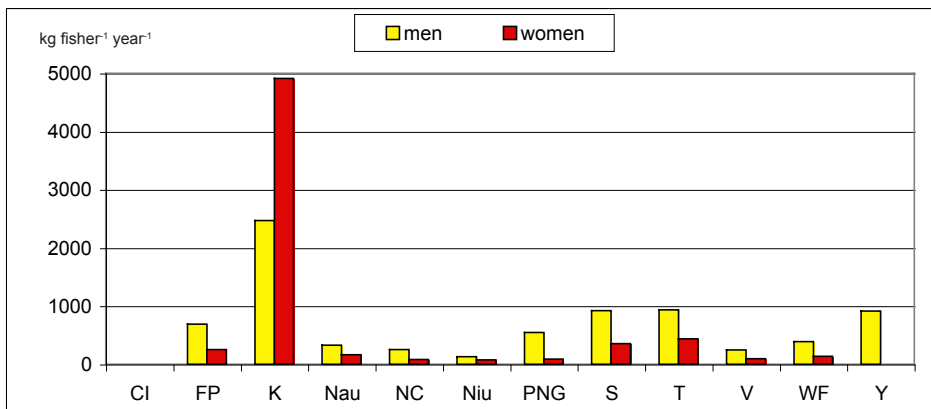


Figure 4. Average annual finfish catch (kg fisher⁻¹ year⁻¹) as reported by fishermen and fisherwomen targeting the sheltered coastal reef habitat (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

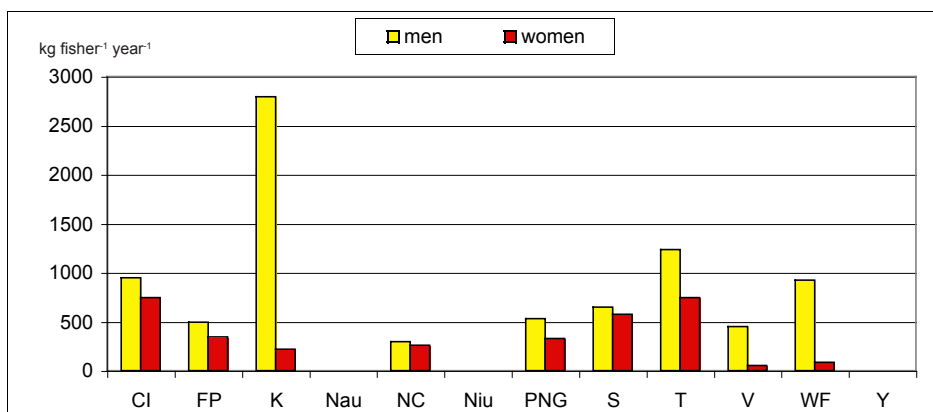


Figure 5. Average annual finfish catch (kg fisher⁻¹ year⁻¹) as reported by fishermen and fisherwomen targeting the lagoon habitat (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

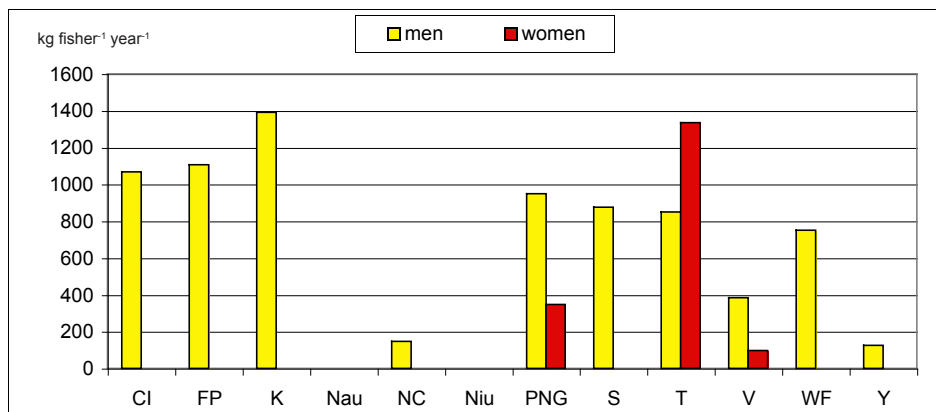


Figure 6. Average annual finfish catch (kg fisher⁻¹ year⁻¹) as reported by fishermen and fisherwomen targeting the outer reef habitat (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

Average finfish CPUE

The finfish CPUE is calculated as the average catch in kg caught per fisher and per each hour spent fishing (i.e. the time spent from start of the fishing trip until landing of catch). We use CPUE as an indicator of fishing efficiency. CPUE figures are presented for the same three major habitats: sheltered coastal reef, lagoon and outer reef (Figs. 7, 8 and 9) to complement the above-presented average annual catches. The highest CPUE figures are reported by outer reef fishers, with most sites reaching ≥ 3 kg hour⁻¹ fished. Taking

~ 3 kg hour⁻¹ fished as a threshold for comparing fishing efficiency between the targeted habitats, this is only reached in about 50% of all sites surveyed for sheltered coastal reef fishing. The CPUE figures reported for lagoon catches are even lower. The data also show that fisherwomen reach comparative CPUE figures in the rare cases when they fish in the outer reef habitat. The same observation is true for lagoon fishing. However, in the case of sheltered coastal reef fishing, most CPUE figures reported by women are much lower, particularly at sites that have the highest CPUE figures for fishermen.

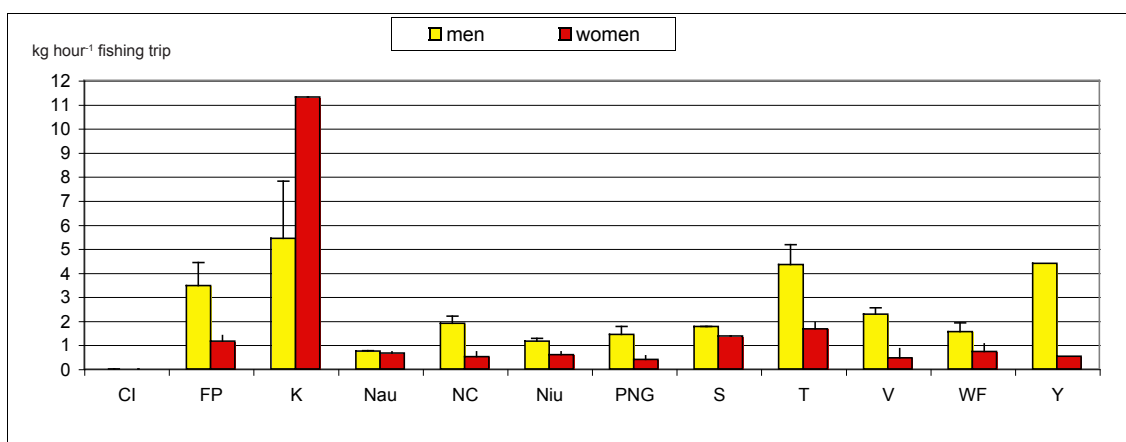


Figure 7. Average reported CPUE (kg hour⁻¹ fished; SE) for the sheltered coastal reef habitat by gender (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

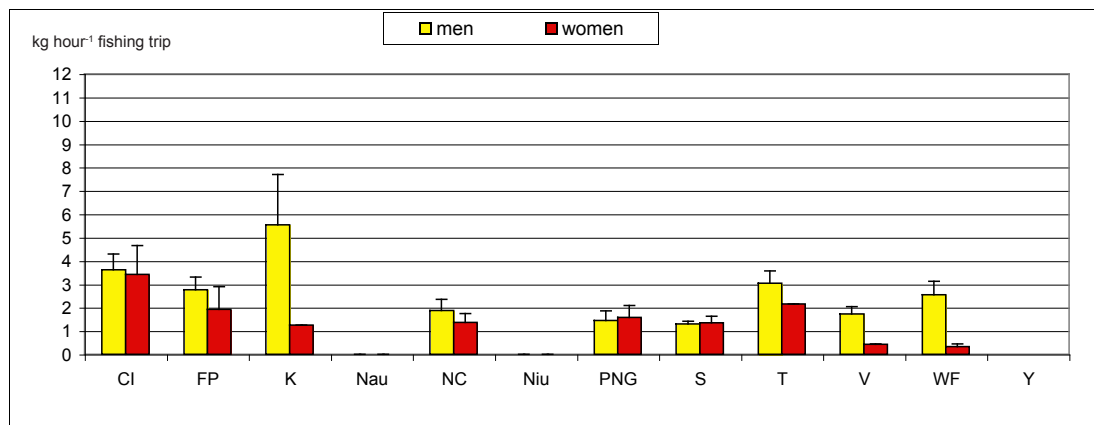


Figure 8. Average reported CPUE (kg hour⁻¹ fished; SE) for lagoon habitats by gender (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

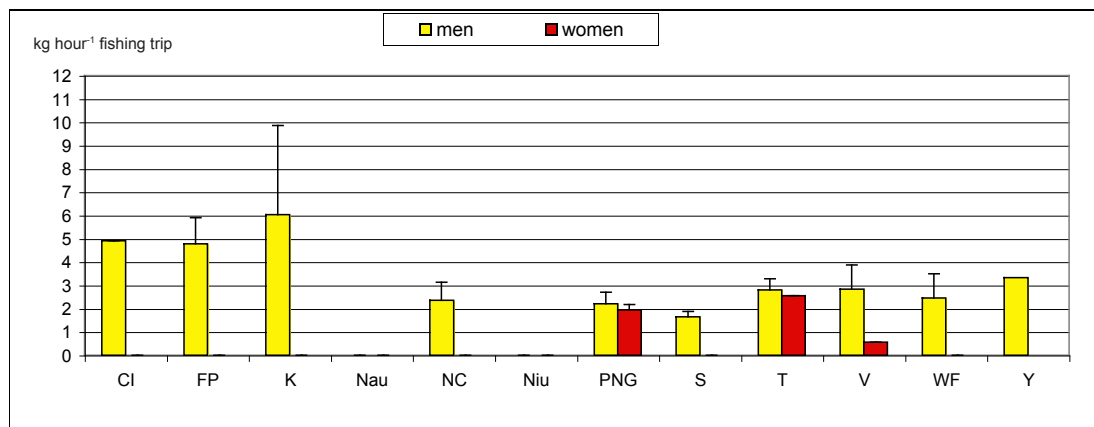


Figure 9. Average reported CPUE (kg hour⁻¹ fished; SE) for the outer reef habitat by gender (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

Gender participation in invertebrate fisheries

The harvesting of invertebrates can be divided into gleaning (collecting) and diving activities. Generally speaking, gleaning activities serve subsistence and local market demands, while diving activities are often linked to commercial fisheries and address both national and export markets (e.g. beche-de-mer, lobsters, trochus). While gleaning activities can often be pursued with a minimum of equipment, such as knives, spoons or other tools (baskets and buckets) found in the average household, dive invertebrate fisheries may require non-motorised or, often, motorised boat transport (to reach fishing grounds that are farther away from shore), dive gear (mask, snorkel, fins) and fishing tools (spears, knives, etc.).

The above data suggest strong participation and dominance of women in invertebrate fisheries. When the participation of women and men in gleaning and diving activities is separately projected (Figs. 10 and 11), it becomes clear that women dominate gleaning activities but hardly ever engage in diving for invertebrates. In order to figure out which invertebrate dive activities attract the most women, we have counted the number of women who participate in each dive fishery across all survey sites considered (total number of sites: 34). The frequency of participation of women in each of the dive invertebrate fisheries is shown in Figure 12. The highest participation by women occurs in beche-de-mer fisheries and in the group of "other" dive activities, which includes the collection of giant clams, octopus and lobsters. Here, it must be noted that beche-de-

mer fisheries may also include collecting specimens by walking along seagrass beds or reef tops during low tide, or participating in transporting the catch from the sea to the beach, or drying and processing the catch. The same observation applies for “other”

invertebrate fisheries, as lobsters, giant clams and octopus may be harvested in knee-deep water at low tide. Thus, the percentage of women accounted for under “dive invertebrate fisheries” may represent collectors, but for commercial purposes.

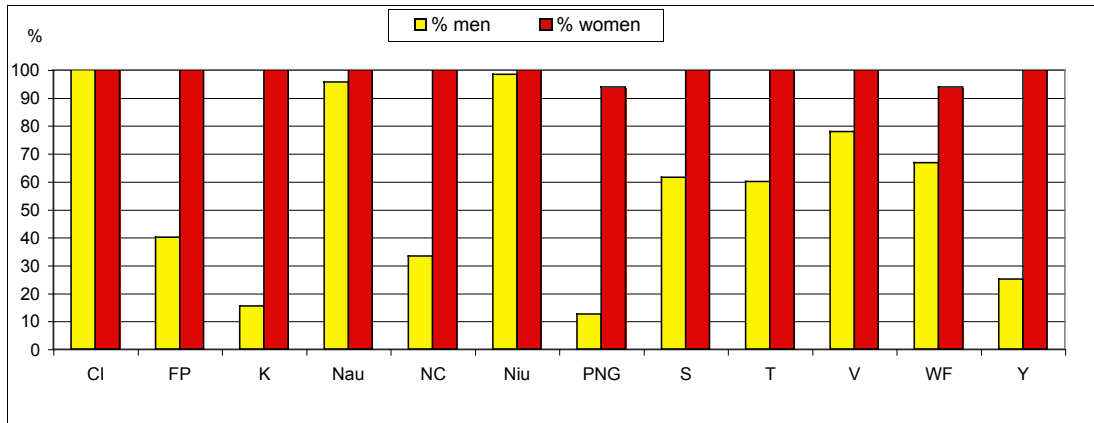


Figure 10. Percentage of fishermen and fisherwomen participating in invertebrate gleaning (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

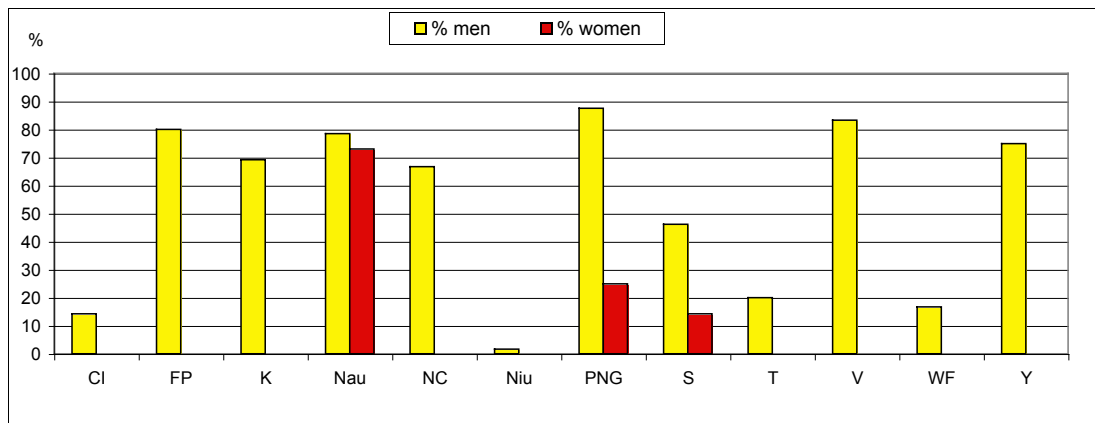


Figure 11. Percentage of fishermen and fisherwomen participating in diving for invertebrates (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, NC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

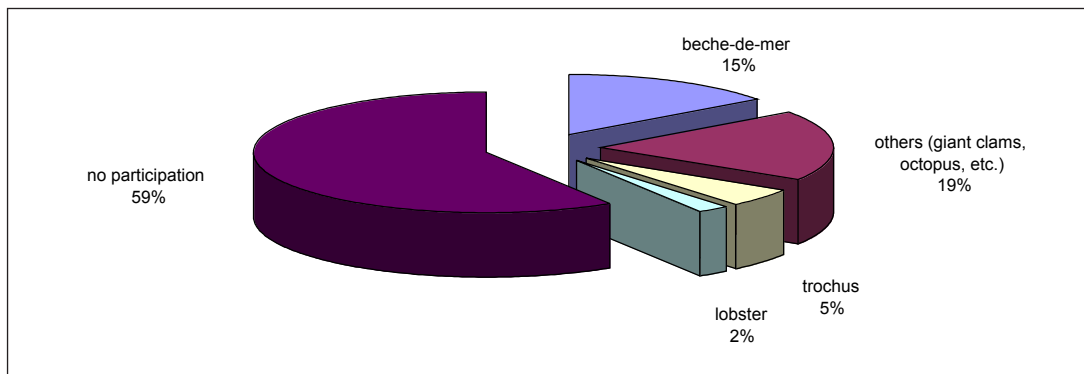


Figure 12. Number of occasions where fisherwomen reported participating in any of the various invertebrate dive activities, expressed in % of all sites (n = 34 sites) (data: PROCFish/C socioeconomic surveys).

Objectives of invertebrate fisheries

The above arguments for broadly characterising gleaning and diving activities are confirmed by the proportion of either activity done with the objective of subsistence, commerce or both purposes. Figure 13 shows that most invertebrate gleaning is done to provide food for the family, and that very little gleaning is done exclusively for commercial interests. For invertebrate dive fisheries, subsistence and income purposes seem to be equally important. Here it should also be borne in mind that while some species, for instance trochus, are mainly collected in order to sell the shells for export, the meat is used locally as food.

Average annual invertebrate catch

In order to compare women’s productivity in invertebrate fisheries with that of men, we have selected the gleaning fisheries that are most favoured by both genders: reef-top gleaning; beche-de-mer fishing, which has the highest women’s participation among all dive/commercial invertebrate fisheries; and trochus harvesting, which is exclusively done by men.

In general, there is little difference in the annual performance of each gender. A comparison of all three fisheries, as depicted in Figures 14 (reef-top gleaning), 15 (beche-de-mer collection) and 16 (the exclusively male trochus dive fishery), shows that variability between the sites is higher than the variability of annual productivity between men and women. Figure 14 shows that there is a tendency towards slightly higher productivity by fisherwomen reef-top gleaners.

Discussion

Our figures show that women participate in both finfish and invertebrate fisheries, but that there are particular roles that women play in finfish fisheries and invertebrate harvesting. These results are in line with the principal commonalities of local knowledge systems pertaining to coastal marine environments and resources identified by Ruddle (1993, 1994), including the conclusion that skills and tasks are age and gender specific and are taught by members of the appropriate sex (Omoto 2004; Kronen 2004). In general, the role of women in the reef and lagoon fisheries of PICTs is very much focused on invertebrate collection (gleaning) and sheltered coastal reef and lagoon finfish fisheries. Women’s performance in finfish fisheries is generally lower than men’s by annual productivity and by effectiveness (CPUE), but in the case of invertebrate fisheries, the picture is different: women’s and men’s performances do not vary significantly; indeed, there are indications that women may perform better than men in some cases (or, as observed for certain fisheries, women do not participate at all).

From these observations and data on fishing strategies, major trends emerge. In general, and given the isolated rural and often still very traditional communities, women have fished mainly to serve subsistence needs, although women’s gleaning and fishing seem to be increasingly developing into small-scale income-generation activities in response to increasing demands for cash to meet basic household and family needs. However, changes in socioeconomic situations throughout PICTs have prompted more pronounced shifts in gender roles: for instance, women are participating in income-earning fisher-

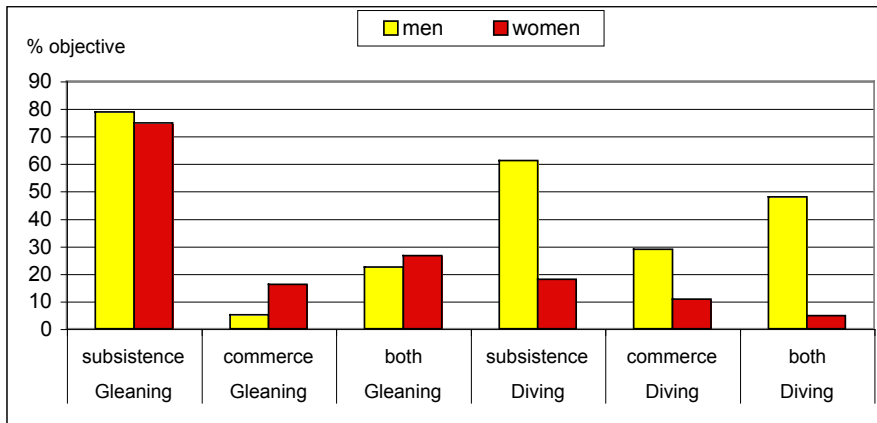


Figure 13. Purposes for gleaning and diving for invertebrates in % of fishermen’s and fisherwomen’s responses (data: PROCFish/C socioeconomic surveys).

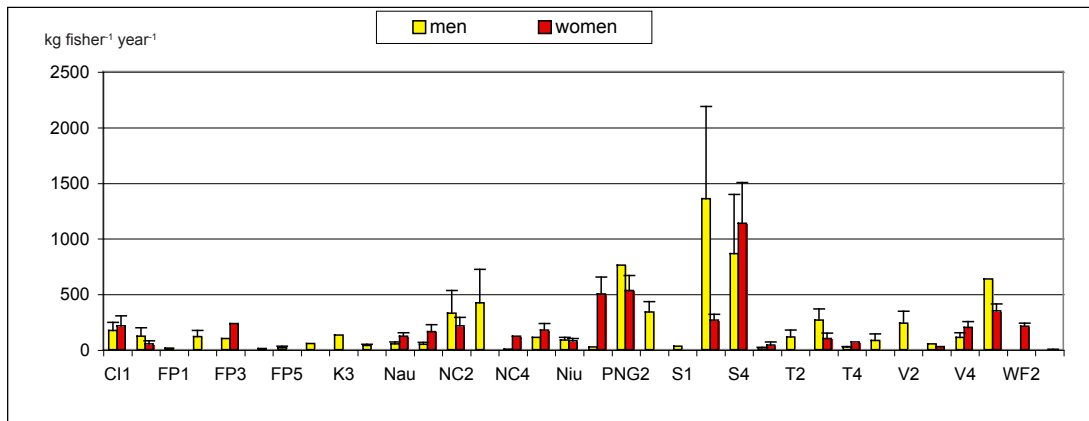


Figure 14. Average annual reef-top harvest (kg year⁻¹ fisher⁻¹; SE) reported by fishermen and fisherwomen (data: PROCFish/C socioeconomic surveys) (CI-Cook Islands, FP-French Polynesia, K-Kiribati, Nau-Nauru, BC-New Caledonia, Niu-Niue, PNG-Papua New Guinea, S-Samoa, T-Tuvalu, V-Vanuatu, WF-Wallis and Futuna, Y-Yap).

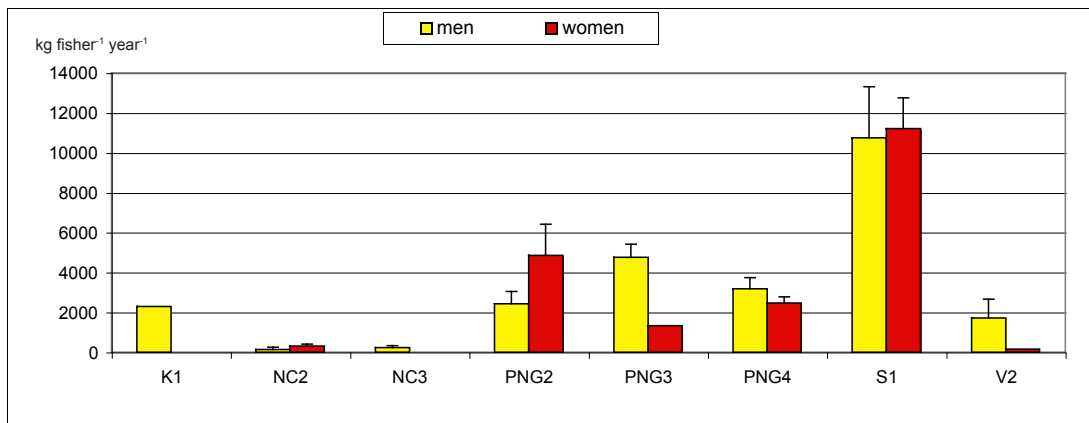


Figure 15. Average annual beche-de-mer harvest (kg year⁻¹ fisher⁻¹; SE) reported by fishermen and fisherwomen (data: PROCFish/C socioeconomic surveys) (K-Kiribari, NC-New Caledonia, PNG-Papua New Guinea, S-Samoa, V-Vanuatu).

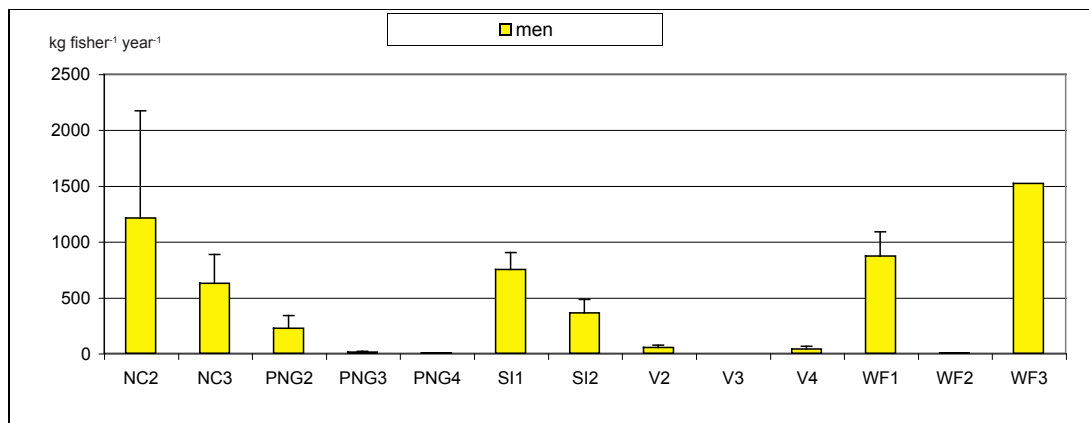


Figure 16. Average annual trochus harvest (kg year⁻¹ fisher⁻¹) reported by fishermen (data: PROCFish/C socioeconomic surveys) (NC-New Caledonia, PNG-Papua New Guinea, S-Samoa, V-Vanuatu, WF-Wallis and Futuna).

ies that extend beyond responding to temporary or infrequent cash demands. Despite this, women who participate in income-maximising fishing activities seem to still assume traditionally defined roles, rather than adopting new strategies. For example, gleaning activities may be done to collect shells for commercial handicraft production, or to sell catches on the local market to earn cash income to help satisfy basic family needs. Gleaning may also be done to collect beche-de-mer, which would necessitate women engaging in diving activities. The same applies for octopus and lobster collection, both of which may be sold locally; the latter may even be an export product.

Our cross-regional data suggest that men, on the other hand, are responsible for the majority of finfish catches by volume and weight; men, therefore, supply most of the family's needs in terms of seafood and money. Differences also exist in the degree of gender participation depending on customary practices. In some cases women take on more responsibility for family nutrition than men, while in other cultures women rarely participate in fishing. For example, our detailed data show cases where women are the main providers of households' seafood supply. Matthews (1991) stated that 11% of the households in Kiribati rely completely on shellfish collected by women and children for their protein supply.

There are other examples. For instance, Chapman (1987) showed that the total yield supplied by fisherwomen was 32% in American Samoa and between 25% and 50% in the Gulf of Papua New Guinea. The total catch on Fiji's main island, Viti Levu, in 1993 was surveyed at 3515 tonnes (mt) for subsistence and 6206 mt for artisanal fisheries (Rawlinson et al. 1995). By comparison, invertebrate sales averaged ~700 mt yr⁻¹, worth FJD1.5 million. Saltwater and freshwater clams, which are exclusively harvested and marketed by women, comprised about 48% of this volume.

Traditionally, fishing was considered a dangerous activity (Schoeffel 1995) and the time spent at sea, which was often at night, did not allow women to tend to their children's and family's needs. Omeri and Wararu (in Commonwealth Secretariat 1990) stated that for Papua New Guinea, "the participation of women in fisheries activities has been minimal and, at best, secondary to that of man, who has been regarded as the provider and protector of the family". This description still applies in some modern situations. Women have a preference for daytime fishing, which allows them to be at home to prepare the family's supper and to tend to their children's safety and needs at night. In cases where collection is for income generation, and where fishing pressure has increased (often coupled with a

decline in the resource status), women are engaged in night fishing. This applies to beche-de-mer collection and gleaning on reefs that yield higher catches, and allows women to target night-active species or species that provide higher yields and thus better returns if collected at night. Women also seem to continue to target easy-to-access habitats, usually shallow-water fishing grounds that are close to shore (Matthews 1991). Time restrictions, lack of access to motorised boats, or limited access to fishing techniques appropriate to other habitats (nets, rods, etc.) may be possible reasons for this. Where women use motorised boats, they mostly hire them from men or accompany men on fishing trips.

Women still rely more than men on simple fishing techniques that require less investment costs. The fact that habitats closer to shore and less efficient fishing techniques are used by women may explain their lower CPUE figures than those reported by men. Women's fishing trips in general tend to be shorter than those of men. And if women's major objective is to provide food for the family, their lower annual productivity is explained simply by the fact that they will stop once the required amount is harvested. One could argue that, generally speaking, women may be the more sustainable fishers as they often fish for subsistence rather than commercial purposes, and hence exploit frequently but in small amounts. However, in areas where demographic and income pressures increase, and where there are no other alternatives, women may also intensively participate in fishing for income.

All of these observations do not mean that Pacific Island fisherwomen (compared with fishermen) have less-developed traditional scientific systems to acquire detailed knowledge and skills concerning the behaviour of target species or habitats, to perfect fishing techniques, or to understand weather and tidal cycles. In order to perform effectively under time constraints, women must have acquired a solid understanding of the behaviour of inshore marine resources, weather and sea conditions. Therefore, opinions that regard women's fishing activities, such as "just collecting shells", or "not involving interesting technology", or "little economic significance" are unjustifiable (Gina-Whewell 1995).

It is worth emphasising that the data presented show general trends and are based on average figures. If looked at in more detail, the data show changes in women's fishing participation, including women who use motorised boat transport, go out night fishing, fish to earn money, and dive for invertebrates or finfish. Very often, the performances of these women are not accounted for individually but are included in data reported by their husbands.

Conservativeness may be a possible factor restricting women from exploring completely new avenues in fisheries. Conservative attitudes towards women are part of the strong traditional forces guiding the social values and norms of many societies (Ram-Bidesi 1995).

Women's participation in fisheries often concerns most, if not all, aspects of marketing. While commercial invertebrate fishermen very often liaise directly with agents, women are the ones most engaged in processing and transporting finfish and invertebrates to the local market, to buyers and to agents or middlemen. Women's participation in marketing should be a subject for further investigations.

Implications for fisheries management

The value of women's local knowledge and the way it is transmitted, and the potential for women to contribute to family well-being, financial stability and economic development, are now becoming broadly recognised (Williams 2001; Omoto 2004; Bennett 2005). A better and more detailed understanding of the roles that women and men play in reef and lagoon fisheries could assist in improving fisheries management because:

- target groups could be identified;
- communication and stakeholder involvement could be tailored;
- needs would be identifiable; and
- suitable solutions could be found and adopted.

As shown by Kronen and Vunisea (2005), the changing roles of women's and men's fishing strategies and practices in the Pacific strongly suggest that reef and lagoon fisheries are gaining importance for food security in coastal communities. Tongan and Fijian surveys have demonstrated that alternative and more lucrative income sources are preferred over artisanal fisheries. The increasing need for cash income results in increased rates of emigration of breadwinning household members seeking cash-paid jobs in nearby or distant urban centres. Accordingly, women have supplied and continue to supply the regular protein needs for their families. Also, women's catches are increasingly aimed at fulfilling cash needs that accrue seasonally (school and church fees), occasionally (funerals, weddings, etc.) or even regularly (basic household expenditure) if remittances are sent irregularly.

Community fisheries management approaches are often used in PICTs, because of the traditional community-based tenure and governance systems in place or, more recently, as a means to effective governance in isolated coastal areas that are hard to service, monitor and manage by a central governmental authority. While a community fisheries management approach addresses the entire com-

munity, gender issues demand that planning and governance decision-making be fine-tuned.

A small but good example is the sea turtle education and conservation campaign in Palau. This campaign mainly targeted women, although sea turtles in Palau are exclusively caught by men. However, while women do not participate in the fishery itself, they hold decisive roles in regulating the frequency and intensity of sea turtle catches as they control their use as traditional money (*toluk*), high-value jewellery (*klilt*) and food (popular and feasts) (Matthews 2002). The fact that Palau is a matriarchal society was not the only reason for this campaign but it was also the objective to take into account participation of more "invisible" groups, here women.

Furthermore, the detection of changes in gender roles is as crucial to effective fisheries management as the detection of resource status. Planning and governance decisions need to respond accordingly.

These arguments are expandable from the community level to the national level. Fisheries and government authorities can better respond with appropriate policies if roles — such as the participation and objectives of both women and men in reef and lagoon fisheries — and possible changes are better understood.

Some implications of women's roles in fisheries at the national policy and strategic planning level are:

- Social strategies and health
 - at the community level and, on a larger scale, at the national level, the contribution to food security in terms of protein and other nutritional value supplied by invertebrates and fish harvested by women;
 - limitations of women's involvement in reef and lagoon fisheries due to family responsibilities, caring for children, cultural barriers to adopting certain attitudes and to performing certain techniques, and lack of finance to invest in innovations; and
 - sociocultural barriers to acknowledging women's performance and to their full participation in decision-making and governance of resources.
- Economic strategies and migration
 - changes for women as main income providers. Today, many women have acquired an education, are conducting household business in the absence of working husbands and have taken a more influential role in village life. They can earn real income through fishing and controlling family finances. Often, this development has been reinforced

through networking among themselves (Vunisea 1995);

- changes in women's roles in isolated coastal situations where fisheries may be the only reliable resource for earning the necessary cash to cover daily life expenditures and to secure the well-being of the household due to migration of the male workforce. Although remittances may be important for the family, if supplied as commodities they do not meet the continuous need for cash;
 - the weakening of social share-and-care networks with increased urbanisation and loss of traditional structures, and the increased need for cash to fulfil social obligations and cater for basic household needs; and
 - changes in women's contribution to national GDP, not only in terms of monetary assessment of subsistence catches and their share in the informal fisheries sector, but also in view of the globalisation process, which may trigger substantial changes in the demand for fish, and thus impact on coastal fisheries.
- Environmental strategies
 - consideration of women's role, potential and contribution to the sustainable use of coastal marine resources as owners and users of the resources and educators of new generations.
 - Institutional strategies and awareness
 - acknowledging the need to provide the necessary institutional support for women fishers at national, extension and community levels;
 - changes in the role of women in fisheries require that training opportunities respond accordingly to provide the necessary skills at all levels; and
 - awareness by women fishers of the support available to them must take into account the societal changes that have taken place at all scales and in all environments, but also the great differences that still exist between urban and rural areas, main and isolated islands, cultures, and religions.

To conclude, the major question is not whether women in the Pacific hunt (or fish, for that matter), but whether to include women in Pacific Island coastal fisheries policies and strategic planning as equal partners with men. What is needed is an approach that acknowledges that the roles of women and men may differ, but that there is a need to pay equal attention to women and men in PICT coastal fisheries.

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Institutional influences on gender roles

Aliti Vunisea¹

With the increasing emphasis on participatory approaches to marine resource management, community-based management, and stakeholder participation, there is a need to look at gender roles in Pacific Island communities, and understand how institutions and their associated protocols, dictate and influence people's lives. In most Pacific Island countries, people live in communities that are identified by certain levels of groupings (e.g. households, extended households or clans, districts and provinces). These groupings are, in most cases, bound by the customs and practices of several institutions. "Institutions" can refer to traditional or customary institutions, religious institutions and market institutions.

Many Pacific Island societies, for example in Melanesia, have a strong history of defined customary roles, where the division of labour between men and women is clear. Women look after domestic duties, child rearing and food gathering, while men are involved in more physical or perceived harder tasks, such as cutting trees, clearing bushes for gardens, and providing basic food supplies. Men also tend to fish in the outer reef areas, while women mostly fish in inshore areas. Fishing and food gathering activities in many rural Melanesian communities (for example in Fiji and the Solomon Islands) still follow this pattern. But changes in gender roles are occurring in communities near urban areas, and in places where women have paid employment. Traditional institutions can, therefore, define gender work areas and expectations.

In Polynesian countries, there are also defined gender roles, but there is an overlap in what may be described as men's or women's work in households, with men readily cooking during communal gatherings and for the family on Sundays. In Samoa, men are usually responsible for all cooking when there are guests or when there is a large community activity. In Micronesia, women's and men's roles are clearly defined and are nearly similar to those of Polynesia, with men undertaking more physical activities but at the same time taking over some traditionally defined women's duties in household-related activities. In the outer Marshall Islands,

women are mainly involved in making handicrafts and collecting shells for use in handicrafts, while men are involved in invertebrate gathering for daily household consumption.

Where modern market economies exist and where women have paid employment, new household divisions of labour are emerging. Although it could be argued that these changes are minimal and nearly non-existent in many rural situations, it is important to recognise that these changes and barriers to change do exist. Institutions in these instances may encourage change, or could prevent change from occurring if traditional ideals and protocols are strictly followed within the community.

With the coming of modernisation, education and exposure to Western cultures, gender barriers in many contexts are beginning to break down, and it is interesting to note the roles that community-based institutions have on current gender roles. In situations where women are the ones working in paid employment, men have taken over household responsibilities. These roles are usually accepted within the household, but in most cases are not accepted by the community as a whole. The traditionally defined roles of men and women are, in most cases, accepted as the norm because of the important role that traditional and religious institutions play in society. It is not uncommon in some communities for a woman to be rejected by her female relatives for having gone beyond the normal areas of participation and behaviour defined by traditional and religious institutions.

For traditional institutions, strong customary ethics within a community generally relates to both men and women still behaving within customarily defined areas. In addition to taking on new roles — for example seafood marketing — women must still tend to their domestic duties. In this case, fishing is viewed as an extension of a woman's household or care-giver role. Thus, many women live a dual life. Customary expectations in this case clearly define what women can and cannot do. In some cases, a woman might be very strong and independent in a totally foreign setting, such as a work environment;

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but this same women must adhere to and fit within the expected societal norms when back in her community or when participating in communal activities. In near urban areas where many women work, there sometimes exists a work-sharing responsibility in households between men and women. In these cases, women have begun to enjoy various forms of empowerment, including a different status outside the home, the ability to interact and work with other women, and the exposure that enables them to make better informed decisions about the future of their households.

In patrilineal societies, such as in some parts of Fiji and in Malaita and other parts of the Solomon Islands, women are merely users of marine resources in the communities they are married into, because land ownership passes through males only. Here, traditional institutions determine ownership, and access to and use of terrestrial and marine resources. In instances where women have acquired a higher status through marriage, these statuses are withdrawn when the husband dies. The lack of ownership and access to resources directly affects the decision-making process in matters relating to fisheries development and management. Although women often have unique knowledge and skills related to the use of the nearshore coastal zone area, they lack the necessary recognised power to be involved in the decision-making process. There are, however, exceptions to this. For example, Melanesian women of chiefly birth are accorded the same respect and authority as men in their families. So, even within the most traditional Melanesian societies, women of chiefly birth can hold positions of authority.

Religious institutions and ethics also influence gender roles in many Pacific Island countries, and the church is one of the major agents of change. Church and religion is a way of life in the Pacific and any teachings through the church are usually adopted and followed by communities. Many women still perform traditionally defined roles or are bound to perform a modern role at the workplace, and a customary role of domestic duties at home. Religion clearly defines women's tasks and modes of behaviour, which in many cases are accepted without question and followed diligently because they come from religious institutions. The influence of religious institutions is also evident in the way in which people distribute household resources and finances. Some households may forgo educational and other urgent needs for religious obligations and commitments. In an evident shift in power at the community level, religious leaders in some cases are taking over the authority from traditional leaders. This occurs in Samoa and Fiji, where in some areas, pastors and church representatives enjoy a higher status than that accorded to traditional chiefs. In the absence of traditional institutions, reli-

gious groups take over community activities. With regards to resource management, religious institutions have been used as an avenue for awareness raising work.

Protocols and norms associated with all of these institutions also influence fishing patterns at the village level. Traditional obligations — called *oga* in Fiji — are part of the Fijian everyday cultural commitment. For *oga*, people are obliged to give or buy goods appropriate for the occasion or, in most rural coastal locations, such functions mean extensive fishing activities. Samoa has a similar traditional obligation with the *falavelave*, a function where people are expected to contribute. *Falavelave* usually include marriages, deaths and ear piercing, as in Niue and the Cook Islands.

In the context of fisheries, market institutions can include fishers' associations, middle sellers, exporters and buyer groups. These institutions — although small and almost invisible at the community level — have considerable influence in how and what people fish for. Fisheries such as beche-de-mer, trochus, live reef fish and coral are, in most cases, almost always controlled by external institutions. Exporters, buyer groups and middle sellers set prices and determine which species are the most lucrative on the market. People at the community level respond to the demands of external institutions by changing species, fishing patterns, and their involvement in fishing to meet these demands. The demand sometimes results in intense fishing participation for certain periods of time, resulting in fishers changing fishing patterns and focusing on market demands. In many Pacific Island countries, access to marine resources must be granted from customary owners. Buyers and exporters liaise directly with resource owners and not with the Fisheries Department or the authorities responsible for the sustainable exploitation of marine resources.

Market institutions and the demand they exert on fishers at the community level result in changes in gender roles within fishing communities. Where there is demand for a certain species, both men and women may participate in the fishing and selling of the product. An example is the increased involvement of both men and women in the beche-de-mer trade. In other situations, men may take on commercial fishing activities, leaving woman to fish for home consumption (although there are instances where women may be the ones involved in commercial fishing).

All of these institutions have, over time, changed their focus and leadership patterns. And while community participation is important in modern fisheries development and management, it is also important to take note of these institutions and

their functions and influences on society. In any traditional community setting, it is important to work with one or more of these institutions.

What does this mean for marine resource management? Identifying stakeholders for the purpose of project development should also include identifying and ranking institutions. Pacific Islanders strongly identify with certain institutions, and so it is necessary to work within these organisations when trying to implement marine resource management measures.

Another challenge is to determine how far an institution should be allowed to influence fisheries development and management interventions at the community level. Religious institutions have a strong influence on men's, women's and youth groups, sometimes overtaking traditional insti-

tutions. In other cases, where new church groups have come into rural communities, there are often conflicts within communities, and people may shift away from traditional knowledge, skills and traditional ties. Consequently, new groups at the community level emerge, with traditional institutions and traditionally defined roles overlapping with new religious groupings.

For successful marine resource management, it is necessary to identify existing institutions within the community, and to maximise the use of such institutions to the best advantage. These institutions also provide the key contact for community people to external partners. Equal efforts should be given to promoting marine environmental awareness at the community level and, more importantly, to those that operate the institutions that govern marine resources.

Anadara fishing supports urban households in Tarawa, Kiribati and Suva, Fiji

Lilian Fay,¹ Veikila Vuki,² Samasoni Sauni³ and Temakei Tebano⁴

Introduction

Women dominate the subsistence fisheries sector throughout the Pacific Islands region (Mathews 1993). In recent years, women's fishing activities have changed from subsistence-oriented to semi-commercially focused fisheries (Vunisea 1997). This shift in fishing practices has been influenced primarily by monetary needs generated by overall modernisation and by corresponding changes in lifestyle and diet.

Women's participation in inshore fisheries activities in Pacific Island states, contribute significantly to food security and small-scale income generation for households. Many Pacific Island countries rely on nearshore marine resources to feed their families. Marine invertebrates, such as shellfish, form a significant portion of women's catch (Keough et al. 1993). Shellfish, especially ark shells (*Anadara* spp.), are an example of a species that is often harvested because it is found in intertidal areas where women fish. Shellfish are a major source of protein for human consumption, as well as a source of income for coastal towns and villages.

Although these bivalves are an important source of dietary protein and income for indigenous people living in the coastal areas of both Kiribati and Fiji, they have received very little attention in the scientific literature and by fisheries managers (Tebano and Paulay 1995). One contributing factor relates to the fact that *Anadara* collectors are mainly women who have gained very little status and recognition among fishing communities (Fay-Sauni 2001). It has been suggested that the general lack of analytical gender-specific information has inhibited development opportunities for women in the fisheries sector (Mitchell 1994).

This study focuses on women's involvement in the ark shell fishery in the urban areas of Kiribati and Fiji. *Anadara* fishing activities and their socioeconomic importance at the household level in urban areas were investigated. Because *Anadara* collecting is particularly popular among women in these

two countries, the extent to which women in urban areas support their families through subsistence use and alternative means of earning income, were also examined.

Study areas

Tarawa, Kiribati

South Tarawa comprises the islets along the southern rim of the atoll, all of which are inter-connected by causeways, allowing easy commuting between communities and employment opportunities in the main urban centres of Bairiki and Betio. Tarawa's very large population is directly or indirectly dependent on coastal marine resources. *Anadara* in this case is one of the more accessible resources for women and households.

The islets on Tarawa are fronted by a largely intertidal reef platform (a few hundred meters wide) on the ocean side, and a wide sand flat on the lagoonal side. Most of the western rim of the atoll, which is below sea level, consists of a wide, submerged barrier reef lying at a depth of a few meters, interrupted by a single deeper passage near its southern end.

The study area in South Tarawa ranged from Teoraereke to Bikenibeu (Fig. 1). On Tarawa, *Anadara* is most commonly found in seagrass beds on lagoonward margins of sand flats along the villages from Ambo to Bikenibeu.

Suva Peninsula, Fiji

Suva Peninsula lies on the southern tip of Viti Levu island in Fiji and covers approximately 15 km² (Fig. 2). The intertidal zone around Suva Peninsula supports a wide range of finfish and invertebrate subsistence fisheries (Quinn and Davis 1997). The intertidal area consists primarily of soft sediment mudflats. The sand flats of this region support a subsistence invertebrate fishery, an important source of fresh marine food for many low-income families around metropolitan Suva (Quinn and Davis 1997).

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Figure 1. Tarawa, Kiribati.

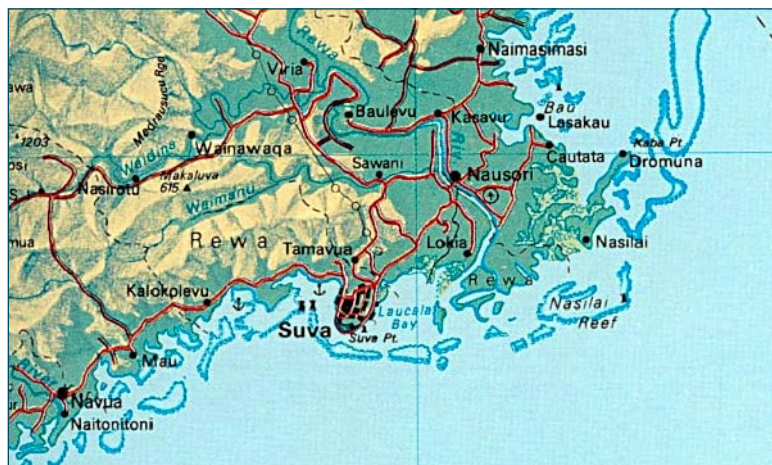


Figure 2. Suva Peninsula and surrounding areas and reefs
(Source: www.fiji.gov.fj).

Surveys were conducted within the Suva Peninsula area from the Pony Club to Nasese areas. The substratum sediment ranged from coarse sand and rubble along the shoreline, to fine sand and silt mainly towards the centre. Although the seagrass *Halodule uninervis* was present throughout the study area, a large dense bed was observed within the area. The seagrasses *Halophila ovalis* and *Springodium isoetifolium* were also observed.

Methods

Questionnaire survey

A questionnaire survey was designed to extract socioeconomic information from individual house-

holds of women residing in the urban communities studied. Such information is essential in assessing the impact of the *Anadara* fishery on the lives of these women. The questionnaire surveys were undertaken only in urban areas as described above for the two countries, because the *Anadara* fishery is under significant fishing pressure in these areas (Davis et al. 1998). Women were interviewed about their household income and expenditures, fishing activities, traditional and biological knowledge of *Anadara* species, and their level of participation in conservation and resource management.

In total, 97 women were questioned about their involvement in the *Anadara* fishery in South Tarawa in Kiribati. At Suva Peninsula, in Fiji,

84 women were interviewed. The questionnaire included questions about household size and composition, occupation of each family member, other employment activities, level of income from fisheries activities, fishing methods used by each household, and individual experiences with *Anadara* such as fishing areas, methods, catch composition and effort.

Creel surveys

Creel surveys were undertaken to determine the amount of *Anadara* collected by women (measured in kilograms per hour). Catch was measured by weighing women’s *Anadara* catches using a handheld spring balance, while fishing effort was measured by the number of hours women fished.

Women were interviewed when they returned from fishing. Fishing time was estimated using three main categories: 2 hours or less, 4 hours, and 6 hours.

Results

Demographics and household details

The majority of fishers engaged in *Anadara* fishing in South Tarawa and Suva were in the 30–39 year age group.

This study highlighted how young women (less than 20 years of age) in South Tarawa are usually left at home to look after toddlers, while other women in the household go out fishing for *Anadara*.

In contrast, women in Suva were usually more active in *Anadara* fishing. The study further revealed that a relatively high percentage of respondents (48% in South Tarawa and 64% in Suva) stated that at least one woman in the household was engaged in harvesting *Anadara* (Fig. 4). Up to four women per household in Suva compared with five in South Tarawa were involved in *Anadara* fishing (Fig. 4).

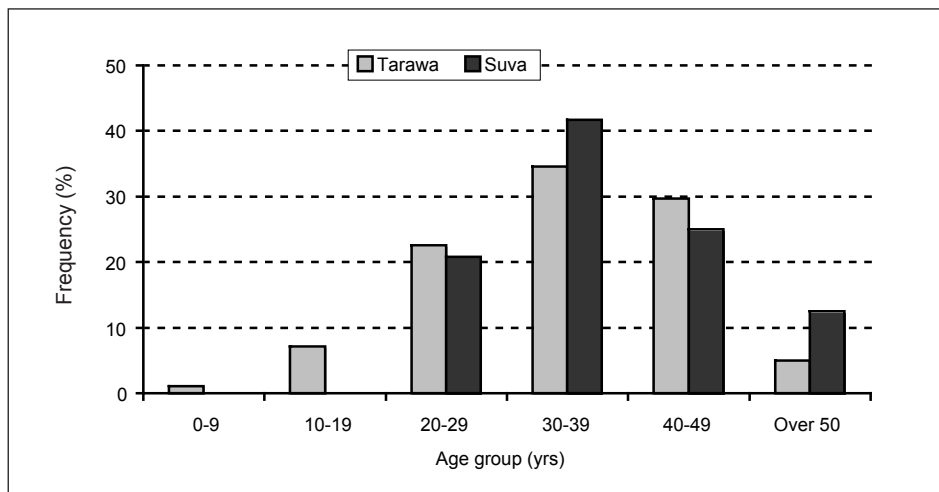


Figure 3. Age composition of women engaged in *Anadara* fishing activities.

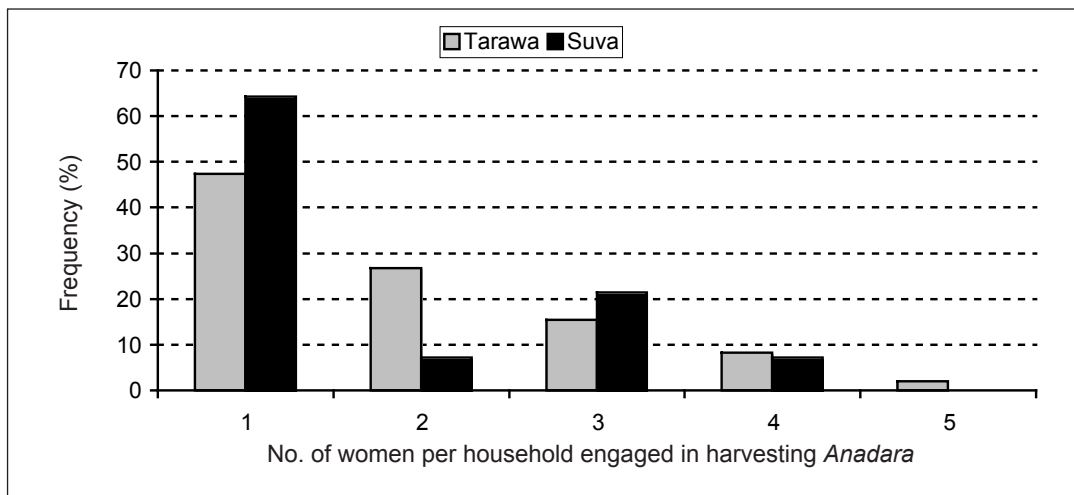


Figure 4. Frequency of women per household engaged in harvesting *Anadara*.

Over 90 respondents were unemployed compared with 57% in Suva. The high unemployment in South Tarawa explains the greater interest and involvement in *Anadara* collecting. Nonetheless, women who lived in households with members who had some form of paid employment were still engaged in harvesting shellfish to supplement earnings or to help reduce spending on other protein sources. By comparison, Suva had a relatively higher and wider range in average fortnightly earnings compared with South Tarawa. There was a wider variety of job opportunities (e.g. garment factories and other manufacturing industries) available to women in Suva, with some respondents receiving up to AUD 300 per fortnight, in contrast to earnings between AUD 36 and AUD 200 in South Tarawa.

Many households were totally reliant on the *Anadara* fishery to sustain a living in South Tarawa. This was for both subsistence and economic needs. About 62% of respondents stated that no one in the household was employed in Kiribati, as compared with 36% in Suva. Nine respondents from South Tarawa further stated that their households had no other source of income. Other respondents had other ways of earning money, including the production and sale of handicrafts, and sales from shellfish (e.g. *Anadara*), doughnuts, bread, buns, *tibuta* (a traditional Kiribati women's blouse), local candies and other items.

Women in both countries typically travel to fishing grounds either on foot or by boat (which usually belong to men). In South Tarawa, fishers walk to fishing grounds or travel by bus from Betio. In Suva, fisherwomen either walk to the fishing ground or catch a bus or truck, and then walk the rest of the way. Thus, there is very little use of, or reliance on, sophisticated forms of transport.

Target areas and fishing methods

Although *Anadara* collection is referred to as "gleaning", women are skilled at identifying where the *Anadara* are partially buried, and also have special ways of using their feet to find the clams in the sand or mud before picking them up with their hands. Also, women search for signs of the clams' siphons at the water's surface on an incoming tide. Women visually spot the half-covered *Anadara* shell gape in clear water at low tide. Thus, women are usually observed wading out from the beach towards the seagrass beds at high tide, feeling with their toes for shells in the muddy sand. They fish as far out as they can stand with their heads above the water. As the tide recedes, women use their fingers to search for the clams. This practice was particularly common in South Tarawa. In Fiji, however, women predominantly go out when the tide was at its lowest.

In South Tarawa, at Teoraereke village, a recently re-settled area, more people were observed fishing for *Anadara*. This could be explained by the area's high unemployment rate and the collection of *Anadara* for food and income.

This study's survey results from Suva and South Tarawa show that the preferred fishing areas for *Anadara* were seagrass beds (*Halodule* sp.) and areas with soft muddy substrates. It was also common for fishers to search for *Anadara* along the sand and mudflats on their way to the seagrass beds and when they returned home.

Anadara harvesting is a frequent activity, with women collecting several times a week during low tides. In South Tarawa, there was a distinct difference between the frequency of harvesting for home consumption and the harvesting for sale: two to three times a week on average (65%) for home consumption only, versus daily (83.5%) for both sale and home consumption. Thus, with the exception of Sundays, collection for both sale and consumption combined was an almost daily activity.

In Suva, about 50% of the women fished at least once a week and this was on Saturdays. Fishing more frequently was difficult because of paid employment and other family commitments. The number of women engaged in fishing depended mainly on whether the *Anadara* were intended for home consumption, sale, family or community functions or sending to families abroad as in Tarawa. Thus, the collection of *Anadara* was an almost daily activity in both locations and this pattern intensified when fishing for commercial purposes.

Anadara sales

This study showed more pronounced selling activities, and therefore greater dependence on *Anadara*, in Kiribati than in Fiji. In South Tarawa, *Anadara* was commonly sold either fresh in large 10-kg bags along the roadsides, or cooked. About 56% of South Tarawa respondents were engaged in selling *Anadara*, in contrast to 7% from Suva. About 85% of South Tarawa respondents sold *Anadara* six times a week. This was mainly at Bairiki market where cooked *Anadara* meat was sold in plastic bags for one dollar and served with breadfruit or coconut. In Suva, respondents selling *Anadara* clams from the study site was rare, and this was only if there was excess catch. On average, fishers in Suva sold *Anadara* at least once per fortnight.

About 35% of respondents earned about AUD 150 each per fortnight from selling *Anadara* in South Tarawa. The women's average fortnight earnings were approximately AUD 167. Most of this income went to household necessities, school fees, clothing

and bus fare. Household income by women was predominantly earned from fishing activities (44%). Women are increasingly involved in semi-commercial activities such as the selling of doughnuts, handicrafts, rolled tobacco, boiled toddy and other items, and income from these sales were used to supplement the family income. An estimated 61% of South Tarawa women were solely responsible for earning household income (Table 1).

In the case of Suva Peninsula, only 7% of respondents acknowledged the contribution of *Anadara* sales to their household income. Half of these women stated that *Anadara* sales were their sole source of family income. The remaining 93% of respondents collected solely for home consumption. Those who sold their catch used the money to purchase household necessities (especially other food items), and pay for transport costs.

Anadara were sold for AUD 2.00 a heap (2–2.5 kg) at the Suva market or to neighbours. The average fortnightly earning from this was approximately AUD 40. Other marine species that women often sold with *Anadara* at the market included *Dolabella* (seahare), crabs and prawns.

Anadara catch levels and creel catch analyses

An estimated 72% of Suva fisherwomen stated that *Anadara* constituted 25–50% of their catch, compared with 59% in that category in South Tarawa. Also, 57% of Suva respondents stated that their average catch was 2.5 kg, whereas 43% stated that they caught about 5 kg per day-trip. However, for South Tarawa, 78% stated that their average catch was 10 kg, whereas 22% reported catching 15–45 kg per day-trip. This could be indicative of the differences in reliance on *Anadara* as food and an income source, and could signify the abundance of *Anadara* in the two locations.

When women glean on the flats, *Anadara* is not the only species they target. The most common mol-

luscs and crustaceans collected in South Tarawa are: *anadara* (ark shell, *Anadara* sp.); *nouoo* (lipped strombus, *Strombus luhuanus*), *katura* (surf clam, *Atactodea striata*), *koum'ara* (shellfish, *Gafrarium pectinatum*), *koikoi* (shellfish, *Asaphis violascens*), *wiiaau* (snail, *Cymatium muricinum*), and *te ibo* (a seaworm, *Sipunculus indicus*) and *nimataanin* (reef shell). All of these were primarily found along the mudflats and seagrass beds. For Suva, the other species that were collected together with *Anadara* in the area included: *kaidawa* (hard shell clam, *Periglypta puerpera*), *kuku* (mangrove mussel, *Modiolus agripetus*), *drevoua* (moon snail, *Polinices flemingianus*) and *veata* (green sea hare, *Dolabella auricularia*).

Suva fisherwomen usually collected between 1 and 2 kg hr⁻¹ of fishing, with 2 kg hr⁻¹ being the most common (48%). In South Tarawa, CPUE ranged from 1–8 kg hr⁻¹ (Fig. 5). Women fishing along the flats of Eita village achieved the highest CPUE (8 kg hr⁻¹). These women collected approximately three bags (10 kg per bag) per fishing trip and most women sold their catch 6 days a week. Again, the differences could be an indication of the degree of abundances of the species.

The average CPUE in South Tarawa was 3.1 kg hr⁻¹ (Table 2) and the mean catch per fisherwoman was approximately 1087 kg yr⁻¹. Calculations using a mean of 200–400 harvesters per day (Paulay 1995) showed that between 217 and 435 tonnes of *Anadara* were collected per year from South Tarawa's sand flats. Creel survey data from this study also showed that on average, 1 kg of *Anadara* equalled approximately 42 *Anadara* in South Tarawa.

Discussion

As evident from this study, the *Anadara* fishery is important in many Pacific Island countries. Although women's involvement in this fishery has been mainly at the household level, it has recently become more commercialised with catches con-

Table 1. Women's contribution to household income in South Tarawa (N = 97) and Suva (N = 84)

Household income	Rank (%)	
	South Tarawa	Suva
Solely earned by women	61	-
Predominantly earned by women	20	17
Partly earned by women	13	43
Least earned by women	6	40

tributing significantly to household incomes, such as in Kiribati.

Women fishing for *Anadara* were predominantly between the ages of 30 and 39 years, although some women over 50 years of age at Suva Peninsula were frequently seen fishing. These would be mostly married women assisting with household food and income. In South Tarawa, women younger than 50 years of age were predominantly engaged in *Anadara* fishing, although older women were perceived to be more efficient and skilful in collecting *Anadara* because they knew exactly where and when to go. These women have extensive local knowledge relating to the tide, moon phase and cloud cover that are best for certain types of fishing. For many wom-

en, these skills are handed down by their elders and they only pass it on to their descendants. In Fiji, seasonality affects the fishing patterns of some species such as mangrove crabs and *Anadara*, which are targeted on a rotational basis.

More women per household in South Tarawa are engaged in the *Anadara* fishery than in Suva. This may be due to the high unemployment level, the large number of people per household, and the high abundance of *Anadara* in South Tarawa. In South Tarawa, many households rely totally on the *Anadara* fishery to sustain their living. In other households where there was little income, families collected *Anadara* for household protein and purchased other necessities with whatever money they had.

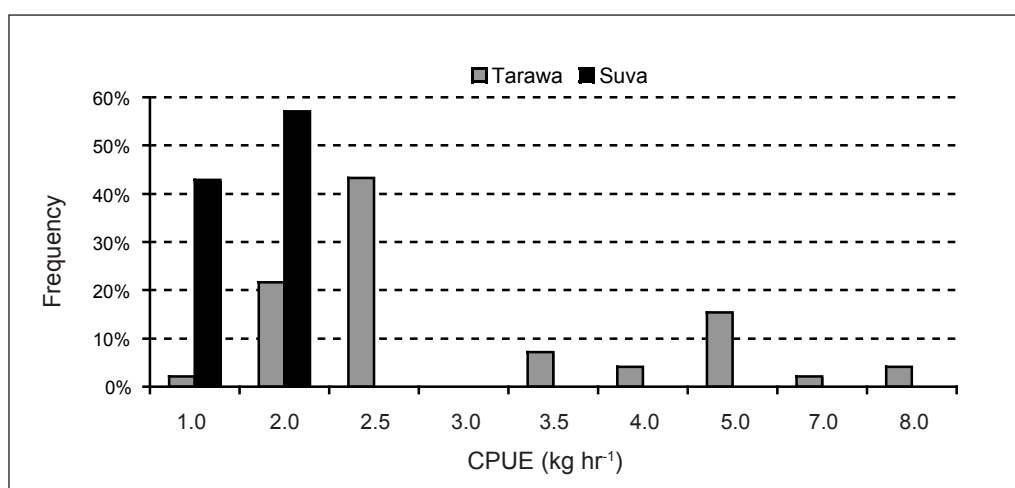


Figure 5. Percentage distribution of catch per unit of effort (CPUE) in kg h⁻¹ for women in South Tarawa and Suva.

Table 2. Summary of *Anadara* catch calculations for both South Tarawa and Suva

Details	South Tarawa	Suva
Average CPUE (kg hr ⁻¹)	3.1	0.6
Average catch per fisherwoman per year	1087	118
Average number of harvesters per day	200–435	5–9
Number of <i>Anadara</i> per kilogram	42	43
Total number of <i>Anadara</i> collected each year	9,331,000–18,705,000	25,327–45,666
Total area covered by creel survey (m ²)	10,000,000	900,000
Relative density of <i>Anadara</i> in the area (ind. m ⁻²)	2.9	2.9
Approximate no. of <i>Anadara</i> in area	29,000,000	2,610,000
Percentage caught per year (%)	32–64.5	1–2

Another important factor that explains how these households are able to sustain a living is the cultural practice of *te kaonoono*. This is a traditional gifting system whereby people give food to family, friends and neighbours and in return receive fish, taro, breadfruit and household items (Vunisea 1996). Usually friends and relatives who are well off give money and basic imported food items such as rice, flour and sugar to their relatives. In unusual circumstances where families are facing great difficulties, they go and ask for money and food from neighbours, friends or relatives. The use of the *Anadara* resource for consumption, sale and trading for other basic goods appears to be prominent among poor families in South Tarawa. The continuing intense harvest of *Anadara* by the local population without any proper monitoring or management may have adverse effects on the sustainability of the *Anadara* fishery.

In many urban Pacific Island communities, one person working is usually economically insufficient to support an entire household, thus women involved in small-scale income generation, such as the *Anadara* fishery, play a crucial role in supporting households.

The predominant *Anadara* consumption pattern in both countries is twice weekly with some households consuming *Anadara* every day. This is particularly true for larger households in South Tarawa. About 77% of the urban households in Kiribati did not have canoes to access the lagoons for other types of fishing, thus shellfish consumption was high compared to the outer islands.

Methods and gear employed by fishers are still very traditional, with minimal impact on surrounding habitats. In Kiribati and Fiji, *Anadara* fishing is strictly confined to the use of bare hands, with no gear used. However, overturning stones and disturbance to seagrass habitats are common when searching for *Anadara* and can cause potential damage to the substrate and other fauna. Several factors may explain the different level of women's participation in the *Anadara* fishery. In terms of fishing effort, women in Suva fished at least once per week (50%). The involvement of women in fishing for other target marine organisms (e.g. mangrove lobsters and crabs) may explain the pattern of *Anadara* fishing in Suva. Likewise, work commitments (at home or through part-time paid jobs) influence fishing effort.

In comparison, fishing in South Tarawa takes place six times a week (46.4%), Sunday being the exception. The reason for the difference in participation is mainly due to opportunities available for women in Kiribati. Unlike Fiji, there are few employment opportunities so women who do not have paid jobs engage in fishing for *Anadara*.

Selling *Anadara* was common in Kiribati. This study found that 56% of respondents in South Tarawa sold *Anadara*, compared with 7% in Suva. About 85% of respondents in South Tarawa sold *Anadara* on a weekly basis, mainly at the Bairiki market. In Suva, it was harvested mainly for home consumption, whereas in South Tarawa, it was for both home consumption and commercial purposes.

In South Tarawa, there is a thriving domestic market for *Anadara*, which includes the selling of cooked *Anadara* at the Bairiki market, especially on government fortnightly paydays. The findings of this study show that 35% of South Tarawa respondents earn AUD 150 per person every fortnight from *Anadara* sales. This amount is equivalent to the average wage of household members in paid jobs. Basic household necessities, school fees and other related items were reported as the most common uses of the income. Sale data for *Anadara* in Fiji is quite different from Kiribati. Fishers in Suva only earn about AUD 60 per fortnight.

Fishers' catches show no significant differences when compared with previous findings. The average CPUE of 3.1 ± 0.179 kg hr⁻¹ (approximately 1048 kg yr⁻¹) for fishers in South Tarawa was within the range estimated by Paulay (1995), who found a CPUE of 8 ± 6 kg hr⁻¹. The creel surveys found a CPUE of 0.6 ± 0.08 kg hr⁻¹, which is equivalent to 118 kg yr⁻¹. Although this is lower than those estimated by Quinn and Davis (1997) who stated it to be 1.1 kg hr⁻¹, these figures are still very similar because the variability was not given. This difference in CPUE results can be attributed to methods employed in the creel surveys, weather, time of the year surveying took place, and the number of people interviewed.

In summary, *Anadara* like other invertebrates collected by women, are usually not seen as fishing activities and so are not enumerated or included in official statistics. This study, however, highlights the vital role such fisheries play in maintaining food security and household income in urban areas in Kiribati and Fiji.

Acknowledgements

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Fishing for *Anadara*: A case study of Ucunivanua village in Verata, Fiji Islands

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Introduction

Pacific Island coastal communities have traditionally obtained the bulk of their protein and income from the sea (Zann and Vuki 2000). They often had no alternative. However, the increase in human population, political instability and the high demand for cash income in recent decades (driven by various socioeconomic factors) has increased the fishing pressure on marine resources.

Several socioeconomic studies of fishing communities in Verata District (Passfield 1997; Vunisea 1996) and other parts of Fiji (Hoffman 2002a, b; Davis et al. 1998; Mathews 1993; Veitayaki 1990) have demonstrated the relationship between the increasing harvesting trend of inshore fisheries (particularly of sessile marine invertebrate) and socioeconomic changes. Passfield (1997) suggested that the lack of information on targeted coastal fisheries, such as *Anadara* clams inhibits opportunities for successfully managing and sustaining local fisheries. *Anadara* clams are found on mudflats.

The *Anadara* fishery continues to be an essential fishery in many coastal villages in Fiji, particularly Ucunivanua in Verata. Although this is primarily a subsistence fishery involving mainly women and children, it has consistently provided for the basic necessities of village households throughout the year. *Anadara* was also the high chief of Verata's food totem and was an important economic resource in the village (Vunisea 1996).

Ucunivanua villagers have expressed concern that due to the increasing number of fishers harvesting *Anadara* clams, and the increasing catches of fishers that are sold and consumed, *Anadara* stocks may be on their way to overexploitation. As a result, the Fiji Department of Environment and the University of the South Pacific (USP) collaborated with the South Pacific Action Committee for Human Ecology and Environment (SPACHEE) and the Biodiversity Conservation Network (BCN) to try and find solutions to managing the fishery. They jointly conducted participatory workshops in the district to create community awareness of the fishery.

Since 1995, the *Anadara* fishery has been the focus of efforts by the Ucunivanua people in trying to manage this fishery for their livelihood. Therefore, this study was undertaken to gather information on the fishery in order to manage it as a valuable source of income and as an important food source. We gathered information on women's participation in the *Anadara* fishery and its importance to villagers' diet. The processing methods used by women were also described. The socioeconomic significance of *Anadara* and approaches to fisheries management was developed in order to address this particular fishery's management issues.

Study area

This study focused on Ucunivanua village, one of the major suppliers of seafood to the Suva market (Rawlinson et al. 1992). It is located in the coastal district of Verata within the province of Tailevu on the eastern shore of Viti Levu (Fig. 1). A primary school is also situated near the village.

Ucunivanua is a prime example of a community with a strong sense of communal activities. The economy is primarily based on fisheries, agriculture and a few formal employment opportunities. There were four small cooperative shops, five fishing boats and four registered licensed fishers with outboard motors in 1999 and these help put the *Anadara* fishery in context. The other types of commercial operations were seaweed farming and middlemen buying fishery products.

Ucunivanua residents have access to the area by an unpaved feeder road leading off from a junction 20 km north of Nausori along the Kings Road. There is a daily bus service from Ucunivanua village to Suva and Nausori markets.

The fishing grounds are shared with other neighbouring villages and districts. The inshore area consists of important habitats, including riverbanks, seagrass beds, mangroves, and fringing and patch reefs. Ucunivanua has an extensive intertidal area enclosed by fringing reefs with patches of mangrove forests lining the shoreline. The intertidal sandflats

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Figure 1. Ucunivanua Village in eastern Viti Levu

are one of the commonly targeted habitats for *Anadara* fishing. *Anadara* is important for subsistence living and increasingly, to generate income.

In 1999, the total resident population of Ucunivanua was 338 (170 males and 168 females) and 68 households. A total of 52 households were interviewed about their involvement in the *Anadara* fishery.

Women's participation in the *Anadara* fishery

Women and school children (under 15) made up 65% of Ucunivanua's total resident population. All respondents interviewed confirmed that women and school children were actively involved in the *Anadara* fishery. It was also established from earlier studies (Vunisea 1996) and from preliminary investigations that all women were prime fishers, targeting marine resources, particularly *Anadara*, in the intertidal areas. Pre-teenaged daughters and young children often accompanied their mother.

Up to four or five women and children per household were involved in collecting shellfish. *Anadara* was collected almost exclusively by women and children (under 15 years of age). School children were encouraged to accompany their mothers and female relatives to help supplement their household income. Elderly women up to the age of 60 also contributed to the household by gleaning for *Anadara* and other marine organisms for their own consumption. Other fisheries resources included sea cucumbers, seaweed, lobsters and octopus. Several sea cucumber species (*Holothuria atra*, *H. scabra* and *Stichopus chloronotus*), giant clams (*Tridacna squamosa*, *T. maxima* and *T. gigas*), various reef fish, lobsters

and octopus, and maiden hair seaweed (*Hypnea* sp.) were also harvested. Fisherwomen, particularly older ones, have extensive local knowledge of intertidal areas.

After gleaning, women process the clams by washing them thoroughly to remove the mud and sand. They are sorted to marketable sizes and the larger *Anadara* are left in tidal pools near the village to soak until market days. The smaller sizes are processed for family and household consumption. The women process *Anadara* by cleaning them and removing the flesh with a knife. The clam meat is then marinated in lemon juice or boiled before consumed. Some are left to dry or are soaked in buckets of seawater for a day before being eaten.

Women were solely responsible for marketing at the Nausori or Suva markets. The *Anadara* were sold in a heap, ranging from 2.0–2.5 kg, for FJD 2.50. Other marine species were also sold with *Anadara*, including seahares, crabs, octopus, seaweed, giant clams, beche-de-mer and fish.

Dietary importance of *Anadara*

Anadara was consumed at least twice a week by each household surveyed: 42% of all households in Ucunivanua consume *Anadara* four times a week. Some households consumed *Anadara* twice a day. *Anadara* were mostly eaten raw after being marinated in lemon juice, or boiled (Table 1). In 35% households, raw *Anadara* marinated in lemon juice (called *kokoda*) was commonly served as either the main meal or side dish. About 42% of households boiled (*vakavuso*) *Anadara* in their shells, while the

other 2% cooked *Anadara* in coconut milk either in their shells or without the shells.

Table 1. Common ways of eating *Anadara* in Ucuivanua (N = 52 households).

Methods	Percentage of households who consume <i>Anadara</i> using a particular cooking method
Marinated in lime juice (<i>kokoda</i>)	35%
Boiled (<i>vakavuso</i>)	42%
Cooked in coconut milk (<i>vakalolo</i>)	23%

Anadara provides a consistent source of protein and iron for Ucuivanua people. The average six-member household consumes approximately 98 *Anadara* per meal (3.1 kg). Based on the nutritional value³ analyzed in this study, the total edible weight was 459 g per meal, with an average daily intake for a household member of 12 g of protein and 17 mg of iron. The annual harvest was estimated at around 364,439 clams, or 16,675 kg for the entire village.

Approximately 40% of Fiji's population suffers from anaemia (Aalbersberg 1991), a disease that is associated with a lack of iron in the blood. Because of this, iron levels were analyzed to find out whether there were sufficient levels of iron found in *Anadara*. The values were high, ranging from 189 mg kg⁻¹ to 255 mg kg⁻¹.

Iron (II) was more soluble in the acidic conditions of the intestine (Coulter 1996). The marinated *Anadara* in lemon juice increased the acidic conditions (pH~6). With the presence of the reducing agent (vitamin C), iron (II) was favoured. This increased the bioavailability of iron to the human body when consumed. These acidic conditions also further reduced the amount of bacteria (*Escherichia coli*) in *Anadara* (Naqasima 1996).

Socioeconomic significance of *Anadara*

A high percentage of those surveyed were living in six-member households. The number of people per household ranged from two to ten. An average family consisted of at least two children (under fifteen years of age), while one in four families had a family member over 60 years of age. In many cases, the number of family members was relatively small because many high school children were away at boarding schools or attending schools in Suva at the time of the survey.

At the household level, *Anadara* was considered by Ucuivanua people as the most reliable fishery, the one that most households depended for basic needs throughout the year. In addition to being the prominent source of protein, it also contributed to about 37% of household incomes.

All households (N = 52) surveyed were engaged in harvesting *Anadara* for subsistence and commercial purposes. The number of people per household engaged in a single fishery was much higher for *Anadara* than for any other fishery in Ucuivanua.

Anadara clams are mainly targeted because they are easily harvested and are available throughout the year. *Anadara* was the only fisheries resource that was consistently harvested and sold in the market each week throughout the year. Although other marine resources such as fish, sea cucumbers, seaweed, lobsters and octopus, are sold in addition to *Anadara*, these are only supplementary because they are caught seasonally.

Another advantage of targeting *Anadara* is the fact they are found in areas that are easily accessible to fishers. *Anadara* are mainly collected using hands and feet.

In 1999, *Anadara* catch levels in Ucuivanua were 1308 kg month⁻¹. The higher catch level of 88 *Anadara* hr⁻¹ fisher⁻¹, in contrast to 61 *Anadara* hr⁻¹ fisher⁻¹ in 1998, could be attributed to the increase in cash and food demand, along with the increase in the social obligations of each household. These factors were mainly driven by villagers' commitments to infrastructure-related developments that took place during that period. There were observed temporal increases in the village population during the studied period because of road development. The road upgrade may have also increased the accessibility of fishers to market their catches in urban markets and along road sides.

The demand for cash income to meet the costs of hosting and catering for workers associated with developments, may have accounted for the observed increase in the income levels. Fortnightly incomes from *Anadara* sales increased from FJD 42.28 in 998, to FJD 57.06 in 1999. Fishing activities tended to be responsive to the household demand, whether it was for cash or for food. Discussions with several prominent fishers revealed that the frequency and intensity of fishing within a week could almost be predicted by social commitments, called *oga*, at the household or village level. The generated income from *Anadara* sales from household surveys in 1999 is presented in Table 2. The majority of households (47%) earned FJD 150–200 in a fortnight from selling *Anadara*.

Table 2. Percentage of households earning income from *Anadara* sales.

Average fortnightly income range (in FJD)	Percentage of households earning income in this range
<50	8%
50–100	10%
100–150	30%
150–200	47%
>200	5%

It was a common practice to identify the amount of money required for the week to meet household needs and additional cash needed for the *oga* before assigning household members to go fishing. Clearly there was pressure on households to earn money to meet its increasing needs. Fishers selling at the market were always under an additional pressure to collect or harvest more. The increase in income from *Anadara* was due to large amounts of *Anadara* collected and sold, and not from changes in selling prices at the markets. Market prices did not change during the study period, but the quantities of *Anadara* collected and sold increased. The proportion of *Anadara* consumed at the household level also increased.

It was evident from the study that the increase in catch levels was dependent on various socio-economic factors such as increase in cash needs of the households and increase in village obligations. The households were also required to contribute cash or food because of increase in development in the village.

The main uses of household income earned from *Anadara* sales are presented in Table 3. Most of the money earned (36%) was used for children's school fees and for buying their stationary. A further 31% of the income earned from selling *Anadara* was used for buying household groceries.

Table 3. Percentage of uses of income earned from *Anadara* sales.

Type of use	Percentage of uses of income
School fees and school stationary	36%
Household needs	31%
Traditional and church obligations	13%
Others (e.g. bus/truck fare, clothes)	20%

Innovative approaches to conservation and management of *Anadara*

A new approach to the conservation and management of inshore fisheries resources included participatory threat assessments by fisherfolk. Participatory threat assessments were carried out in Ucuivanua in 1998 and 1999. Fishers indicated that "overfishing" was a major threat. In particular, *Anadara* fishing, "coral mining" and the "use of fish poison" were identified as major threats. Other dominant activities and issues that were a threat to the productivity and the sustainability of fisheries were increased sedimentation caused by coastal erosion and runoff, and the depletion of mangroves and coastal pollution. The increase in economic demands, increase in the population of the area, indiscriminate burning and logging practices, dumping of domestic and sewage waste into the sea, and changes in diets and social structure were possible explanations.

A series of participatory rural appraisal (PRA) exercises on environmental awareness and biodiversity conservation conducted in Ucuivanua resulted in the development of a community action plan and an integrated resource management plan. The plan addressed specific issues that included banning the use of fish poisons, cutting of mangroves and coral extraction. Goals were also set to stop throwing trash into the sea and improve sanitation in the village by building proper toilets and kitchens for each household. In order to address overfishing, specific areas were set aside as refuges for fish and other marine species.

In this study, more than 90% of respondents were aware that smaller sizes of *Anadara* were being collected compared with the previous year. Women were also collecting fewer *Anadara* while spending more hours looking for them. As a management tool for *Anadara*, the communities established *tabu* areas, a traditional management tool that was usually implemented after the death of a high chief. After the establishment of *tabu* areas, respondents (52%) recommended the establishment of additional *tabu* areas to include other species and adjacent habitats, and to strengthen existing ones. Other recommendations included the imposition of size and catch limits (39%) for vulnerable resources and more awareness (4%). These suggestions were implemented by villagers to ensure the long-term sustainability of the *Anadara* fishery and other coastal resources.

In order to understand the benefits of establishing a *tabu* area, *Anadara* abundances and sizes were monitored in *tabu* areas and harvested areas by village monitoring teams. Monitoring results were discussed with the villagers (through a participatory approach) to help them understand the effective-

ness of *tabu* areas and their use as part of an overall community-based marine management plan (Tawake et al. 2001)

The community-based monitoring approach, applied “scientific concepts” as a tool for measuring the success of the community’s resource management interventions. This was an adaptation from the traditional method of measuring conservation successes. It must be noted that the community-based monitoring approach adopted was specifically sought to help communities routinely measure the effectiveness of *tabu* areas as replenishment zones. The simplified community-oriented nature of the monitoring process used was beneficial in ensuring that the villagers understood the concept of integrating the traditional *tabus* with community-based monitoring adaptive management approaches for the purposes of conserving the *Anadara* fishery.

Summary

Harvesting *Anadara* for sale has provided relatively good returns for the majority of households. One main reasons for villagers’ reliance on this fishery is that the harvesting areas for *Anadara* are easily accessible to fishers during the day. Transportation and fishing equipment (e.g. masks and boats) were either minimal or not required. The usual practice was to walk to the mudflats at low tide and collect *Anadara* by hand.

The reliance on the *Anadara* fishery by the people of Ucuivanua was clearly evident in this study. Fishers needed a source of protein and income. The income supports basic household needs, school fees for students, and village obligations. Village obligations include traditional, church, clothes and bus fares. Our surveys show that more households are engaged in making more food and making a living from the *Anadara* fishery than any other fishery activities.

An innovative approach, using participatory rural appraisals, was used to successfully maintain this fishery as a valuable resource for food and income for Ucuivanua villagers. The community-based approach of developing and implementing a management plan to integrate traditional *tabus* into the fisheries management plan was developed effectively to address villagers’ concerns. The community-based monitoring approach, using scientific concepts of *Anadara* abundances and sizes, was a useful way of helping villagers’ understand the need to conserve this particular resource.

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Good credit risk: Investing in microcredit schemes for women in poor coastal communities to curtail overfishing

Amanda Vincent¹

Overfishing in many of the world's coral reef ecosystems is escalating as coastal populations boom and desperate people go to sea as an occupation of last resort. Conservation groups have tried for years to offset the problem by offering impoverished fishers other means of employment, but most of these efforts fail because of poor social or economic viability. I advocate a different strategy: offering microcredit to women.

Since the 1970s, the Grameen Bank and many other microfinance institutions have enabled millions of people in developing countries to start self-employment projects without collateral or a verifiable credit history. Most of these initiatives focus on women, in part because women are considered a good credit risk and tend to invest their earnings in their families' well-being. Microfinance schemes in impoverished fishing communities should follow suit.

The way it works is this: A woman would apply for a small loan — perhaps as little as USD 20 — to invest in an entrepreneurial venture showing clear potential to reduce her family's fishing effort. She might start a shellfish farm, for example, or buy a pig to slaughter and sell. To improve its chances of qualifying, the activity would also need to lessen the family's dependence on fish for food. Unsustainable fishing will continue unless poor coastal communities find alternative sources of dietary protein; most still rely heavily on seafood.

Besides drawing people away from fishing, I predict that a microfinance initiative directed at women would greatly enhance current conservation efforts in at least three key ways. First, such a scheme would allow women with a strong entrepreneurial spirit to develop projects that respect local ideas,

skills, conditions, and limitations — giving those activities a better chance for success than the current alternatives, most of which depend on external expertise and ignore the costs incurred by outside organizers.

Second, women with higher economic capacity would have a stronger voice in community affairs. In the fishing communities where I work in the central Philippines, women are seldom consulted in the initial planning meetings regarding local ecosystem management, despite their considerable role in both fishing and conservation. The same is true elsewhere. Women in the Pacific islands have told researchers that they remove half the biomass harvested each year, yet their activities are largely ignored in official fisheries statistics and decision-making. Involving women would generate conservation plans that embrace all fishers instead of men only. Empowering women also tends to build community cohesiveness, which often generates other collective efforts to improve resource management.

The third and perhaps most-important payoff from a microfinance initiative for women would be a trend toward smaller families. Experience proves that women with greater economic opportunity have fewer children — a major benefit for coastal communities where population growth overwhelms current conservation efforts.

Initiatives to curb the pressures on marine resources for food and livelihoods while still supporting local communities would be a boon for marine conservation. Such change does not, of course, eliminate the need for distant markets to curb seafood consumption, but it is a significant step in the right direction.

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Fish – A cornerstone of future food security for the Pacific

Johann Bell¹

Source: Islands Business, October 2007. <http://www.islandsbusiness.com>

Maslow has helped us understand that development rarely takes place until people's basic needs — food, shelter and security — have been met.² This lesson must be taken to heart in the Pacific — plans to improve health and education, provide jobs and manage natural resources have to be underpinned by access to nutritious food for all.

This is no easy task. Pacific Island populations are growing rapidly and careful planning is needed to identify how best to provide the food required.

Four programmes at the Secretariat of the Pacific Community (SPC) have joined forces to help Pacific Island countries and territories (PICTs) meet this challenge — Public Health, Statistics and Demography, Coastal Fisheries and Oceanic Fisheries (www.spc.int). The conclusion is that much of the answer lies with fish.

The SPC team identified how much fish should be eaten for a healthy diet, how much fish is being eaten in the region now, and how much fish will be needed for food security in the region in 2030.

The results confirm that the Pacific is still extraordinarily dependent on fish. In many PICTs, fish makes up 70–90% of total animal protein intake. Other important findings were that most of the fish used for food comes from subsistence fishing, and that fish consumption in most PICTs well exceeds the level required for good nutrition (i.e. an average of 35 kg per person per year). The large inland populations of Papua New Guinea are a notable exception — their consumption of fish is meagre due to limited access.

The good news is that Pacific Islanders are eating plenty of fish. The reality is that they have few alternative sources of animal protein. The challenge for national planners, therefore, is to ensure that growing populations continue to have physical, social and economic access to the fish they need. In rural areas, fish needs to be made available in ways that enable households to catch or produce it for them-

selves. In urban centres, it needs to be supplied at affordable prices.

The amount of fish needed by the region in 2030 will be much greater than most people realise (see figure). Another sobering realisation is that even well-managed coastal fisheries cannot produce the fish required. Preliminary analysis shows a huge shortfall between the needs for fish in 2030 and estimated sustainable production from coastal fisheries for 13 of the 22 PICTs. Solomon Islands is a case in point. Sustainable production from the nation's coastal fisheries is not known accurately, but is likely to be in the range of 5000–10,000 tonnes per year. This falls far below the 30,000 tonnes of fish the country will need for food security in 2030.

There is consensus that no further increases in coastal fisheries production are possible for many PICTs, so where will the additional fish come from? Improved access to tuna by rural communities is part of the solution, as is small pond aquaculture. There is more than enough tuna to feed the people of the Pacific for decades to come and, with careful planning and management, the large surplus can continue to be used to contribute to national economies through export-orientated domestic industries and sale of access rights to distant water fishing nations. Distributing the proportion of tuna required for food security to rural communities is the challenge.

A joint project between SPC and NZAID has provided a way forward. The project team modified the design of the moored fish aggregating devices (FADs), commonly used in the region since the early 1980s, to reduce their cost and extend their lifespan. These low-cost moored FADs, designed for inshore waters, are suitable for use by coastal fishing communities. They can be placed close enough to shore so that villagers can paddle to them in canoes, or further offshore where communities can afford to operate skiffs. The FADs aggregate tuna and other large pelagic fish and promise to greatly increase production from subsistence fisheries. Their poten-

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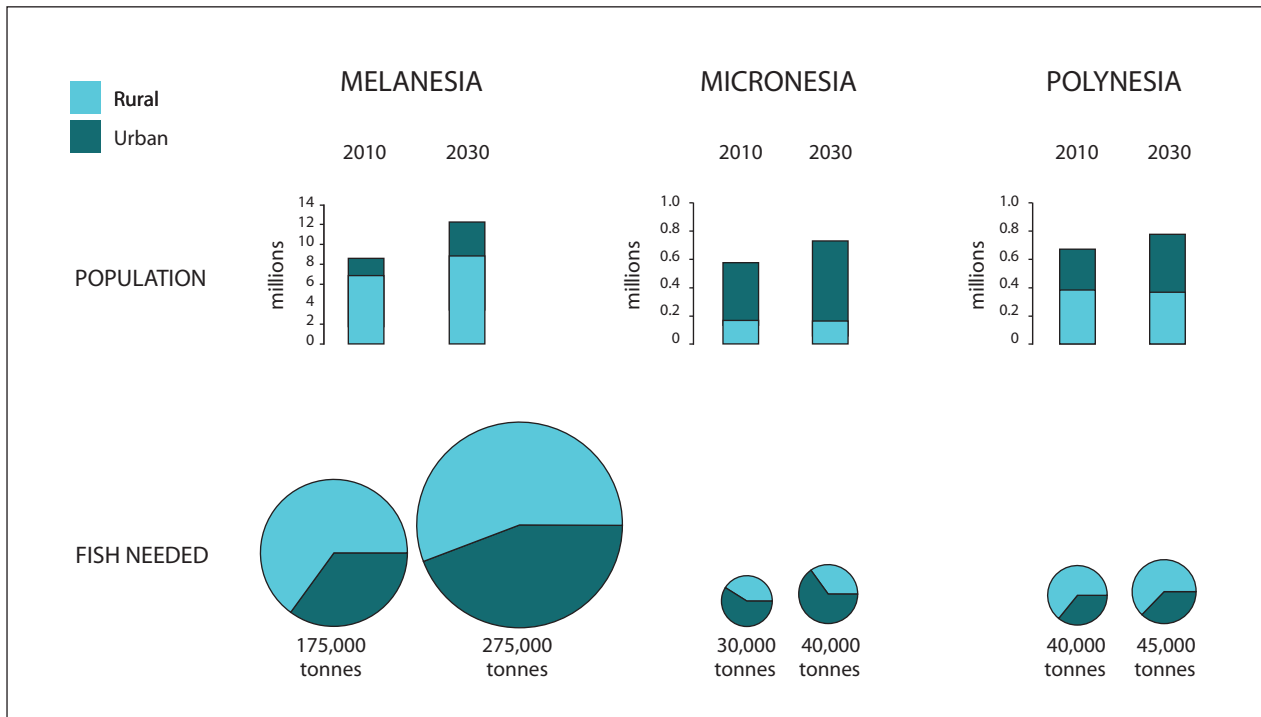
2. See Maslow's Hierarchy of Needs at http://en.wikipedia.org/wiki/Maslow's_hierarchy_of_needs

tial has been confirmed through trials in Niue and Cook Islands, where the gross value of fish harvested exceeded the cost of the FADs by three- to seven-fold.

Nauru is also benefiting from new designs for inshore FADs. The Nearshore Fisheries Development and Training Section at SPC recently helped the Nauru Fisheries and Marine Resources Authority (NFMRA) to deploy seven simple inshore FADs within 500 m of the coast. These FADs, funded by Taiwan/ROC, have innovative mooring systems, using grapnels instead of concrete blocks, and can be deployed from small vessels. SPC also trained local fishermen in mid-water fishing methods and arranged for an Australian boat builder based in Kiribati to teach local fishermen to construct canoes using modern materials and tools. These canoes are suitable for fishing around FADs in reasonable weather.

Charleston Deiye, CEO of NFMRA, reports that all FADs are yielding fish and three have large mixed schools of rainbow runner, skipjack, frigate mackerel, yellowfin tuna and wahoo. "Our fishermen all know the importance of FADs and are very attentive to keeping them in place and making suggestions about improvements," he said.

NFMRA will join staff from SPC and the Forum Fisheries Agency at this year's Conference of the Pacific Community in Apia to make presentations during the special theme on "The future of Pacific fisheries – planning and managing for economic growth, food security, sustainable livelihoods" (http://www.spc.int/AC/conf_V_theme.htm). The theme will not only help PICTs find ways to maximise the contribution of tuna to economic growth, it will also focus on planning the use of fish for food security.



Forecasts of population growth, and the fish needed for food security, for rural and urban areas in the Pacific. (Estimates of fish needed by Melanesia are based on an average annual consumption of 35 kg per person per year, except for inland Papua New Guinea. Estimates for Micronesia and Polynesia are based on current rates of per capita fish consumption.)

The Pacific Islands Marine Protected Area Community¹

Meghan Gombos²

It has been recognized that marine protected area (MPA) managers in the Pacific Islands face a unique set of challenges, including limitations in human and financial resources and isolation from other MPAs. While each MPA has its own strengths and issues, most share the challenge of capacity limitations. They also have in common the great distances between islands that restrict the ability of managers to learn from and apply approaches that have been successful elsewhere. These shared challenges inhibit Pacific Island MPA systems from being as effective as possible. Nevertheless, many people feel the answers to today's challenges can be found in the islands. Traditional marine resource management approaches in the Pacific Islands are thousands of years old. For MPA managers the difficulty lies in building on these traditional approaches while adapting to modern technology and practices. Therefore, to play a successful role in MPA management, traditional and local approaches must be actively fostered, developed, and integrated into current MPA systems.

To address these unique challenges, more than 45 MPA leaders from the Pacific Islands region met in Tumon, Guam from 26–31 August 2005 to discuss their common strengths, challenges, and commitments to work together to support effective MPA management. Meeting participants shared a common vision for a regional coordination network that would strengthen their individual and collective MPA efforts. The group committed to working together in an evolving regional Pacific Islands MPA Community (PIMPAC). PIMPAC is envisioned to be a collaboration of MPA managers, non-governmental organizations, federal, state, and territorial agencies, local communities, and other stakeholders working together to collectively enhance the effective use and management of MPAs in the US Pacific Islands, the Freely Associated States and Fiji.

The implementation of PIMPAC is underway. Specifically, PIMPAC aims to build partnerships among Pacific Island MPA practitioners and to bring sup-

port to the region in order to strengthen MPA planning, development, management, and evaluation efforts and conserving the marine resources of the Pacific Islands. Using these partnerships, PIMPAC has developed a three-year strategic plan that focuses on four main activities:

- 1) training and technical assistance — provided through regional workshops that offer skills building in specific topic areas and on-site technical support to continue more site specific consultations;
- 2) academic institutional capacity building to foster long-term development of MPA management curriculum and internships to build the next generation of MPA leaders;
- 3) information sharing — to spread updates on recent MPA accomplishments, science, and funding or learning opportunities relevant to the region; and
- 4) exchange visits — to foster peer-to-peer learning among MPA managers and gain hands-on experience.

Through collaboration among PIMPAC partners, all of these activities are in progress. The main current focus of PIMPAC training and technical assistance is stakeholder involvement in the development and management of sites, as well as management planning. However, future years will build on this foundation of management planning to provide in-depth technical support in other key MPA topics, such as networking, monitoring, enforcement, outreach, and sustainable funding. PIMPAC activities carried out in 2006 and 2007 include; hiring a co-coordinator to support US National Oceanic and Atmospheric Administration (NOAA) coordination in the Micronesia region, development of a management planning guidebook, a regional training on management planning, on-site management planning technical assistance for seven PIMPAC jurisdictions, development of a website/newsletter/list server, three learning exchanges, and support for seven communications interns.

1. The Pacific Islands Marine Protected Areas Community (PIMPAC) is a collaboration of marine protected area (MPA) managers, non-governmental organizations, local communities, federal, state, and territorial agencies, and other stakeholders working together to collectively enhance the effective use and management of MPAs. PIMPAC serves the US Pacific Islands (American Samoa, Commonwealth of the Northern Mariana Islands, Guam, Hawaii), and the Freely Associated States (Federated States of Micronesia, Republic of Palau, Republic of Marshall Islands), with a strong partnership with Fiji. Specifically, PIMPAC aims to build partnerships among Pacific Island MPA practitioners and to bring support to the region in order to strengthen MPA planning, management, and evaluation efforts and conserving the marine resources of the Pacific Islands.

2. Meghan Gombos is one of the coordinators of PIMPAC and is based in Honolulu, Hawaii. Email: meghan.gombos@noaa.gov

Finally, the efforts of PIMPAC strongly support several national and regional efforts to develop networks of effective MPAs. These efforts include the US Coral Reef Task Force, The US National System of Marine Protected Areas, and the Micronesia Challenge. PIMPAC will continue to coordinate the

implementation and establishment of effectively managed MPA sites to help achieve the goals of these large-scale efforts. Funding for PIMPAC is provided by the NOAA and the US Department of the Interior.

Struggle for life always!

Fisherwomen in Brazil create their own national organization to struggle for their rights, and for life

Náina Pierri¹ and Man Yu Chang²

Source: Yemaya March 2007. <http://www.iscf.net>

In March 2006, fisherwomen of Brazil took an important step towards their organization and mobilization. At the Second National Conference on Fisheries in Brasilia, fisherwomen from different regions of Brazil organized themselves and struggled very successfully to highlight their specific rights. At the end of the conference, an independent national organization called “National Articulation of Fisherwomen in Brazil” was created.

One month later, on 8 and 9 April 2006, the organization had its first meeting in Recife, Pernambuco. In the subsequent month, this newborn organization was accepted as a regular member of the National Council for Fisheries, comprising different interest groups and institutions related to the sector.

During the first term of the administration of President Luiz Inacio Lula da Silva, from 2002 to 2006, two national conferences on aquaculture and fisheries were organized, in September 2003 and March 2006. These conferences were preceded by State-level conferences throughout the country. A national meeting for women workers in fisheries was also organized in December 2004, again preceded by State-level meetings.

The purpose of the conferences and meetings was to provide opportunities to government officials to interact directly with fisherfolk in order to ensure that their situation and demands could be incorporated into specific public policies. At the same time, the conferences were undoubtedly precious opportunities for fishworkers to consolidate their class consciousness and set up their own organizations.

During the three-day events, over 2000 representatives of the sector, from different parts of the country, met and reported on their specific realities, and

defined and discussed their priorities and demands. Fisherwomen delegates were particularly aware that such opportunities were rare, and so they used these conferences as an opportunity to strengthen their consciousness, organization and mobilization, grounded in vision, courage and dignity.

The foundation of the “National Articulation of Fisherwomen in Brazil” was the culmination of a process that had begun at least three years ago, in September 2003, during the First National Conference on Fisheries, when fisherwomen from different parts of the country began to discuss their situation. They realized soon enough that the general conference did not give proper attention to their specific problems, and, therefore, requested the government to organize a national meeting of fisherwomen. The government accepted their demand, and, in the following year, 2004, the First National Meeting of Women Workers in Fisheries was organized, preceded by State-level meetings. Despite the fact that the national meeting was convened by the government, it was very helpful for fisherwomen to voice their demands publicly, in an independent and forceful manner.

When fisherwomen arrived at the Second National General Conference on Fisheries in March 2006, they had already accumulated organizational experience. This made them the group with the highest mobilizing capacity among all participants. They had clearly defined three goals for the conference: 1) to gain a slot in the proceedings schedule for a fisherwoman to deliver a speech at the opening and closing ceremony, to express their specific needs; 2) to change the rules and settings of the conference by adding a clause to ensure that the composition of the permanent presiding table had at least 30 per

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cent women representatives; and 3) to get the General Conference to approve the document finalized at the National Meeting of Women Workers in Fisheries, in 2004, as a way to legitimize their demands of being part of the fisheries class.

A strong demonstration by fisherwomen prior to the opening of the conference called the attention of the organizing committee, and the opportunity was created for a speech to be delivered by a fisherwoman representative during the opening ceremony. The group also succeeded in ensuring that the organizing committee of the conference comprised 30 per cent women. Two hundred signatures were collected for the approval of this change in the general assembly of the conference, a change that was finally approved by all delegates. The group also collected more than 400 signatures in two hours in support of a legislative change that would recognize activities performed by women, related both directly and indirectly to fisheries.

Several activities, both in the pre- and post-harvest sector, are usually performed by women. It was hoped that this project would ensure recognition of this work and confer labor rights on fisherwomen. Following the intense and successful mobilization,

the women's group met one more time and founded the "National Articulation of Fisherwomen in Brazil". The first meeting of this organization took place during 8 and 9 April 2006 in Recife, with the support of the Conselho Pastoral dos Pescadores (CPP), a branch of the Catholic Church committed to social causes. There were around 70 participants.

Fisherwomen discussed the principles and goals of the organization, and defined the first plan of action for the next term. A foundation letter was written, which synthesized the history of the struggle of fisherwomen, expressed their main problems, and established principles and priority demands. The principles highlighted were: solidarity, autonomy, democracy, respect of differences, and respect for the environment. Among the demands prioritized were the valorization of the fisherwomen's identity and their struggle against discrimination and violence of all kinds. The foundation letter ended with the phrase "Struggle for life always!", which synthesized well the spirit of these courageous women founders. The main challenges at present are to increase grassroots participation; promote gender and class consciousness; and strengthen mobilization at local, regional and national levels.



Uncertain future

Women seaweed collectors in the Gulf of Mannar region of Tamil Nadu face an uncertain future

Ramya Rajagopalan¹

Source: Yemaya March 2007. <http://www.iscf.net>

Shanti, a 34-year-old woman from Meenarvarkuppam, a small fishing hamlet on the Kilakarai coast of Ramanathapuram district, Tamil Nadu, India, has been collecting seaweed right from the day she was 10 years old, from the islands in the Gulf of Mannar area. She collects seaweed everyday, except on Fridays, a day designated as a no-collection day by the village leadership. Women from Meenarvarkuppam regularly visit the islands of Appa, Valai, Muli, Musa and Manali.

Earlier, Shanti used to stay on the islands during the peak season — from December to February — and collect seaweed. Now, she goes to the islands using an outboard motor (OBM)-powered *vallam* (plank-built canoe). She goes with about 10 other women, with a man on board to navigate. They leave early in the morning by 6 a.m., cooking and packing their two meals before they set off to sea, and return by 6 p.m.

Like all the other women with her, Shanti collects seaweed with her hands. She uses goggles to protect her eyes. The net is tied to her hip, and metal plates are fixed to her legs to help her keep swimming. She dives up to a depth of 6–7 m to collect seashells and seaweed. She spends eight hours in the water, often in neck-deep waters, with her back bent, collecting seaweeds with her hands. She earns roughly Rs 50–100 (USD 1–2) per day — this is one of the main sources of income for her family of five, which includes her husband and three daughters. Seaweed can be collected for a period of only six months, from October to March, as, during the rest of the year, it is too windy. Even during the seaweed season, collection is not possible when the waters are murky. During the off-season, Shanti catches fish and crabs.

There are about 50 women from the same village who have been collecting seaweed on a regular basis from these islands, earning Rs 50–100 per day. They collect around 500–600 kg of seaweed each day. They also collect molluscs and ornamental shells.

These women are sure they would not like their children to collect seaweed for their livelihoods.

The main species of seaweed collected are *Gelidiella acerosa* and *Sargassum*. These are sold fresh to the trader, who comes and collects it from the village, at a rate of Rs 4 (USD 0.1) per kg in the case of *G. acerosa*, and of Rs 10 (USD 0.2) per kg for *Sargassum*. While *G. acerosa* is available throughout the year, *Sargassum* is available only for a period of three months — October, November and December. The traders collect the seaweeds, dry them and sell them to the two agar-processing companies in Madurai.

The seaweed is collected from the islands closer to Meenavarkuppam. These islands are part of the 21-island chain of the Gulf of Mannar region, which was notified as a National Park (marine protected area) by the Government of Tamil Nadu in 1986, under the Wildlife (Protection) Act (WPA), 1972. The National Park is being managed by the Wildlife Warden, Department of Environment and Forests, Government of Tamil Nadu.

The seaweeds grow only in the shallow waters around the islands. According to the WPA, extraction of any resource from a national park is prohibited. Though the park was declared in 1986, there was no strict implementation of regulations until 2002. It was only in 2002 that people were asked to stop collecting seaweed from the area around the islands.

These islands also form part of the “core” area of the Gulf of Mannar Biosphere Reserve, which was declared in 1989. As part of the management of the biosphere reserve, a United Nations Development Programme (UNDP)-Global Environment Facility (GEF)-Government of India (GOI) project was initiated in 2002, and the Gulf of Mannar Biosphere Reserve Trust (GOMBRT) was set up to handle the management aspects of the biosphere reserve. A number of talks have been organized among scientists working on seaweed, seaweed collectors, trad-

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ers and other related industry groups, to discuss conservation strategies for seaweed through this initiative.

In the Gulf of Mannar region, there are around 5000 women from approximately 25 villages dependent on seaweed collection for their livelihoods. Many of them are part of the Ramnad Fishermen's Union. The sudden restriction on seaweed collection in 2002 had severe implications for these women. Several discussions took place at both the union and village level, and it was decided to regulate collection activities — the method of seaweed collection and the number of days it could be collected. Prior to 2005, for example, seaweed was collected using metal scrapers, considered destructive to their further propagation. In 2006, the union and a number of villages decided to ban collection of seaweeds using metal scrapers. Traders were also asked not to purchase seaweed collected in this fashion.

However, despite these efforts at self-regulation, women seaweed collectors face harassment on a regular basis as seaweed collection around the islands is officially forbidden. They have to pay off local forest guards and rangers if they want to go to collect seaweed.

A joint meeting of seaweed collectors, wholesale merchants, manufacturers of seaweed products (the All India Agar and Alginate Manufacturers Association), research institutes, GOMBRT and the management of the Gulf of Mannar National Park was held on 17 December 2006 in order to discuss some of these issues. The meeting agreed that sea-

weed collection should be avoided in national park areas, that only non-destructive methods of collection should be adopted, and that seaweed collection should be banned in the months of March, April and May, considered the growing season for seaweed, to help in further propagation of seaweeds.

The traders were asked to fix a reasonable price according to the species and quality, and not to purchase immature seaweed and seaweed collected using destructive methods. The GOMBRT was asked to organize women self-help groups (SHGs) for seaweed culture, and to create awareness about the importance of seaweed in maintaining biodiversity.

With the upcoming three-month ban on seaweed collection looming large, women in the community fear they are going to be badly affected, given that seaweed collection is their main source of income and livelihood. In most villages, few options for alternative livelihoods have been provided. Discussions on the viability of culturing *G. acerosa* and *Sargassum* are still going on.

Many issues face the women seaweed collectors in the Gulf of Mannar, including restriction of access to seaweed resources, methods to be used to harvest seaweed in non-destructive ways, closed season, and low market prices. Their future in the only livelihood they have known depends on whether their perspectives are incorporated into the upcoming management plan for the national park and biosphere reserve, and on the manner in which these plans are implemented.



New SPC publication:**Socioeconomics fisheries surveys in Pacific Islands: A manual for the collection of a minimum dataset***by M. Kronen, N. Stacey, P. Holland, F. Magron and M. Power*

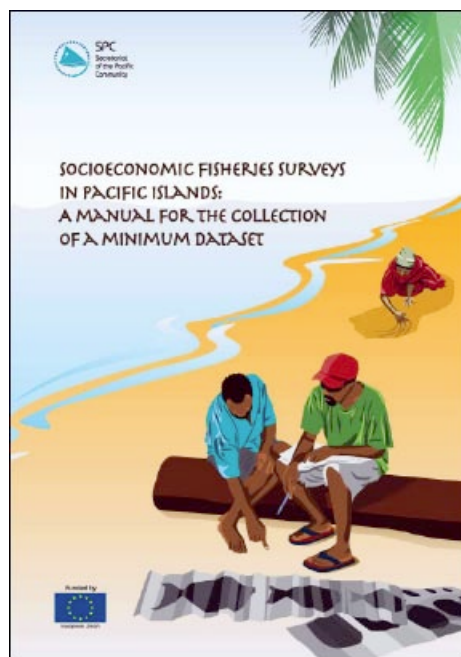
There is growing acceptance in the Pacific Islands region that reef and lagoon fisheries can no longer be managed by focusing on the biology of the stocks and the fishing activity alone. Many other aspects of the local community and its use of the resources also have serious implications for the overall health of coastal marine systems. These aspects include alternative income sources, living costs, access to boat transport and fishing gear, and marketing infrastructure.

Socioeconomic information helps fisheries officers and other coastal resource stakeholders to monitor and manage reef and lagoon resources in their country. The information gathered is also important for making informed decisions about the sustainable use of coastal marine resources. Looking at it from the other side, the (effective) management of coastal resources has equally serious implications for the welfare of the community in terms of food security, income generation, and cultural practices, especially where the fishery is predominantly for subsistence purposes.

Socioeconomic information can help coastal fisheries managers identify potential problems and focus management priorities accordingly. We now know that understanding these aspects of the community is critical for effective resource management. For example, understanding the extent to which the traditional non-monetary exchange system has been replaced by a Western cash economy reveals the importance of the role of fishery resources in maintaining social institutions and thus contributing to social security within a community. Such aspects need to be taken into consideration, for example, when planning to improve income-earning opportunities through improving the marketing infrastructure for coastal fishery products.

This 129-page manual is a guide on how to collect and analyse “socioeconomic” data on reef and lagoon fisheries.

The manual is available for download, in PDF format, from:
http://www.spc.int/coastfish/Fishing/SocioEco_E/SocioEco_E.htm



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