

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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- approaches. DemEcoFish targeted two communities in each country that had been included in the World Bank survey.
- b) Comparison of communities with a varying degree of urban influence in each region. Geographical isolation (i.e. small island location, and distance from the next centre) was used as a proxy.
  - c) Interest of local authorities and their demand for information on specific communities that could be accommodated in DemEcoFish's field research; and
  - d) Logistical viability to ensure successful implementation of socioeconomic and ecological surveys.

## Survey development, design and implementation

### Approach

A comparative snapshot approach was used for the DemEcoFish project. Sites or communities were visited only once, regardless of the time of the year. However, major festive occasions, when village activities diverted from normal routines, were avoided. The snapshot approach taken excluded replications, thus there is only one dataset for each surveyed site or community.

The socioeconomic survey rendered information on the location and popularity of fishing grounds harvested by fishers from the surveyed communities. Information gathered about fishing grounds provided the basis for planning and lay-out of underwater resource surveys.

### Preparation

All relevant data for each country and, in particular, selected sites (i.e. communities), were collected and reviewed prior to final planning and implementation of field surveys. Such data included demographic information, aerial photographs, and topographic and nautical charts. Technical and scientific reports, if available, were also used. These all gave insight to fisheries, fishery systems, vernacular names, localities and habitats of marine species and rural development projects associated with any of the sites envisaged for survey.

Local, national counterpart authorities were contacted to assist in the preparation of field surveys. Usually, the two communities in each region were surveyed within one field trip. Local preparations required appointing socioeconomic survey team members and talking with the respective regional fisheries officer (RFO) in charge. The RFO was responsible for informing selected communities

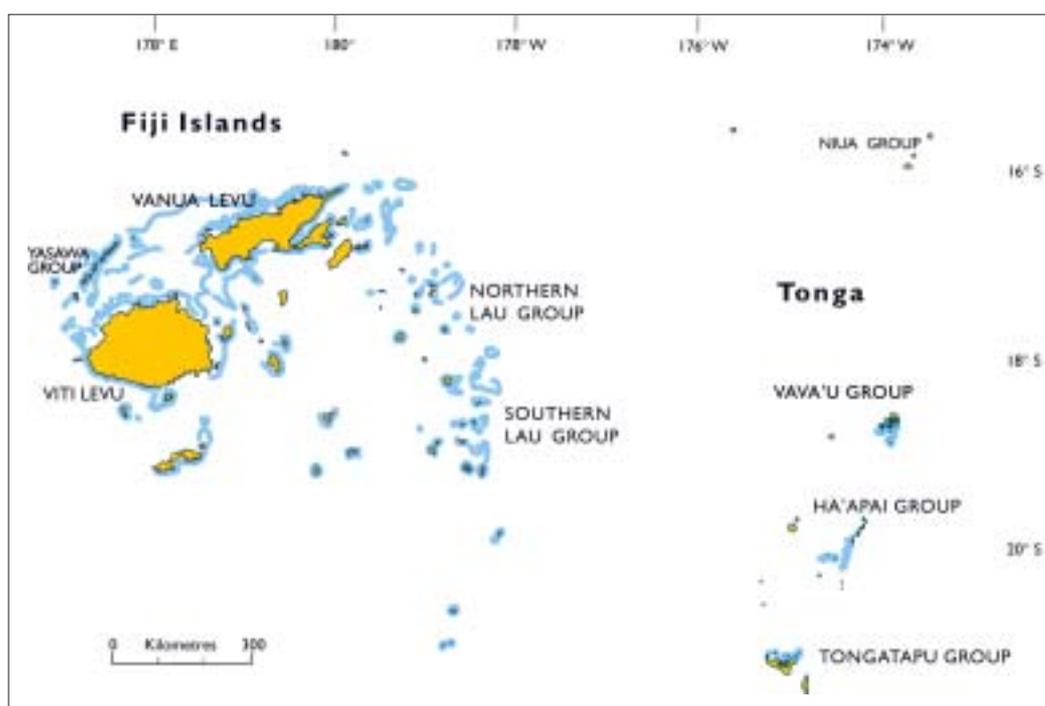


Figure 1. Fiji Islands and Tonga

about the objective and purpose of the survey, and for arranging a suitable time for its implementation. The RFO was also in charge of ensuring that all necessary traditional protocols were followed.

According to basic demographic data (i.e. approximate number of households and total population), the necessary survey material was prepared. Information provided by the RFO, in particular on traditional protocols to be followed and on survey team members appointed, assisted in the preparation of budgets for socioeconomic surveys.

Major components determining and/or closely associated with “fishing pressure” are depicted in Figure 2. Accordingly, the survey design aimed to elicit answers to the following:

- what fish/seafood is caught where? (habitat-fishing ground)
- when?
- how? (technique, means of transport)
- by whom? (fisher, gender)
- for what reason? (autoconsumption, sale, gift).

Answers were derived from households, individuals, fishers, boat owners, marketing agents, and students.

### Survey design

Overall, the socioeconomic survey followed four distinct levels (see Fig. 3). Level 1 is the first contact

between the survey team and the target community. This initial contact usually occurred through a community meeting, where men and women of all age groups were encouraged to attend; participation at these meetings was voluntary. These community meetings served to introduce team members, and to present the objective, purpose and actions to be taken, as well as the expected cooperation expected from community members throughout the survey. During these community meetings, fishing grounds were identified on charts. The popularity of these areas were determined using participatory scoring and ranking for fishers and individual groups.

Provided that participating community members reached approximately 20 people, participatory scoring and ranking was done for gender age groups, old and young men and all women. Each group was asked the same questions, which aimed at gaining an overview of the main preferences and consumption of fish and invertebrates, fisheries characteristics and overall food preferences within the community.

Community meetings were also used to identify key persons who were later addressed with open-ended questionnaires in order to learn about the management of marine resources, general problems, and perceptions of local fisheries.

At level 2, a closed questionnaire type of surveying was adopted, which mainly focussed on the

Level	Subject	Methodological approach	Target group	Output
1	community meeting village authorities	PRA open-ended questionnaire	village population village elders key persons	overview on fishing and seafood consumption general information on management name of boat owners, serious fishers, etc.
2	household census household consumption	closed questionnaire closed questionnaire	all individual households all individual households	demography, socioeconomics household consumption on finfish and other seafood
3	fishing and marketing consumption and fishing fishing boat survey marketing survey	closed questionnaire closed questionnaire closed and open ended questionnaires	all serious fishers >30% of adults >15 years all boat owners agents, middlemen, shop owners, etc.	fishing systems, marketing consumption and general fishing activities quantitative and qualitative information on fishing vessels marketing and price systems
4	children's survey	PRA	primary school students (≈12 years)	children's participation in village fisheries

Figure 3. Overview of DemEcoFish project methodological design

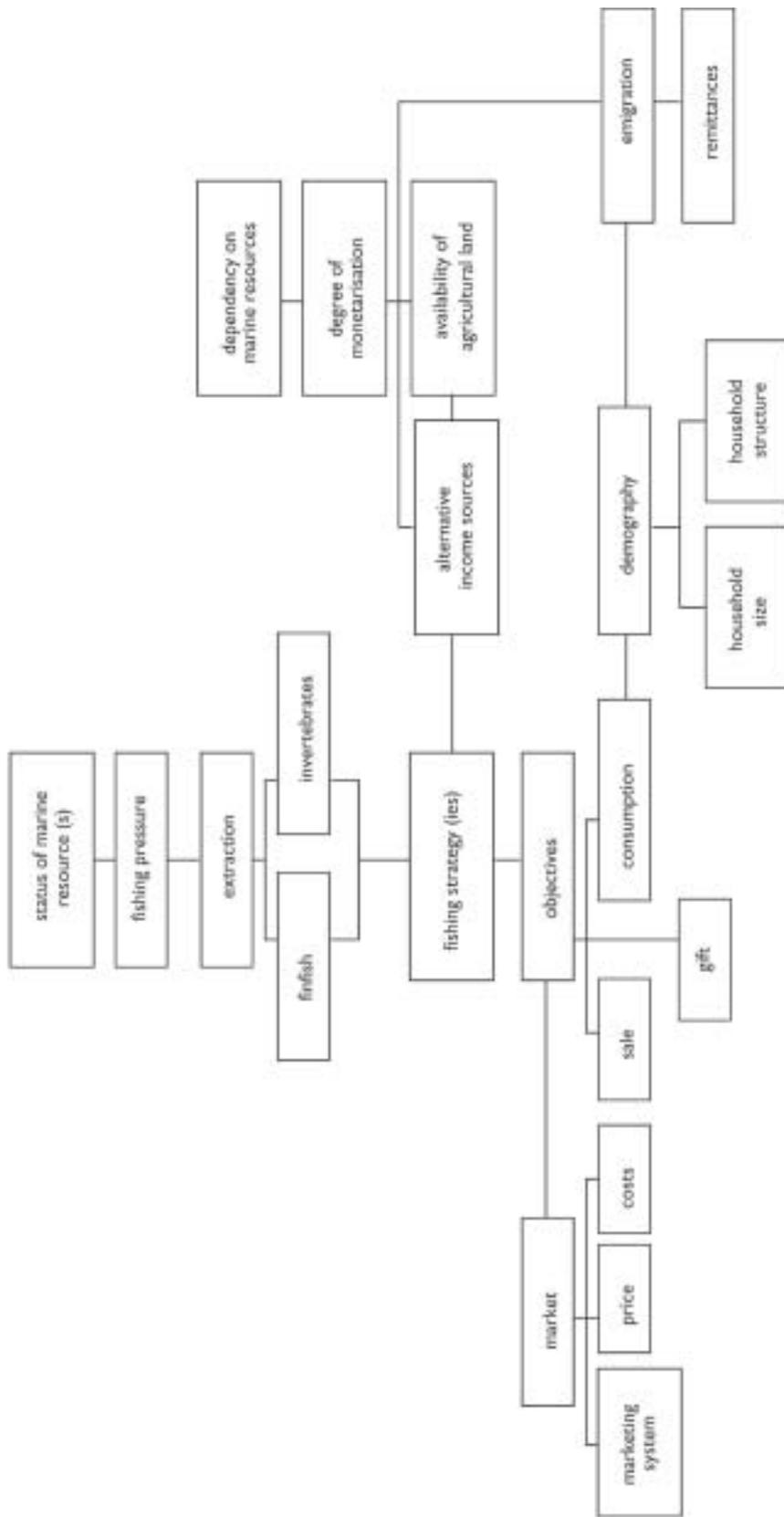


Figure 2. Flow-chart model of DemEcoFish project approach

collection of quantitative and complementary qualitative data. All active households in each community were numbered and consequently surveyed about demographics, basic economics, and household seafood consumption patterns. The target group responding to both questionnaires were heads of households for demographic and economic data, and women responsible for preparing the family meals for seafood consumption patterns.

At level 3, various groups within each community were asked questions that would provide the necessary information for understanding, quantifying and characterising fisheries in each surveyed village. Thus, all boat owners and so-called “serious” fishers were identified. Closed questionnaires were either filled in on a strictly individual basis or, as in the case of Tonga field surveys, by individuals but in a group setting. Boat owners include all members of the community that own a motorised or non-motorised boat. “Serious fishers” are persons who fish more frequently, more successfully and more for selling purposes than the average community member. The status of a “serious fisher” is either based on social community recognition only, and/or on individual perception. Very often, the status of a serious fisher coincides with ownership of motorised boats or regular use of motorised boats.

In addition, usually more than 30–35% of all women and men over 15 years of age were interviewed on the basis of a closed questionnaire in each community to learn about individual preferences and seafood consumption patterns as well as fishing (finfish and invertebrate collection) and marketing.

Complementary data on seafood marketing and pricing were obtained by interviewing agents, middlemen, shop owners and cooperative managers where applicable.

At level 4, an additional and experimental part of the socioeconomic survey targeted older primary school students. Children’s fishing activities are not included in any official statistics because they are not considered a significant factor of fish harvesting and, thus, fishing pressure. The socioeconomic part of the DemEcoFish project attempted to estimate the amount of children’s fishing contribution to family fish harvesting rather than obtaining comparative quantitative data as in case of the individual adult surveys.

## Survey implementation

In Tonga, villages were visited on a daily basis, whereas the survey team stayed in the village during Fiji survey implementation. Community meetings were held in places proposed by village elders, at a pre-arranged time. In both countries, the survey team participated in traditional kava<sup>2</sup> ceremonies upon their arrival and departure.

Total length of stay in each village community was kept to a minimum so as to not unnecessarily disturb normal life and routines. Village elders were contacted first to obtain all necessary permission, useful advice and names of people falling in one of the specialised target groups (serious fisher, boat owners, etc.).

Local counterparts were used to communicate with villagers in their native language, and to conduct the surveys; they were trained and guided by the expatriate socioeconomic team leader. Local customs were adopted in approaching households and individuals. The headmaster of various primary schools was contacted to approve and organise the participatory primary school student survey.

Any agent, middleman or shop owner living outside of the surveyed community was contacted and interviewed, accordingly.

## Data analysis

All survey data were entered into Excel worksheets, and a database for each surveyed community was created. Credibility and reliability of data were tested by filtering out extreme values. Also, the design of the survey questionnaires included a comparison of various approaches. For seafood consumption data, total household figures can be compared with information provided in individual questionnaires. Likewise, for examining fishing pressure, data derived from “serious” fishers and by general fishers, is regarded complementary. Boat owners can be cross-checked with information on boat ownership included in the household and individual surveys.

Finally, research hypotheses were formulated and data sources for statistical analysis were identified (Table 1).

Statistical analysis includes descriptive to non-parametric multivariate analysis depending on the

2. Guests offer kava, the bare and dried roots of a pepper bush/tree to the chief or head of a village. During the kava (or *yaqona* in Fiji) ceremony, the chief or head of the ceremony mixes the powdered root with fresh water in a large hardwood bowl (*tanoa* in Fiji), then strains the root powder with a cloth and offers each participant at the ceremony a small cup, usually made of half a coconut shell, (*bilo* in Fiji) of the liquid.

degree of complexity of each hypothesis to be tested. Various statistical packages such as Microsoft Excel, SAS and Statistica will be used to perform the analysis.

## Discussion

All socioeconomic field surveys from the DemEcoFish project have been completed. Due to the fact that data analysis is currently underway, results presented and discussed here only focus on the methodology and field survey components.

## Timing

Field experiences indicate that although the limitations imposed by applying a one-time snapshot approach are acceptable, timing is still crucial. Visiting a village community within a certain period preceding or following a major holiday and other event does not render typical/normal information on seafood consumption and fishing patterns. Also, competition of time requirements between survey and increased social activities significantly reduces village interest, participation and cooperation.

In addition, survey implementation also needs to take into account unpredictable social events that restrict or prevent the presence of the survey team and the participation of village population (e.g. funerals, major church or chiefly gatherings).

## Survey design

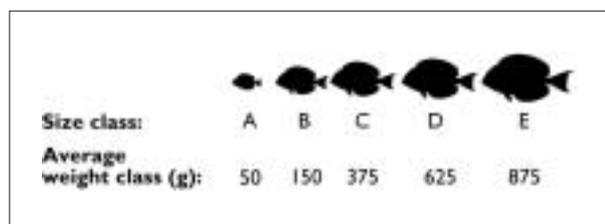
Overall, the survey design proved to be successful in both countries. The successful organisation of a village community meeting, however, was found to be highly dependent on three major factors: preparatory steps taken, status and relationship between local counterparts and communities targeted, and the strength of social networking. Taking into account that participation at community meetings was voluntary, turn-up rates of gender and age groups at these gatherings varied considerably. There are no clear selection criteria for participatory survey design to ensure representation of the community. Also, participatory surveys involve a high risk of manipulation and the reliability of results is therefore questionable. Thus,

**Table 1. Hypothesis for data analysis**

Objective	Hypothesis
Indicators for fishing pressure	(a) fish consumption (b) dependency on marine resources, (c) fishing strategies, and/or (d) a combination of all are possible indicators
Consumer typology	there are different consumer groups within and between each of the two countries surveyed
Dependency on marine resources	is determined by fishing activity level
Fishing strategy	fishing strategies are distinguishable according to specific characteristics, resulting in fishing activity level
Methodological comparison between PRA and individual surveying	PRA is more likely to suffer from manipulation, hence rendering less reliable data than close questionnaire surveys

information gained from participatory scoring and ranking performed during community meetings may be misleading. Consequently, in the case of the DemEcoFish project, data gathered from participatory surveys will not be used in the final analysis. However, validation of participatory surveying will be performed by comparing data obtained from both, participatory ranking and scoring and individual surveys. This will also assist in determining how far results from the World Bank and the MacArthur-funded studies can be compared.

The reliability and accuracy of closed questionnaires are dependent on the training, effort and cooperation of the survey team members and cooperation and interest of the persons interviewed. Overall, the questionnaire should follow an easy to understand and simple to fill in design. The use of pictures for determining species and sizes (quantification of fish consumed for example) proved useful (Fig. 4).



**Figure 4. Fish size-weight charts**

The numbering of each household in the community proved to be very useful as this number was easily used as a reference to link all different survey results to a particular household dataset.

Household census and consumption surveys served to estimate the community's total seafood consumption of the community and its economic dependency on marine resources. While in fact 100% coverage of all households was achieved in most Tongan and Fijian villages surveyed, a much smaller coverage percentage is presumably necessary to reliably estimate both parameters.

### **Cooperation**

The success of this type of survey was highly dependent on the availability and cooperation of local counterpart staff. Experience indicated that connection and familiarity with the communities is the most crucial factor rather than technical or scientific background. The support of local extension, technical or scientific staff members can shorten the time required for preparation, and increase interest and cooperation of target communities. Also, the incorporation of young women with secondary school education from the target communities in the survey team proved to be successful. Once familiarised and trained with a particular component of the survey, they had easy access to local community members.

### **Fishing grounds**

Identifying names and localities of finfish fishing grounds proved feasible by using enlarged hydrological — or if lacking — topographic maps. Information on names and locations was obtained from individual persons or group gatherings. The popularity of fishing grounds could be easily

established by encouraging fishers to perform scoring and ranking. However, fishing grounds used by reef gleaners and collectors of other seafood than finfish required resource mapping. The scale of hydrological and topographic charts, even if copies were enlarged, did not allow recognition of most invertebrate fishing grounds.

### **Fishing pressure**

Complementary use of survey results from the "serious" fisher and individual groups interviewed requires avoidance of double counting (i.e. the same persons having filled in both questionnaires as well as the possibility for an a posteriori classification of fisher groups). Social status within one community does not necessarily reflect current fishing activity levels. Particularly in the case of Tonga, women's fishing activities are chronically underestimated and socially undervalued.

Experience demonstrated that the comparison and alignment of vernacular and scientific names for both, finfish and invertebrates is crucial. However, this task poses a major challenge as both systems follow different logic, and hence are not necessarily comparative at the species level.

The quantitative transformation of invertebrate units caught, marketed and consumed poses another difficulty. This part is much more diverse than finfish and requires in-depth field measurements.

### **School children survey**

Although a complementary activity, participation and engagement of school children was extremely high. Field experiences also suggest that the role of children is an important factor in village fisheries, yet is underestimated.

## **Empowering Pacific Island communities**

*Silvia Troost*

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The global community's image of Pacific Islands is one of paradise — azure water, palm trees, and other tourist brochure clichés. In reality, Pacific Small Island Developing States (SIDS) face serious and unique development challenges that render them as vulnerable as the poorest nations of Africa. Pacific Islands are geographically small and isolated. They have a limited and extremely fragile natural resource base with "no room for error" in terms of management decisions.

Pacific Islands have small populations with relatively limited opportunities for advanced education. The few people who do manage to receive higher education and skills are often recruited into higher paying jobs in New Zealand and Australia, resulting in a serious "brain drain".

Economically speaking, Pacific SIDS for the most part do not benefit from globalisation in its current manifestation. They are often the dumping ground