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Introduction

This issue's central theme is pressure on and depletion of marine resources.

Liz Matthews reports on the impacts to corals reefs and associated species in Palau, where a 53-mile coastal road is being cut through forests and mangroves. Numerous secondary activities are resulting in sedimentation, which has flowed downstream onto reef flats. Palau's reefs are also being impacted by coral bleaching (an event in 1998 that killed nearly 90 per cent of the *Acropora* sp. corals on many reefs, and bleached and killed many giant clams as well). In Papua New Guinea, Jeff Kinch reports that human population growth has had, and will continue to have, an increasing effect on marine resource use in the Louisiade Islands. He also notes that with increased shellfish exploitation, bivalve shell morphology changes. He explains that gathering within a population over a period of time produces a consistent mortality of large shell individuals. This, combined with the continual gathering of older, larger-sized individuals is resulting in a general reduction in size range. Thus, the heavier the exploitation, the more dominant the younger age classes will become. An entirely different kind of pressure on marine resources is occuring in the west African nation of Guinea. Peter Lowry from FAO reports that industrial fishing boats made 450 illegal incursions into the nation's coastal waters in 2002. These boats destroy the nets of smaller boats when they drag their heavy industrial nets over them. Vidhisha Samarasekara says that habitat conversion, pollution, and increasing population pressure are wreaking havoc on mangrove forests and causing dramatic declines in fish stocks.

This issue of the bulletin discusses the ways in which communities are dealing with these problems. 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.

Kim Des Rochers

Contents

Women's fishing

Nearshore invertebrates decline as coastal development increases around Palau

by Elizabeth Matthews, Palau Conservation Society

Sea cucumbers, sea urchins, crustaceans, molluscs, anemones and many other invertebrate species are popular food in Palau (Fig. 1). They are collected for family consumption and are sold in local markets. They are also exported around the region. Many of these species are used to supplement diets and income, especially in rural areas. They are often collected by women and children from reef flats, seagrass beds and mangrove areas at low tide. For generations, the collection of nearshore invertebrates offered a secure source of protein and an enjoyable pastime to Palauans. However, many people have become concerned that the invertebrates are not as abundant as they once were. People say that many of their favorite invertebrates are now much harder to find than they were in the past.

There is some regulatory control of harvest for some of the more commercially important species. However, the status and extent of collection of most species remain unmonitored and unregulated. It is possible that some of the species are being harvested too heavily in some areas around Palau.

Evidence of the decline in invertebrates is growing: a biological survey conducted this year, discussions of biodiversity-related issues with local community members, and conservation actions that have occurred at the community level all indicate that the invertebrates are showing signs of stress. Many factors are probably contributing to this decline: especially overharvesting, increased coastal development, and climate-related factors. The invertebrates and their habitats around Babeldaob, Palau's largest island, may be in particular danger since the island is undergoing rapid development. Local efforts to protect some of the species include national laws that: 1) restrict the harvest (i.e. trochus can only be harvested if the season is opened by the national government); 2) set size limits (coconut crabs, mangrove crabs and lobsters have minimum sizes); and 3) ban export (export of non-processed crustaceans is banned). Local communities have also set aside places as conservation areas where all harvest or boat traffic is banned for several years in order to protect fish and invertebrate stocks. These efforts should help species recover. However they have met with limited success. Poorly planned or unmanaged development that damages important nearshore habitats may be undermining such efforts at conservation and management of these species.

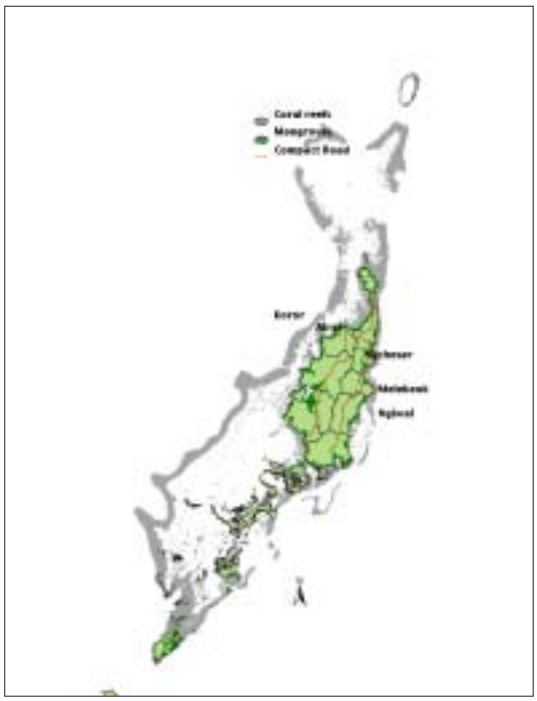


Figure 1. The main Palau islands

Local concerns

In 2002, staff from the Palau Conservation Society conducted interviews in communities throughout Palau to determine the extent of marine and terrestrial resource use and to document local concerns about the future of these resources. These inter-

views were part of Palau's efforts to compile a National Biodiversity Strategy and Action Plan. Declines in fish and invertebrate populations were the most common concerns voiced throughout the country. People from some states were concerned about an overall decline in invertebrates, while others were concerned about particular species. Sea urchins (especially *Tripneustes* sp.), sea cucumbers, land crabs, mangrove crabs, coconut crabs, and mangrove clams were the invertebrates singled out for special concern in many areas.

In Ngchesar state, on the east coast of Babeldaob Island, sea cucumbers were once numerous. Now residents are concerned about declines in the numbers of sea cucumbers, especially *ngimes* (*Stichopus variegatus*). Local women claim that some people collect this sea cucumber in new ways. Previously the women collected the visceral contents by cutting open an animal and throwing the two halves back into the water near where they were collected. They believe that the cut animal will regenerate into two. Now, some women collect the whole animal and they wait until they have finished collecting before they cut them open. By that time, the animals are dead and are unable to regenerate when they are thrown back into the water. The older women of Ngchesar say there are now less sea cucumbers on the reef flats as a result.

Ann Kitalong, who has worked as a biologist in Palau for close to 15 years, conducted a survey of the nearshore invertebrates in Airai state in June 2003. Airai is the southernmost state on Babeldaob Island and is the area where much of the initial development on the island is occurring. She also was concerned about the status of nearshore invertebrates. Recently she worked with two local students to do 49 transects in the prime habitats for giant clams, sea cucumbers, urchins and/or swimming crabs (Figs. 2 and 3). These habitats included mud flats, seagrass beds and fringing reefs. The results are disturbing: the study noted an overall decline in the target species in areas once known as hotspots. The survey team found a few sites that were relatively inaccessible and far away from coastal construction that still had viable sea cucumber or sea urchin populations. Unfortunately, the team found very few live giant clams (*Tridacna* sp.) — although they saw many empty shells — no swimming crabs (two were found outside the study area) and no long-spined urchins (*Diadema setosum*). The team also noted that the seagrass beds in many areas around Airai are looking stressed. Areas that were once healthy meadows of long green seagrasses now look brown, silted, and the blades of the seagrasses are covered with fuzzy algae. Although a full seagrass inventory was not part of Kitalong's study, she noted that there appeared to be less diversity of seagrass, algae and sponges in the areas they surveyed.

While the trochus population seems to be viable as a result of the successful controlled harvest seasons, other species continue to decline despite local efforts at management. For instance, in 1997, a conservation area was set up in Ngiwal on Palau's east coast. One of the goals of the conservation area was to protect the *ibuchel* (sea urchin) from overharvest and to close the area to boat traffic, which is locally believed to have a negative impact on the reef flats. In the five years that the area was closed to fishing, not one urchin was seen during the annual monitoring surveys. Unfortunately it is not known what the current status of urchins is in the area. Residents say they rarely collect urchins in any number anymore.

Figure 2.
Students recording weight of a sea cucumber during an invertebrate survey of Airai state.
Photo: Ann Kitalong

Figure 3.
Sea urchins and cowries measured during the invertebrate survey in Airai.
Photo: Ann Kitalong

Coastal development

Invertebrates are relatively vulnerable to habitat changes — they are sessile and cannot easily find new habitat. Harvesting practices along with increasing threats to the nearshore coastal environment may be combining to endanger the status of many of these invertebrates. All of the areas mentioned in this article (Airai, Melekeok, Ngchesar and Ngiwal) are on Babeldaob Island. Babeldaob is rapidly becoming developed: a 53-mile coastal road is being cut through forests and mangroves in all of Babeldaob's 10 states; the national capital is being relocated from Koror to a hilltop at Melekeok state. Associated with these major projects are nearshore dredging and sand mining; house construction in

sensitive areas within the watersheds; building of smaller access roads; and increased farming along rivers. All of these projects have resulted in sedimentation that has flowed downstream onto reef flats. Landslides that carry sediment onto reefs occur with almost every large rain storm. A study conducted by the Palau International Coral Reef Center, Australian Institute of Marine Science and the University of Guam found that the mud eroded from bare land in Airai is smothering corals and creating a shift in habitat from coral reef to fleshy algae in Airai Bay (Fig. 4).

Figure 4.
Sedimentation smothers the corals in Airai Bay.
Photo: Yimnang Golbuu

The Compact Road is the largest construction project in Micronesia. It is being cut through many sensitive habitats, such as mangroves and forests. Palau's wet climate has created severe difficulties for the contractor building the road. It is currently two years behind schedule, and will not be paved for at least another year.

Other construction activities associated with the road are also contributing to the damage to nearshore areas. Four designated dredge sites around Babeldaob provide fill material for the road. These sites are all located directly offshore. Every other state has at least one dredge area for other uses. Some states also have sand mining operations. Mangroves have been cut and filled for the road as well as for creation of land for buildings such as worker housing. In a non-road related use, mangroves are also used as dumps in many Babeldaob states. They are generally viewed as unimportant, dirty areas that should be reclaimed for more productive uses.

The road will also have future impacts as it increases access to more remote areas. Previously northern Babeldaob was reached only by a three-hour boat ride. Today, even the unpaved road has made it easier to get to the northern part of the island. For instance, Ngiwal state has recently banned the collection of land crabs by non-residents as more and more people are driving to the state to collect the crabs. The residents are afraid that land crabs will be overharvested by people who drive in from elsewhere, collect the crabs, and leave without asking local permission.

Relocation of the national capital will also increase the demand for housing in the states on Babeldaob, especially on the east coast. Impacts of population increases are already being seen in Airai state where the population has almost doubled since 1990, making it one of the fastest growing states in the republic. Forests and mangroves are being cut to make room for housing projects throughout the state. Some people have noticed increasing damage to nearshore habitats from bleach, detergents and other cleaning products that are piped directly out of houses and laundries into streams and mangroves. Local conservationists fear that the environmental damage that is becoming more obvious in Airai will spread northward as the road allows the development to move northward.

Climate impacts

Finally, the climate has also had a devastating impact in the nearshore environment around Palau. The full impacts of the coral bleaching that occurred in 1998 are still being studied. As much as 90 per cent of the *Acropora* sp. corals on many reefs were killed outright by the bleaching event. This has greatly altered the structure of many of the reefs. In addition, giant clams were also bleached and killed. The corals are recovering in many areas, but the reefs are nowhere near as healthy as they were before the bleaching. It is unclear to what extent other environments, such as seagrasses, were affected by the elevated sea surface temperatures that contributed to the coral bleaching.

Conclusion

Nearshore invertebrates are useful indicators of the health of seagrass beds, reef flats and mangroves. Since many are sedentary, they are very susceptible to changes in the local environment, as well as to overharvest. The Airai invertebrate study and observations of people in villages throughout Palau indicate that there is real reason for concern about the status of these once abundant animals. The state governments on Babeldaob are beginning to see the importance of managing land uses in order to protect the nearshore environment. However, to date none of the states has comprehensive land use planning fully in place. Conservation areas and other local efforts to manage and protect nearshore resources from overharvest depend upon such comprehensive land use management programmes. Without control of impacts from pollution, sedimentation, and habitat loss, many positive local conservation efforts will be doomed to failure.

Marine mollusc use among the women of Brooker Island, Louisiade Archipelago, Papua New Guinea

Jeff Kinch[1]

Introduction

Milne Bay Province (MBP), at the far eastern tip of Papua New Guinea (PNG), is dominated geographically by its marine environment. Its maritime area is roughly 110,000 km^2 (Omeri 1991), which makes up approximately 32 per cent of the nation's reef area (Munro 1989). Brooker Island (also called Utian and Nogini) is a small island of just over 400 people located in the west Calvados Chain of the Louisiade Archipelago and is approximately 60 km southwest of the main administration of Bwagaioa on Misima Island. Natural population increase is rapid on Brooker Island, rising approximately 2.5 per cent annually. Currently 40 per cent of the population is under 15 years of age and only 5 per cent are aged 60 and over.

Brooker Islanders use approximately 5000 km^2 of sea territory, which includes a very extensive and diverse marine environment. Their livelihoods, identity and way of life are dependent on the exploitation of this environment. Most people on Brooker Island rely on marine resource harvesting (particularly beche-de-mer), trade, and subsistence agriculture for their food security and livelihoods (Kinch 1999, 2001a, 2002a). The beche-de-mer fishery in MBP, however, is currently showing signs of overharvesting of some species in some locations (Kinch 2002a; Skewes et al. 2002). Brooker territorial waters are also affected. Crop failure also contributes to increased pressure on marine resources: people then turn to marine resource harvesting in order to acquire cash to purchase tradestore staples or to trade with more agriculturally well-endowed islands.

Molluscs or *kubai'*[2] make up a significant part of this exploitation, particularly *limwaiya*, the giant clam species *Tridacna* spp. and *Hippopus* spp. and *sineketa* the blood mouth conch, *Strombus luhuanus*. Little is known about the response of mollusc populations, particularly tropical species, to exploitation by humans. This paper outlines the ecological relationships that Brooker women have with the marine environment and their use of molluscs within it. Although there is a wide variety of molluscs exploited by Brooker women, this paper concentrates on the above-mentioned species only.

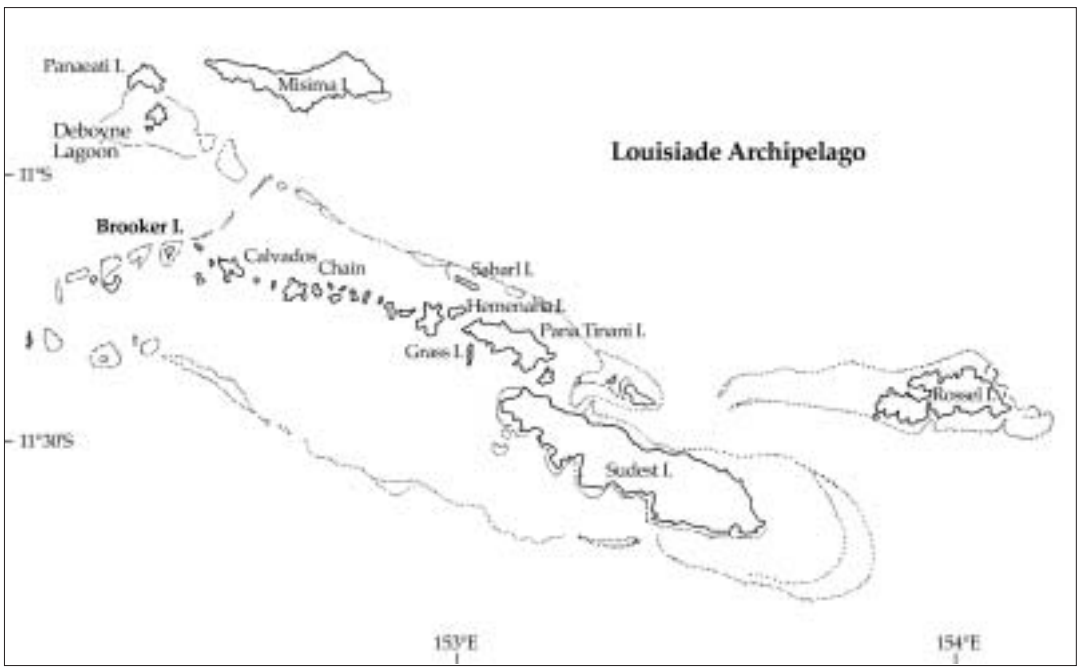


Figure 1. Brooker Island (*source: M. Smaalders*).

1. When this article was written, Jeff Kinch was Community Development and Artisanal Fisheries Specialist for Conservation International, Alotau, Papua New Guinea. He now works for the Marine Aquarium Council. New email: jeffkinch@connect.com.fj
2. *Kubai* is the general term amongst Brooker people for edible molluscs.

Mollusc diversity in Milne Bay Province

Reef communities in PNG are dominated by the following families of molluscs: Arciidae, Strombidae, Tridacnidae, Trochidae, Turbinadae and Conidae. Along rocky shores and mangrove areas the dominant families are Neritidae and Cerithadae (Swadling 1977a, b; Pernetta and Hill 1981; Poraituk 1988).

Milne Bay reef systems are near the epicentre of marine species diversity, an area known as the "Coral Triangle", which contains some of the most biologically diverse and pristine coral reefs, mangrove forests, and seagrass beds in the world (Sekhran and Miller 1994; Piddington et al. 1997; Allen and Werner 1998; Allen et al. 2003a). In 1997 and 2000, Conservation International (CI) conducted two taxonomic surveys in MBP as part of its marine Rapid Appraisal Program (RAP). From these two surveys, 945 species of molluscs were recorded (Wells and Kinch in press). *Coralliophila neritoidea, Drupella cornus, D. ochrostoma, Pyrene turturina, Tridacna squamosa, Turbo petholatus* and *Tectus pyramis* were found to live on or in close association with corals; others, such as *Pedum spondyloidaeum, Lithophaga* sp., *Arca avellana,* and *Tridacna crocea* actually live within the coral. Sandy areas between corals were found to have high numbers of *Rhinoclavis asper.* Five species of the spider shell genus *Lambis* were also recorded, with *L. millepeda* the most predominant (Wells and Kinch, in press). Mangrove and mudflat habitats (important areas for mollusc gathering) were not surveyed and would undoubtedly yield yet more species if they were.

Mollusc use in the Louisiade Archipelago

People of the south coast of PNG have been using molluscs for millennia (see Swadling 1976, 1977a, b). Molluscs are an important source of protein, and parts of them have been used as money, trade, weapons, tools, decoration and ornamentation (Pernetta and Hill 1981).

In the Louisiade Archipelgo, there is a long history of mollusc use for commercial trade and subsistence. For example, when Henry Wickham purchased the Conflict Group in 1896, he employed Papuans to dive for shells, pearls, beche-de-mer and marine sponges (Lewis 1996). Roe (1961) documents "Manila men" pearling fleets at Junet near Sudest Island in 1888, and in the early 1920s several reports of poaching for giant clams (see below) began trickling into the colonial administration (Zimmer 1922-23). During the 1940s, Brooker Islanders gathered shells of customary value for use in the highland areas of Madang and Eastern Highlands Province. At this time, large quantities of cowries, *Cypraea* spp. and *kepu*, pearl shell, *Pinctada margaritifera* were harvested (Toogood, 1947) and this trade continued up until the mid-1950s.

Up until the mid-1990s, Mailu traders from the Central Province were regular visitors to the Louisiade Archipelago, trading for conus shells, which the Mailu use for ceremonial exchange (see Swadling 1994). These visits ceased because local villagers complained that the Mailu visitors were also taking commercially valuable *gunyapu/kival*, *Trochus nilotus* and harvesting giant clams a traditional food source (Heveve 1977; Elimo 1986). The red lip of *Spondylus* sp. is made into *bagi*, which are strings of fine shell discs and used as ceremonial money in mortuary exchanges and the purchase of canoes in MBP. *Bagi* is made in the eastern end of the Louisiade Archipelago (see Armstrong 1924; Liep 1983) and is traded up the archipelago through exchange networks until it reaches the Kula Ring in northern MBP (see Leach and Leach 1983; Damon and Wagner 1989).

Mollusc use at Brooker Island

No specialised technology is used in collecting, gathering and gleaning by Brooker women. Women generally reef glean by walking along the reef flats at low tide, collecting molluscs, invertebrates, small fish, octopus, and lobster as encountered (see Kinch 1999; also Yamelu 1984). Molluscs are extracted from the surface or sediment either by hand, feet or with the aid of a small hand-held digging stick. The commercially valuable molluscs such as *Pinctada margaritifera, Trochus nilotus* and some *Tridacna* spp. are predominately collected by men as they search for beche-de-mer or when found in deep water with women occasionally helping in these activities. Smaller clams such as *Tridacna crocea* and *Hippopus hippopus* are collected opportunistically by women during reef gleaning activities (see Kinch 2001a, b, 2002b).

Molluscs are collected year round but there is recognition of good collecting periods by Brooker women, such as during the day-time low tides in June and July. From data collected during my PhD field research, the frequency of collection coincides with this period or when there is a shortage of fish in the village because the men were away harvesting beche-de-mer. A day or evening of collecting and fishing among women and children provide both a chance to spend hours outside with family, relatives or friends while simultaneously providing nutritious food for the family.

Brooker women have vast knowledge and beliefs associated with many different molluscs and their

habitats. Especially important are the tides and associated wind–current relationships, which help to define access and availability of species[3] as all molluscs have certain food and substrate requirements. The shell species most commonly consumed in Brooker households include the commercially harvested species, including *Tridacna* spp., *Hippopus* spp., *Pinctada margaritifera* and *Trochus nilotus*; and non-commercial shells such as cockles, abalone, oysters (both mangrove and rock), *pwepwet* (unidentified), *wiluwilu* (unidentified), *giambut* (unidentified), *Lambis* spp., *Trochus maculates, Turbo* spp., *Haliotis* spp., *Cypraea* spp., *Cerithium nodulosor, Charonia tritonis, Melo* spp. and *Strombus luhuanus* (Kinch, 1999). *Ovula ovum* and *Cypraea* spp. are used for knifes, *Tridacna* spp. are used as pig troughs and *kabwadau* (unidentified) is used for cleaning and shaping claypots.

***Kabwadau* (unidentified) used for smoothing claypots.**
Photo: Jeff Kinch, 1999

Sineketa — Strombus luhuanus

The Strombid gastropod, *Strombus luhuanus* (Linne 1758) or blood mouth conch, has traditionally been one of the most important molluscs and is still gathered in parts of PNG (see Swadling 1976, 1977a, b; Asigau 1988; Porairuk 1988). Poiner and Catterall's (1988) work in the Central Province shows there has never been a well-developed conservation ethic towards *S. luhuanus* and this is also true for MBP. It has been suggested that because of the biological traits of *S. luhuanus* it is able to maintain recruitment and growth at high densities when exploited by traditional gatherers. Both size and age-dependent burying and the partly subtidal distribution achieve this and provide refugia from human exploitation. The existence of unexploited, adjacent sub-tidal populations and moderate bethnic mobility allows them to migrate over short distances, which also provides a buffer against gathering. *S. luhuanus* also has a pelagic larval period of three to four weeks, which could permit dispersal distances of hundereds of kilometers (see Catterall and Poiner 1987). *S. luhuanus* is found in mix-aged colonies on sand patches of rocky or coral reefs and from the intertidal zone to a depth of ten metres (Swadling 1977b). They breed mainly between the months of August to March (Poiner and Catterall 1988) as do most marine species in the tropics.

During the 2001 stock assessment of sedentary resources, conducted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the National Fisheries Authority (NFA), and Conservation International (CI), 1126 sites were surveyed across MBP (see Skewes et al. 2002; Kinch 2002a). This survey predominately focused on beche-de-mer, but other benthic fauna and substrate conditions were also recorded. *S. luhuanus* numbers were recorded as common (about 50+ per transect[4], >3.2 per m^2) and abundant (200+ per transect, >12.8 per m^2) for areas that Brooker women use. The bottom substrates of fringing reefs for the area of interest for this paper were made up of varying proportions of sand (range 20–100%), live coral boulders (range 1–10%), and rubble (dead coral heads and other coral detritus; range 1–80%). Macro and filamentous algae were present in variable densities (range 1–30%). Areas with high numbers of *S. luhuanus* also had high levels of the seagrass, *Thalassia hemprichii*.

Brooker women collect *S. luhuanus* year round during the day-time and usually on an ebbing tide when the shells are collected by walking and wading. *S. luhuanus* is a major subsistence food and trade item for Brooker Islanders and hundreds or thousands may be collected in one gleaning session. Women and girls are the predominant collectors, although men occasionally help. Only a knife and plastic bag are used. The areas exploited by Brooker women are highly productive as the two examples provided below show: On 16 September 1999, three women were observed gleaning for 1 hr 15 min on the large and extensive sandy reef flats at Manua Island. Within this period they

3. See Appendix for names of species identified by Brooker women
4. On the reef top, a diver swam along a 40 m transect and recorded resource and habitat information 2 m either side of the transect line. On the reef edge, at each site two divers swam adjacent transects perpendicular to the reef edge from the top of the reef edge to a depth of 20 m or a distance of 100 m whichever came first. At each site, substrate was described in terms of the percentage of sand, rubble, consolidated rubble, pavement and live coral. The growth forms and dominant taxa of the live coral component and the percentage cover of all other conspicuous biota such as seagrass and algae was also recorded (see Skewes et al. 2002).

gathered 63.1 kg of *S. luhuanus* or 1753 individual animals. They also collected eight *Lambis* spp. and two *Hippopus hippopus*. The next day, one woman was observed gleaning in the same area for 20 min. She gathered 345 individual animals or 12.4 kg. Catch per unit of effort (CPUE) ranged from 420–1020 animals per hour per person or between 4.2–10.2 kg per person per hour. All *S. luhuanus* collected exhibited mature traits. Mature *S. luhuanus* are thick-lipped with fluting occurring only on the upper whorls.

S. luhuanus reach maturity within two years of settlement, at which time the shell length stabilises at about 40–60mm. Male *S. luhuanus* are usually smaller than females (Abbot 1960). Poiner and Catterall (1988) found that traditional gleaners rarely collect individuals that are buried or are subtidal or less than 30 mm in shell length (approximately one year old). As they grow to maturity, the shells spend less time buried, although even adults spend some time buried (Catterall and Poiner 1987) and the proportion of buried shells frequently increases during adverse weather conditions (Catterall and Poiner 1983, 1987). Brooker women also reject individual *S. luhuanus* below a certain size.

S. luhuanus is processed first by laying them down on the shore and draping them with dried coconut fronds that are then set alight. After this, they are cracked open and threaded onto a stripped midriff of a coconut frond and then smoked. Each strand contains between 45 and 50 individual animals, and is approximately 55–60 cm long. The strands are either be traded or sold at market for 1 kina (approximately USD 0.25). They are eaten as snacks or are cooked in a soup with local greens such as *kalolu*, *Hibiscus manihot* and *aupe*, *Amaranthus dubius*.

Processed *Strombus luhuanus* ready for a snack or for trade.
Photo: Jeff Kinch, 1999

Limwaiya — giant clams

The giant clams, *Tridacna* spp. and *Hippopus* spp. are a major fishery in the Pacific. Their large size, shallow water habitat, and longevity means these species can be rapidly fished out in local areas. Clams are predominantly found on the sheltered sides of fringing reefs, followed by the sheltered sides of barrier reefs, with smaller numbers found on exposed barrier reefs and lagoon reefs, preferring rocky bottoms surrounded by live corals (Allen et al. 2003b).

Commercial fisheries for giant clams developed in MBP in the wake of the reduction of illegal fishing by Taiwanese vessels and in response to sustained demand. The Milne Bay Fisheries Authority, established in 1979 (Munro 1989), began exporting giant clams from the province in 1983 (Lokani and Ada 1998). A ban was placed on purchasing and exporting wild-caught giant clam meat in May 1988 but lifted in May 1995. During the ban, some regeneration of giant clam stocks occurred, which provided an incentive for a local fishing company to commence harvesting and exporting. The ban was reinstated in 2000 when it was found that the local fishing company had infringed on its licensing arrangements (Kinch 2001b, 2002b).

From the 2001 CSIRO/NFA/CI sedentary resources stock assessment, mean densities for species of giant clam in Brooker territorial waters were recorded to be: 0.77/ha for *alitau/kakoama*, *Tridacna gigas;* 10.03/ha for *puapual/pat lagona*, *T. maxima;* 0.58/ha for *malina*, *T. derasa;* 3.52/ha for *baliseya*, *T. squamosa;* 11.54/ha for *pualpual*, *T. crocea* and 4.93/ha for *pwapapwaha*, *Hippopus hippopus* (Kinch 2002). There has been a noticeable decline in giant clam populations by Brooker people in traditional fishing areas (see Kinch 1999) and this has been confirmed by the CSIRO/NFA/CI stock assessment (see Kinch 2002b). Mean densities for *Trochus nilotus* were 9.91/ha and *Pinctada margaritifera* was 0.47/ha.

The low numbers of giant clam species can be attributed to the commercial harvest for the adductor muscle. During my PhD field research, volume of sales were recorded from January to the end of September 1999, where a local fishing company purchased 697 kg of giant clam muscles — mostly *T. gigas* and *T. derasa* — from Brooker Islanders. Total purchases from January to September were broken down into 551 kg (or 1970 clams) of specimens under 400 g earning 3306 kina, and 146 kg (or 170 clams) earning 1460 kina (Kinch 1999, 2001a, b, 2002b). Of this volume, almost one-third of the *T. gigas* were not full-grown adults.

I also conducted a more detailed catch survey from 5 January to 1 May 1999. During this period, 121 trips were recorded where fishers from Brooker Island targeted giant clams, holothurians, and crayfish in the Long/Kosmann Reef area surrounding Nagobi and Nabaina Islands, and the Bramble Haven Group.

These trips were divided into three sub-types depending on the use of vessels and main targeted species. These include:

- Trip type 1: Fishers harvesting holothurians as the main target species, with giant clam taken opportunistically. Fishers operating from sailing canoes. There were a total of 39 trips recorded in this category with an average dive time of 6.8 hrs/trip. The combined total duration for trips of this type was 265.2 hrs.

- Trip type 2: Fishers harvesting lobster and giant clam as the main target species to sell to a local fishing company, with holothurians collected opportunistically. Fishers operating from sailing canoes. There were a total of 37 trips recorded in this category with an average dive time of 10.4 hrs/trip. The combined total duration for trips of this type was 384.1 hrs.

- Trip type 3: Fishers harvesting lobster and giant clam as the main target species, with holothurians collected opportunistically. Fishers using dugout and outrigger canoes launched and picked up from a local fishing vessel. There were a total of 45 trips recorded in this category with an average dive time of 3.9 hrs/trip. The combined total duration for trips of this type was 174.1 hrs.

Catches of all commercial and utilitarian shells were also recorded throughout this period, and the CPUE rates (number of individual animals caught per person per hour) are provided below for each species for three different day trip types. The most commonly harvested species during the first part of 1999 was *Hippopus* spp., which made up the bulk of the species in the unidentified category. These clams are not for commercial sale, but are utilised for subsistence and trade and are mainly collected by women.

Juveniles or subadult giant clams are collected and placed in secret locations or on the foreshore reefs outside village houses where they can be harvested as needed. This is done predominately by both women and girls who collect them during calm weather from the outer reefs. They are placed in shallow lagoon areas where they will grow, and become accessible during bad weather, and as a reserve food source. This has a conservation value, but it is done for subsistence rather than management purposes (Kinch 1999, 2001a,b; Hinton 1982; McLean 1978; Wells 1997).

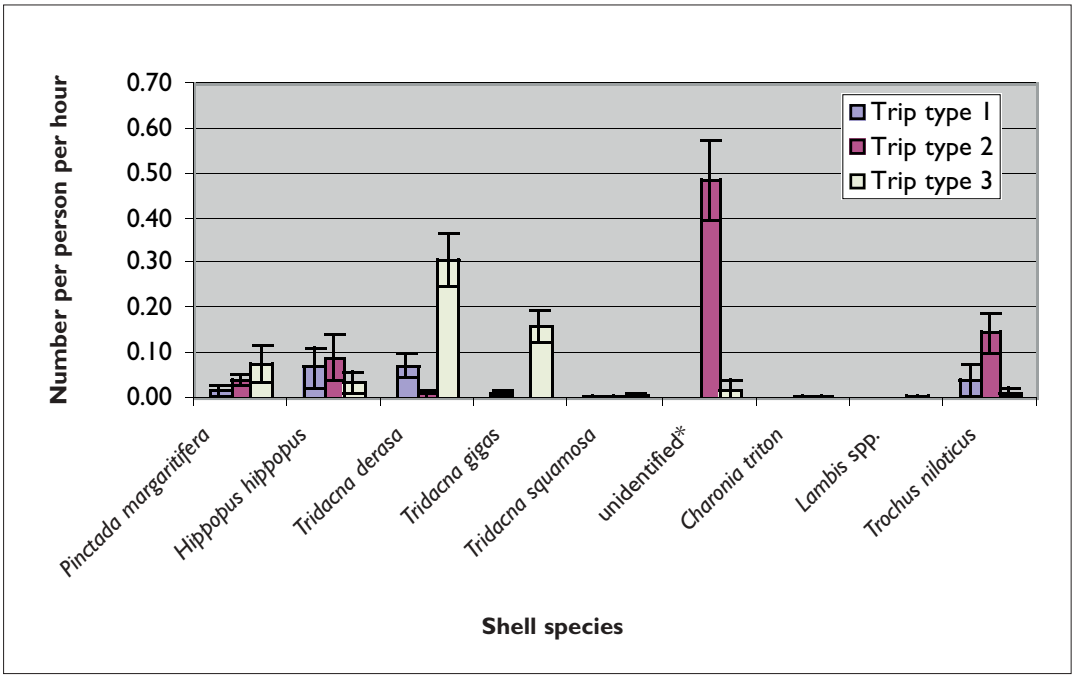
Conclusion

Population growth has had, and will continue to have, an increasing effect on marine resource use. Changes in demographic patterns have resulted in the depletion of molluscs in some areas (see Swadling 1977a, b; Asigau 1988). This has been observed in other parts of MBP at East Cape on the mainland (Sando et al. 2002) and in the Engineer Group of Islands (Lima et al. 2002).

With increased exploitation shell morphology changes because gathering within a population over a period of time produces a consistent mortality of large individuals, which is far higher than usual for a particular species. The size at maturity is also important in relation to the minimum size typically taken by gatherers. If the animals mature at a size significantly smaller than the smallest size typically harvested, then some reproductive potential is conserved within the population. However, if the shells mature at a larger size than the minimum harvested, recruitment overfishing can rapidly follow (see Catterall and Poiner 1987). This combined with the continual gathering of older, larger sized individuals has the effect of inducing a rapid turnover of age classes, resulting in a general reduction in size range, and hence overall shell size of the population. Thus, the heavier the exploita-

Species	Trip type 1		Trip type 2		Trip type 3	
	No	CPUE	No	CPUE	No	CPUE
Pinctada margaritifera	9	0.02	81	0.04	18	0.08
Hippopus hippopus	78	0.07	99	0.09	14	0.04
Tridacna derasa	64	0.07	10	0.01	85	0.31
Tridacna gigas	9	0.01	2	0.00	39	0.16
Tridacna squamosa	4	0.00	3	0.00	3	0.01
Unidentified*	-	-	781	0.49	4	0.02
Charonia tritonis	-	-	5	0.00	1	0.00
Lambis spp	-	-	2	0.00	2	0.00
Trochus niloticus	14	0.04	169	0.15	5	0.01

* Mostly *H. hippopus*.



* *Mostly H. hippopus*

tion, the more dominant the younger age classes will become (Swadling 1976).

From the research carried out by the author, Brooker Islanders have had an impact on *Tridacnid* spp. and *Hippopus* spp. abundances. This is due to the previous commercial harvest but may also be due to selective harvesting; smaller clams are more highly prized for subsistence as these are considered better eating. The trend towards smaller species is also a feature of the ecology of these animals. Once populations are reduced below certain levels, even subsistence fishing may be sufficient to keep populations below recruitment levels (Munro 1993; Kinch 2002b). The impact on *S. luhuanus* has been negligible.

In order to ensure the sustainability of all marine resources, effective management strategies must be implemented. CI has been contracted by the United Nations Development Program to execute the Milne Bay Community-based Coastal and Marine Conservation Program (CMCP). The CMCP constitutes the first large-scale marine conservation and resource management initiative in PNG. It is to be a 10-year programme assisting many coastal and island communities in village-based marine resource management and conservation activities aimed at the betterment of their livelihoods. Strategies to achieve this are assisting communities in the establishment of Locally Managed Marine Areas (LMMAs) (Kinch 2002d). The CMCP needs to take into account that women harvest a great deal of molluscs and other sedentary inshore resources, and retain considerable information on the distribution of these marine resources (Kinch 2001a). Therefore as women are involved in the harvesting of inshore marine resources, they must also be included in any conservation and management activities.

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Appendix: Molluscs identified by Brooker women

Misima name	Family	Scientific name	Etymology
alitau	Tridacnidae	*Tridacna gigas (large)*	tau-man
baliseya	Tridacnidae	*Tridacna squamosa*	-
bololi	Cypraeidae	*Cypraea mauritania*	nil
bubuna	Trochidae	*Trochus lacintus*	bubunama-to be shiny
bunloga	Cypraeidae	*Ovula costellata*	nil
bwagigi talmwalawa	Cymatiidae	*Cassis cornuta*	mwalawa-whistle
bwagigi tautauyoga	Cassidae	*Charonia tritonis*	yoga-call; tau-man
bwanolal	Bursidae	*Tutofa bubo*	nil
datudatu	Volutidae	*Cymbiola rutila* *Aulica flavicans* *Voluyoconus bednalli* *Amoria turneri* *Aulivina vesperitillo*	datu-low tide
dumosi	Strombidae	*Strombus urceus*	nil
dunal	Ovulidae	*Ovula ovum*	nil
ebunol	Gaaleodidae	*Syrinx aruanus*	nil
gabali	Tonnidae	*Tonna galea* *Tonna dolium* *Tonna luteostomo* *Tonna allium* *Tonna cepa* *Tonna perdix*	nil
giambut	Unidentified	-	giam-axe, but-blunt
gigig	Unidentified	-	nil
gigiyoyu*	Camaenidae	*Papuina taumantias* *Megalacron alfredi* *Megalacron boivini* *Megalacron lambei*	gilolu-a slimy substance, spittle
gimbul	Cerithiidae	*Cerithium nodulosor*	nil
gonu	Cypraeidae	*Cyprae testundinaria*	gonu-spotted (once used to make knives)
gunyapu	Trochidae	*Trochus niloticus*	gunina-bottom,yapu-long; kival-nil
kakaoma	Tridacnidae	*Tridacna gigas* (small)	kakoama-steal
halhal	Muricidae	*Thais armigera*	halhal-rough or hard surface
kaboboma	Haliotidae	*Haliotis asisnina* *Haliotis ovina* *Haliotis varia*	nil
kabwadau	Unidentified	Large bivalve	nil
kakanilu	Unidentified	Small venerid bivalve	nil
kalomi	Turbindae	*Turbo petholatus* *Turbo argyrostoma* *Turbo marmoratus* *Turbo crassus* *Turbo setosus* *Turbo spaverius*	nil
kalomi mata yanayana	Turbindae	*Turbo chrysostomus*	matana-eye; yanayana-white
kanenel/kawaliya	Cyraeidae	*Cypraea caputserpentis*	nil
kepu	Pteriidae	*Pinctada margaritifera*	-
kival**	Trochidae	*Trochus niloticus*	nil
kokoyou	Conidae	*Conus leopardus* *Conus litteratus* *Conus betulinus*	nil
lotupa	Potamidadae	*Cerithidea largeillitieri* *Telescopium telescopium* *Terebralia sulcata* *Cerithidea anticipata*	lo-to go down, tupa-to come up against
malina	Tridacnidae	*Tridacna derasa*	-
matahup	Turindae	*Turbo cinereus*	matana-eye, hup-jump in
nevanak	Unidentified	*Spondylus* spp.?	nevanak-women

Misima name	Family	Scientific name	Etymology
onon	Trochidae	*Trochus maculatus*	onon-white
pinyapu	Terbridae	*Tereba* spp. *Dupicaria* spp. *Hastula* spp. *Impages hecitca*	pinin-bottom, the end of something; yapu-long
potokipa	Conidae	*Conus marmoreus*	potokipa-disease like piles
pat lagona	Tridacnidae	*Tridacna maxima*	pat-stone, lagona-wife
puapual	Tridacnidae	*Tridacna crocea*	puan-embed; pat-stone, lagona-wife
pwahapwaha	Tridacnidae	*Hippopus* spp.	pwaha-decay
pwepwet gonugonu	Unidentified	Perriwinkle	pwet-to turn over, gonugonu-black
siki	Strombidae	*Lambis crocata* *Lambis lambis* *Lambis scorpius* *Lambis truncata* *Lambis millepeda*	nil
siki bala	Strombidae	*Lambis chiragra*	sala-tusk
siniketa	Strombidae	*Strombus luhuanus*	ket-red
siyam	Ostridae	Mangrove oyster	nil
siyakal	Unidentified	Large bivalve	-
tamwatamwailu	Cypraeidae	*Cypraea arabica*	tamwatamwayagin-easily freed
tanapat	Trochidae	*Trochus lineatus*	ta-we,na-go, pat-rock
uduudu	Turbindae	*Turbo marmoratus*	nil
veveloga	Nautiladae	*Nautilus pompilius* *Nautilus macrompha* *Nautilus scrobiculatus*	veve-flap
wiluwilu	Unidentified	-	-
yaluman	Volutidae	*Melo broderipi*	yal-bailing/yalu-sail
yaluman bodiman	Volutidae	*Melo umbilicatus*	bodiman-any object used for bailing

* Generic term for snails
** Not used by Brooker people these day due to the practice of "tomati" (see below).

Methodology

Most shells were identified when collected on diving or fishing trips to outer islands, while others were found on the foreshore or as debris in the villages. The names of shells were recorded when encountered. These specimens were used in association with the following reference materials (Hinton no date, 1972) in an identification workshop held on the 26 May 1999. Women who attended this workshop were mainly middle-aged or elderly women. Further consultations were held with knowledgeable women to correct any anomalies.

Language use and orthography

The Misiman language is spoken by approximately 14,000 people who live on the islands of Misima, Panaeati, Panapompom, Kimuta; and Brooker, Motorina, Bagaman, Panuamarla and Kuanak in the West Calvados Chain of the Louisiade Archipelago. From island to island and in some cases from village to village, slight distinctions can be heard in the use of the language (dialects or different "tunes"). Many words also differ from place to place. Reasons for this include isolation, heterogeneous use and the practice of "tomati" where the name of something is changed if it sounds similar to the name of someone who is deceased. Consequently, many mollusc names are specific to Brooker Islanders and not known across the wider Misima District. Misiman vowels are: "a" as in father, "e" as in pet, "i" as in seek, "o" as in corn, and "u" as in lute.

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Women diversify their livelihoods

by Peter Lowrey[1]

Moree, Ghana

The small-scale fishing economy in this community perched on a rocky headland overlooking the Atlantic is as dynamic as any larger economic unit. Any missing link in the production chain – a shortage of fish or wood for the smoking ovens, for example — spurs villagers to brainstorm for a solution and jump to fill the gap.

The following story recounts not only how the community's lateral thinking solved a particular problem, but how it acquired and worked with both local and national allies, setting in motion the momentum for success.

On the happy days when full fishing boats land their cargo on the beaches below Moree, the 60 fishmongers and processors in the women's group gear up for business. They buy all the fish they can afford, carry it up the hill in big tin bowls, gut and clean it, and lay it on racks in the smoking ovens. Wood smoke swirls through the community's alleyways. The product is trucked to Accra, the capital, two hours to the east by road, and elsewhere in Ghana.

Women bid for a limited supply of fish in Moree, Ghana.

Community life is difficult. The men do not always find fish. Women sometimes must travel as far as Nigeria to buy fish to process and sell. During the hungry season from January to May, there is little money to buy food and some villagers get by on two meagre meals a day. Or sometimes on water alone.

Birth of a "brilliant idea"

With firewood for the ovens becoming more and more expensive, the women's group hit on the idea of starting their own woodlot. They approached FAO's Sustainable Fisheries Livelihoods Programme, which matched them up with local government fisheries officer, Yaw Sabah, now a member of the Programme's National Coordinating Unit.

"I thought it was a brilliant idea, but they didn't know about planting and maintaining trees," says Mr Sabah. "So we brought in the necessary expertise."

Women decided to diversify activities by growing not only trees but also food crops such as cassava, shown here being harvested.

Preparing fish for smoking.

1. Information Officer (Peter.Lowrey@fao.org), Food and Agriculture Organization of the United Nations, Focus February 2003

As part of the Programme method, another National Coordinating Unit member, Doris Yeboah, a trained government facilitator, arrived to "take them through the possibilities of what they could do for themselves."

Women work in their wood lot.

Cleaning the rack of a smoking oven.

A woman sells her wares in Moree, Ghana.

Attracting powerful partners

In order to bring about dynamic and sustainable economic development, the Programme encourages community groups to form partnerships with powerful interests for the duration of the project, and beyond. Why not get the village chief involved? The local bank manager? Government extension officers? They all have an interest in the growth of the local economy. "By working together, the groups convinced the chief to release land for the woodlot quickly," notes Emilia Amang, the Programme's national coordinator.

Future plans

Microcredit is proving less successful in Moree. As of late 2002, only 3 out of 20 borrowers had kept up their repayments, while 17 were 5 months in arrears. On the women's behalf, a local politician is pushing the project to forgive the loans and start afresh. "Fishing was bad this year," the women say.

However, the women will soon have new sources of revenue. They have planted cassava, pepper, maize, cowpea, plantain and mango between their trees. The fast-growing acacias are now eight-metres high and ready for cutting in 2003.

"When ocean fishing is bad, we dream of finding a reliable supply of fish," says Elisabeth Bentum, the group's financial secretary. "And we want a day-care centre for the children for when we have to travel in search of fish. Most of our relatives are also fishmongers, so we have nowhere to leave our children. If we leave them with an elder child, then that child can't go to school."

And the men of Moree? They are supportive and have helped with land preparation and tree planting. But they have not proved as flexible in their choice of livelihoods as their womenfolk.

"Men prefer to stick to fishing," admits Nana Kodwo Mensa-Bonsu II, Moree's chief fisherman. "They'll go and fish elsewhere rather than try something like farming."

Note

All photos by D. Minkoh/FAO. All six shots were taken in Moree, Ghana.

Socioeconomic status of fishing communities

Seaweed: A promising option for women's small business development in the Pacific region

by Dr Irene Novaczek[1]

In Fiji, Vanuatu and Papua New Guinea there are women engaged in turning a locally abundant but underutilised resource — marine plants — into saleable market products. I came to the South Pacific region in 1999 as a marine botanist to work on a fisheries post-harvest project at USP, funded by Canada-South Pacific Ocean Development. As I travelled around the Pacific Islands performing a needs assessment for the project, I noted that although sea plants were frequently used as medicines in Asia and Southeast Asia, they were rarely used by Pacific Island herbalists engaged in rural health care. Outside of Fiji, where a half a dozen species are eaten and sold in the market, there is also relatively little use of seaweeds as food. Although seaweeds are prized as valuable organic fertilizers for home gardens in other parts of the world, this use is not evident in the Pacific.

To ignore the value of local marine plants is to miss out on many opportunities. Marine plants have been used traditionally as medicine in many parts of the world, and according to recent scientific findings, many diseases and health conditions may be prevented or alleviated through the use of these plants. One can expect different sea plant preparations to be useful for basic home first aid (constipation, diarrhoea, cuts and burns). There are also published studies that indicate that sea plant extracts can be used as preventative medicine for heart disease, cancer, high blood pressure, obesity, diabetes and viral infections, and can strengthen the immune system generally. There is folkloric information on the use of sea plant extracts for lung conditions, colds and flu, and sexual dysfunction. Some sea plant extracts have potential for prevention and/or treatment of some viral infections (dengue, HIV) and parasites (malaria). Others have been clinically proven as effective ingredients in skin care products. Finally, sea plants are a source of vitamins and minerals, especially micronutrients.

Marine plants would therefore appear to be a valuable resource, especially for food on atolls where agriculture is difficult, and for preventative health care on small islands where access to western medicine is limited. Small businesses based on the careful harvesting and value-added processing of marine plants is a development option that has received scant attention, yet has great potential both for domestic and export markets. There is a vibrant and expanding international market for marine plants as health food and also as ingredients in fine cosmetics and health spa treatments. Although exporting sea plant products may be uneconomical for many small Pacific Island businesses, there are clearly opportunities to provide products and services to tourists, thus "exporting" the products without having to worry about transportation costs and trade restrictions.

In 2001 and 2002, I worked in the Pacific region developing and delivering training workshops on the use of sea plants for food, agriculture enhancement, medicine and income generation. Village people, NGO staff and government staff were introduced to the various uses of sea plants in the course of two workshops in 2001. In 2002, I developed three booklets that were published. "Sea Plants" is an overview of how to find, harvest and use marine plants. "A Guide to the

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Common Edible and Medicinal Sea Plants of the Pacific Islands" provides pictures, descriptions and other information on 34 genera of tropical seaweeds. "Sea Vegetable Recipes for the Pacific Islands" includes recipes for a wide array of sweet and savory dishes that can be used for family food or market products. These booklets are available from SPC offices and from the Marine Studies Program at USP.

In 2002, I received the Canadian Bureau for International Education's Professional Leadership Award, which allowed me to spend two months in the Pacific region, based at USP, delivering a series of three workshops. With assistance from UNDP, a workshop was developed with the explicit aim of providing information, skills and support to selected women who might develop a small business. Seven trainees from Papua New Guinea, Solomon Islands, Vanuatu, Samoa and Kiribati worked with myself and several Fijian trainees at USP. Most of the trainees were traditional healers. One was a seaweed farmer and one already had a small business in herbal cosmetics. The response of these women to information on sea plants was strong and positive.

Alice Athy in Vanuatu now has a vibrant business, with natural therapy clinics in Port Vila and Santo employing more than 10 people. Another trainee, Liviana Madanavatui, has a successful small business in Suva, Fiji, selling sea plant-based cosmetics, tonics and other preparations. Minnie Bate in PNG has developed a seaplant product line to add to her existing herbal business. These preliminary efforts have proven that women who have the entrepreneurial spirit can be effectively trained to develop or diversify small businesses using underutilised sea plant resources. The start-up capital requirements are minimal and the women report positive satisfaction with being able to produce and sell products that are beneficial to people's health.

Other trainees are still in the early stages of business development; most require follow-up assistance. Similarly, workshops targeting women in villages, fisheries officers and NGO staff have borne fewer tangible results in terms of stimulating local economic development or improved health care. This is because most people do not have the energy and ambition required to be an entrepreneur, or the gift to be a healer. However, with follow up assistance from NGOs and government extension officers, coastal villagers could benefit from diversification of their food sources, home remedies for simple ailments, and from the use of sea plants to improve the yields from gardens. With this in mind, Foundation for Peoples of the South Pacific International has developed a project proposal that, if funded, will allow them to carry on with the support of the existing trainees, the training of more prospective entrepreneurs and the extension of basic information into coastal villages.

I am also interested in working with Atoll Seaweed Company in Kiribati, with the Department of Fisheries in Fiji, and with the Rural Fishing Enterprise Project in Solomon Islands. In each case the agencies are working with communities to grow seaweeds commercially. Communities engaged in seaweed cultivation should examine their options for capitalising on this resource through local processing and use; for example, the manufacture of cosmetics, health products and agricultural aids.

Because sea plants are available for free to coastal herbalists and mothers who traditionally look after family health, their use should be optimised. Although trainees are reporting much success in their own practices, there is a need for scientific research into the applications of the types of simple extracts that rural women can produce using just a cooking pot and fire. I am currently working to bring together an international research team to do detailed studies. If funding support is forthcoming, commonly available sea plants can be screened for medicinal properties to determine which species are most effective for different conditions. These would then be tested in a clinical setting. With this information in hand there would be sound scientific backing for recommending which species women should use for home and community health care, and at what concentration or frequency.

Wattsia mossambicus
Artwork: Les Hata. © SPC

When fishing grounds are closed: Developing alternative livelihoods for fishing communities

by Marion Howard

Source: Marine Protected Area News

Closure of customary fishing grounds, whether for fisheries management or as part of an MPA, can strain coastal communities. Fishers, processors, and other workers dependent on fisheries for income may find few options for other employment, particularly in remote, rural areas. When prospects for alternative employment are limited, fishing-dependent communities can suffer economic hardships, including unemployment and outward migration. In areas with little or no enforcement, fishers may be tempted to resume fishing within the closures.

It may be in the interest of governments and MPA proponents to help ensure there are alternative livelihoods available for displaced fishers. But developing viable employment options is more easily said than done. To illustrate some of the factors and potential strategies involved, MPA News this month examines three alternative livelihood programs for fishers, each with different circumstances and challenges.

Atlantic Canada: Massive adjustment to cod closures

The cod fishery off the Atlantic coast of Canada, once the emblem of the maritime culture in Canada's eastern provinces, is a shadow of its former self. Overfishing and other factors depleted cod stocks to the point of collapse in the early 1990s. Despite stringent conservation measures adopted since then, cod populations remain close to the lowest ever recorded in Atlantic Canada.

As stocks have declined, so have prospects for cod fishermen. The Canadian government placed a moratorium on cod fishing in 1992, throwing 40,000 fishermen and fish plant workers in Atlantic Canada out of work. Although the fishery was partially re-opened in the mid-1990s, this April the government re-closed three of the four open stocks indefinitely. Compared to the height of cod fishing decades ago when 800,000 metric tons/year were harvested, this year's quota for the remaining open stock — off the south coast of Newfoundland — is 15,000 metric tons.

In announcing the most-recent cod closures, which are expected to impact about 3000 fishers and plant workers, the Canadian government allotted CAD 44 million (USD 31 million) in community-based economic development assistance, targeted to provide short-term employment for affected workers and ensure they can qualify for unemployment benefits over the next two years. This is the latest installment in what has been a CAD 4 billion (USD 2.8 billion) effort overall by the federal government since 1992 to help fishers and plant workers adjust to cod closures. This massive effort has featured an array of initiatives including license buyouts, income support, skills training, relocation, and assistance programs for economic diversification. While this has occurred, the federal government has also overseen a major expansion of existing crab and shrimp fisheries in the region, fueled primarily by a boom in these stocks' resource base and improved market conditions in the US and Japan, particularly for crab. Because of this, the government has been able to alleviate some, though not all, of the pain associated with the cod closures by allowing additional access to these alternative resources. Despite the shellfish boom, the total of registered fishers in Newfoundland and Labrador, the province hardest hit by the cod collapse, still dropped 44% from 1991-2002.

Impacts of the above initiatives are evident. Tourism — a major focus of government development assistance — is making a growing contribution to the Newfoundland and Labrador economy, attributable to a mix of product development, training, and advertising campaigns highlighting the cultural, historical, and environmental features of the province. From 1992 to 2002, the number of visitors to the province increased 40%, and related expenditures more than doubled to CAD 300 million (USD 210 million) annually. Meanwhile, shellfish has become the foundation of the Newfoundland and Labrador fishery, accounting for 82% of the total landed value. Crab catches were four times higher in 2001 than 1990, and shrimp catches were three times higher.

Doug Burgess is the Newfoundland and Labrador director of public affairs with the Atlantic Canada Opportunities Agency (ACOA), the federal agency responsible for providing economic development assistance to Atlantic Canada. He says the growth in tourism is at least as much because of local ini-

tiative as government funding. "To say that the changes have come about because the government threw a lot of money at the problem would be unfair," he says. "The people who have chosen to remain here [in Newfoundland and Labrador] have shown the initiative to come up with successful projects." ACOA field staff and account managers work with community organizations to identify opportunities for the creation of alternative employment and to develop sustainable local economies.

The shifts in the provincial economy have not been seamless, says Burgess. There has been a net outward migration of 40,000 people from Newfoundland and Labrador since the 1992 moratorium. While there are success stories, certain areas of the province have lost up to 30% of their population, and unemployment remains high in many fishing-dependent areas, he says.

There are also signs that the crab fishery, which once welcomed cod fishermen, is reaching its limit: the crab quota in some parts of Labrador this year was cut by 40% compared to last year. (Shrimp harvests remain strong: the Canadian Department of Fisheries and Oceans increased the Atlantic Canada shrimp quota this year by 29% to 152,000 metric tonnes, and allocated some of the quota increase for the direct benefit of those affected by reductions in cod and crab.)

Burgess says that dealing with this decade of cod closures - what he terms the largest industrial adjustment in Canada's history — has provided lessons to ACOA, particularly in terms of interacting with community organizations. "Governments need to be patient when dealing with community volunteer groups," he says. "You're dealing with a dramatic transition out of a well-established industry with a particular set of skills into other industries or projects, often requiring whole new skill sets." Burgess says that by organizing programs involving multiple communities, rather than addressing each community individually, development agencies can take advantage of opportunities for collective strength. He cites one peninsula particularly hard hit by the cod closures where several communities have teamed successfully to organize and promote a historic heritage trail and related tourist attractions.

A fundamental part of ACOA's work has been to foster a culture of entrepreneurship in Newfoundland and Labrador, which Burgess says is not a traditional part of the provincial psyche. "Fishing and fishing-plant work had been so labour-intensive, there was always an opportunity to find an existing job close to home," he says.

Komodo National Park: Transforming the live reef fish trade

In Indonesia, more than 20,000 people live in communities in and around the coral-laden Komodo National Park (KNP). Largely dependent on marine resources for their food and income, these residents will be affected by the planned implementation of no-fishing zones in the 1817-km^2 park. Although impacts of the new zoning plan will be mediated by use zones and exclusive use rights, those local fishers who depend on reefs inside the park will experience losses, particularly over the short term. Fishers who engage in illegal fishing practices - such as the use of explosives to kill fish (blast fishing) and the use of cyanide to stun and capture fish for the lucrative live reef fish trade based in Hong Kong — have been curbed in recent years by an effective enforcement and awareness program, although these practices remain a threat and could increase again if enforcement were reduced.

To lower dependency on reef fishing among the surrounding communities, the park is working to identify and promote alternative livelihoods in conjunction with The Nature Conservancy (TNC), a US-based NGO. To draw fishers away from the reefs, KNP and TNC have developed a pelagic fishery in the relatively unfished deep waters of the park, deploying six fish-aggregating devices (wooden rafts anchored to the seafloor) to attract skipjacks and yellowfin tuna. They have also worked to foster a local seaweed farming industry. Of the livelihood projects pursued so far, however, the most capital-intensive has been the development of a fish-culture system. In addition to providing local residents with an alternative livelihood, a goal of the mariculture project is to help transform the live reef fish trade - a scourge of Southeast Asian reefs in general - from its unsustainable and capture-based structure to one that is sustainable and culture-based, thereby protecting wild populations.

The mariculture project is still under development, but here is how it will work. The project is based on a "full-cycle" culture: captive broodstocks of grouper and snapper will spawn in a hatchery and the fertilized eggs will be collected. Larvae will be reared and, when they reach fingerling size, be transferred to village-run sea cages to grow out. Once they are of marketable size, the fish will be returned to the hatchery to be marketed to Hong Kong. A percentage of the revenue from fish sales will go to the villages and the remainder will be reinvested in the project to fund continued operation of the hatchery. Villages will be given the opportunity to operate the grow-out units as inde-

pendent businesses after paying back the project for capital investments (i.e. the grow-out cages).

The hatchery has already been built, and a first small batch of fingerlings has been produced. According to Trevor Meyer and Sudaryanto, TNC field staffers who are developing the mariculture project, significant quantities of fingerlings may be transferred to experimental grow-out units in September. They estimate that once the fish-culture industry is established and the existing hatchery upscaled as planned, the project and its associated grow-out units will employ more than 200 local people. If replicated at other sites along Indonesia's 95,000-km coastline, the concepts developed in Komodo would provide livelihoods to many more people and greatly increase the contribution of cultured fish to the Hong Kong market.

"It should be understood that this alternative livelihood project does not exclusively target fishers involved in the live reef fish trade," says Peter Mous, a TNC scientist who helped start the project. Although villages with high rates of destructive fishing practices will be among those selected first to participate in the project, any fisher in the Komodo area who is willing to commit to fish culture will be welcome to participate. "It is unlikely that the revenue of fish culture workers will be equal to or higher than the money that is made by cyanide or blast fishers who work pristine reefs - this would be like expecting drug traffickers to stop their practice by offering them a job at a supermarket," says Mous. "Rather, the project hopes to offer a sustainable livelihood that compares favorably to other occupations in the area, including fishing by legal means."

The project has faced challenges. The main one so far has been to optimize juvenile fish production in the hatchery. Compared to other fish species, there are relatively few clearly defined production techniques for grouper and snapper aquaculture, says Sudaryanto, and survival rates of grouper and snapper juveniles can be extremely variable. To address this, the project has hired experienced aquaculture personnel and maintained a number of strategic partnerships with relevant research centers that have expertise in the field of grouper culture.

One concern faced by nearly all fish aquaculture initiatives is the threat of disease transmission in captive populations. "The main precaution against stress and disease is to keep the densities low," says Sudaryanto. "We will develop a set of best practices and standard operating procedures to that effect." Another concern: the potential for the grow-out units to be misappropriated for raising wild-caught fish, although Mous suggests this will not be a major problem. "It is expected that the hatchery will become a much more constant source of fingerlings in terms of quantity and quality, so it is unlikely that grow-out of captured juveniles will become much of an issue," he says.

It is not guaranteed that even the employees of the grow-out units will refrain from engaging in destructive fishing practices in their free time, away from the project. "As far as illegal fishing in the park is concerned, we do not rely exclusively on alternative livelihood projects to address this problem," says Mous. "Our alternative livelihood projects are part of a more comprehensive program that includes modules on park planning and financing, outreach, and surveillance. We think that all of these modules together achieve conservation success, whereas none of these modules would achieve much if implemented in isolation."

CORDIO, Indian Ocean: Producing for local market

Alternative livelihoods for fishers may become necessary when fisheries are degraded and no longer productive, whether or not formal closures are instituted.

CORDIO, an international program created to address coral reef degradation in the Indian Ocean, is working to mitigate the impacts of coral bleaching through, among other efforts, the development of alternative livelihoods for coral-dependent communities. These alternatives, designed to reduce pressure on reefs, also aim to help human communities avoid economic dislocation in the event of mass coral bleaching. The program is funded by Sida (Swedish International Cooperative Development Agency), the World Bank, IUCN, WWF, and the governments of Finland and the Netherlands.

Olof Linden, a biologist at the University of Kalmar (Sweden), serves as a coordinator of the program. "We are dealing in reality with coastal communities and their struggle to survive on what is produced locally," says Linden. "We have been involved, for example, in developing alternative livelihoods for communities on the Tuticorn coast, India. There, families cannot survive any longer on fishing alone, so activities under CORDIO have helped to develop aquaculture, post-harvest processing (to increase the value of fisheries products), and various composting activities for the production of fertile soils for agriculture."

Because of the breadth of the program's focus — the entire Indian Ocean — the feasibility of poten-

tial livelihoods may differ widely among communities within the program area. CORDIO is developing aquaculture for aquarium fish in Sri Lanka, and for crab, fish, and prawn in East African mangrove areas. Seaweed farming has also been successful as an alternative livelihood in East Africa, but has been a bust in South Asia, where growing conditions are different and there is no traditional market for the product.

David Obura, director of CORDIO's East African operations, says the main challenge facing the program is to establish a context for developing livelihoods that reflects the culture and resources of the target community. "CORDIO has worked with an education and training center called KWETU in Mombasa [Kenya] where we have tried to motivate local fishers to develop mangrove crab culture in pens in the mangroves, rather than relying on wild-caught crab," says Obura. "To match their resources, we have intentionally not used high-protein feed such as fish and meat that needs to be transported from local butcheries, commercial fish markets, etc. Instead, we have tried to rely on local trash food."

Unfortunately, the local food source for the crabs has not been in high enough supply or of sufficient protein richness to stimulate the rapid growth rates that cultured crabs can attain, says Obura. "Another setback has been that the fishermen with whom we work, while well-skilled at catching and maintaining crabs and observing how they are growing, are not experimentally minded enough and do not adapt quickly to problems," he says. "They will observe crabs fighting and breaking each other's claws off without visualizing solutions such as isolating the crabs somehow or binding their claws."

This highlights the importance of interaction between researchers/technicians and local resource users for identifying real alternatives. "The challenge is to find the right specialist, who may need more skills in public relations and adaptive management than in specialist science," says Obura. Relating to resource users is key, particularly in situations where there may be community suspicion of the intentions and motivations of an "outsider" program like CORDIO. "The local political dimension is perhaps the biggest wild card in our work," he says.

For many communities near coral reefs, dive and snorkel tourism is an option as a livelihood. Linden says CORDIO encourages communities to get involved in the tourism industry. "Tourism will develop whether we like it or not," he says. "We might as well try to develop forms of tourism in such a way that the negative effects are minimized."

Obura notes that tourism has been around for so long in the Indian Ocean that many of the local communities are already involved in it in some way. "Many fishers take to guiding tourists on the reefs if they get the chance, as the returns are higher than for fishing, but the work is highly seasonal and their boats don't often stay in good enough condition for very long," he says. "For alternative livelihoods, I operate a policy of "produce for the local market" rather than over-dependence on tourism, particularly in a place like Kenya, where the tourism market is so volatile." The projects in which Obura invests CORDIO time all relate to local or near-market consumption. The food produced in part to protect the nearby reef may also be retained within the household for protein.

Obura says the term "alternative" should not imply a complete switch from one livelihood activity to another, but rather the ability to adopt multiple alternatives or options. "Diversifying household income and food security rather than depending on single activities is perhaps the best way for the poor to withstand shocks and unpredictable events," he says.

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Partners in mutual trust: Globalisation has opened up new opportunities, but it has also undermined many women's economic independence

by Modesta Medard[1]

Source: *Samudra* March 2003

The process of globalisation in fisheries is transforming the structure of markets and gender relationships. Social, political and economic processes now operate locally and globally. Women in the Kagera Region of Lake Victoria, in northwestern Tanzania, face major challenges in the fishery, due to the growing demand for Nile perch in the export market.

This article looks at the relationship between globalised markets for Nile perch and gender relations in the Lake Victoria fisheries of Tanzania. It explores the challenges women have faced and describes some of their responses to them. Particular attention will be paid to the Tweyambe Fishing Enterprise (referred to as the Tweyambe Group), a well-known women's group based in Kasheno village in Ruhanga subvillage (a *kitongoji* comprising 150-200 families) on the shores of Lake Victoria in the Muleba District of the Kagera Region.

The Tweyambe women, like those in other districts, at present face great challenges within the fishery. These include limited access to capital, interference by men in their activities, theft of fishing gear, and sociocultural problems. This article will explore their responses to these challenges, discuss the potential for new gender-based relationships linked to initiatives like the formation of the Tweyambe Fishing group, and explore the relevance of this case study for future initiatives intended to promote greater gender equality.

Lake Victoria is the second largest freshwater lake in the world, with a surface area of 68,800 sq km. It is shared between three countries: Tanzania (51 per cent), Uganda (43 per cent) and Kenya (6 per cent). Lake Victoria has a catchment area of 258,700 sq km and a mean depth of 40 m. The shoreline is approximately 3450 km long, of which 50 per cent (1750 km) is in Tanzania. The lake accounts for an estimated 60 per cent of Tanzanian inland fish production. Fish and fisheries products from Lake Victoria are a significant source of food for the country, yielding 122,000 tonnes in 1995. They also contribute to the country's foreign exchange coffers, generating about USD 60 million in 1997. These fisheries provide income and employment for over 32,000 fulltime fishers. An estimated 500,000 people are employed, formally and informally, in fisheries-related activities.

The Kagera Region is located northwest of Tanzania and shares borders with Uganda in the north, Rwanda and Burundi in the west, and the administrative regions of Kigoma, Shinyanga and Mwanza in the southwest. The region is isolated from the rest of the country by poor transportation and communication networks. Kagera is subdivided into six administrative districts: Bukoba Rural, Bukoba Urban, Muleba, Biharamulo, Karagwe and Ngara. The total population of the region is estimated to be 1.6 million. The livelihood of over 90 per cent of Kagera's population is derived from agriculture and fishing. Inhabitants from the Haya ethnic group make up 95 per cent of the population of the Kagera Region.

Poor recognition

Women comprise 51 per cent of Kagera's population, but contribute 70 per cent of all the labour input to farming, the region's dominant economic activity. Despite this, women's contributions are poorly recognised and greatly undervalued. Women assume an inferior position within certain customs, taboos and within the sexual division of labour. Research on Lake Victoria suggests that women dominate the fish trade. If true, this would mean that the fishermen are dependent on women to convert the fish into money and to buy other food. However, recent work on the Tanzanian sector of Lake Victoria suggests that women no longer dominate: out of 198 fish traders and respondents interviewed in 1998, 78 per cent were male.

Historically, fish was primarily consumed fresh, except for some sales to distant markets of sun-dried or smoked fish. The sexual division of labour varied from place to place, depending on the ethnic origin of the group. Women were more likely to participate in fish trading in the eastern portion of

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Lake Victoria, than in the central and western portions. Traditionally, the Sukuma from the central portion were mainly farmers, and the Haya from the western portion did not value fish-related activities. Local culture generally prohibited women from being away from their homes, limiting their ability to trade fish. The dominant means of transport were travel on foot and by bicycle, which tended to limit fish traders to local markets.

Since the 1980s, the Nile perch fishery has attracted tremendous investment. It has become one of the most important economic activities in the area. Industrial fish processing factories and fishing camps generate revenue for communities in the regions surrounding Lake Victoria. Recent research on the Tanzanian sector of Lake Victoria indicates some of the problems that small-scale fish traders and processors have faced in attempting to benefit from the export-oriented Nile perch fishery that developed in the 1980s. Irrespective of gender, the two dominant problems are transport and the availability of funds. However, both quantitative and qualitative data indicate that most fish suppliers in the Nile perch fishing industry are men. In 2000, male suppliers made up 84 per cent of those providing raw material to the processing sector, compared to 16 per cent women suppliers. In addition, men largely control the new technologies associated with the Nile perch fishery. Fish factory owners attribute the dominance of male fish suppliers to the access men have to the capital needed to buy boats, provide seed money and hire labourers. Other advantages for men are their ability to travel frequently, having better access to business collateral, and being more aggressive than women in persuading owners to grant them loans and advances for fish procurement.

Other work

There are important differences between men and women in the way they engage in the Tanzanian Lake Victoria fish trade. Women, more than men, combine fish trade with other types of work. A majority of women (57 per cent) participate only in fish trading, but 43 per cent combine fish trading with other business activities. In contrast, on the Tanzanian side, 74 per cent of men participate only in fish trading, while 24 per cent combine fish trading and other business. The high percentage of women who combine fish trading with other business may indicate women's greater vulnerability and greater income insecurity within fisheries-related activities.

In contrast to the fish-supply sector, women made up a majority of those purchasing and processing the waste from the fish plants in the first three years of factory development in Tanzania. Nile perch fish frames (skeletons), locally known as *punk*, were considered waste and factories had to pay to dispose them. To eliminate this cost, factories began selling them to local processors. Women were the first to look for Nile perch byproducts in factory doorways. This business started in 1993, one year after fish processing firms invested in Tanzania.

A study carried out in *punk* processing camps indicated that 70 per cent of *punk* dealers were women. In six operational Nile perch processing industries on the Tanzanian side of the lake, about 67 per cent of those buying and utilising byproducts from the fish-processing industries were women. The women collected fish frames in troughs, baskets, hand-drawn carts and wheelbarrows, and took them to the processing camps.

By 1997, four to seven tonnes of fresh fish frames cost TZS 60,000-90,000 (USD 75–112.50) wholesale. After processing (smoking and sun-drying), the processed *punk* could be sold for TZS 100,000-120,000 (USD 125–150). Women used the revenue from this activity to build houses, feed their families, buy clothing, and pay for school fees and medical care. Over time, however, the Nile perch processing factories improved their filleting process so that no meat content was left on the frames. This meant the *punk* community could not get enough fish frames for human consumption. In response, some women started to grind *punk*s in locally made mortars to feed their chickens.

More recent changes in this sector have further eroded the capacity of women to generate livelihoods from fish frames. In 1996–1997, processing *punk* for animal feed got commercialized, resulting in new investments in local fishmeal factories.

Fishmeal products

The major markets for processed fish frames were Shinyanga, Tabora, Dodoma, Morogoro, Singida, Mwanza, Mara and in some parts of Kagera Region. The main markets for fishmeal products were Dares Salaam, Arusha, Mwanza, Morogoro, Dodoma and neighbouring countries such as Zambia and Kenya. In 1998, the higher standards of hygiene required by the European Union (EU) encouraged Nile perch factory owners to seek wholesale buyers for their byproducts.

This ensured that the factory doorways were quickly cleared, reducing congestion by both humans and byproduct waste. When the factory owners started selling their fish frames to wholesalers, many women were forced out of the trade. Most could not

compete with the men buying these products for animal feed as well as human consumption.

The strong export orientation of the Nile perch industry and limited opportunities for women to derive employment and incomes from the sector have encouraged some to focus on purchasing juvenile Nile perch harvested with illegal gear. The minimum weight for legally harvested Nile perch is half a kilogram. Purchasing this fish requires access to capital to compete with the factory agents, who are the main buyers. These agents are not allowed to purchase juvenile Nile perch of less than half a kilogram. Since legally harvested fish has become more expensive for the small traders who serve the local markets, and because falling incomes among local consumers limit the price they can pay for fish, the women traders have resorted to buying fish harvested with illegal, small-mesh gear.

Studies at Ihale beach in Tanzania indicate a preference for illegal beach-seines and nets with a mesh size below the recommended minimum mesh size of 5 inches (127 mm). The fishermen claim that smaller mesh sizes earned them higher incomes from their fish sales to industrial fish collectors. However, marketing this fish provides a precarious source of income for small traders. Fish less than half a kilogram caught in beach seines and undersized gillnets may be sold to industrial agents who can offer higher prices.

Some women fish traders have resorted to staying in the beach-seine fishing camps overnight so that they can get priority access to the available catch. Others have dropped out of the fish trade and moved to trading in other goods. If illegal gear is eliminated, the surviving women traders and processors could lose their access to fish.

Women also work in the Nile perch processing factories. Women processing workers tend to be segregated into the low-status, poorly paid types of work commonly associated with "caring" professions such as laundry work, fillet trimming, packing, sweeping and cleaning. Men dominate the highly paid jobs, including those involving fish procurement, quality control, environmental engineering, accounting, production supervision, ice machine operation, administration, and fish filleting and skinning.

Women workers were poorly represented among support staff and in actual production, compared to men. The most valuable Nile perch byproduct is processed and dried swim bladders. Swim bladders receive a high price in export markets. Of those who process and dry these bladders, 81.4 per cent were women, while 18.5 per cent were men. Only one factory employs 10 women on a permanent basis.

An interview with one of the factory owners, however, suggested that filleting and skinning are regarded as rough jobs that men manage better than women. In contrast, women are considered to be better than men at trimming and packaging. The employer considered this work required greater attention because mistakes could result in the rejection of an entire shipment in the foreign markets.

Kagera's women have sought to solve their multiple burdens by organizing into groups. However, their socioeconomic situation makes it difficult for them to do so. They face multiple household roles with heavy workloads, capital shortages and minimal access to credit. They are also ill-educated, often lack confidence and have to confront socially accepted "bad" beliefs concerning women.

Shared trust

On the positive side, women have identified several factors that have contributed to their successful organisation. Central to their success has been the trust they share, a characteristic that is lacking in men's groups.

Women from Ruhanga put forth several reasons for being unsuccessful in obtaining loans and credit from the revolving credit funds. These include the fact that women typically lack collateral; that men often interfere in their wives' attempts to apply for these funds; and that men are better able to more aggressively pursue loans. In addition, women often do not know how to apply for the loans, while men bribe loan officials. Also, the new men entering the fish business tend to lower women's chances of getting loans. Among those women whose loan applications were successful, some quarreled with their husbands over the loans, ending up divorced for their refusal to surrender the loans to their husbands. Other women found themselves unable to fully repay their loans because the funds were mismanaged or misused by their husbands.

The Tweyambe Fishing Group started as a self-help group for women in Ruhanga, Kagera. The living conditions are tough in Ruhanga village, which has no primary school, hospital or reliable shops. Women's workloads are heavy and comprise responsibilities for work in the household, agriculture and in the fisheries. The women spend much of their time on farms located on the slope behind the village. The fishermen's work routine determines the daily pattern of household activities in many fishing communities. Fishermen leave at

night or in the evening, while their wives work during the day. Men have little or no opportunity for family life and this adds to women's responsibilities and work. The women sell fish to supplement their incomes. They are forced to accept the prices offered by buyers on the beaches and want to change this. One woman said: "We can't afford to sell the fish in the distant markets. Transport is a big problem, accompanied by the lack of a well-established market in our village." Ruhanga's women thought that if they could acquire some kind of transportation, like a mini-bus, they could get a better price for their fish. In order to do this, however, they needed a way to raise the capital to buy the vehicle.

In 1992, a group of 14 women came together to form the Tweyambe Fishing Group. They agreed on the following objectives: to coordinate women's economic and day-to-day activities; to improve the household dietary status and socioeconomic condition of communities in Ruhanga by investing in fishing activities; to protect all women's rights; to help each other and to solve the road transportation problem in their community.

Maximum membership

They also agreed that 14 would be the maximum membership for their group and that all of these members had to be married women, settled in Ruhanga. This requirement was intended to avoid the potential negative effects migration could have on the group's success. Finally, all members had to be mature and trustworthy.

In February 1993, the group collected USD 82 from the revolving credit scheme and supplemented this with weekly membership fees of approximately 40 cent per woman. Members sold bananas, groundnuts, handicrafts and grass for roofing and home "carpeting". (The Haya communities cover their floor with grass, which they will normally change every two weeks.) They used the money raised to invest in smoked and fried-fish processing, bought six nets and hired a boat.

Towards the end of 1997, the group applied for a loan from the Kagera Fisheries Project to buy a vehicle to solve the transport problem. The application was rejected by the Fisheries Department on the grounds that running and maintenance costs for the vehicle would be high in view of the bad roads in the area. The Department suggested the group consider developing alternative transport solutions, in particular, water transport. The women agreed, and obtained a loan of TZS 3,580,000 (USD 4475), with which they were able to buy a 25-horsepower outboard engine and a transport boat. This investment has since yielded dividends. Income from fish sales between 9 June 1998 and 29 September 1999 was TZS 2,309,600 (USD 2887), while expenditures amounted to TZS 1,559,600 (USD 1950), leaving the group with a clear profit.

Women generally confront many challenges in their trade and household work. In order to sell their fish, they have to make prior arrangements with male buyers to assure a guaranteed market. This is particularly the case during the farming season, when many buyers return to their farms. In the fish trade, women's main competitors are men. Most of these male buyers are fishermen, and there is an understanding between them and the other fishermen that the male buyers would help them out if they ran into trouble with their boats while on the ake. These male buyers control the fish auctions at the landing site and have come to dominate fish trading activities at the site. The Tweyambe women acknowledge that they cannot easily compete with the men, and could possibly get destroyed.

Another challenge occurs when the EU closes the markets for Nile perch, for whatever reason, causing prices to drop so low that they barely cover production costs. Women understand the extent to which they rely on export markets and so want reliable alternative markets for their Nile perch. Export bans and intense competition can destroy their savings. Tweyambe Group members also complain of lack of funds to expand their businesses.

The Group's water transport business has faltered and their income from this source has been halved because of competition from men who have also invested in water transport. The Tweyambe Group has also had to cope with gear theft. Competition and theft have forced some women to drop out of fishing or to shift to less competitive and less remunerative parts of the fishery.

Absentee owners are particularly likely to be cheated of their catch and gear. Since most women hire out their fishing gear to fishermen and do not take part in fishing activities away from the shore, they are most at risk of gear theft. This risk limits the number of units each woman investor is willing to operate. Women often employ men who are related to them or their own sons, in order to avoid theft of nets and catch. In Ruhanga, for example, the women employed their sons as crew. Despite such precautions, in 1997, profits dwindled when 45 of the group's gill-nets, valued at TZS 1,350,000 (USD 1688), were stolen. These nets had targeted Nile perch, the group's most profitable fish. In some cases, women fishers have arranged for night

patrols on Lake Victoria, and have selected times for fishing and landing that make it easier for them to monitor their catch and gear.

Poor training

A fish marketing study conducted along the Tanzanian part of Lake Victoria in 1998 indicates that the extent of training amongst fish traders and processors was low. Out of 198 fish traders and processors interviewed in this area, only six per cent were trained in bookkeeping and only two per cent in fish processing. Of those with training, only three (two per cent) were women. These women, like others, believe that education plays an important role in directing their lives and limiting their opportunities.

However, any information received by the leaders was conveyed to the members of the group in both Kiswahili (the language spoken all over Tanzania) and Haya, thereby diffusing, to some extent, the knowledge that they had acquired. They believed that mutual trust and teaching one another have helped the group survive in a competitive environment.

Members of the Tweyambe Group perceive themselves as primarily responsible for the economic well-being of their families. Their domestic and work responsibilities made it hard for them to find time for their group activities. In response, the women looked for ways to create some free time for themselves, for example, by establishing a nursery school. The Tweyambe Group has a schedule of activities that ensures each member allocates time for group activities as well as for her farming or domestic activities.

In contrast, the women who work in the fish-processing factories have had little opportunity to their own time. In all the six factories we studied, women worked both day and night shifts. They were hired as casual labourers, and thus denied access to holidays, maternity and emergency leave. Some women factory workers are reported to have quarreled with, and even divorced, their partners in order to comply with the factory rules, while others found it difficult to marry because men would not accept them working night shifts or taking time away from their household duties.

Tweyambe Group members have adopted a strategy of income diversification, so as to protect their households from hunger. When income from the fishing business is down, the women independently sell *matoke*, groundnuts, cassava, yams, second-hand clothes, tea and burns (candies), fresh beans and sweet potatoes at the village market.

Non-fish products

Women also travel long distances to the beaches in the early morning. Once there, they sit under the trees with their commodities for exchange, while waiting for fishermen to come out of the lake. Intense competition for fish has encouraged the women to resort to bartering for other, non-fish products along the beaches. Firewood, fruits, tomatoes, maize and cassava flour are commonly exchanged for fish. Bargaining is common. These independent activities, the women argue, have helped their husbands and children understand that the Tweyambe Fishing Group is not an extension of their households, which they can exploit, but a separate entity.

Economic hardship and the important roles played by these women in supporting their households have changed men' s attitudes. Group members say that men have realised that they can no longer provide for their families by themselves, and that the prevailing economic conditions are forcing both men and women to devise strategies for their mutual survival. However, problems persist. In the words of one woman, "When we buy and prepare the meals, pay school fees, buy clothes for the children and sometimes buy small gifts as a surprise, men see and realise our potential, although they don't appreciate it. Quietly, they feel offended by our initiative."

Tweyambe Group members continue to depend on men for many things, including advice and access to fish. Although the group has gained local respect through their association with donor agencies and the government, this association and their financial success and investments have also caused some members of the community to be very jealous of them. Women from polygamous households sometimes complained that it was difficult for their husbands to care for all their wives and children and some wives were neglected. Such women work extra hard to bring up their children. Some of the men in Ruhanga have demanded full involvement in their women's Nile perch fishing activities, defining it as a project for the entire community, including both members and non-members. Men have also tried to participate in the selection of crew members and engine operators. Members' husbands have demanded to know the exact income of the women's group and have interfered with planning and operations related to their investments. One woman explained: "I almost broke my marriage because of group funds. My husband forced me to give him TZS 100,000.00 (USD 124) for his court case, but we eventually resolved the dispute." In Vihiga District of Kenya, according to one study, many of the men who

belonged to, or were associated with, women's groups as "advisors" were considered to be "crafty" and "sly".

Further research is needed to investigate the various issues that concern women's groups. Research topics should include ways to increase women's economic productivity and reduce the burden of their traditional household responsibilities; and ways to increase the participation of women in decision-making, as well as in access to, and control over, various resources. Women's time constraints will need to be taken into account too.

Changes in Lake Victoria's fisheries and fishing communities from primary reliance on local markets, equipment and sources of capital to reliance on export markets, external equipment suppliers and external sources of funding have affected, and have been mediated by, gender relations. Globalisation has opened up new opportunities for some women but it has also undermined many women's economic independence and increased the challenges they face in supporting themselves and their families. It has done this by contributing to environmental change, undermining their access to fish for processing and trading, enhancing competition and theft within fishing and trading, and ghettoizing women in poorer paid occupations within industrial fish processing as contingent, vulnerable workers. As elsewhere, gender divisions of labour in households and communities within Ruhanga have persisted.

Post-harvest activities

Most development efforts in Tanzania, as in other parts of the world, have tended to discount the potential contributions of women to economy and society, and have thus failed to mobilise this vital human resource. The idea that those who fish are fishermen and that fishing predominantly involves men going fishing in boats has generally not been challenged by the institutions extensively involved in Tanzania's fisheries. Women are thought to engage only in post-harvest activities (smoking, drying and marketing), where they earn less profits than those earned by fishermen, particularly the owners of fishing equipment and gear. The case study of the Tweyambe Group shows the importance of integrating women into fishery programmes and development projects. This should be done in ways that address women's dual responsibility for income generation and family care.

Women's interests should be built into the design of programmes aimed at obtaining sustainable resource management. Several indicators confirm the value of the Tweyambe Fishing Group for its members and the larger community. Group members report that face-to-face interaction allowed them to get to know one another, build a reputation and develop trust. Openness on the part of the members helped them to resolve small conflicts within the group. In many cases, they have managed to separate project from individual activities and thereby helped to insulate the group from wider household pressures.

These features of the group point to its relevance for community organisation initiatives, such as the development of co-management regimes designed to respond to the often larger-scale economic and social dilemmas affecting fishing communities affected by globalisation.

When people consider themselves to be a member of a group, they are able to collectively achieve more. The benefits that accrued to the community as a whole support women's groups in their attempts to break through some of the constraints they face, particularly within an industry that is dependent on export markets and global processes. This means providing women with support not just for income-earning opportunities, but also for advocacy, mobilisation in the public sphere and empowerment. It means ensuring that women's voices are heard in all the main decision-making processes, and not just in a small, isolated, women's office. Available evidence suggests that by working with more women's groups, the reach of extension services can be doubled and costs reduced. The result would be greater food security for rural families. Women's needs and interests are more likely to be satisfied if they are made the primary beneficiaries of certain welfare programmes. Examples like the Tweyambe Group remind us that donor organisations and governments must understand that people, especially poor women, are capable of promoting their own development if their efforts and initiatives are recognised and supported.

A gender-sensitive approach to development that assesses and monitors the impact of rules and regulations at all levels on women, men and gender relations is more than a political imperative. It is, in fact, a basic condition for sustainable economic and social progress. It requires radical changes, particularly in areas where the belief that women are inferior to men continues to prevail. It would be advantageous for men and women to collaborate in the development of a gender-sensitive approach in order to avoid problems and conflicts. However, in order for this to happen, men would need to learn how to work in partnership with women.

People and the sea:
Stakeholders are using the Internet and electronic mail to shape plans for the future of South Asia's fragile coastal areas — and make a difference in the lives of the people living there

by Vidhisha Samarasekara[1]

Source: *Asian Development Bank Review* May-June 2003

From a short boat trip on Pakistan's Korangi Creek, it is obvious that the communities living and fishing in the Indus Delta are not doing well. Having fished for generations or migrated to this area to improve their livelihood, they now face a dramatic decline in fish stocks.

The main reason is a drastic drop in the area covered by mangroves. Habitat conversion, pollution, and increasing population pressure have all taken their toll on these forests of small trees that provide an important stabilisation role and act as a breeding and nursery ground for many commercially important species of fish.

The Korangi Creek in Sind Province is one of Pakistan's high-priority coastal areas. While South Asia's coastal waters have some of the richest and most diverse marine species and coastal habitats in Asia, many are under threat. Most of the coastal communities depend on the sea for their livelihoods, and many of the people living in these communities are vulnerable to — or living in — poverty.

Increasing resource exploitation has had a marked effect on South Asia's coastal zones and watersheds. Direct pressure on these areas from agricultural and urban development is increasing. Indirect pressures include elevated nutrient levels, increased sediment loads, and changes in coastal configurations.

Additionally, unplanned tourism developments that contribute to environmental degradation continue to be detrimental to coastal ecosystems.

Increased environmental demands

With increasing population and economic demands on coastal resources, more people are generating at least part of their livelihood from activities that directly affect the coastal environment.

Food, medicines, building materials, and resources for income generation are drawn from the environment. The way in which coastal resources are used — and institutional and policy conflicts in coastal areas — create conditions that further degrade the environment, causing livelihoods to become more vulnerable and poor people to be more marginalised from lack of access to resources.

The Asian Development Bank (ADB) and its partners — World Conservation Union (IUCN) and the governments of India, Maldives, Pakistan, and Sri Lanka — are seeking to address these issues through an 18-month regional technical assistance project on Coastal and Marine Resources Management and Poverty Reduction in South Asia. The effort started in October 2002.

Given the regional implications of the work and the importance of effective proactive government coordination and action, the South Asia Cooperative Environment Programme is also playing a key role in the effort, as is the Centre for Earth Sciences Studies in Trivandrum in supporting work in Kerala, India.

Using an integrated approach to coastal zone management as a planning and development tool, participating countries have made significant headway toward long-term, coastal zone planning. Through the project, coastal zone issues, including threats, are systematically categorised and a list of priority areas is developed for each country.

Seashore erosion

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Site-specific planning

National site-specific plans using integrated coastal zone management are being developed in areas with the highest concentration of poor communities. Outcomes so far have included analysis of institutional and policy barriers and constraints to effective integrated coastal zone management. With a clearer understanding of the relationships between poverty and the environment, a regional strategic action plan for South Asia is being developed.

Key to the project's success has been the improved exchange of information through electronic mail and a website, where stakeholders and the international community involved in planning and implementing an integrated approach to coastal zone management can exchange experiences and lessons learned.

The Sustainable Development Network of Pakistan led the initiative to set up the tools for exchanging information. Key themes integral to the project, such as poverty and the environment and sustainable fisheries, are regularly posted in a debate forum to initiate discussion and share country experience and opinions.

A sense of ownership has been developed among stakeholders through regular meetings and updates, consultative regional and national workshops, and site visits. Although the project is drawing to a close in terms of ADB's deadlines, much momentum has been gained and commitments to build on the progress made have been expressed.

Kovalam shore, Pakistan

Addressing the needs of the poor and the environment in South Asia's fragile coastal areas requires taking a long-term perspective, forming new partnerships with local communities and national stakeholders, continuously involving government, and fostering the ongoing commitment of all stakeholders. It is hoped that lessons learned from the project will be used to improve the management of coastal areas in other South Asian countries.

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 South Pacific Forum Fisheries Agency (FFA), the University of the South Pacific (USP), the South Pacific Applied Geoscience Commission (SOPAC), and the South 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.

PIMRIS

Pacific Islands Marine Resources Information System

Community-based management and conservation

Marshall Islands surveys to support a national effort towards reef conservation

by Dr Silvia Pinca[1]

The Marine Science Program (MSP) at College of the Marshall Islands (CMI) is working on marine resources together with Marshall Islands Marine Resources Authority (MIMRA), the Ministry of Internal Affairs (IA) and Environmental Protection Authority (RMI-Epa) under the umbrella of the newly formed "MIEC Working Group". The MIEC group was established in fall 2002 through the coordination of the Secretariat of the Pacific Community to help each atoll population prepare their individual Fish Management Plans. The idea is to delegate responsibility for coastal resource management to the local communities and government councils and help them manage fishing and other activities related to marine resources. The multi-agency-driven plan supports the local governments with underwater marine resources surveys and active involvement of local communities through workshops. The community workshops are directed by MIMRA representatives, conducted in Marshallese, and aimed at both women and men's groups in the outer islands. MSP-CMI is engaging in the underwater surveys to assess the health of reefs and the fishing potential of the atolls of RMI with the purpose of conserving particularly rich or threatened zones, which is one of the goals expressed by the Biodiversity Strategy and Action Plan issued by the central government in 2000.

The first pilot project undertaken by MSP-CMI in 2001 in Likiep, was already part of this project even before the formation of MIEC, and took shape by a request from MIMRA that needed to understand "what resources are available and abundant and what resources need to be conserved". It was the first step towards the preparation of the Fish Management Plans. This study in Likiep was successful in both training local students — now local experts working as intern at MIMRA — and in data acquisition on the state of reefs and food fish resources in the atoll as well in issuing recommendations on best sites for possible conservation practices. After this first 2001-Likiep experience, more surveys followed at Rongelap and Bikini, in summer 2002 by the Natural Resources Assessment Surveys team (NRAS). At the MSP-CMI, I put together NRAs for those expeditions in 2002 to match up local marine survey expertise with that of scientists from different countries all around the world. The team of 14 science divers included previously and newly trained local graduates as well as invited external scientists from UK, US and Australia. This time the study included not only commercial food-fish and general coral reef assessment but also a higher detailed study on the health and richness of coral reefs and their associated fauna, as well as a biodiversity qualitative assessment of all the species of shelf and slope reef fish and hard corals. This last effort was made possible by the presence of two specialists from Australia. In June and July 2003 the NRAS team was composed of scientists and students from nine different countries (RMI, Australia, Brazil, Canada, Italy, Germany, the Philippines, UK, and USA) who worked together in the remote atolls of Mili, Rongelap and Ailininae.

Methods used

Local students from the College of the Marshall Islands received long-term training on coral reef taxonomy, species identification and survey methodology. The trainees had participated in previous expeditions (Likiep, Jaluit, Bikini) and are now the national experts in coral reef surveying and species identification.

The survey methodology applied in the 2002 and 2003 surveys (NRAS, 2002) was fine-tuned after the experience of the pilot project in Likiep (2001). Four transects, parallel to the shoreline, are laid at four different depths (20, 15, 10 and 5 m). Divers on

1. Marine Science Program Coordinator, College of the Marshall Islands

each transect record substrate type, coverage, abundance of target species of corals, percentage coverage of coral life forms, abundance and size of target species of about 120 species of fish and fish families, seaweed coverage and genera, and commercial invertebrates abundance, in a volume of water of 1250 m^3 (50 x 5 x 5 m). In addition, the 15 m transect is replicated three times to give an indication of the variability at that depth. Sites are selected on both ocean and lagoon sides of the atolls, including pinnacles and patch reefs. In addition to the transects, two taxonomists record biodiversity of fish and corals during 60-minute timed-swims. Collection of a species of damselfish, *Chrysiptera tracey*, has been added to the plan during this last expedition to obtain a genetic analysis to detect possible different populations of the fish and their connectivity, which then gives an indication of larval dispersal. Measurements of currents have been made through the deployment of flow meters at all the major passes and through in situ measurements at all sites to model a pattern of current flow around the atoll that will help the determination of larval dispersal mechanism. These two pieces of information will be used for a more accurate selection of sites for MPAs.

Major results

New range extensions (where a species of fish or coral is found in this area — or in the Pacific region — for the first time) for several species of corals and fish were detected during the 2002 and 2003 expeditions. New species of corals and fish are under description.

Recommendations for MPAs to be established — as it is the general wish of the local populations and of MIMRA — at Likiep and Rongelap-Rongelap were presented at the end of the two 2001 and 2002 expeditions. New ones for Mili and Rongelap atolls will be ready soon. The first trip to the uninhabited atoll of Rongelap, limited to the main island of Rongelap-Rongelap, where a new tourism activity is taking the first steps towards development, resulted in recommendations for the institutionalisation of an MPA or sanctuary at the south tip of the island at Jaboan point. A very high diversity and extreme richness of fauna, together with perfect health of reef were recorded in this particular area. Coastal managers and marine biologists worked together to recommend this site to be preserved in its current state of pristine health and high biodiversity. The 2003-expedition surveyed the entire atoll. The 15 participants explored reefs from inside the wide lagoon of Rongelap and on the outside walls and passes to find pristine reefs and particularly large fish, and overall a specially rich and diverse fauna. Data are still in the process of being analysed and more recommendations for new MPA sites will be issued soon.

On the atoll of Mili, the team is cooperating directly with local land-owners and government to support the declaration of a marine sanctuary and other protected zones. Land-owners agreed to dedicate a few islands to the conservation of the natural richness of a region in the northeast corner of the atoll. Beaked whales, spinner dolphins, sharks and large-size fish were found in this area, which is also very diverse in habitats. The area includes ocean walls, passes, pinnacles and lagoonal reef habitats. It is the desire of the inhabitants of Mili to have a marine laboratory located in this area for both students from CMI and visiting scientists.

Discussion

The actions towards the preservation of Marshallese marine resources answer both a precautionary effort to conserve pristine reefs and a direct demand from local users who complain of the loss of target preys of both commercial and local use. Lower abundance of clams, fish, lobsters and cowrie shells have been reported by local populations from different outer atolls. There is still a long way to go before marine reserves or other management measures are firmly established, but several atolls (Jaluit, Likiep, Mili and Rongelap) are spearheading this effort. The scientific help in the selection of conservation sites and

School of rainbow runners (*Elegatis bipinnulata*) and black jacks (*Caranx lugubris*) off the north wall in Rongelap.

Coral diversity in Rongelap atoll.

Surveyors and gray reef shark (*Carcharhinus amblyrhynchos*) on Rongelap Atoll.

practices is based on biological information of coral reef communities, biodiversity, current measurements and conservation theories. Ecological observations such as the ones collected by NRAS can indicate on where the healthy and productive ecosystems are, where conservation is more urgent and more efficient for repopulation of scarce species, and where the recruitment of important species takes place, since it is important to protect both nursing grounds and spawning sites. It is on these scientifically based recommendations that the working group will help the local atoll governments plan their conservation resolutions together with the opinions and desires of local communities. In this way, the establishment of marine protected areas will be the result of community consultations, expectations and requests, as well as of the outcome of the research conducted by local and external scientists.

Conservation will hopefully also help protect fishing grounds from illegal fishing operations. With outstanding diversity and coral cover, Rongelap and Mili atolls provide refugee for a suite of marine organisms. Because of their remote location, these atolls and other atolls such as Ailinginae, Bikini and Jaluit, still lay prey for illegal fisherman.

The community-based marine protected areas (CB-MPA) will be adopted as the modernised version of the traditional Marshallese *mo* or tabu area. When such small reserves are established in RMI, local people will be engaged in the patrolling of the protected areas, become tour guides for nature visitors, be in charge of monitoring the condition and health of the ecosystem, as well as managing research stations that should gravitate around such protected sites.

These CB-MPAs will be funded through community-managed activities based on tourism and aquaculture. The management plans will have to include programmes for economic exploitation of MPAs: tourist entrance fees to the park for snorkeling access, anchoring fees at mooring buoys, interpretative material and souvenir sales at the park, guided tours. New aquaculture enterprises (giant clams, corals, pearls) coupled with MPAs as sources of seedlings and as protection of the in situ farming site, could support the programme through the dedication of part of the profit (sales to aquaria and souvenir shops) to the park management expenses. The income generated by such kind of activities would sponsor the park rangers salaries and the patrolling expenses.

Training local personnel in management and monitoring is essential to the success of any community-based solution to conservation and sustainable development. Plans for training local people are being developed at CMI, and some punctual assistance from external institutions has been given in the past (University of Rhode Island – Coastal Resource Center for community-based management; University of Hawaii-Hilo for locally-based aquaculture; University of Alaska for market and economic studies on aquaculture and fisheries). Projects for more workshops and training are being prepared for the specific case of MPAs management and monitoring, but complementary financial support is needed. Local inhabitants are already showing interest in being park rangers or controllers and asking for training. Local community awareness is organised by MIMRA through community meetings and workshops in the outer island. The Likiep community already received this part of the training. For marine park rangers, a more specific education will take place at CMI, where basic instruction on reef ecology and monitoring techniques will be offered. MPAs locations are selected to be nearby villages in order to facilitate the patrolling and monitoring of the sites.

An extremely important and difficult task that is still in need of support will be the assistance for enforcement of new regulations that control MPAs: legal and financial assistance is searched for in order to achieve a correct use of MPAs. Without enforcement of regulations any other efforts in the preparation and setting up of MPAs would be useless and the ending result would be doomed to failure.

It is our hope that the combined work of NRAS, local stakeholders and governments will ensure the long-term protection and sustainable use of the natural resources of these islands as well as the preservation of the richness of these reefs for the benefit of future generations.

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Poachers routed by community patrols

by Peter Lowrey[1]

Bongolon, Guinea

An experiment in community surveillance of inshore fishing grounds has succeeded in reducing illegal incursions by industrial trawlers by 59 percent. The success suggests that partnerships between small-scale fishers in their motorised canoes and the Guinean coast guard — which lacks the equipment and resources to patrol 300 kilometres of coastline effectively — may be the key to reducing incursions.

Deaths at sea

Poor fishing communities from the Congo to Senegal complain bitterly about daily, sometimes fatal, encounters with industrial fishing boats that poach in the richly stocked zone reserved for small-scale fishing. The industrial boats, some national, others foreign, destroy the nets of the small boats when they drag their heavy industrial nets over them. They rarely pay compensation.

In Guinea in 2000, before community patrols began in the zone around Bongolon and two other project fishing villages, industrial boats made 450 illegal incursions into the zone, according to government figures. The boats injured 12 fishers in collisions with their canoes. Only 56 incursions were recorded in the first six months of 2002.

Partnership is hailed as the way forward

FAO's Sustainable Fisheries Livelihoods Programme is hailing the success of the project as proof that bringing small-scale fishing communities into the fishing sector as full partners is the way forward, both for poverty reduction and for fisheries conservation.

In Bongolon, trouble with industrial boats had reached crisis proportions. Five men had died when their boat was destroyed by a trawler. Small-scale boat crews were afraid to put to sea. Now, according to community elder Sekhouna Sylla, villagers are overjoyed that, thanks to the new surveillance system, fishing has resumed.

"Many of us are now able to obtain credit at the Rural Credit Bank because they now believe that we will be able to repay the loans by catching and selling fish," he says. "Fishing families have started sending their children to school again."

Selected fishers in Bongolon, Guinea use a satellite-positioning receiver (in fisher's left hand) and radio to report the position of illegal vessels to the coast guards
Photo: FAO/ D. Minkoh

Will surveillance be expanded?

In Conakry, the capital, members of the National Coordinating Unit of FAO's Sustainable Fisheries Livelihoods Programme are important players in key fisheries institutions. They must act as catalysts and advocates within the fisheries establishment if the partnership between fishing communities and the coast guard is to be institutionalized, with a dedicated operating budget to cover its extension to the entire coastline.

"I have done a major impact study on the community surveillance project, which documents its success," says Mamadou Moussa Diallo, a member of the National Coordinating Unit and a socioeconomist at the influential Boussoura National Centre for Fisheries Science. "I think I am getting through to my

1. Information Officer, Food and Agriculture Organization of the United Nations, Focus February 2003. Email: Peter.Lowrey@fao.org

colleagues about the system. I explain the methodology and how it works. They are interested."

Poverty reduction potential

Guinea has a national poverty reduction strategy that includes the country's 30,000 small-scale fishers.

Abdourahamane Kaba, Director-General of the Boussoura Centre, explains that coastal fisheries are not at their limits. "There are important resources that are not sufficiently exploited. Small-scale fishers will have to diversify and catch high-value species. They will need training and new techniques. But there is a potential for fisheries to contribute to poverty reduction," he says.

The coast of Guinea is guarded by the National Centre for Fisheries Surveillance and Protection, which has a budget for six or seven patrols per month. How does Mohamed Sidibé, the Centre's Assistant Director-General, rate the community surveillance experiment?

"It is a good success. After all, now our boats can intervene when there is a call and not patrol at random," he says. "In the beginning, my patrol officers were a bit sensitive about the project – they thought they might be replaced by village patrols -– but now the spirit has changed. The system isn't perfect, but we can perfect it."

"The Centre doesn't have the means to expand the network, but community surveillance has been included in the government strategy against poverty," he says. "The government will find the means to pay for its expansion."

Empowering participation:
The Community-based Coastal Resource Management Festival was time to celebrate, reflect and ponder over strategies

by Nalini Nayak[1]

Source: *Samudra* July 2003

The Community-based Coastal Resources Management (CBCRM) Festival was held between 2 and 4 June 2003 in Subic Bay, Zambales, Philippines. About 150 CBCRM practitioners, implementers, researchers and advocates from coastal communities, non-governmental organisations (NGOs), academic and research institutions, development organisations and government agencies in the Philippines and selected countries in East Asia, Europe and North America participated. The Festival critically analysed the multifaceted achievements of CBCRM, while celebrating its gains, so as to learn lessons that will guide CBCRM practice into the future.

There was much to celebrate at the Festival, despite the fact that several fishers have been killed, while others remain in prison for conscientiously safeguarding their marine resources and apprehending illegal fishers.

The CBCRM movement could not have achieved this level of commitment but for a long and persistent process of interaction and collaboration among the coastal communities, NGOs, academics, scientists and funding agencies.

"Our involvement in CBCRM has not only changed our perspective about our fishery but it has continued to develop our views on the whole," said Pedro Valparaiso at a creative panel discussion at the start of the festival.

"It was we women who moved first," added Patricia Panaligan, chairperson of a local people's organisation (PO). "We decided to establish the fish sanctuaries and our men backed us up, assisting in demarcating it with buoys and bamboos."

From the manner in which these fisherfolk spoke out at the festival, it was quite obvious that they were not only capable but also committed to the concept of CBCRM. This seemed to be the result of a dual process that has emerged as the crux of CBCRM, namely, a painstaking process of capacity-building of POs through very creative and genuine participatory rural appraisal (PRA), the motto being "participation that empowers, with equity as the guiding principal".

This process that commenced in the Philippines more than a decade ago as an NGO initiative of partnership with coastal communities to build

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local, democratic organisations to conserve resources for sustainable livelihoods, gained legitimacy with the enactment of the new Fisheries Code in 1998. The Code delineated 15 km of the inshore waters as municipal waters, beyond which the "commercial" fishers could operate. This Code also made mandatory the creation of Fisheries and Aquatic Resource Management Councils (FARMCs) at the local municipal level, based on the principles of co-management. The local governments could thereby enact suitable ordinances to apply the Code. But, as we all know, mere enactment of ordinances, even when they are very progressive, do not make them automatically applicable, unless there are active POs at the base. Sensing a top-down and manipulative approach, several of the earlier operative CBCRM groups were reluctant to get integrated into this initial process.

Budget allocation

While the dominant trend of the discussion during the Festival was that the POs should engage the government and the mainstream CBCRM process so that budget allotments could be made to carry the process ahead, one could not but be impressed by the reports of the POs on how they collectively made their management plans, demarcated their sanctuaries, engaged in the regeneration of the mangroves, apprehended illegal fishers, developed paralegal skills, and created systems to sustain their efforts through contributing a percentage of their incomes for the labour of the fish wardens.

The CBCRM groups that create their own constitutions take on the responsibility of not only conserving the resources but also developing ways of transforming these efforts into means of livelihood. Several of them launch better fish marketing networks, make value-added products, diversify income generation and even create co-operatives and credit mechanisms for their members. In fact, an external evaluation conducted of the Oxfam-supported efforts notes how overburdened these POs are, taking on the responsibility of conserving, nurturing and policing the fish habitats as also the livelihood alternatives in the communities, even as most of the members of the POs struggle to make ends meet in their households.

Coming from India, which has a long contiguous coastline, I could not but appreciate how the geophysical formation of this island nation of the Philippines lends itself to such a programme of micro-ecosystem management. In a way, the cultural context of the Philippines, which is far less hierarchical than in India, is more cohesive and defining, and the community does not seem to be as complex as it is in India. Certainly, there could be no absence of conflicting interests, but, I guess, the groups that were present at the Festival came from areas where the chief conflicts arose mainly between the legal and illegal fishers, and not with other contenders for the coastal resource.

The CBCRM movement also struck me as being a very feminist concept in fisheries, where life and livelihood are put centre stage, and caring and nurture become the responsibility of men as well in the public domain.

Similar strides have to be made in the private domain, although I did meet a couple of women who said they felt very supported by their husbands who now also take responsibility in household chores as they are required to be out in the community handling their responsibilities.

Reviewing challenges

True to the spirit of learning fostered at the Festival, there was also time for critical assessment and reviewing the challenges for the future. One of these was the need to widen the concept of management beyond the micro-ecosystem, which now focuses mainly on habitat conservation, to creating alliances with other resource users in the watershed.

Several warnings were flagged regarding:

- the implications of communities demanding tenurial rights that will deny use by others;
- the ability of the POs to remain democratic so that "empowerment" does not result in domination;
- the need to continue to strengthen support mechanisms as the NGOs withdraw and the POs come of age;
- establishing sustainable mechanisms within the POs that are transparent and accountable;
- creating an enabling policy environment so that the processes of co-management remain democratic;
- transforming the gains into tangible livelihood inputs; and
- further addressing the threats of globalization vis-à-vis markets and other terrestrial rights.

The challenge is to remain eternally vigilant.

It was indeed striking to hear people echo that CBCRM is not merely a management strategy but a way of life. Committed as they are to a process, it is also a challenge to the NGOs to practise what they preach to the POs, thereby making resource management a way of life and fostering communities of practice wherever they are. For the seven or so POs

that collaborated in organising the Festival, this is not a distant dream as they successfully managed to transcend differences among themselves and generate a creative atmosphere with tremendous energy.

This Festival was the third in a series of such celebrations, a way of collaborative learning, storytelling and documenting. In the words of Elmer Ferrer et al., "This process of learning and the relationships between people that are as a result of this process, generates social energy that advances and sustains the CBCRM process. Social energy becomes manifest when individuals and groups work together to achieve common aspirations."

Fishermen's wives participate in conservation

by Rianne C. Tecson

Source: Cebu Daily News, 14 July 2003

If it were not for the need to conserve and manage their coastal resources, the men and women of Sitio Bangag, Barangay Saavedra in Moalboal town would have gone about their usual lives: the men fish while the women tend to the house and children. Now fisherfolk take turns protecting an 8.13-hectare marine sactuary where corals and fish abound.

The men who fish for a living said the sanctuary increased their fish catch. The women, on the other hand, earn by catering to visitors who are eager to learn how the people protected the sanctuary for 17 years.

The marine sanctuary was established under the Central Visayas Regional project in 1986. Merlita Abrenica, secretary of the Saavedra Fisherfolk Association, said that from July to September 2002 the group earned PHP 18, 775 (~USD 342.00) in user's fees imposed on divers and snorkelers.

While the men are at sea, women members of the association remove crown of thorns starfish from corals inside the sanctuary. The women also take turns in stationing themselves at the guardhouse to monitor the sanctuary's premises.

The future of Fiji's live rock

by Sian Owen, Coordinator, World Wide Fund for Nature, Coral Reefs Initiative

A couple of hours west of Suva, Fiji's capital, an unpaved road winds through the sugarcane plantations to the coast and Malomalo village. Of the 150 people who live here, one-third depend directly on the ocean for their primary source of income. But not all this income comes from fishing — a significant part comes from harvesting "live rock".

Live rock is actually dead coral or rock covered with coralline algae, pink/purple-coloured algae found growing on rocky substrata in all of the world's oceans. It's used in aquariums to form a reef base in order to house tropical fish, corals, and invertebrates. The coralline algae also help keep the water clean.

The live rock trade is a booming business, growing at a rate of 12–30 per cent per year since 1990. With two-thirds of the world's 1.5 million aquarium hobbyists, the US is the world's largest consumer of live rock, representing more than 90 per cent of the trade.

Fiji is a major exporter of live aquarium products to the international market. This trade, which includes live coral and fish as well as live rock, is crucial for some Fijian villages, where the only alternative sources of income are low-skilled jobs in the sugarcane plantations and in tourist resorts. In 2001, over 800,000 kg of live rock was harvested and exported from Fiji alone.

The extraction of live rock takes place along the edges of the reef, with villagers selectively targeting rock covered with light to dark pink coralline algae. The villagers break up slabs of rock using iron rods. These are loaded up onto a *bilibili*, or bamboo raft, and dragged onto the beach by horses, where the rock is placed into boxes and loaded onto a waiting truck which takes it to a processing facility.

Once at the facility, the rock is placed under showers that continually spray salt water. The rock is

trimmed of all visible green algae growth and graded according to shape, weight, and percentage of coralline algae cover. The rock is left under these showers for 24–72 hours before shipment.

In the early 1990s, the villagers of Malomalo negotiated a deal with Ocean 2000, an indigenous company that supplies live rock and fish for export. Fiji's entire coastline is under customary tenure, with the rights to resource use belonging to individual villages. At the end of a series of traditional formal meetings, an agreement was reached with a contract signed by the Custodian of the Fishing Grounds and the sole license for live rock removal in the area belonging to the village Chief, Ratu Saula Maiyale.

Since 1994, live rock has been collected at Malomalo for Ocean 2000 by the traditional male users of the reef, both on a full time and an occasional basis. The rock is reimbursed for USD 0.70 per kilogram, which is divided among the collectors (USD 0.50), the custodian (USD 0.10), and the marine reserve that forms part of the village's traditional fishing grounds (USD 0.10). Full-time harvesters extract up to 200 kg per week. At an average of 150 kg live rock per week, some 7500 kg are extracted for sale by a single full time harvester in a year, contributing USD 3750 to annual household income.

The live rock trade is obviously is very important for the livelihoods of Malomalo's inhabitants. But after nine years of extraction, the villagers were aware that these activities could have long-term consequences. Large-scale removal of live rock can destroy habitat for fish and marine invertebrates, can undermine the structure of coral reefs, and can lead to increased underwater erosion. This is exacerbated as not all harvested live rock is accepted, meaning that much more is harvested than the official figures suggest. Large quantities are often rejected, with the wastage evident as piled accumulations along the beach.

Concern about the sustainability of the industry was also raised in Fiji and in other parts of the world at around the same time. In 2001, the Fijian government called for an environmental assessment to inform policy on the trade. Also at this time, WWF was exploring a partnership with the Marine Aquarium Council (MAC) in relation to their newly launched certification system for the aquarium trade. All of these forces collided last year, when WWF and MAC embarked on a project to answer the government's concerns. The project's goal is twofold: to develop community-based processes for wise coral harvesting and management, and to help the government structure sound policies and legislation that will support a sustainable aquarium trade.

As part of the project, WWF has facilitated a series of community workshops to raise awareness on monitoring, evaluating, and managing marine resources. In Malomalo, the consensus following the workshops was that the productivity of their marine environment and certain marine resources was indeed becoming depleted. As a result, the village designated part of its traditional fishing grounds a *tabu* area, banned from extractive use.

WWF scientists also visit Malomalo regularly to gather data from the site. In 2002 (October), a team from WWF set out to conduct its first ever Biological (Status of the environment) and Socio-economic Assessment (aspects of the Live Rock Trade in Malomalo) of the area. Other visits to the site is basically to raise more awareness within the community and to help them with their management plans and at the moment the main focus is the Collection Area Management Plan (CAMP) a certification pre-requisite to being certified under MAC (Marine Aquarium Council). Each time they come, the scientists are first invited inside, where they sit barefoot on woven mats and begin the ceremony to request permission to visit the project site. A gift of *yaqona*, the root of which is used to make the slightly narcotic traditional drink which is consumed at all traditional ceremonies, is presented to the chief's representative, who then asks the elders to permit scientists to visit the project site.

It's too early yet to tell the results of this collaboration, but dialogue between traditional knowledge and modern science has begun, a first step to ensure the long-term stability of a reef and the people that it supports. Malomalo has acted upon what many around the world have yet to recognize — that marine resources, although hidden from sight, are under constant pressure, and need sound monitoring and management to ensure their continued provision of life for us all.

Transporting live rocks on a *bilibili* (bamboo raft)

Other news . . .

Filling the gaps: Indigenous researchers, subsistence fisheries and gender analysis

by Drs Joeli Veitayaki[1] and Irene Noaczek[2]

Throughout the recent university break (30 June – 11 July), while most of Suva's population was enjoying the South Pacific Games, a group of 15 Pacific Island researchers could be found hard at work in the classrooms Marine Studies, USP. These researchers, drawn from Fiji, Vanuatu, Solomon Islands, Tonga, Samoa, Tuvalu, Kiribati and FSM, were embarked on an exciting new project funded by the Canada – South Pacific Ocean Development Program (C-SPOD), entitled "Case Studies in Gender and Subsistence Fisheries".

For two weeks, under the leadership of Dr Joeli Veitayaki (MSP) and Dr Irene Novaczek (Institute of Island Studies, University of Prince Edward Island, Canada), the researchers studied, read, discussed and wrote about how issues of gender, sustainability and fisheries intersect. Invited resource persons (Aliti Vunisea and Dr Mecki Kronen of SPC, Neil White of the Biology Dept. USP, Margaret Leniston of Forum Secretariat, Dr Vanessa Griffen) provided inspiration, skills and knowledge through seminars and hands-on exercises. Project participants learned about and practiced research methods, examined a gender sensitive research framework for fisheries, and developed their own research work plans and research instruments.

By the end of two weeks of intensive work, each researcher was prepared to return to his/her country to develop a case study on some aspect of fisheries important to the Pacific region. Each case study will consider and analyse the roles of both women and men in fisheries activities. Most will focus on the small scale fisheries that provide food security and livelihoods to many rural Pacific Islanders.

The case study writing project seeks to fill some of the gaps in the fisheries literature of the Pacific region. As has been repeatedly pointed out by SPC researchers, the activities of women in fisheries are largely invisible, as they are rarely researched or reported. The same can be said for artisanal and small scale, inshore fisheries where women often are heavily involved. Despite the importance of these fisheries for regional food security and livelihoods, there is little formal published information that could be used in planning for development, management or conservation. Yet, without such information, and without a gender sensitive analysis that recognizes the roles, knowledge and perspectives of both women and men engaged in fisheries, there is little hope of adequate planning for long-term sustainability.

In considering the current literature on fisheries in the Pacific one can see not only an emphasis on large scale, export fisheries but also a prevalence of foreign rather than indigenous writers. The case study writing project seeks to address this by providing opportunities for talented Pacific researchers to perform gender-sensitive fisheries research and have it formally published.

The case study writers involved include USP graduate and post-graduate students as well as fisheries officers, rural development staff, researchers attached to regional organizations and NGO staff.

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2. Institute of Island Studies, University of Prince Edward Island, Canada

In the Solomon Islands, rural development officer Alan Agassiz will be researching the impact of the industrial bait fishery on a coastal community on Marovo Lagoon, Western Province. Meanwhile, Kristina Fideli and Cherie Morris, researchers supported by SPREP, will be documenting the shell money trade in Malaita, Solomon Islands. In a related case study, Alan and Setapu Resture will document the increasing importance of the ornamental shell fishery in Tuvalu.

Samasoni Sauni and Lilian Fay will develop a descriptive account of small-scale fisheries in Tuvalu, and Lilian will also look at the importance of a women's shell fishery in Kiribati. Aliti Vunisea will take a regional look at how gender roles are changing in Pacific fisheries. In some cases, subsistence fisheries are becoming commercialized. Women previously engaged in subsistence activities are now taking their catch to market. Often, when this happens, men also enter a fishery, sometimes with new and more efficient technologies. Resources that used to feed families are being converted to cash, with different and not always positive impacts on men, women and families.

In Vanuatu, Jean Tarisesei from the Vanuatu Cultural Centre will look at how rural fisheries in Vanuatu are changing with the increasing importance of cash markets and new enterprises such as the live fish trade. Kalo Pakoa of the Vanuatu Department of Fisheries, working together with Francis Hickey, will document the traditional fisheries management system on Epi Island in Vanuatu.

In Fiji, fisheries officer Stanley Qalovaki will consider the impact of changing rural fisheries on family life, while Aliti Vunisea and Samasoni Sauni of SPC will analyse a rural live rock fishery. Another Fijian study, by Jyotishma Rajan, will deal with gender roles in the processing sector of the tuna industry. Recent initiatives by Fijian rural people, particularly women, to restore and conserve mangrove habitats will be the topic of a case study by Jese Verebalavau.

In the Federated States of Micronesia, researcher Moses Palik will look at the traditional mangrove crab fishery and how technology and gender roles are changing as markets open up for the resource. Maere Tekanene in Kiribati will team up with the Kiribati Council of Women to investigate the status of women in the fresh fish trade on Tarawa Island. Fisheries officer Siola'a Malimali in Tonga will do a preliminary assessment of social and economic impacts of the introduction of *Trochus* (a commercial shellfish) into Tonga. Malama Siamomua, meanwhile, will document whether and how women and men are involved in and supportive of recently developed local fisheries management institutions in Samoa.

The 16 case studies now under way will be published in 2004 by the Institute of Pacific Studies USP, in the form of a book. The long-term goals are to move Pacific fisheries towards greater sustainability by: a) providing information on gender roles in fisheries so that women's as well as men's contributions are recognized; b) focusing on small-scale fisheries that are increasingly under stress from over-harvesting, pollution and habitat destruction; and c) highlighting the need for equity in both fisheries development and fisheries management. Each case study will offer recommendations based on research results. Our hope is that in future, policy makers will be inspired by the case studies to develop policies and management strategies that target women as well as men, and that seek to conserve and enhance subsistence fisheries.

Lutjanus gibbus
Artwork: Les Hata. © SPC

News from the SPC Coastal Fisheries Management Section

Progress on the Regional Fisheries Management Strategy

A significant focus of the Community Fisheries Management (CFM) Section's work over the last few months has been on the Regional Fisheries Management Strategy and the process of familiarising countries with the strategy. Following the regional meeting in Nadi, and the mission to several countries of the region that followed, the strategy received the support of the directors of fisheries agencies at the Heads of Fisheries meeting in Noumea in July 2003. The strategy highlights the main problems faced by various fisheries sectors in the region and identifies urgent priority areas.

The major problem areas identified in the strategy included the depletion of resources due to overexploitation, the lack of relevant legislation and policies, and the associated problems of enforcement. Use of overly efficient fishing gear, the move to commercial fishing, the inability of fisheries agencies to deal with the problems because of resource constraints, and a lack of data to allow for efficient management were also identified.

Major needs areas identified included:

- management strategies to address overexploitation of resources,
- more relevant and up-to-date legislation and policies of coastal resources,
- data or statistics on inshore fisheries to ensure efficient management and development,
- training on acquisition of scientific and socioeconomic data,
- the need for capacity building within countries, and the
- need to address the increasing use of detrimental fishing practices.

The need to include women and other sectors of communities and the need for the exchange of expertise and officers within countries and to SPC were also identified under capacity building initiatives. Training and human resource support in priority areas were clearly identified as urgent work areas to be addressed by the CFM Section.

The identified needs and recommendations from the strategy will direct the work of the CFM Section and will form the basis of collaborative work with other agencies, including NGOs, institutions and regional organisations working on coastal resource management and other related areas, and with other SPC programmes.

CETC workshop

SPC's CFM Officer, in collaboration with staff from the University of the South Pacific, organised and coordinated a one-week fisheries module, that formed part of the CETC course in July. Tony Chamberlain, Johnson Seeto, Jone Maiwelagi and Jese Verebalavu made up the USP resource team for the module. The CFM Section's contribution to the course focussed on gender participation in fisheries, especially in community-based coastal management initiatives.

The use of participatory learning tools for gathering information and creating awareness and teaching was also introduced to CETC participants. The 16 women who attended the fisheries module especially enjoyed the field experience out on the reef and later preparing their catch. More time should be devoted to this module given the importance of the fisheries sector to island countries.

Tokelau country visit

Both officers of the CFM Section visited Tokelau from 28 August to 12 September. The CFM Adviser conducted a preliminary assessment on the feasibility and needs of community-based management in Tokelau, which was requested from the director of fisheries. The CFM Officer was part of a Forum Fisheries Agency/ SPC team that is developing a Tokelau National Tuna Management and Development Plan. FFA is the lead agency on this initiative, while SPC is providing technical input to the plan.

Both the CFM Adviser and Officer spent three to four days on each atoll, meeting with various sectors of the community, including the *taupulega* (Council of Elders), and men's, women's and youth groups. Discussions focused on tuna resource development and management, and the possible associated social implications and gender issues.

The Tokelauan community strongly support the Tuna Management and Development Plan, with many realising the importance of economic development that will result from developing this industry. Tuna represents one of the only potential areas for employment for people and so received support from all sectors of the community.

The various community groups also realised the importance of putting into place some management measures for coastal fisheries. Although there was still an abundance of seafood, especially finfish, there were noted decreases in some species such as giant clams and land crabs.

A landing barge is used to transport cargo and people to and from the M/V *Tokelau* to shore.
Photo: Kim DesRochers

A household fishing survey being conducted on Atafu Atoll, Tokelau
Photo: Kim DesRochers

Women cleaning reef fish on Nukunonu, Tokelau
Photo: Aliti Vunisea

Aluminium boats, used for fishing and transport, moored off a beach on Fakaofo
Photo: Kim DesRochers

Gender in fisheries writers workshop

The workshop, held in Suva in July this year, brought together individuals working on gender and fisheries issues in the region. SPC's Coastal Fisheries Programme provided resource persons and technical advise on the project, which is coordinated by Dr Joeli Veitayaki of USP. The outcome of this initiative is the documentation of case studies on gender in fisheries participation in the region. For more information on the workshop, see article on page 39.

Palau sub-regional workshop

The CFM Officer attended the Sub-regional Workshop on Coastal Fisheries Legislation in Koror, Palau from 7–10 October 2003. The workshop focused on aquaculture, fish health management, and fisheries co-management. Countries represented at the meeting included the Marshall Islands, Nauru and the Federated States of Micronesia. The workshop was the initial step in an FAO project in which coastal legislation and policies will be reviewed and assessed. This acknowledges the importance of legislation in management and development work within coastal areas. SPC's Coastal Fisheries Management Section is collaborating closely with FAO on this initiative and presented its strategies and planned work on coastal management in the region to workshop participants.

Western Regional Fisheries Management Meeting

The 120th Western Pacific Fishery Management Council meeting, held in Honolulu from 20–23 October was attended by the Coastal Fisheries Management Officer who was a keynote speaker. She discussed SPC's strategic plans for coastal fisheries management in the region, encouraging collaboration and support from the Council. SPC's CFM Section is especially looking at data collection and statistical work, and the areas of regulations and policies as possible areas for collaboration.

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