

- Mayors and *barangay captains*, in particular, and other local government staff members must be targeted for continued capacity-building programs as they serve as the community's primary support system for all coastal resource management concerns.
- Awareness of coastal resource management issues among fisherfolk is fairly high. However, formal education in elementary and high

schools and local colleges and non-formal education in the coastal and marine environment are needed to expand community understanding of the basic concepts of fisheries biology, marine ecology, the relationship between environmental quality and fish catch, and root causes of coastal resource decline, in particular the role of population growth, habitat destruction, and overfishing.

Socioeconomics status of fishing communities

Coral harvesting and its impact on local fisheries in Fiji

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Coral harvesting for the aquarium trade has become one of the major economic activities for many coastal villages on Viti Levu, Fiji. Rising village unemployment and increasing demand for cash have encouraged community participation in this activity, which is easily entered by villages, and offers potentially lucrative incomes. Villages have been involved in the trade for between two and nine years. The major challenge currently facing the Fijian government and fisheries officers and managers is the need to establish management and monitoring strategies that ensure the collection of and trade in coral is sustainable and does not adversely impact long-standing subsistence activities.

Communities, industry developers and resource managers all face a difficult task in balancing the need for access to new income opportunities while at the same time ensuring that the non-monetary values of natural resources that provide for subsistence livelihoods are also recognized. Given communities' limited access to other means of earning money, the coral trade provides them with an exceptional opportunity. Community involvement in the trade has allowed coastal communities to earn needed income and build basic amenities, and has provided some villages with much needed economic development. But in addition to the potential cash income from the coral trade, coral reefs also form the mainstay of subsistence livelihoods in most rural coastal communities. Many people

are concerned that extended periods of coral collection will result in the loss of and changes to reef ecosystems, habitats, and species, and in a lessening of villagers' knowledge and skills about reefs and reef organisms. The net result may be a reduction in long-term food security.

Over generations, coastal peoples have fine-tuned their fishing skills and knowledge relating to reefs and marine species within their fishing grounds. Women — who are regular fishers of the nearshore coastal area and reef flats — have a wealth of knowledge, fishing skills and lore that assists them in their fishing activities. In contrast to the specialized knowledge and techniques that reef fishing and gleaning requires, coral harvesting involves modern collection methods that require no special skills.

Any changes in either the condition or use of reef ecosystems will greatly impact on women, whose fishing activities are predominantly within the nearshore reef area. Women fish primarily for home consumption, therefore, food security at the household level largely depends on them. Threats to their fishing areas can affect basic food security and may result in the loss of what has, until now, remained a fallback option for rural coastal populations.

Currently, there are 10 companies involved in the aquarium industry in Fiji. Two of the companies,

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Seaking Trading and Aquarium Fish (Fiji Limited), have been operating since the start of the industry 15 years ago, while others have been operating for periods ranging from between two and nine years. These coral harvesting and aquarium fish collecting activities have concentrated in certain areas of Fiji, and there is concern about the impact of long-term extensive coral collecting within these fishing areas.²

Methods used to collect coral include the use of large iron bars to pry or break off coral pieces. Fish fences, scoop nets and an assortment of rods and chisels are used to catch fish and other marine organisms. Many local people harvesting these resources lack a basic biological understanding of coral reefs, or of the impact of their collecting and associated activities on the reefs, which include trampling over non-collecting areas, and dragging bamboo rafts to the dry shore areas.

Collecting and packing usually involves 20 to 30 men from each village. Money paid out to packers and collectors ranges from FJD 90 per week for packers to FJD 228 per collector per week in some areas. Approximate goodwill payments to fisheries custodians ranges from FJD 3000 per year for one company to FJD 28,000, for another, depending on the regularity and extent of collecting activities. Export earnings from the six companies involved in the trade has been estimated to be between FJD 250,000 per year and FJD 6,000,000 per year. Live coral, live fish and other marine products are primarily exported to North America (US and Canada), Europe (Germany, England, France, Belgium, and Denmark) and Asia (Hong Kong, Taiwan/ROC, and Singapore).

In 2002, the International Marine Alliance (IMA), an international NGO with an office in Fiji, was contracted by the Fiji government to conduct a study on the coral harvesting/aquarium fish collecting industry. The purpose of the study was to establish the importance of the industry to local communities and to determine implementing, monitoring and management strategies. The study was commissioned as a result of concerns raised by the government, NGOs, and various institutions and individuals regarding the long-term impact of the industry on coastal people's livelihoods. Some of the discussions and observations included below are initial responses to rapid village visits and interviews with village leaders, which the author conducted as part of the IMA visits to vil-

lages in Nadroga District (currently a major coral harvesting area).

During some village visits the general perception was "this was a unique opportunity to earn income". Among the factors that encouraged involvement in the trade were: fish scarcity; the lack of a market to sell seafood; lack of access to good agricultural land; lack of formal and informal employment opportunities; and transportation and other associated problems that complicated marketing of local products. During discussions, some young men stated that coral harvesting (which involves instant payment of money by the company for coral collected) was more profitable than sitting at the local market all day trying to sell coconuts (previously one of the major economic activities pursued).

Companies offer short training stints in coral harvesting, instructing collectors in the identification of desirable species and in good collection practices and methods, which ensure minimal damage. During harvesting men divide themselves into three groups, so at any one time there are three teams at a harvest site. Coral harvesting works as follows: harvesters (*tuki*) identify and break off coral. The next team comes along and places the coral pieces onto bamboo rafts. This is usually done at the turn of the tide. The third team cleans the coral and separates out the undesirable pieces. The coral pieces are then stacked in large buckets, which are later collected by the company for immediate transportation to the factory, where the coral is weighed and paid for. For coastal people who have been fishers all their lives, these are easy tasks, requiring at most a half-day of work several days a week to earn a substantial amount of money. Harvesting depends on demand from the buyers, however.

Both harvesting and the distribution of money are community-organised in nearly all instances. Companies have a contact person in the village who liaises between the village and the company. This is usually a village elder or one of the *qoliqoli* owners (fishing rights owners). The companies approach the *qoliqoli* owners directly and negotiate with them. In some of the villages visited, the decision to allow coral harvest in their *qoliqoli* was based on communal financial demands, and the lack of employment and alternative ways for people to earn money.

2. Most of the activities of Seaking Trading and Aquarium Fish have been in the Beqa reef area and Ra Province. Ocean 2000, Acropora International Limited and Waterlife Exporters have operated for at least seven years with most of their activities concentrated in the provinces of Tailevu and Rewa. Ocean 2000 has also operated within Nadroga Province. Walt Smith International, which has been operating for four years, has worked mainly with communities in Nadroga Province.

Traditional and religious obligations place heavy demands on rural people. Fijians' traditional obligations and customary rituals at times require substantial amounts of money from individuals. The Methodist church (which is the dominant church in most of these areas) has special levies on communities, which amount to thousands of dollars a year. The levy depends on the village population; for Sanasana, in Nadroga, for example (which has a large population), the annual levy is more than FJD 10,000.00. This financial demand on the community, plus the need for village development, encourages rural coastal communities to engage in trades or fishing activities that promise quick monetary returns. Immediate and clearly evident financial benefits can influence the willingness of a community to participate in the industry.

Once the coral has been delivered and paid for there is a meeting for the distribution of money within the village. In most cases an agreed distribution criterion is used. In Sanasana village, for example, the liaison man (who owns the harvesting license that is being used by the community and is responsible for all outside dealings relating to the village's coral harvesting activities) receives 25 per cent of all earnings. Ten per cent of the money is allocated for *vanua* or communal obligations, while another 10 per cent is allocated for religious obligations. The rest is then shared amongst the working team, with the team identifying and breaking coral getting a slightly larger share than the other two teams. The distribution method is well known and accepted by those involved.

There have been instances of dissatisfaction in which people were not happy with their allocation. In one of the villages along the Nadroga coast the conflict affected the entire community, and involvement in the trade was temporarily halted as a result. In this instance the chief or owner of the *qoliqoli* was receiving a very large portion of the money earned and collectors were not receiving sufficient reward for their efforts. In such cases, communities typically solve their differences through village meetings, or otherwise come to a consensus.

Also obvious through discussions with people at the community-level was their very limited understanding of the biology of coastal ecosystems, and of the impact that removing coral has. People did not see any reason for concern regarding the abundance or distribution of marine resources within these areas. Villagers' perceptions and attitudes included the following:

- Collectors maintained that regrowth of coral to a former state occurred within a period of three

months, and that coral reefs were in better condition following harvesting activities.

- When they were questioned about resource sustainability, community members commonly suggested declaring reef "no take zones" as a measure to regenerate reefs after harvesting. Feasibility studies on the appropriateness of areas declared "no take zones" was almost nil; instead, communities simply put such zones into place themselves. There was thus a sense of self-assurance that even though coral harvesting took place at a significant rate, communities were taking effective action by putting some areas aside for regeneration. The willingness to declare "no take zones" could be exploited for management purposes.
- In some instances people believed that harvesting conducted "far away from the village" would not impact village fisheries; they did not appear to consider interdependence of different reef areas, or migratory movements of fish.

Communities supported the activities of companies involved in the coral trade, and appeared more willing to work with them than with the Fisheries Department or with "outsiders". This is thought to have come as a result of the frequency of visits by company personnel, and the immediate benefits that derived to communities from involvement in the trade.

Exporters have argued that coral harvesting and collecting is not the only contributor to loss of coral reefs in Fiji. Other contributing factors to loss of reefs include: expansion in the tourism industry; landscaping and coastal development; poor land use practices in catchment areas; and logging activities. Impacts from these activities are exacerbated by frequent storms, cyclones and subsequent flooding.

Companies have tried to put in place precautionary measures to ensure that only targeted species are collected, and that proper certification of products under a Marine Aquarium Council agreement is carried out. Unfortunately, collecting activities are conducted by community members without supervision or monitoring, by either government or industry. Large amounts of waste coral were evident in nearly all the villages visited.

Extensive coral harvesting activities can constitute a threat to reefs and the livelihood of coastal populations. The attraction of quick monetary return can override traditional management systems and result in degradation of resources. In some villages (e.g. Sanasana) coral harvesting was introduced to ensure that traditional (and especially religious) obligations are met. Thus, ironically, a traditional

source of food security is threatened by a combination of the cash demands of modern society and traditionally defined obligations.

Social benefits and disadvantages of involvement in the coral trade are many and varied at this stage. Most villages began their participation at different times and are therefore at different stages. Communities that have been involved in the industry for more than six years stated that they had benefited immensely from the activity, citing the funding of children's education and building of better homes as some of the benefits.

In Vatukarasa village, discussions with people living away from the village revealed concerns about rising alcohol abuse and the lack of any planned use for money earned. Discussions within the village, on the other hand, revealed direct benefits to both the community and individual households.

Most people interviewed defended the activity, which may be expected from people who have lived on very meagre incomes, and suddenly have access to significant amounts of money.

In Nadroga District there is no vocational or tertiary institution where young school dropouts can take up studies or pursue a career. These youth enter the coral trade due to a lack of alternatives. Efforts to develop alternative employment activities must offer comparable wages. Rigorous campaigns need to be conducted to create awareness and educate the people to make informed decisions about their coral reefs. The initiative began by the government and currently conducted by the International Marine Alliance needs to be supported. Findings and strategies identified need to be considered and implemented to ensure proper monitoring and management of the trade.

The socioeconomics of reef fisheries in the South Pacific: A methodological approach

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Introduction

Two projects emerged from continuous discussions between representatives of the Secretariat of the Pacific Community and the World Bank on how best and most effectively to address the assessment of the status of the Pacific Island reef fisheries. The World Bank funded "voices from the village", the first project to be designed and implemented. A participatory approach was used to investigate factors contributing to the successful management of coastal resources in the Pacific Island region, from the perspective of coastal communities (World Bank 1999).

The second project, "DemEcoFish", is funded by the MacArthur Foundation and implemented by the Secretariat of the Pacific Community (SPC). DemEcoFish is the first attempt to link quantitative and qualitative resource and user surveys to assess the status of reef and lagoon fisheries. The project uses an interdisciplinary approach involving ecology, fisheries and socioeconomics. This paper focuses on the socioeconomic component of the DemEcoFish project, and aims to 1) provide an overview of the methodological approach devel-

oped, and to 2) discuss its advantages and disadvantages based on experience during the implementation phase.

Site selection

Two Pacific Island countries, Tonga and Fiji, were selected to represent a Polynesian and Melanesian culture. Within each country three major regions were chosen, and in each region, two coastal communities were identified and surveyed.

The site selection criteria applied ecological and socioeconomic parameters. At the regional selection level, only those islands that had reef and lagoon systems were considered. In Tonga, the island groups of Ha'apai and Vava'u, as well as the main island of Tongatapu were selected; in Fiji, the Lau group, Vanua Levu and the main island of Viti Levu were selected (Fig. 1).

At the community selection level, four criteria were applied:

- a) Methodological comparison between the World Bank and MacArthur Foundation project

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