GCRMN

GLOBAL CORAL REEF
MONITORING NETWORK

SOCIOECONOMIC MANUAL FOR CORAL REEF MANAGEMENT

L. Bunce, P. Townsley, R. Pomeroy, R. Pollnac

With contributions by H. Cesar, E. Nicholson, P. Wiley

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FOREWORD

Coral reef management has focused traditionally on the biophysical aspects of coral reefs – the corals, other benthos, fishes and the physics and chemistry of surrounding waters. Today reefs are coming under increasing pressures from human activities. Therefore, the human dimension of reef management must play an important role in reef management programmes that now emphasise stakeholder involvement, community participation, and cooperative management. This is especially important in countries where people depend on reefs for subsistence and commercial fisheries, shoreline protection, and tourism attractions and yet their behaviour often adversely affects the health of the reef ecosystems.

Reef researchers, managers, and policy-makers recognise the importance of understanding not only the biophysical conditions that determine system structure and processes, but also the social and economic conditions, contexts, and motivations that are associated with their use. As a result, interest has grown among government, non-government, community and research organisations in guidelines on how to assess socioeconomic conditions and how to incorporate this information into reef management programmes.

The Global Coral Reef Monitoring Network (GCRMN) aims to provide critical information and data on both the biophysical and socioeconomic aspects of coral reefs now and into the future. This socioeconomic manual, which was developed to parallel the existing biophysical manual (English et al. 1997), is intended for use by coral reef managers directly working on reef management around the world to assist them with basic socioeconomic assessments in their communities. The audience is the manager who does not have formal social-science training and may use English as a second or third language. Implementation of this manual should be accompanied by training and guidance in how to conduct socioeconomic assessments.

We are pleased to recommend this manual to you as an excellent guide in assessing people who use and affect coral reefs. Hopefully with its use, there will be greater appreciation of how people interact with coral reefs and improved management of their activities to ensure that these marvellous ecosystems will continue to provide sustainable services for communities into the future.

Edgardo Gomez
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Science and Technology
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World Commission on Protected Areas
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PREFACE

HISTORY

The concept for this manual first emerged in 1996 during the 8th International Coral Reef Symposium in Panama City. Several social scientists discussed the need for guidelines on how to conduct socioeconomic assessments of coral reef uses in different regions of the world. At the same time, the Global Coral Reef Monitoring Network (GCRMN) was being urged by international donor organisations to conduct parallel monitoring of socioeconomic aspects with the existing biophysical assessments of coral reefs. The development of a socioeconomic assessment manual that would complement the biophysical manual (English et al. 1997) became a project for the GCRMN.

In 1997, the Environment Agency and Marine Parks Center of Japan sponsored a workshop, in conjunction with the Marine Sciences Institute of the University of the Philippines and the International Center for Living Aquatic Resources Management (ICLARM) in Bolinao, northwestern Luzon, Philippines to scope the issues and material to go in the manual. Subsequently the National Oceanic and Atmospheric Administration (NOAA) agreed to provide editorial support and financial assistance to develop this manual with experienced authors. The World Conservation Union (IUCN) provided significant funds and additional support was provided by the Japanese Government Ministry of Foreign Affairs and Environment Agency, and the United Nations Environment Programme.

CONTRIBUTORS

The Manual was authored by a team of social scientists with extensive experience from around the world. Leah Bunce, who served as editor and author, is an international marine affairs specialist with the National Oceanic and Atmospheric Administration National Ocean Service where she advises on marine and coastal policy issues related to coral reefs, marine protected areas and socioeconomic assessments. She is currently coordinating the IUCN World Commission on Protected Areas – Marine Sustainable Fisheries Initiative and previously conducted socioeconomic assessments in Jamaica and Antigua as part of her doctoral research.

Philip Townsley is a specialist in participatory approaches to natural resource management projects and consults worldwide, including for the Food and Agriculture Organisation of the United Nations and the Department for International Development, U.K. During his 16 years of experience he has worked mostly on the

social aspects of fisheries and aquaculture in Asia and Africa and has published several manuals on participatory approaches to development.

Robert S. Pomeroy is a Senior Associate, Coastal and Marine Projects, in the Biological Resources Program of the World Resources Institute in Washington DC. Over the past 15 years he has worked on research and development projects in over 40 countries and focused in the fields of natural resource and environmental economics, specifically policy analysis, fisheries management and development, aquaculture economics, coastal resource management, international development, agricultural marketing and agricultural extension. Prior to joining WRI, Bob served as a professor at Clemson University and Senior Scientist at ICLARM.

Richard Pollnac is Professor of Anthropology at University of Rhode Island, where he is associated with the Coastal Resources Center. Over the past 26 years he has worked with fishery development and coastal management projects in Africa, Central and South America, the Middle East, Southeast Asia and the Northeastern United States. He has written numerous articles, book chapters, and books concerning fishery and coastal management development, including most recently *Assessing Behavioral Aspects of Coastal Resource Use,* which he co-authored with Brian Crawford.

Herman Cesar, Betsy Nicholson, and Peter Wiley provided additional contributions. Herman Cesar provided text for the economic components and assisted with the development of the manual. He is a researcher at the Institute of Environmental Studies of the Free University in Amsterdam, the Netherlands, and is consultant in natural resource economics to the World Bank and USAID among others through his firm: Cesar Environmental Economics Consulting. Betsy Nicholson, who co-authored the case study and assisted with the sampling strategy, is a Sea Grant Fellow with the National Ocean Service Center for Sponsored Coastal Ocean Research / Coastal Ocean Program and is currently a graduate student focusing on marine policy and socioeconomic issues at Duke University. Peter Wiley, who assisted with the economic components, is an economist with the Special Projects Office in the National Ocean Service where he focuses on socioeconomic assessments of the National Marine Sanctuaries.

The Manual underwent intensive review by an Advisory Panel of Coral Reef Managers from around the world, which included:

- Nyawira Muthiga, Head of Coastal & Wetlands program, Kenya Wildlife Service;
- Antonio Perera, Director, National Center for Protected Areas, Cuba;
- Foua Toloa, Local Extension Specialist Consultant, Samoa Marine Biodiversity Protection and Management Project; and
- Johnnes Tulungen, Program Manager, Proyek Pesisir (Indonesian Coastal Resources Management Project), North Sulawesi, Indonesia.

The manual was also reviewed by an Advisory Panel of Social Scientists experienced in conducting socioeconomic assessments on reefs, which included:

- Tomoya Akimichi, Professor, Department of Cultural Research, National Museum of Ethnology, Japan;
- Jim Anderson, Ashley Halls, and Graham Pilling, Fisheries Specialists, Marine Resources Assessment Group, UK;
- Michael Mascia, Researcher, Duke University; and
- Jason Rubens, WWF Technical Advisor, Mafia Island Marine Park, Tanzania.

The final drafts of the manual were edited by Clive Wilkinson, coordinator of the GCRMN, and Liz Tynan, Manager of Science Communication at the Australian Institute of Marine Science (AIMS). Wendy Ellery and Steve Clarke of AIMS provided the lay-out design, and Gavin Ryan and Marietta Eden provided the illustrations and diagrams.

The authors would also like to thank the following people whose assistance greatly contributed to the production of this manual: the participants in the Bolinao for their initial insights into the direction of the manual (Tomoya Akimichi, Herman Cesar, Peter Espeut, Monica Gorman, Maha Gorospe, Ingvild Harkes, Bob Johannes, Tadashi Kimura, Keiichi Nakazawa, Yulfita Raharjo, Jason Rubens, Richard Pollnac, Bob Pomeroy, Bing Santos, Lea Scherl, Clive Wilkinson); Bill Zahner of the Policy, Analysis and Communications Division of National Ocean Service, for his advice on the publication and design process; the Coastal Services Center of National Ocean Service for use of their facilities during the authors' workshop; Bob Leeworthy of the Special Projects Office of National Ocean Service for his critique of the manual; and Jordan West of IUCN for her critique of the manual.

SPONSORS

National Ocean Service, National Oceanic and Atmospheric Administration (USA)
As the United States' principal advocate for coastal and ocean stewardship, the National Ocean Service is responsible for coastal and ocean science, management, response, restoration, and navigation. The National Ocean Service (NOS) is part of the National Oceanic and Atmospheric Administration (NOAA), which was established in 1970 within the United States Department of Commerce. The NOS mission is to be the Nation's principal advocate for coastal and ocean stewardship through partnerships at all levels and to support and provide the science, information, management, and leadership necessary to balance the environmental and economic well-being of coastal resources and communities. International stewardship is a prominent component of the NOS mission. Through the International Programs Office, the NOS has implemented bilateral partnerships, provided technical assistance to international organisations, such as the GCRMN, and provided leadership to global conservation efforts, such as serving as the Vice-Chair (Marine) of the IUCN World Commission on Protected Areas.

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IUCN-The World Conservation Union
Founded in 1948, IUCN brings together States, government agencies and a diverse range of non-governmental organisations in a unique world partnership: over 900 members in all spread across nearly 140 countries. As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

Through its network of regional and country offices, expert Commissions and member organisations, and Marine Program, IUCN supports a variety of coral reef conservation and management efforts that promote: protection of critical habitats and threatened species; design of management plans with stakeholder participation; development of ecological and socio-economic assessment methodologies; enhanced capacity building for sustainable management; and support of effective governance structures. IUCN is an original partner of the International Coral Reef Initiative (ICRI) and a founding co-sponsor of the Global Coral Reef Monitoring Network (GCRMN).

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Australian Institute of Marine Science
The Australian Institute of Marine Science (AIMS) is one of Australia's key research agencies and the only one committed primarily to marine research, with an emphasis on tropical marine science. It undertakes research and development to generate new knowledge in marine science and technology, and to promote its application in industry, government and environmental management. The research programme involves medium- to long-term research that is geared towards improved understanding of marine systems and the development of a capability to predict the behaviour of complex tropical marine systems. In the past 20 years the Institute has established a sound reputation for high quality research on coral reef and mangrove ecosystems, and on the water circulation around our coasts and continental shelf. Researchers have not only published extensively in scientific journals but have also written field guides, books and monographs for regional use. This work supports a wide range of studies for effective coral reef management.

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The Government of Japan
The Government of Japan has supported the development of this socioeconomic manual since the beginning in recognition of the importance of monitoring reef use for conservation of coral reef ecosystems. Recently, Japan established the International Coral Reef Research and Monitoring Center in Ishigaki City, Okinawa prefecture and has started a monitoring programme at Sekisei Lagoon near Ishigaki Island as one of the first initiatives. This socioeconomic manual will be as meaningful and useful for the people of Japan as it will be for all other countries with coral reefs.

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INTRODUCTION

IMPORTANCE OF THIS MANUAL

Coral reef managers have to balance sustainable use and reef conservation; therefore the relations between human behaviour and reef ecosystems are critical. Reef health is affected by human activities, but also the livelihoods and prosperity of people living in coastal tropical areas depend on the condition of the marine resources. Therefore, coral reef uses, reef management and reef ecology cannot be considered in isolation.

There is a close link between how people use coral reefs and their socioeconomic background. Understanding the socioeconomic context of reef stakeholders is essential for assessing, predicting and managing reef use. To balance sustainable use and reef protection, the reef manager needs to know:

1. The status of the reef and changes in the health of coral and fishes etc; and
2. The people that use and affect the reef, including their use patterns, perceptions of reef management and characteristics.
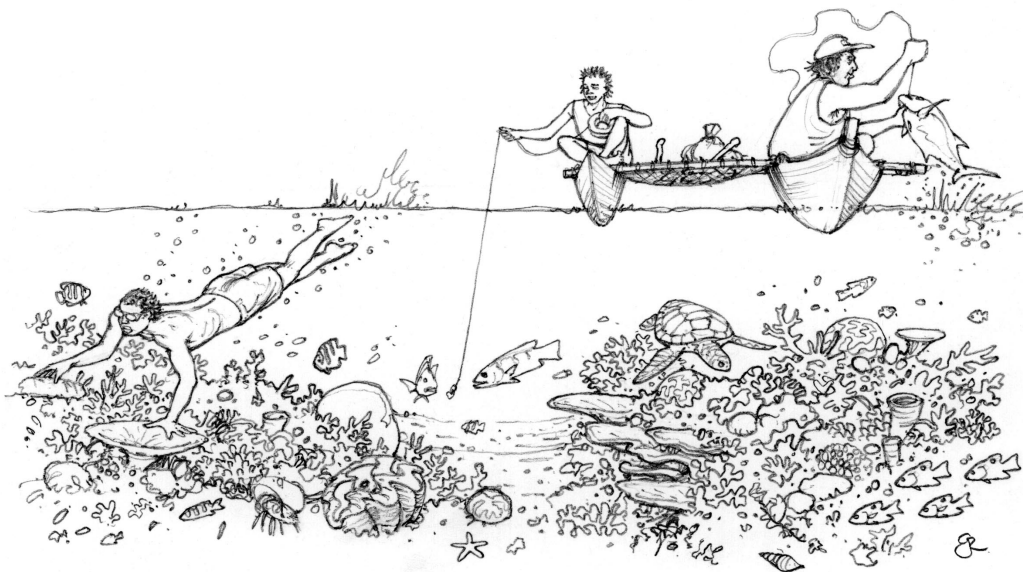
Socioeconomic information enables reef managers to:

Stakeholders – people, groups, communities and organisations who use and depend on the reef, whose activities affect the reef or who have an interest in these activities, including government agencies, non-government organisations, local users, universities and researchers.

- Incorporate *stakeholder* group concerns and interests into the management process. This will increase the perceived legitimacy of decisions and make compliance with rules and regulations easier;

- Determine the effects of management decisions on the stakeholders, which will improve policy decisions to minimise adverse impacts and maximise benefits to stakeholders; and

Reef resources and services – fish, other edible items, corals and other curios, cultural items, rock and sand; and shoreline protection, fisheries habitats, tourist attractions, potentially useful drugs, biodiversity.

- Demonstrate the value of the *reef resources and services* to the general public, stakeholder groups and policy-makers, which will generate greater support for reef management programs.

This socioeconomic manual was written because:

- Coral reef managers recognise the importance of understanding the people who use and depend on coral reefs, including the social and economic conditions and motivations associated with reef use; and
- Governments, and non-government, community and research organisations, are interested in basic guidelines for assessing socioeconomic conditions and incorporating this information into reef management programs; and
- Practical guidelines on how to conduct socioeconomic assessments of coral reef communities have not been developed previously. The few existing socioeconomic assessments of coral reef communities are site specific, and often focus on a particular stakeholder group (e.g. Gorman 1995; Pido 1995; Pollnac et al. 1997; Bunce et al.1999). Existing handbooks about human behaviour of reef communities also tend to focus on particular stakeholder groups (e.g. Pido, et al. 1996) or on particular methods (e.g. Townsley 1993; Pollnac 1998; IIRR 1999).

WHAT IS A 'SOCIOECONOMIC ASSESSMENT'?

Socioeconomic assessment – study of the social, cultural, economic and political conditions of people, groups, communities and organisations.

A s*ocioeconomic assessment* is a way to learn about the social, cultural, economic and political conditions of individuals, groups, communities and organisations. There is no fixed list of topics that are examined in a socioeconomic assessment, however the most

commonly identified topics are: resource use patterns; stakeholder characteristics; gender issues; stakeholder perceptions; organisation and resource governance; traditional knowledge; community services and facilities; market attributes for extractive use; market attributes for non-extractive use; and non-market and non-use values. Socioeconomic assessments vary in the extent they cover these topics, and this will depend on the purpose of the assessment. Some socioeconomic assessments may be a full evaluation of all these topics; others may focus on stakeholder perceptions or resource use patterns.

The types of socioeconomic assessments differ, but they can be characterised by 2 main factors:

- whether they are *participatory* or *extractive* in nature; and
- whether they are *product-oriented* or *process-oriented*.

These factors are at opposite ends of a broad range of assessment types illustrated by the X and Y axes in *Figure I-1*. For extractive socioeconomic assessments, a limited group of outsiders, such as researchers, reef managers or decision-makers conduct an assessment to learn about socioeconomic conditions (examples A and B) and learning is limited to this group. For participatory socioeconomic assessments, all stakeholders, including outside researchers, reef managers, community groups, reef users and other interest groups, are involved and all learn from the process (examples C and D). The difference between these two extremes is that one is 'extractive' – information is taken away by the people who collect it. The other extreme is 'participatory' – many people are involved in data collection, analysis and use.

Another way to look at assessments is whether they are oriented towards producing an information report for one group of stakeholders (examples B and D in *Figure I-1*);

Figure I-1: Types of socioeconomic assessments.

or whether the assessment is about the process of collecting information so that the learning mechanisms may be as important as the information (examples A and C). A socioeconomic assessment can fit at any point related to these two types of characterisations. Example E is a socioeconomic assessment that is between the extremes and involves a mix of extractive and participatory approaches and is both process- and product-oriented. Whether an assessment is more participatory, extractive, product-oriented or process-oriented will depend on the particular situation. The increasing interest in stakeholder participation in natural resource management has led to a greater use of more participatory, process-oriented approaches. However, product-oriented assessments that use more extractive approaches also make essential contributions to reef management.

Assessment team – the people who do the socioeconomic assessment.

Socioeconomic assessments involve planning and preparation before the *assessment team* interacts with stakeholder groups through interviews and observation to collect field data. The assessment concludes with the team analysing and presenting the data. However, there is no best step-by-step way to conduct a socioeconomic assessment, and the order of the steps will vary widely depending on local conditions and the requirements of the people. Sometimes, the assessment steps may follow a clear order, but in other cases they may need to be repeated and the order changed to adapt to new learning and changing circumstances. *Figure I-2* shows how different steps in an assessment can become complex, particularly when the emphasis is on building a process of learning involving many different people. Each socioeconomic assessment should be adapted and the process modified to the situation faced by the reef manager and based on experience, common sense and knowledge of the area.
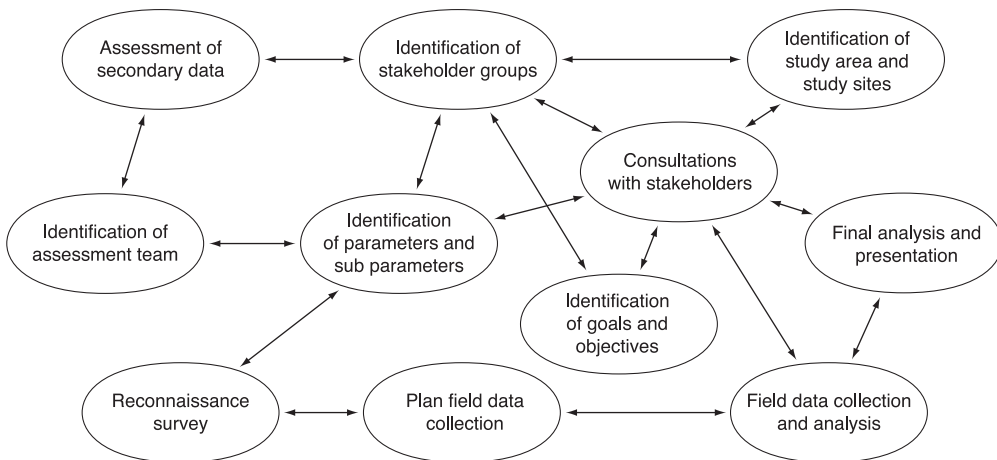

Figure I-2: The complex links between the steps involved in conducting a socioeconomic assessment.

OBJECTIVE OF THIS MANUAL

This manual is intended to help reef managers understand the steps in a socioeconomic assessment, and provide practical guidelines on how to conduct baseline socioeconomic assessments of coral reef stakeholders. The step-by-step process in this manual can be used to assess the socioeconomic background of coral reef stakeholders. The social, cultural and economic issues are discussed as well as the organisation and resource governance of coral reef management.

The socioeconomic information collected and the processes suggested here will help reef managers in management, development, research, monitoring and policy at a site. The baseline information may also contribute to national, regional and international comparisons of data, which are useful for science and policy-making.

This manual will also be used to gather socioeconomic information in parallel with biophysical assessments and monitoring being conducted by the Global Coral Reef Monitoring Network (GCRMN) and Reef Check. Both involve collecting data on corals, fishes, other biota and physical parameters using transect lines across the reef. Reef Check works with communities and volunteers who have limited experience and training (see methods in www.reefcheck.org). GCRMN monitoring (methods in English et al. 1997) gathers more data on more parameters along the transects, but requires more training and takes more time than Reef Check protocols. The goal of GCRMN and Reef Check is to gather biophysical and socioeconomic data at the same time, and often with the same team collecting both types of data. This combination of biophysical and socioeconomic information will assist reef managers in sustainable management of the resources.

AUDIENCE FOR THIS MANUAL

The main users of this manual will be coral reef managers in developing nations. It is assumed that they will be responsible for organising a team to do the assessment (see *Chapter 1, Identify the Assessment Team*). Everybody involved in the assessment, including the assessment team, may also be interested in the manual and its contents. These include:

- People directly or indirectly using and/or affecting the reef resources;
- Staff from cooperating agencies and institutions;
- Staff from non-governmental organisations; and
- Researchers, including students, involved in the assessment.

End-users – people or organisations that use assessment findings to make decisions and policy about reef management, identify research needs, or plan development in coastal areas.

The manual will also be useful for people who will want to use the assessment findings (the 'end-users' of the assessment), even if they don't do the assessment themselves. These may include policy-makers, reef managers from neighbouring areas and people in funding

organisations. These *end-users* may have limited knowledge of socioeconomic assessments and this manual may help them to understand what a socioeconomic assessment can provide.

This manual acknowledges that reef managers may have limited experience in socioeconomic issues, and may have limited staff, time and resources to carry out socioeconomic assessments. Therefore, alternative methods and tools are presented and guidance is given to help the manager determine how to make the best use of these limited human and material resources.

The language in the Manual is deliberately basic because many reef managers do not use English as their first language. Many complex socioeconomic terms have been cut out in favour of basic English – others are defined in the *Glossary* at the back.

STRUCTURE OF THIS MANUAL

There is no best way to conduct a socioeconomic assessment – the steps involved may be conducted in many ways. This manual arranges these steps in the most likely order, and organises them into four chapters (see *Figure I-3*). These chapters cover the 4 major phases of socioeconomic assessments.

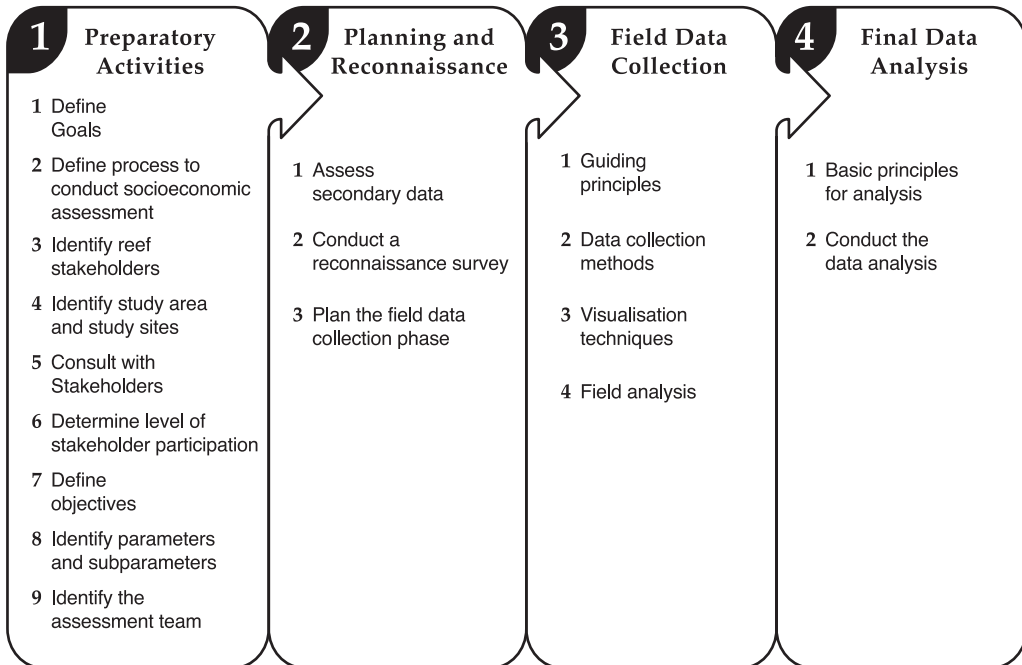| **1** Preparatory Activities	**2** Planning and Reconnaissance	**3** Field Data Collection	**4** Final Data Analysis
1 Define Goals	1 Assess secondary data	1 Guiding principles	1 Basic principles for analysis
2 Define process to conduct socioeconomic assessment	2 Conduct a reconnaissance survey	2 Data collection methods	2 Conduct the data analysis
3 Identify reef stakeholders	3 Plan the field data collection phase	3 Visualisation techniques	
4 Identify study area and study sites		4 Field analysis	
5 Consult with Stakeholders			
6 Determine level of stakeholder participation			
7 Define objectives			
8 Identify parameters and subparameters			
9 Identify the assessment team			

Figure I-3: Structure of this manual.

How to Start the Socioeconomic Assessment – Chapter 1 describes the preparation needed to start the assessment, including defining the goals, discussing the overall

Parameters – the elements, components or topics that are the focus of an assessment .

process, identifying, and consulting with stakeholders, defining objectives and socioeconomic *parameters* and identifying the assessment team;

How to Plan the Field Data Collection – Chapter 2 presents the planning steps for field data collection, including collecting and analysing existing secondary data, doing a reconnaissance survey in the field, and planning the field data collection;

How to Conduct the Field Data Collection – Chapter 3 discusses guiding principles for field data collection, describes the various collection methods and the visualisation techniques in detail, and discusses field data analysis;

How to Analyse the Data – Chapter 4 describes the final phase of analysing the data, validating the findings with the stakeholder groups involved, and presenting the results.

What are the Socioeconomic Parameters – Appendix A describes each of the socioeconomic parameters involved in a baseline socioeconomic assessment. The importance of studying the parameters is described, as are relevant sub-parameters and the means of data collection, analysis and presentation.

How to Sample – Appendix B describes how to determine who to interview and survey, which is an important component of *Chapter 2, Plan the Field Data Collection.*

To guide the reader, the manual contains *Worksheets* which cover the main elements of the assessment process and are intended to be completed by the reader when working through the steps.

A fictional *Case Study* runs throughout the manual to illustrate the process of conducting a socioeconomic assessment. At each step, a bit of the case study is presented. The background of the case study is provided in the next couple of pages. The reader can use these case study boxes as a way of reviewing the manual or an exercise in how to plan a socioeconomic assessment.

Summaries of five real socioeconomic assessments are also presented to show how assessments are done. Short examples are provided throughout to illustrate the points further.

The manual concludes with references, a glossary to clarify various terms, and a list of suggested readings to enable the reader to access more in-depth information.
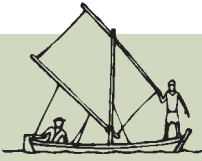
Studying Mombuka: Background

Carol Recife is the manager of a new marine protected area (MPA) in the town of Mombuka on Tebu Island. Carol was hired because she has 10 years of work experience with the National Park Authority, knows the local dialect, and is familiar with the area. She is a trained marine biologist.

Carol and her 3 staff, Lon, Jeb and Una, are responsible for managing the MPA, which includes patch and barrier reefs, mangroves and seagrass beds. These ecosystems support a community of fishers in Mombuka and one tourist watersports centre.

There are 15,000 people in Mombuka, including many families who have been fishing for generations. Now the number of fishers is increasing, although fish catches are declining. The town is also becoming a tourist attraction because of its reputation for great beaches and pristine natural resources, and there is an airport only 50km away. There are 10 guesthouses as well as the watersports centre; but these tourism activities do not contribute much to the local economy. Tourism is expected to increase when the road to the airport is improved. Upriver, there are some forestry operations, which a recent environmental impact assessment found were adversely impacting the reefs through sediment run-off.

The national government recognised that the patch and barrier reefs off Mombuka have significant ecological value, so they established 'Mombuka Marine Park' (the Park) a few years ago. The goal of the Park is to ensure sustainable use and protection of the marine resources. Carol was appointed park manager last year and since then has been drafting a management plan with strategies to achieve these goals, but so far the only prohibited activity in the Park is blast fishing.

The National Park Authority (NPA) is responsible for managing the protected areas on Tebu Island, including the 3 recently established marine protected areas (MPAs). Mombuka Marine Park has been given the highest priority, and Carol is expected to share her experiences with the other MPA managers. A new national government has just been elected, with the policy of decentralisation and local empowerment. The government sees the establishment of MPAs as a way of involving and empowering local communities in management decisions concerning coral reef protection by bringing them into the planning process. Consequently, the NPA views stakeholder participation as a key component of MPA management and has strongly encouraged Carol to work with local people.

The concept for a socioeconomic assessment came from the Global Marine Conservation Fund (GMCF), a well-known international NGO that provides funding for the Park. GMCF proposed an ecological assessment of the marine resources, including a small socioeconomic component, to determine the levels of uses of those resources. The NPA, however, wanted more importance placed on involving the local community, so they modified the proposal to have two assessments of equal weight – the ecological and socioeconomic assessments. Together, the NPA and Carol agree that the overall goal is to learn about the socioeconomic conditions to help management of the Park for the betterment of both stakeholders and the resources. They also agree that the socioeconomic assessment will be based on a participatory process with stakeholders. Finally, the NPA and Carol agree that the findings will provide a basis for developing a long-term monitoring program, which will allow Park staff to track changes in socioeconomic conditions after the establishment of the Park.

The NPA is interested in using Carol's experience in conducting the socioeconomic assessment as an example for other MPA managers. The NPA has given Carol and her staff one month to complete the socioeconomic assessment.

HOW TO USE THIS MANUAL

How this manual is used depends on who is using it. Senior coral reef managers may be more involved in planning and supervising the assessment and therefore need to understand the entire process from the start through to the analysis and presentation of its findings *(Chapters 1-4)*. In contrast, the assessment team members may be mostly involved in the field data collection *(Chapter 3)*.

There are two important guidelines to consider when using this manual:

Adapt the process to the particular situation
The socioeconomic assessment should be adapted to fit the situation. The detailed processes planned for a socioeconomic assessment will vary depending on the objectives of the assessment, the stakeholder groups involved, and the resources available, especially the people. Therefore, this manual does not describe one particular approach or 'blueprint'; instead, it describes a general process.

The order of the steps and how they are followed will be determined by local circumstances. The reef manager and assessment team should use common sense, experience and knowledge of the area to determine how to adapt the steps, e.g. *Chapter 2* includes the step *Conduct a Reconnaissance Survey,* but the team may know the area well enough to leave this step out. Similarly, *Chapter 1, Consult with Stakeholder Representatives* advises the reef manager to consult with relevant stakeholders regarding plans for the socioeconomic assessment. The reef manager may want to consult with many government agencies and community groups. However, there may not be enough time, so the manager may only contact one agency and two community groups.

The manual also presents a range of socioeconomic parameters to assess, as well as the collection methods and visualisation techniques. The reef manager and assessment team should select suitable parameters and methods for their situation and needs. Some parameters may not be relevant or cannot be covered with available resources, or there may be other parameters not described that should be included.

The steps in this manual apply to a range of stakeholders who use, or whose activities affect, reef resources, such as fishers, coral miners and watersports operators, as well as land-based stakeholders, such as hotel owners, foresters and farmers. Therefore the manager and the team should focus on some stakeholders based on their objectives, resources and circumstances. It is not possible to discuss how to gather information from each stakeholder group in each chapter; therefore, the team should determine how to apply the information to the groups being studied.

Modify the process continuously
The timetable and order of completing assessment steps can be changed. The manual presents a series of steps in linear time order, but the steps involved in a socioeconomic assessment are not always this direct. Sometimes new information

comes in that can create new requirements, so the team should review progress and change plans to fit the new conditions. Therefore it is necessary to continuously assess results, consider the implications for other steps in the process, and change plans accordingly. Some steps, or even entire sections, may have to be repeated or modified if things change or there is new information (*Figure I-4*) e.g. the team may learn about new stakeholders who should be consulted, so these have to be added and the timetables changed. These modifications make it difficult to define the time and resources required and even what the output will be, but they ensure the process is flexible and the information collected will be effective.
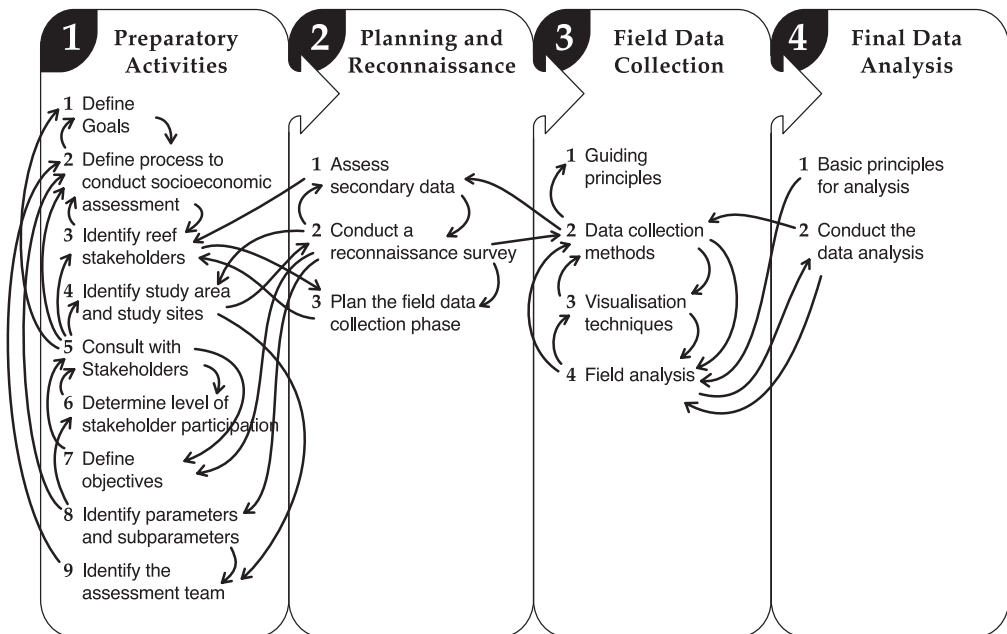
Figure I-4: Modify the process continuously.

LIMITATIONS OF THIS MANUAL

It is important to recognise the limitations of this manual.

Assessing the complexities and intricacies of socioeconomic dynamics

This manual does not address all types of analyses associated with socioeconomic assessments, such as cost-benefit analyses, total economic values, impacts of specific management strategies, forecasting and participatory management. These require specific expertise and often long-term data that cannot be collected from a single socioeconomic assessment. Some data collected during single assessments can contribute to these analyses and help coral reef managers understand what further analyses are needed. But the details of how to carry out those analyses is beyond the scope of this manual.

Need for experience and guidance to supplement manual

No manual can fully prepare someone to undertake a socioeconomic assessment. Nor can it substitute for first-hand experience of doing assessments, particularly collecting the field data. Therefore, the value of this manual will depend on the training and experience of the assessment team.

It is highly recommended that the reef manager and the assessment team receive guidance and training, in addition to using this socioeconomic manual. This is particularly critical when reef managers and team members do not feel comfortable with the processes described or do not feel they have the background and capacity to fully understand the methods and processes.

Establishing a starting point

The information gained from socioeconomic assessments can be used by reef managers as a starting point for planning management activities; however, continuous learning is critical for managers to adapt to changing socioeconomic conditions that happen during coral reef management.

APPLICATIONS OF THIS MANUAL TO SOCIOECONOMIC MONITORING

A socioeconomic *assessment* is a single study in time, whereas socioeconomic monitoring should be conducted continuously over time, usually at set

> Assessment – a study to collect data at one time.

intervals. Socioeconomic assessments conducted at the start of a project will help understand the community and establish baseline conditions. Monitoring should follow after the assessment to measure changes and show that the project is meeting its objectives. Assessment results will help define the monitoring parameters, but because monitoring is repeated regularly, fewer parameters will be measured than the initial assessment, and these may change as the project continues. But if there is good baseline information, it will be possible to compare results in the future, even though some data are not collected throughout the monitoring.

It is not possible to predict which parameters or methods to use for all *monitoring,* since situations are different. These decisions will depend

> Monitoring – continuous studies to collect data, usually at set times.

on: local conditions; the objectives of the project; and the resources available. For example monitoring could measure asset ownership and education levels of children if the project aims to improve the livelihood on coral reef users. However, if the aim is to assess the economic impacts of tourism, monitoring could measure the number of tourists, beds and SCUBA divers. Reef managers can use this manual to help plan socioeconomic assessments and monitoring programs based on their situations.

CASE STUDY: RESOURCES, RESOURCE USERS AND FISHERIES MANAGEMENT IN SAN SALVADOR FISHING COMMUNITY, PHILIPPINES

INTRODUCTION

In 1996, ICLARM (International Center for Living Aquatic Resources Management), an international NGO based in the Philippines, and the Haribon Foundation, a Philippine non-government organisation, set up a study to examine how a fisheries co-management project was working in San Salvador Island, Zambales Province. The goals of the study were to:

* characterise the resources and resource uses;
* examine performance criteria of sustainability, equity and efficiency to determine the impact of the management strategy on the people and coastal ecosystem; and
* describe the conditions and factors necessary to establish a fair, lasting and resilient resource management institution.

The characterisation of the resources, resource users and fisheries management arrangements in the San Salvador fishing community is an example of a socioeconomic assessment. The objectives were to provide baseline information to evaluate the effectiveness of the co-management project and to provide insight for fisheries managers at the national and regional levels who were considering co-management programs.

DATA COLLECTION

The socioeconomic assessment was a collaborative process between ICLARM, Haribon Foundation, the Municipal Government of Masinloc and San Salvador community members. The assessment team included 2 staff members from ICLARM and 3 local community members. They worked with the collaborating organisations to design and implement the evaluation.

The team examined the following parameters and sub-parameters of the resource, resource users and fisheries management arrangements:

I. Physical, technical and biological attributes
* physical – customary, political, legal, and technical boundaries
* technical – fishing gear, information sources on gear types, fish harvest sharing system
* biological – live coral cover, fish catch and fish species, fishing grounds, perceived trends in the condition of fishery resources, perceived importance of the Marine Sanctuary

II. Fisher, stakeholder and community attributes:
- fisher community
- characteristics of sample fishers – age, education, household size
- fisher households – age composition of the households and out-migration; educational background of household members, household assets, occupational multiplicity and dependence on fishery resources, job satisfaction

III. Market characteristics:
- food fish/marine products – fishing ground, market outlets, place sold, number of trades, existence of favoured buyer & length of relationship, market orientation, value of product
- aquarium fish

IV. Community institutional and organisational arrangements:
- tradition of collective action and attitudes of fishers – current membership in village organisation, attitudes toward association leadership and decision-making, attitudes toward collective action, attitudes toward the distribution/sharing of responsibility for fisheries management, willingness to support a similar project in the future
- decision-making at the village level
- fishery-related property rights and rules in San Salvador – property rights, types of rules occurring in San Salvador, informal and formal operational rules, collective choice rules, constitutional rules, knowledge of rule, attitudes toward rules
- monitoring and enforcement – recorded violations, current perceptions of rule enforcement and violations, need for more marker buoys

V. External institutional and organisational arrangements:
- services from external organisation
- decision-making arrangements – municipal level, provincial level

VI. Exogenous events:
- macroeconomic
- political
- social
- natural

The field data collection involved surveying a random sample of 42 fishing households in the village, conducting key informant interviews with village leaders, members of the fishers association, and other individuals who have worked at the site and reviewing secondary data. The team conducted a household survey to

gather data on biological and socioeconomic parameters, including market attributes. In addition, institutional arrangements such as property rights and rules, enforcement, and attitudes toward collective action and decision-making were assessed. The sample size of 42 was based on statistical power analysis (Cohen 1988) and included two sample groups: 21 members and 21 non-members of the fishers association, and 21 non-members. The research team used a recent list of village households by occupation to draw up the sample of people to the survey. The sample included only households directly involved in fishing, either as their main activity or as an additional source of livelihood. People were also listed into members and non-members of the fishers association.

Following the surveys, key informant interviews were conducted to probe into the project experience and to investigate organisation arrangements before, during and after the project started. Key informants included village officials, past and current officers of stakeholder associations, members of stakeholder organisations and other community-based organisations, fish traders, community organisers, field staff and other project implementers, and municipal government staff. The team included some visualisation techniques in the interviews, including resource maps, maps of the geographic location of residents by ethnic group, maps of the management zones, timelines, seasonal calendars for gear types and species caught, and historical transects of various attributes (e.g. times when there was open access to all municipal waters; times when the market was focused on the export market for aquarium fish).

Secondary data, including local legislation/ordinances, socioeconomic and demographic profiles, project preparation documents, progress reports, and published articles, were collected to support the primary data.

DATA ANALYSIS AND PRESENTATION

The socioeconomic data were summarised into descriptive text for each of the sub-parameters. The descriptive analyses for the parameters included frequency counts, percentages, means and standard deviations, which provided a distribution of respondents across the parameters. Where quantitative analysis was possible, a range of statistics was used (descriptive and inferential statistics, both univariate and multivariate) to summarise and analyse the primary data. To test hypotheses and do quantitative analysis, several inferential statistical tools were employed in the study, namely: chi-square, t-test (paired and independent sample), principal component analysis, correlation analysis, and regression. As a result, the summary of each sub-parameter included descriptive text with some statistical data, tables of results and figures (e.g. maps). For example, information on fisher houses included a description of age composition, educational background and household assets and included a table identifying the percent distribution of assets among household members and non-members.

The data analysis results were also used to determine the characteristics of successful fisheries co-management arrangements. These characteristics were based on reviewing the socioeconomic data and determining patterns and trends that correlated with the management strategies. For example, the socioeconomic data supported the conclusion that job satisfaction positively influences perceived benefits from the marine reserve and that dependence by households on fishing as a primary income source is likely to result in perceived improvements in benefits from the Marine Sanctuary.

The socioeconomic results were presented in a 100-page evaluation report, which was organised into the following sections:

Introduction – history and purpose of the project
Research framework and methodology – discussion of co-management and the data collection, sampling and analysis of the evaluation
Overview of the Fisheries Co-Management Experience of San Salvador – summary of the history of the co-management project
Contextual Variables – description of each of the parameters and sub-parameters as outlined above, including tables, maps and diagrams where appropriate
Incentives to Cooperate and Patterns of Interaction – discussion of the basis for interactions among fishers, government organisations, NGOs and other stakeholders
Outcomes/Performance Indicators of Co-Management – analysis of the equity, sustainability and efficiency of the co-management project since it started in 1988
Synthesis – summary of the socioeconomic parameters that shaped fisheries co-management institutional arrangements in San Salvador over time
Characteristics of Successful Co-Management Institutional Arrangements – insights on the characteristics of successful fisheries co-management institutional arrangements, along with the underlying explanatory variables.

The socioeconomic data were presented in detail in the *Contextual Variables* section, were summarised in the *Synthesis* section and contributed to the insights in the *Characteristics of Successful Co-Management Institutional Arrangements* section. To illustrate the kinds of findings reported, following are 2 summary tables from the *Synthesis* section:

Attributes of Fishers and Fisher Community

Indicator	Socioeconomic and other Attributes
Homogeneity/heterogeneity of resource users	• Homogeneous resource users until the 1960s • Heterogeneous resource users since the 1970s
Dependence on the fishery for livelihood	• High dependence on the fishery (about 60%) of the village residents) • More than half of the total household income comes from fishing at present
Motivation of users	• Fishery exploitation was primarily subsistence-driven until the 1960s and then more market-driven from the 1970s onwards
Attitudes of fishers	• Initially indifferent towards collective action • Relatively stronger collaborative attitude since 1989 as a result of community organising efforts and sanctuary establishment
Level of information and knowledge on the fishery and management	• High indigenous knowledge of fishing gear • Lack of knowledge on fish stock management and coral reef rehabilitation • Improved knowledge of sustainable fisheries management as a result of the Marine Conservation Project for San Salvador (1989-1993)

Market Attributes

Indicator	Market Attributes
Subsistence or market oriented	• Market-oriented since the 1970s
Market structure	• Many sellers and buyers • Existence of *sukis* (favoured buyers) who provide loans to fishers and a guaranteed market for fish • Dominance of women in fish trading activities
Market orientation	• Mixed market orientation: local and national for food fish and international for aquarium fish
Value of fishery products	• Low to medium for food fish • High for aquarium fish

More important than producing a document, the study team presented their results to the community and staff. These presentations provided an opportunity for them to learn about the study's major findings, ask questions and discuss the results with the team, and to discuss among themselves how these results would affect future management activities.

One of the greatest effects of the study was to validate with a quantitative and scientific study the generally accepted knowledge about the benefits of the co-management program to the community. In doing so, the findings increased the community's confidence in the project and increased their willingness to

support the co-management system, despite internal squabbles.

In addition to providing valuable information for the San Salvador community, this study has contributed to regional understanding of fisheries co-management arrangements in the Philippines and Asia. The results, particularly the lessons learned, have been disseminated widely throughout the region and have been incorporated into ICLARM and the Haribon's fisheries management work.

(Full reference in Pomeroy et al. 1996)

A typical day of fish sells in the market (Photo: Tomoyo Akimichi).

CHAPTER 1: PREPATORY ACTIVITIES

The first phase of conducting a socioeconomic assessment, prepatory activities, is when the scope of the assessment is established. This involves defining the goals and objectives, identifying the stakeholders, and determining the parameters to be assessed. These steps are often conducted by the reef manager as a brainstorming exercise to determine how to start the assessment. These ideas form the basis for consulting with stakeholders to plan the assessment.

DEFINE GOALS

The reef manager should define the goals of the socioeconomic assessment of the coral reef stakeholders based on the needs and interests of the reef manager and other end-users. In some cases, the goals may have already been determined by the organisations that started the project.

These goals help determine how to set up the assessment and how complex it will be. As a general guide, reef managers and other end-users have five types of goals:

1. *Management* – the assessment may be designed to study the potential socioeconomic impacts of reef management strategies intended to protect and conserve the coral reefs.
2. *Research* – the assessment may aim to increase knowledge about the social and economic conditions of reef stakeholders and to show how the condition of the reef is directly linked to human activities.
3. *Development* – the assessment may aim to identify socioeconomic issues that need to be addressed during development activities to improve the conditions of reef stakeholders.
4. *Monitoring* – the assessment may help establish a baseline for assessing socioeconomic changes over time in communities linked with coral reefs.
5. *Policy* – the assessment may be designed to provide socioeconomic information and make recommendations to guide decision-makers and policy-makers.

Complete the Goals Column of the Goals & Objectives Worksheet!
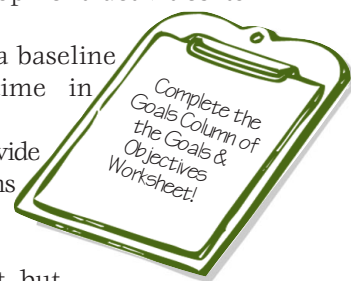
These goals define the overall purpose of the assessment, but
leave room for incorporating more specific concerns later. These will be addressed when the objectives are defined during *Chapter 1, Define Objectives*.

Defining the Goals

After talking with NPA and GMCF, Carol considers the goals of the socioeconomic assessment to be linked to management and monitoring. The socioeconomic information about the stakeholders will help Carol manage the Park for the betterment of the stakeholders and the reef resources. In addition, the process of conducting the socioeconomic assessment and the resulting information will provide guidance for the other MPA managers to help them conduct their own socioeconomic assessments. The assessment will provide baseline data that will be used for a monitoring program to look for changes in socioeconomic conditions over time. Carol drafts the goals for the Goals and Objectives Worksheet based on this information.

Goals and Objectives Worksheet

Goals	Objectives	Specific Objectives
Management – help determine how to manage the MPA for the betterment of the stakeholders and the reef resources – provide guidance for other MPA managers		
Monitoring – establish baseline data to use for monitoring changes in socioeconomic conditions		

DEFINE THE PROCESS TO CONDUCT THE SOCIOECONOMIC ASSESSMENT

After setting the goals, the reef manager should consider the process of conducting the socioeconomic assessment for his/her situation. The best way to understand the overall process is to read through the whole manual and to try to visualise how the various phases and steps will proceed. Then determine what resources and how much time are needed for the socioeconomic assessment. The following list is a general guide:

- Car rental, boat rental, other transportation to/from sites (e.g. buses, taxis);
- Consultant fees (e.g. economist);
- Accommodation for non-resident team members;
- Camera, binoculars, tape recorder, video camera;
- Maps, nautical charts, Global Positioning System (GPS);
- Copying and other office-related expenses;
- Notepads, flipcharts/posterboard, pens/pencils, markers; and
- Expenses related to hospitality for the communities (e.g. drinks).

The time required for each socioeconomic assessment varies depending on the size of the area, number of stakeholder groups, and the parameters included.

The reef manager needs to consider who is able to work on the assessment, how much time is available to conduct it and what resources are available. Based on this information, the reef manager should set a timetable and allocate the funds and other resources needed.

Defining the Process

Carol reads through the entire manual to determine the time, staff, funding, and resources needed to complete the assessment. She drafts a table based on the major phases and notes the time, resources and staff she thinks she will need for each phase.

Carol quickly realises that one month is not enough time to conduct a careful assessment, so she discusses this with the NPA. The NPA says that it is still urgent because of the need to help the other MPA managers, but they agree to a three-month study. GMCF agrees to contribute funds to cover the logistics (e.g. fuel, boat rental, and office expenses) and some accommodation for the outside staff. Carol realises that a car will be needed to travel to some of the field sites and possibly a boat to visit some coral reef stakeholders. Carol decides to provide the small items, including notepads, flipcharts, and markers from the Park office. She realises that the assessment will require several staff, particularly for field data collection and analysis, and decides to involve at least two of her three staff part-time. But she also realises that additional staff and funding will be needed. She makes a note to discuss possibilities for assistance during her consultations with stakeholders.

Socioeconomic Assessment Phase	Timeline	Resource Needs	Staff Needs
Prep activities	1 week	Notepad	Carol
Planning & reconnaissance	2 weeks	Office space, notepads, markers, accommodation for outside staff, copying facilities, flipchart	Estimated 3-4 people
Field data collection	7 weeks	Office space, flipchart, notepads, boat and car transportation, accommodation for outside staff, copying facilities	Estimated 3-4 people
Analysis and final report	2 weeks	Office space, accommodation for outside staff, flipchart, notepads, copying facilities	Estimated 3-4 people

IDENTIFY THE REEF STAKEHOLDERS

The reef manager needs to identify the reef stakeholder groups to determine which ones should be the focus of the assessment. Stakeholders may be listed in three groups:

Primary stakeholders – people who directly depend on the reef for a living and who make direct use of the reef and its resources (e.g. fishermen, dive operators);

Secondary stakeholders – people who do not use the reef and its resources directly, but make use of products or services from the reef (e.g. fish traders) or whose actions may affect the reef (e.g. upstream farmers);

Relevant organisations – organisations with direct responsibility for managing activities affecting the reef or with an interest in the primary or secondary stakeholders, including government agencies, informal or traditional organisations, universities, and non-governmental organisations (NGOs). These might also be the end-users.

The reef manager can identify the stakeholder groups by looking at activities affecting the reefs either directly or indirectly. The manager can then determine who is associated with each activity. As a general guide, a list of primary and secondary stakeholders and relevant organisations is given in *Table 1-1*.

Some stakeholders may fall into several categories, while other stakeholders may not want to be listed in particular groups. They may prefer to be listed as one community. The assessment team should recognise such potential difficulties when identifying and grouping stakeholders.

Depending on the goals of the assessment, the study may only involve those stakeholders associated with particular activities. For example, if the main interest is tourism, then the stakeholders associated with commercial coastal development, marine development, boating and snorkeling/diving may be identified as the relevant stakeholders, whereas fishers and farmers may not be involved in the assessment.

When it is not possible to study all the stakeholders on the list, it may be necessary to set priorities for which stakeholders to study. This can be done by noting three main factors:

- their proximity to the reef areas concerned;
- the impact that their activities may be having on the reef; and
- their relative levels of dependence on reef-related activities.

The reef manager's knowledge about these may be limited before the assessment. But as the assessment progresses and more is learned about different stakeholder groups, these priorities may be refined and adjusted.

In addition, as the assessment team learns more about the area, they may find new stakeholder groups and break other stakeholder groups into sub-groups. For example, the reef manager may know there are people who use the reef, but not be able to identify the different reef stakeholder groups. Therefore the assessment would try to discover more about these different groups. Similarly, people fishing on the reef may first be described as 'reef fishers' until later they can be classified as 'trap fishers' or 'hook and line fishers'.

Complete Stakeholders Worksheet 1!

Identifying the Stakeholders

Carol starts to think about which reef stakeholder groups to consider in the socioeconomic assessment, and makes a full list of reef-related activities and the relevant stakeholders based her knowledge of the community. For example, Carol lists 'fishing' as a well-known traditional activity in the area, and then lists 'fishers' as primary stakeholders. She realises from her experience that there are some conflicts within the fishing community and wonders if distinctions among members of this group would explain these conflicts. She makes a note to investigate sub-groups during consultations with stakeholder representatives and during the reconnaissance survey. Although Tebu College is approximately 100km away, Carol lists the Biology Department because it conducted the recent environmental impact assessment of the area. She also lists the Anthropology Department at the College, because she wants to talk with the professors about helping conduct the socioeconomic assessment.

Carol wants the study to be as comprehensive as possible, but realises she doesn't have the time and staff to thoroughly assess all of these groups in 3 months. So she decides to keep the initial list of primary and secondary stakeholders until she can learn more about them and then determine how much time and effort to spend on each group. She completes the Stakeholders Worksheet 1, keeping in mind that this list will change as the team investigates these groups and their relationships to the reefs.

Stakeholders Worksheet 1

Reef-Related Activities	Primary Stakeholders	Secondary Stakeholders	Relevant Organisations
Fishing	Fishers Division	Fisheries	Mombuka
Tourism	Watersports Centre	Guesthouses	Mombuka Planning Office
Forestry		Forestry Operations	
General (management, research, education)			NPA
			GMCF
			Biology Dept. at College
			Anthropology Dept. at College

Table 1-1. Major reef-related activities, potential impacts on the reefs, and the associated primary and secondary stakeholders and relevant organisations.

Reef-Related Activities	Potential Impact on the Reefs	Primary Stakeholders	Secondary Stakeholders	Relevant Organisations
Fishing	Over exploitation of fish stocks	Fishers/gleaners	Fish traders/sellers	Fisheries agencies, Fishers associations
Destructive Fishing	Physical damage from destructive practices and gear coming in contact with coral	Fishers/gleaners	Fish traders/sellers	Fisheries agencies, Fishers associations
Collection for Ornamental/ Aquarium Trade	Over-exploitation of reef species; Habitat destruction	Aquarium fish and coral collectors	Local traders	Fisheries Agencies, Trade Agencies, Fishers associations
Diving & Snorkeling	Physical damage from divers who damage the reefs	Watersports operators, dive operators		Tourism agencies, Watersports Association
Boating	Physical damage from anchoring and grounding	Resident boaters, tourists, commercial shippers		Port authority, Yachting Club, Commercial Shipping Association, Merchant Marines, Trade Department
Bioprospecting	Loss of reef habitat due to removal of reef species	Pharmaceutical companies		
Coral Mining	Physical damage to fish habitat	Coral miners	Cement buyers	Miners Association, Construction Industry
Oil and Gas Mining	Pollution from oil spills; Habitat destruction		Mine operators Mine operators	Trade Authority; Mining Association Land Ministry, Miners Association
Land Mining	Sedimentation and pollution from run-off			
Farming	Sedimentation from land run-off; eutrophication from pesticides, fertilisers	Upland and lowland farmers		Agriculture Department, Farmers Association
Forestry	Sedimentation from run-off	Mangrove cutters	Charcoal producers, Commercial loggers	Forestry Department, Foresters Association

Table 1-1. (continued)

Reef-Related Activities	Potential Impact on the Reefs	Primary Stakeholders	Secondary Stakeholders	Relevant Organisations
Aquaculture and seaweed farming	Eutrophication; Over exploitation of reef species; Physical damage		Aquaculture operators	Fisheries agencies, Agriculture agencies
Residential and Commercial Coastal Development	Habitat damage, Eutrophication Sedimentation, Waste disposal	Developers, Hotel owners, Coastal residents		Planning Office, Developers Association
Port and Marina Development	Habitat damage; Sedimentation from land clearing	Developers, Marina owners		Port Authority, Developers Association
Industrial Development	Pollution from industrial effluent		Factory owners	Trade and Development Authority, Industry Association
Electric and Desalination Plant Operation	Pollution from effluent and high salinity water		Plant operators	Trade and Development Authority, Industry Association

IDENTIFY STUDY AREA AND STUDY SITES

Once the stakeholder groups have been identified for study, the reef manager needs to identify the study area. The manager should consider the location of the coral reef, as well as the stakeholder groups. Coral reef resources are fixed and may cover a relatively limited area, but the reef stakeholders may be highly mobile and spread far wider. The reef manager should consider where the stakeholder groups live and where they work. In situations where this area is greater than the assessment team can reasonably cover due to resource and time constraints, the reef manager should reduce the study area to focus on the priority stakeholder groups defined in *Chapter 1, Identify the Stakeholder Groups.*

There may be several communities in the defined study area that all include important stakeholders, but there may be too many to be covered in the assessment. For example there may be 10 fishing communities in the study area. The reef manager should select a sample of these communities as specific study sites. Study sites can be selected using the following approaches (see *Appendix B* for more detail):

- *Random selection* – the reef manager decides on the number of study sites that can be assessed, each small area or community is numbered and the required number picked at random;
- *Convenience selection* – the reef manager bases the decision on the convenience of access and other logistic considerations. If study sites are defined in this way, the reef manager should be aware that the factors making these sites more accessible for the assessment team may mean that these sites have social and economic characteristics different from sites that are harder to access;
- *Purposive selection* – the reef manager selects study sites deliberately according to factors such as the diversity of conditions in the area (i.e. sites where all the main types of reef-related stakeholder and reef-use activities are represented), the willingness of the communities to co-operate and whether issues of particular interest to the reef manager occur at the site.

Complete the Study Sites Worksheets!
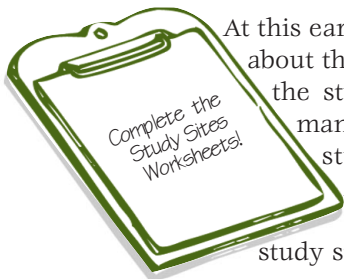
At this early stage, the reef manager may not have sufficient information about the stakeholders or the area to finalise the study sites. Therefore, the study area may be defined but not the study sites. The reef manager and assessment team will gather more information on the study area during *Chapter 1, Consult with Stakeholder Representatives* and *Chapter 2, Assess Secondary Data* and *Conduct a Reconnaissance Survey,* which will help finalise the study sites.

Identifying the Study Area

Carol defines the study area to include the reef resources and the stakeholders, particularly where they operate. Thus, the study area includes the forestry operations located approximately east of Mombuka, the reefs to the west of Mombuka, and the fishing communities in Mombuka. Carol draws the boundaries of the study area on the Mombuka map.

Carol understands there are over 700 fishers in 6 fishing communities, 15 forestry operations, over 10 guesthouses and 1 watersports centre. These numbers are based on her knowledge of the area having worked as the Park manager. She marks the locations of these stakeholder groups on the map as well as on the Study Sites Worksheet. Since the 10 guesthouses are all in town and there is only one watersports operator, Carol decides the team can easily cover all of these. However, Carol feels there are too many fishing communities and forestry operations to cover all of them, therefore she decides to select a few study sites for the foresters and the fishers. She uses purposive selection to choose the forestry operations closest to the river that carries the sediment out to the reef. But Carol decides she needs more information about the fishing communities before selecting study sites, which she plans to get from the reconnaissance survey. She writes up the Study Sites Worksheet with all this information.

Study Sites Worksheet

Stakeholder Groups	Locations	Study Sites
Fishers	Ceracas Fishing Community	To be determined
	Sullivans Fishing Community	
	Buru Fishing Community	
	Loh Fishing Community	
	Sanya Fishing Community	
	Tanzar Fishing Community	
Forestry operations of Mombuka	Four operations northeast southeast of Mombuka	Forestry operations
	Six operations east of Mombuka	
	Five operations southeast of Mombuka	
Watersports centre	One watersports centre between Sullivans and Buru Buru	Watersports centre between Sullivans and
Guesthouses	Over ten guesthouses in Mombuka	Guesthouses in Mombuka

Preparation

NORTH

To Kela
(~ 6 km)

road

Study Area Boundary

Park Boundary

forestry
operations

reefs

Loh

forest

Tanzar

road

Mombuka

Sullivans

Guesthouses

Watersports
operator

Park office

Buru

river

Sanya

forestry
operations

forest

Ceracus
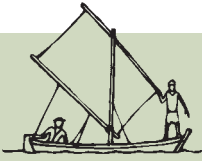
CONSULT WITH STAKEHOLDERS

The reef manager usually conducts the previous, preliminary steps. It is important to expand the discussions to include the stakeholders who are the focus of the assessment once this preliminary work is done.

Early consultations can have several advantages. They can:

- help ensure the concerns and priorities of as many stakeholders as possible are included in the planning of the assessment;
- help ensure the co-operation of stakeholders, particularly the relevant organisations, in implementation of the assessment;
- increase the stakeholders' sense of ownership of the assessment and eventual findings;
- increase the stakeholders' understanding of, and commitment to, the assessment's recommended actions;
- provide access to local knowledge, resources and assistance, which is particularly useful to managers with limited resources; and
- increase public and political support for the assessment and management measures in general.

It may not be possible to consult with all the identified stakeholders at this stage, but the reef manager should consult with stakeholder representatives, people who represent the views of stakeholders because of their positions in formal and informal organisations. These may include representatives from reef stakeholder associations or professional groups, community or religious leaders, or traditional heads.

Consultations may be conducted in several ways:

- one-on-one meetings between the reef manager and stakeholder representatives;
- small discussion groups or workshops with the reef manager and several stakeholder representatives; and
- discussions through existing forums, such as periodic planning meetings held by local authorities or co-ordination meetings involving different non-governmental organisations.

During the consultations the reef manager should:

- discuss plans for the socioeconomic assessment, including who is initiating the assessment, why it is being conducted and the contributions it could make towards reef management;
- seek stakeholders' input on plans for the assessment, including identification of objectives, stakeholder groups, study sites and parameters;
- seek stakeholders' insight regarding anything the reef manager and assessment team should know about the proposed study sites,

Preparation
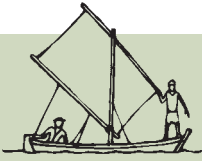
Consulting with Stakeholders

Carol feels that stakeholder participation is critical to the success of the socioeconomic assessment, particularly as she has limited funds and staff. She wants their cooperation, knowledge, assistance and resources in the assessment to ensure that she gets accurate results and their understanding of any future policy changes.

Carol doesn't have time to consult with all the stakeholders, so she decides to focus on representatives from the relevant organisations, primary stakeholder groups and secondary stakeholders groups who are having the largest impacts on the reefs (i.e. fishers, forestry operations, and tourism operators). She develops the following list based on her previous experience:

- President of the Fishermen's Cooperative
- Mombuka Planning Office officer
- Mombuka Fisheries Division Chief Fisheries Officer
- Professor in Biology Department at Tebu College
- Professor in Anthropology Department at Tebu College
- Manager of Forestry Operation southeast of Mombuka
- President of the Mombuka Tourism Association

Carol decides to hold a series of one-on-one meetings with all these stakeholder representatives, except the professors who she plans to consult by phone. She prepares the following list of points to discuss with each stakeholder representative:

- plans for the socioeconomic assessment (goals, stakeholder groups, study area and sites);
- priority concerns and issues about reef-related activities;
- key informants; and
- logistical arrangements, procedures and formalities.

As a result of the consultations, Carol learns much about the various stakeholders, which will affect how the assessment team conducts the socioeconomic assessment. For example, the president of the fishermen's cooperative, Jack, tells Carol there are three distinct sub-groups that fish the reefs off Mombuka: townie fishers, who travel by boat from the neighbouring town of Kela; ex-plantation fishers, most of whom left farming to fish during the big drought 30 years ago; and traditional fishers, who have a long tradition of fishing and whose families were among Mombuka's first settlers hundreds of years ago.

Carol also gains useful suggestions for the field data collection. For example, the manager of the forestry operation suggests talking to a recently retired forestry manager who has many more years of experience than the current managers. The president of the Mombuka Tourism Association suggests a few hotel owners and a travel agent who are all closely familiar with the tourism industry in the area.

So Carol revises her plans for the socioeconomic assessment by adding the three sub-groups of fishers to the primary stakeholder list. She also modifies the study area by adding the neighbouring town of Kela.

Most of the stakeholder representatives are receptive and positive about the socioeconomic assessment and pleased to be consulted and involved. Some even offer resources and staff to assist with the assessment. For example, the Chief Fisheries Officer of the Mombuka Fisheries Division offers his junior fisheries officer part-time, and the anthropology professor, Dr Xing, offers the help of a graduate student who is interested in women's issues in the coastal environment. Jack offers to take the team out in his boat for some field data collection.

During these talks, the stakeholder representatives also tell Carol what they would like to learn from the socioeconomic assessment. For example, the president of the Mombuka Tourism Association wants information on the contribution of the guesthouses and watersports centre to the local economy, and future potential contributions.

Preparation

stakeholder groups and parameters, including the basic characteristics of the stakeholder groups (i.e. size of the groups, their location and types of use);

• identify stakeholders' priorities and concerns that may affect the assessment;

• seek stakeholders' advice regarding logistics, including accommodation, transportation and communication;

• discuss procedures and formalities that the assessment team should observe while collecting field data, particularly related to approaching the stakeholders and ensuring the timing of activities in the field causes minimal disruption to local people;

• ask for suggestions of key informants for the field data collection. Key informants are people with rank, experience or knowledge who can provide extensive insight on socioeconomic conditions; and

• establish the existing planning and policy framework related to reef management, including the management authorities.

Modify Goals and Objectives, Stakeholders, and Study Sites Worksheets!

After these consultations, the reef manager should modify the initial list of goals, stakeholders and study sites, and keep in mind the points raised by the stakeholder representatives in the rest of the assessment.

DETERMINE LEVEL OF STAKEHOLDER PARTICIPATION

Having identified the stakeholder groups, the reef manager needs to determine how much each group will be involved in the socioeconomic assessment. Stakeholder participation has the advantage of increasing support for the assessment and its findings, providing access to knowledge, resources and assistance, and enabling the assessment team to better incorporate stakeholder concerns.

Several levels of participation should be considered:

Informed – People who are made aware of the assessment and its goals and objectives, but are not involved in determining the goals and objectives or implementing them. These people may have an interest in the assessment and its findings, but may not be directly affected by the assessment or reef management decisions.

There are various means of informing stakeholders. News and information about the assessment can be transmitted through radio, TV or newspapers if access to mass media is good in the area. Otherwise, posters or leaflets may be prepared and distributed in local markets, meeting places or local schools, or religious and

community leaders may be briefed on the assessment and asked to inform their constituencies. The assessment team and reef manager may also give presentations to stakeholder and community groups.

Consulted – People who are directly involved in discussions on the goals and objectives of the assessment and may contribute to its design. These people may experience impacts from management decisions arising from the assessment and therefore need to be fully aware of how the assessment was designed.

The stakeholder representatives consulted in the initial stages should be given the opportunity to voice their concerns and should be regularly informed of assessment progress. This can be done by sending progress reports or by inviting them to meetings during the preparation and planning phases and when the assessment findings are reported.

Partnership – People who are working closely with the assessment team such as staff of organisations assisting in the assessment.

Partnership implies full involvement, which means that stakeholder representatives should be actively preparing and planning the assessment and assisting in planning workshops. These stakeholders may also take part in the data collection. This partnership can be enhanced if some stakeholders are included as team members.

Ownership – In most cases, the organisations that initiated the assessment will own its results. Where an assessment is the first step in setting up community-based management, the stakeholders may also gain ownership of the assessment and carry out assessment activities themselves or make specific requests for changes in the assessment. Where local stakeholders are well organised, they may ask experienced organisations to carry out an assessment on their behalf. Therefore, 'ownership' will rest with the community.

Examples of how different stakeholders may be involved in the socioeconomic assessment are listed in *Table 1-2*.

The level of participation of different stakeholders may change during the assessment. For example, the reef manager may first decide to keep upland farmers *informed* of the assessment, however later the manager may learn that pesticides are polluting the reefs and decide to involve farmers as *partners,* particularly if limiting some farming practices arises as an option.

The reef manager should determine the right level of participation for each stakeholder group based on the priorities determined in *Chapter 1, Identify Stakeholders*. Social, economic, political and logistical circumstances should also be considered, including:

1. *Social status* – In some social and cultural settings, groups with very different social status (e.g. women) may have difficulty participating in the same consultative process. Separate consultations may be necessary.

Table 1-2: Examples of the levels of participation of different stakeholder groups.

Types of stakeholder	Inform	Consult	Partnership	Ownership
Primary stakeholders		Coastal residents, Mangrove woodcutters, Charcoal producers	Reef fishers, Coral miners, Commercial fishers, Aquarium fish collectors, Dive operators, Watersport operators, Hotel owners	
Secondary stakeholders .	Factory operators, Mine operators	Mining operators, Upland & lowland Farmers, Commercial loggers, Aquaculture operators		
Relevant Organisations	Local forestry service, Coastguard	Local agriculture service, Universities, Researchers, International environmental organisations	Local fisheries services, Extension services, Local authorities, Local environmental NGOs	Marine protection agency
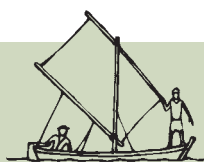
How the Stakeholders Participate

Carol considers the level of interest of the stakeholder representatives and how much they will be involved in the socioeconomic assessment. She notes that the college professors were very interested and willing to assist. Guidance from Dr Xing would be especially useful, but Carol is not sure the biology professor would be that helpful. So she lists the anthropology professor as 'partner' and the biology professor as 'informed'.

Carol also decides how she will involve these groups. For example, she will partner with the Mombuka Fisheries Division by having one of their staff on the assessment team; she will consult with the forestry operations in person or by phone to inform them and seek their input.

She completes the Stakeholders Worksheet 2 based on this information and the information from the stakeholder consultations, knowing these may change during the assessment.

Stakeholders Worksheet 2

Primary Stakeholders	Level of Participation (inform, consult, partner, owner)	Stakeholder Representatives	Key Informants
Watersports Centre	Partner	President of Mombuka Tourism Association	Watersports Operator
Traditional Fishers	Partner	President of the Fishermen's Cooperative	President of the Fishermen's Cooperative, few young fishermen, few older fishermen who know their peer group
Ex-Plantation Fishers	Partner	President of the Fishermen's Cooperative	President of the Fishermen's Cooperative, few young fishermen, few older fishermen who know their peer group
Townie Fishers	Partner	Unknown	Few young fishermen, few older fishermen who know their peer group

Secondary Stakeholders	Level of Participation	Stakeholder Representatives	Key Informants
Forestry Operations	Consult	Forestry Operation Manager	Retired forestry manager
Guesthouses	Consult	President of Mombuka Tourism Association	President of Mombuka Tourism Association, few guesthouse owners travel agent

Relevant Organisations	Level of Participation	Stakeholder Representatives	Key Informants
Anthropology Department	Partner	Anthropology Professor	Anthropology Professor
Biology Department	Inform	Biology Professor	Biology Professor
NPA	Owner		
GMCF	Owner		
Mombuka Fisheries Division	Partner	Chief Fisheries Officer	Chief Fisheries Officer
Mombuka Planning Office	Consult	Officer	Officer

2. *Level of interest* – Some stakeholders may have little interest (e.g. upriver foresters who have little connection with the reef), or feel that it is against their interests to be involved. These groups may require special information and education to bring them into the process.

3. *Resource availability* – Involvement will require stakeholders investing some time and effort. Poor groups may not be able to afford the time and choose to remain outside the process. The assessment team may need to contact them on their own terms to incorporate their concerns in the process.

4. *Political context* – The political framework may discourage involvement and consultation with stakeholders. If people are not accustomed to being consulted, then getting them involved may be difficult. This may make the socioeconomic assessment more of an extractive exercise than a participatory process. The assessment team may need to work gradually to incorporate the stakeholders into the assessment.

Complete Stakeholders Worksheet 2!
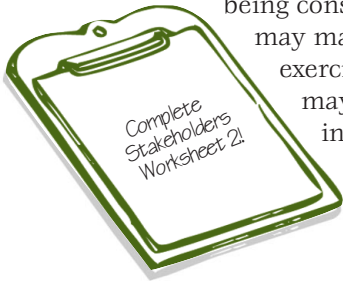
DEFINE OBJECTIVES

The assessment goals were established at the start during *Chapter 1, Define Goals*. After the reef manager has consulted with stakeholders, the objectives can be defined to clarify the focus of the assessment. The reef manager should define the objectives based on the interests and needs of the stakeholders and end-users. A general guide to objectives as they relate to the goals is included as *Table 1-3*.

The reef manager should also identify *specific* objectives for the socioeconomic assessment. These define particular issues of interest to stakeholders or the reef manager, and may range from assessing the role of women as reef stakeholders to examining how communities feel about the way they are represented by village liaison committees.

Complete the Objectives Column of the Goals & Objectives Worksheet!

The reef manager should consider the plan for using the assessment findings, particularly whether a particular product is needed or if the process itself is most important. He/she should also determine whether quantitative or qualitative results are preferred, and how much descriptive socioeconomic background information on the stakeholder groups is required.

What They Want to Achieve

Carol drafts the objectives and specific objectives after her conversations with stakeholder representatives, the NPA and GMCF. She particularly wants to learn how to design reef management programs appropriate to local socioeconomic conditions. Therefore she is interested in stakeholders' perceptions of the Park and existing reef management. Both Carol and the NPA want this information to ensure that stakeholders are involved in other reef management programs. So Carol lists 'collect information to help design reef management that is appropriate to local socioeconomic conditions' and 'establish a process of participatory reef management' as objectives and 'learn more about stakeholders' perceptions of management strategies' as a specific objective in the Goals and Objectives Worksheet.

Carol learned from Jack about conflicts between the 3 types of fishers who compete for access to the limited coral reef fishing grounds in the Park. So Carol defines another specific objective as 'learn more about the conflicts among reef stakeholders, particularly among fishers and how these might be resolved through management strategies'. The president of the Tourism Association asked that she investigate current and potential future contributions of the tourism businesses to the local economy, so Carol adds this as a specific objective. Finally, Dr Xing requested that gender issues be added for his graduate student so 'investigate the issue of gender among Mombuka stakeholders' is added as another specific objective. Dr Xing also mentioned traditional tenure systems, which Carol is interested in learning about, so she adds 'learn about tenure systems' as another specific objective. This is a good starting list, but Carol anticipates adding a few more specific objectives later.

Carol also considers whether the assessment will be 'product-oriented' or 'process-oriented', 'extractive' or 'participatory'. Both she and the NPA think that the assessment will be 'process-oriented' and 'participatory', but the GMCF wants a report to distribute in the region so writing this report adds a 'product-oriented' emphasis.

Finally, Carol considers the balance between collecting qualitative and quantitative data. Most of the findings will be qualitative information, because of the interest in stakeholder perceptions, their conflicts and participation in management programs (mostly descriptive). But quantitative data are particularly important for comparisons with future monitoring, so quantitative data will be collected when possible along with qualitative, descriptive information to explain the data.

Table 1-3: Goals, objectives, and examples.

Goals	Objectives	Examples
MANAGEMENT	To collect information to design reef management appropriate to local socioeconomic conditions	A reef manager wants to increase the effectiveness, and acceptability, of management measures on a reef area by adapting them to local conditions, taking into account the culture, tradition and patterns of resource use. He initiates a socioeconomic assessment to describe those local conditions and to identify ways of making management more appropriate.
	To establish a process of participatory reef management	Official regulations restricting reef use are being ignored by local people, but these same people also have a strong sense of ownership of their adjacent reef areas. The reef manager believes there is an opportunity to make management more effective by giving local reef stakeholders a central role in managing local reef resources. A socioeconomic assessment is conducted to start this process and identify opportunities for community-based management.
RESEARCH	To identify and understand socioeconomic issues relating to coral reef use and reef stakeholders	A local biology professor studied the coral reefs and identified the need for better management, but realised there was little about the behaviour of reef stakeholders who are adversely affecting the reefs. Therefore, a socioeconomic assessment is commissioned on behaviour and attitudes of primary stakeholders as the basis for putting pressure on policy makers to make coral reef protection a priority.
DEVELOPMENT	To collect information to design strategies to mitigate the socioeconomic impacts of development	A tourist complex with a visitor centre and accommodation is planned for a coral reef marine protected area. But the development will displace local fishermen and may negatively affect people running small hotels. A socioeconomic assessment is planned to identify ways of limiting the negative impacts and providing compensation and alternative income for local people.
	To establish a process of analysis and planning to identify and understand socioeconomic issues relating to coral reefs, and to collect information to help planning of appropriate development activities	People in the area near a coral reef are highly dependent on reef resources and are believed to be damaging the reef in various ways. A local environmental organisation plans to alleviate pressure on the reef by helping local people identify and initiate alternative activities that are not resource dependent and are less damaging. A socioeconomic assessment is carried out to catalyse this process with the full involvement of reef stakeholders.

Table 1-3 (continued)

Goals	Objectives	Examples
MONITORING	To establish baseline data for monitoring socioeconomic impacts of development activities	A tourist development is planned near a coral reef and the project planners and local authorities want to assess possible impacts on local people. As they require socioeconomic information before the development starts, they commission a socioeconomic assessment that will include data on local incomes and livelihood patterns so that they can monitor impacts over time.
	To establish baseline data to monitor the socioeconomic impacts of management strategies	A reef manager is concerned that a planned marine protected area may negatively affect the people who use the reef. But very little is known about those people or how they use the reef. Therefore a baseline socioeconomic assessment is done to learn how they use the reef now (before the MPA is established), and the benefits they get from it. This information will be compared with future data to determine changes in activities, income, and well-being that result from the protected area.
POLICY	To identify and understand socioeconomic issues relating to coral reef use to guide wider policy development	A government environmental agency must develop a new policy on marine and coastal resource use. But they realise that they have little information about how coral reefs are used and who uses them. Therefore they commission socioeconomic assessments in various coral reef areas around the country to collect basic information on resource use to help policy development.

Goals and Objectives Worksheet

	Goals Objectives	Specific Objectives
Management – help determine how to manage the Park for the betterment of the stakeholders and the reef resources – provide guidance and insight for reef managers at other MPAs	To collect information to help design reef management that is appropriate to local socioeconomic conditions	Learn more about stakeholder perceptions of management strategies
	To establish a process of participatory reef management	Learn more about the conflicts among reef stakeholders, particularly among fishers and how they might be resolved through management strategies
Monitoring – establish baseline data to use for monitoring changes in socioeconomic conditions	To establish baseline data to use for monitoring	Investigate the current and potential future contribution of the tourism businesses to the local economy
		Investigate the issue of gender among Mombuka stakeholders
		Learn about tenure systems

IDENTIFY PARAMETERS AND SUB-PARAMETERS

After defining the objectives of the socioeconomic assessment, the reef manager should decide which socioeconomic parameters and sub-parameters to assess. The parameters and sub-parameters determine the substance of the assessment and form the basis for deciding what questions will be asked in the field.

Complete the Parameters and Sub-parameters, Methods and Visualisation Techniques Worksheets!

There is no definitive list of parameters and sub-parameters required for a socioeconomic assessment; however *Table 1-4* lists the most commonly identified parameters and their respective sub-parameters. These parameters may be termed and categorised in numerous ways and a full description of each is provided in *Appendix A*.

Rarely is it possible or useful to assess all the parameters in *Table 1-4*. Therefore the reef manager needs to identify those relevant for the socioeconomic assessment depending on the goals and objectives, the situation and the interests and needs of the end-users and other stakeholders, e.g. if the objective is to establish a participatory process, the reef manager may focus on understanding parameters such as perceptions, rather than non-market and non-use values. Where most stakeholders are relatively new to the area, it may not be useful to try collecting information on traditional knowledge.

Identifying the Parameters

Carol prioritises the most important parameters and sub-parameters for the goals and objectives e.g. 'reef use patterns' – to help determine the future impacts of management strategies; 'stakeholder perceptions' – to learn stakeholder concerns and interests about the reefs and management strategies; and 'stakeholder characteristics' – to gain baseline information for future monitoring. Carol modifies some of the sub-parameters to fit the objectives. She completes columns 1 and 2 of the Parameters, Methods and Visualisation Techniques Worksheet.

Parameters, Methods and Visualisation Techniques Worksheet

Parameters	Sub-parameters	Methods	Visualisation Techniques
Resource use patterns	Reef-related activities and changes over time		
	Impacts on reef resources		
	Who uses reef resources		
	Means of reef-related activities		
	Use rights		
	Location of activities and stakeholders		
	Timing and seasonality		
Stakeholder characteristics	Community characteristics		
	Individual characteristics		
	Livelihoods		
Gender Issues	Practical gender issues		
Stakeholder Perceptions	Park management		
	Conflicts among stakeholder groups		
	Threats to the reefs		
Organisation and resource governance	Use and property rights		
	Governance		
Market Attributes for Extractive uses of Coral reefs	Market supply, demand, structure		
Market Attributes for Non-extractive uses of coral reefs	Demand for tourism activities		

The resources and the time available may affect selection of relevant parameters and limit the number of parameters that can be assessed. As a general guide, *Table 1-4* notes the importance of the sub-parameters for a typical socioeconomic assessment and the ease with which the data can be collected.

Preparation

Table 1-4: List of parameters and sub-parameters and their importance and ease of collection (H - high, M - medium, L - low; E - relatively easy to collect; O - moderately difficult to collect; D - difficult to collect).

Parameters	Sub-parameters	Typical Level of Importance	Typical Ease of Data Collection
Reef Use Patterns	Reef-related activities	H	O
	Reef stakeholders	H	E
	Techniques for reef-related activities	H	E
	Use rights	H	O
	Location of reef-related activities and stakeholders	H	O
	Timing and Seasonality	H	O
Stakeholder Characteristics	Inhabitants and households	H	E
	Residency status	H	E
	Ethnicity, caste and religious background	H	E
	Age and gender	H	E
	Education	H	E
	Social status	H	O
	Household economic status	H	D
	Community livelihoods	H	D
	Stakeholder livelihoods	H	D
Gender Issues	Practical gender issues	M	D
	Strategic gender issues	M	D
Stakeholder Perceptions	Reef conditions	M	E
	Threats to the reefs	M	E
	Reef management	M	E
	Stakeholders	M	O
	Culture and beliefs	M	D
Organisation and Resource Governance	Political context	L	E
	Government administrative structure	M	E
	Non-governmental organisations	M	E
	Use and property rights	H	O
	Management Efforts	H	O
Traditional Knowledge	Folk Taxonomy	M	O
	Local knowledge of resources	H	O
	Variations in knowledge	M	O
Community Services and Facilities	Medical services	M	E
	Educational and religious facilities	M	E
	Public utilities	M	E
	Communication facilities	M	E
	Markets and Retail Outlets	M	E
	Transportation	M	E
	Other facilities	M	E

Table 1-4 (continued)

Parameters	Sub-parameters	Typical Level of Importance	Typical Ease of Data Collection
Market Attributes for Extractive Uses	Supply	H	D
	Demand	H	D
	Market Prices	M	O
	Market Structure	H	D
	Market Infrastructure and Operation	M	D
Market Attributes for Non-Extractive Uses	Demand for Tourism Activities	H	D
	Vulnerability of Tourism Market	H	D
	Characteristics of Tourism Stakeholders	M	E
	Supply of aquaculture	L	E
	Characteristics of Aquaculture Stakeholders	L	E
	Aquaculture Market Structure	L	O
Non-Market and Non-Use Values	Indirect Use	M	D
	Direct Use	M	D
	Option Value	L	D
	Bequest Value	L	D
	Existence Values	L	D

IDENTIFY THE ASSESSMENT TEAM

The final step in the preparatory phase is identifying the team to conduct the rest of the socioeconomic assessment, including collection of field data. Any socioeconomic assessment will address a broad range of issues across different disciplines and technical fields, including the social sciences, natural sciences, and political sciences. Ideally the assessment team will reflect this range by including the following social scientists, assessment specialists and natural scientists.

1. *Social scientists* – Since the assessment is studying socioeconomic conditions, social scientists are critical in the assessment team. These include: sociologists, anthropologists, economists, rural communications or extension specialists, institutional specialists and gender specialists.

2. *Assessment specialists* – Since the assessment requires strong planning and organisational skills, the team should include at least one person skilled in planning and implementing assessments, ideally in socioeconomic assessments. If an experienced person is not available, someone experienced in any of the following can contribute: action-oriented research in the field, needs assessments or stakeholder

Preparation

analysis, rapid rural appraisals, participatory learning and action approaches, participatory monitoring and evaluation and rural communication and facilitation.

3. *Natural scientists* – Although the assessment covers socioeconomic conditions, parameters related to the natural sciences, including reef use patterns and traditional knowledge, are included. Therefore, it is useful to have natural scientists in the team, either: marine biologists, ecologists, or fisheries specialists.

Ideally, the reef manager will be able to get people from these fields to form the assessment team. Realistically, most reef managers will be limited to the staff in their agencies and a few people from other organisations, most of whom will be biologists or technical specialists drawn from the natural sciences. Therefore the assessment team may lack important social science skills, and the reef manager should actively seek to address this.

In addition to disciplinary and technical backgrounds, the following factors are also important when identifying team members:

- *open-minded attitude and willingness to learn* – the attitude of team members will often be as important as their specific skills, training and organisational background;
- *gender balance* – having a mix of women and men on the team can help gain better access to communities and avoid gender bias in the outputs of the assessment;
- *ethnic balance* – where the study area includes people of different ethnic origins, having some of these represented on the team can help avoid ethnic bias;
- *local language skills* – if several languages are spoken in the study area, how the team will communicate with local people must be considered when forming the team;
- *organisational background* – particularly when the assessment is intended to generate future actions involving a range of organisations, the inclusion of representatives of those organisations in the team can help increase acceptance of the assessment's findings. Team members from different organisational backgrounds will also bring different perceptions and experience; and
- *range of organisational levels* – the inclusion of people from different levels of organisations can also make a valuable contribution to the team's work as they have different perceptions of issues and problems.

Team members can also be recruited from the stakeholder groups. If the assessment aims to involve stakeholders in monitoring and management, the direct involvement of them in the team can help ensure better understanding of the assessment findings and how they were obtained. Often, assessment teams will need to start work in the study area before they can identify stakeholders who might be able to participate.

When selecting stakeholders for an assessment team the reef manager needs to ensure:

- involvement of some stakeholders (but not others) will not be negatively regarded by the community at large;
- the local team members have a balance of interests or neutral interests that will not adversely affect how they contribute to the socioeconomic assessment; and
- problems of language and cultural interaction will not make it difficult for them to participate as team members, for example because they are not use to working with women.

If the reef manager cannot select team members to cover all the disciplines and the above factors, that does not mean that a socioeconomic assessment cannot be carried out. The team should be aware of these limitations and try to address them during the assessment. If the reef manager and assessment team members do not feel comfortable about conducting the processes in this manual or do not feel they have the capacity or background to fully understand the processes in an assessment, training is highly recommended. Specific training for field data collection and visualisation techniques is discussed in *Chapter 2, Plan for Field Data Collection, Train Team Members*. They are also strongly encouraged to seek help from specialists, such as economists and anthropologists, throughout the assessment.
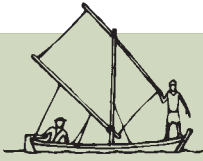
Putting Together the Team

Carol forms the assessment team based on the project needs and the experience, and social and natural science backgrounds of the available people. She tries to have a suitable gender and ethnic balance with the majority of the team understanding the local language, and including some from various organisations and stakeholder groups.

Carol reviews the qualities of potential team members. She has 3 Park staff: Jeb, the chief research officer; Lon, the coordinator of the Park monitoring program; and Una, the outreach and education coordinator. Carol decides Lon and Una are appropriate given their community and monitoring interests, but feels that Jeb's aggressive nature would hinder his ability to conduct interviews. Ish, the junior fisheries officer from Mombuka Fisheries Division, is a strong addition since he is fluent in the local dialect and is on good terms with the local fishers and the watersports operator. Chi Lan, the graduate student from the Anthropology Department, will also be useful given her training in socioeconomics. She also provides a link to Dr Xing, who has agreed to hold a small training workshop for the non-social scientists to teach them some of the basics of conducting socioeconomic assessments, particularly interview methods.

Carol is interested in having at least one local stakeholder involved in the assessment, and asks Jack for a recommendation. Jack recommends Tad, who comes from a long line of fishers and currently works on community development projects.
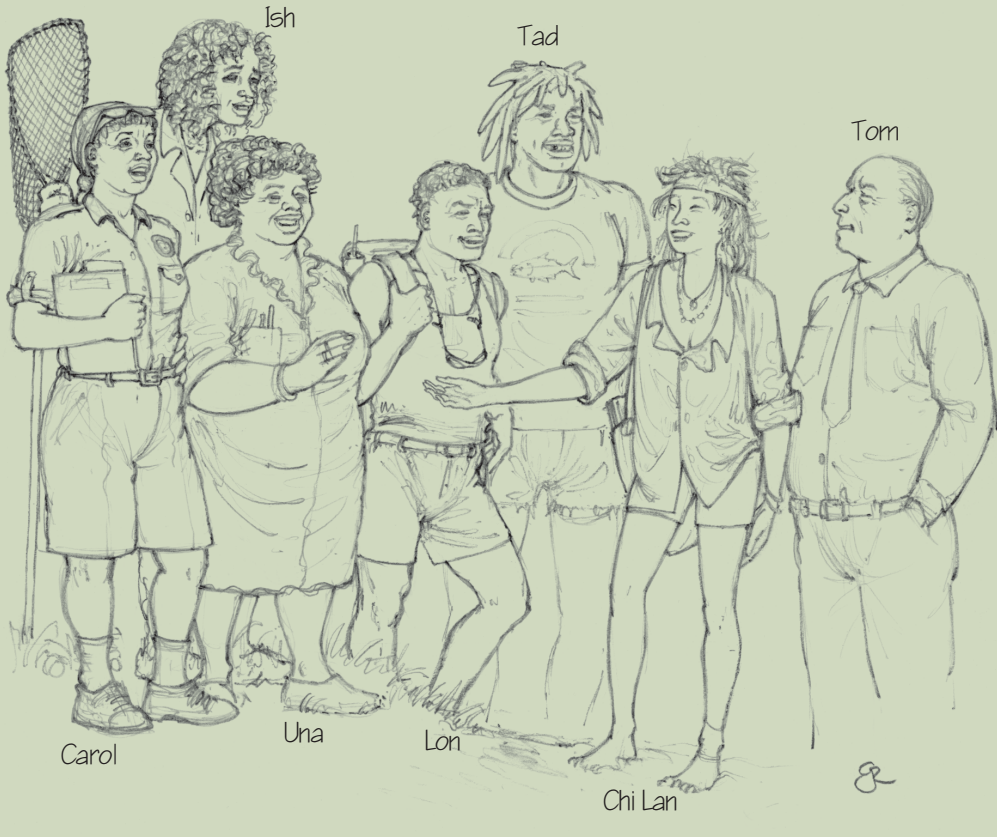
Looking over the list of team members Carol is concerned about the lack of skills in economics. So she asks NPA and GMCF for assistance, and GMCF agrees to bring in Tom, an economist from Canada.

The final list of team members is:

- Carol, manager of the Mombuka Park
- Lon, the coordinator for the Mombuka Park monitoring program
- Una, the outreach and education coordinator for the Mombuka Park
- Ish, a junior staff member of Mombuka Fisheries Division with a background in fisheries ecology
- Tad, a local with ties to the fishing community, currently working on community development projects
- Chi Lan (and some support from her adviser), a graduate student from the Anthropology Department at Tebu College
- Tom, the economist funded by GMCF from Canada

Carol is pleased with the team. It has a good mix of genders, all except Tom speak the local dialect and there are people from a range of organisations. She would like more trained social scientists and there is an over-emphasis on fisheries backgrounds; however, she will try to resolve these issues later.

Carol arranges for the entire assessment team to meet and discuss the plans for the socioeconomic assessment, including the goals and objectives, study area and sites, and parameters and sub-parameters. The team makes a few adjustments. For example, Chi Lan adds "strategic gender issues" to the gender parameter. After getting to know each other during the two-day meeting, the team is ready to begin the reconnaissance and planning phase.

CASE STUDY: HOW PEOPLE AND CORAL REEFS INTERACT IN DISCOVERY BAY, JAMAICA

INTRODUCTION

In 1995 a socioeconomic assessment was conducted of the tourism and fishing activities in Discovery Bay, Jamaica. This was part of Project RAMP (Rapid Assessment of Management Parameters), which provides indicators of human factors affecting coral reefs. These factors are integrated into ReefBase, a global coral reef database developed by ICLARM (International Center for Living Aquatic Resources).

This socioeconomic assessment aimed to:

- examine the socioeconomic background of the people who use coral reefs in Discovery Bay;
- assess the strengths and weaknesses of the methods used to obtain the information to help develop standard methodology for RAMP; and
- provide a baseline of socioeconomic information for reef managers, which would help determine how management strategies might affect the fishing community and assess changes over time with follow-up studies.

DATA COLLECTION

The assessment was run over 5 weeks by Richard Pollnac, an anthropology professor at the University of Rhode Island. He consulted extensively with Jeremy Woodley of the University of West Indies, Z. Sary of the Fisheries Improvement Program, Discovery Bay Marine Laboratory of the University of West Indies, and Peter Espeut of the South Coast Conservation Foundation, Kingston.

Richard organised the socioeconomic assessment according to national, regional and local (i.e. Discovery Bay) conditions. He looked at the land and population, general economy and coastal economy. In Discovery Bay, he looked at the marine habitats and the primary uses of the reefs by the people, as well as reef governance measures, including legislation and traditional practices.

Before starting, he reviewed the available secondary data, including:

- demographic statistics from the Statistical Institute of Jamaica;
- ecology studies of the coral reef fishery from the University of the West Indies (UWI);

- economic and social analyses of fisheries in Jamaica from UWI;
- economic and social survey data for Jamaica from the Planning Institute of Jamaica;
- relevant legislation from the Government of Jamaica;
- tourism statistics from the Jamaica Tourist Board; and
- articles on reef fisheries in the Caribbean from scientific journals.

The field data collection included semi-structured interviews with approximately 25 key informant fishers and a few focus group interviews. During these interviews, Richard used a variety of visualisation techniques. For example, fishers were asked to identify the local fish taxonomy and to locate key places (fishing spots, particular features) on the map. The resulting resources maps were later spot-checked for confirmation. He also ranked items to establish their relative importance e.g. fishers were asked "What are the important types of fish you catch?" The order of the fish in their answers showed how important they were. Average rankings were used to get the final ranking for the analysis. Catch data were also used to list fish species according to percent catch composition and weight, which was also used to rank the importance of fish. Finally, Richard went out with the fishers to better understand the fishing methods and he visited the fishing beaches to count the number of boats at each site.

DATA ANALYSIS AND PRESENTATION

Richard returned to the University of Rhode Island to analyse the field data. He first summarised the information on each parameter and then made some basic calculations to develop the key learning.

Because the socioeconomic assessment was part of the RAMP study, the findings were written as a chapter in RAMP (1998). These data were organised as parameters and presented in the following outline:

I. Introduction

II. The national context
- Land and population
- General economy
- Coastal economy

III. The regional context

IV. Discovery Bay
- The Marine context
- The Human context
- The People

Landing beach for fishermen (Photo: Leah Bunce).

V. Use of the coral reefs
- Tourism
- Fishing and gleaning
- Technology and methods – trap fishing, spear fishing, hook and line, net fishing
- Important target species
- Marketing and distribution

VI. Reef governance
- Local knowledge
- Cognitive mapping
- Folk taxonomy
- Perceptions of trends in resource availability
- Governance
- National governance
- Governance at the local level – local government, the marine laboratory and the Fishery Improvement Project, the fishers' association and other non-governmental organisation
- Traditional resource management by fishers
- Fisher compliance with governance

VII. Conclusions

The written summary for each parameter was accompanied by tables, maps and figures, e.g. the description of the coastal economy included a table of fishery landings and values from 1980 to 1989. The description of folk taxonomy referred to a map, which showed the locations of the local place names. The chapter also included an appendix with the local taxonomy for the various marine species. Endnotes were included to explain the text. The chapter ended with a discussion of problems and challenges for reef management based on the findings from the assessment. The following section from *Use of the Coral Reefs, Tourism* illustrates the kinds of findings reported:

TOURISM

Discovery Bay has much natural beauty with blue waters, and white coral sand beaches. Adding to this beauty are tree-covered hills, with bright houses that rise from the coast. Caves in the limestone hills provide another attraction. Some people say that this was a landing spot for Columbus when he explored the Americas, so it is also a historical attraction for tourists.

Tourists can stay at a 7 room guesthouse, a small hotel (Portside Villas), or one of the 10 registered or estimated 30 unregistered villas in Discovery Bay. Some of the villas and the Portside Villa Hotel have a wharf for visiting yachts. Tourist activities include sunbathing, swimming, jet skiing, water skiing, beach combing (including wading and diving in the shallows where some coral reef patches remain) and diving. The person who ran a diving operation at the hotel stopped in mid-1995 and moved his operation to Runaway Bay, where there are several other dive operators. When asked why, he said, "The Bay is a disaster. Most of the coral has gone, water visibility is bad and there are few fish." In mid-1995, there were no dive operations in Discovery Bay other than the scientists at the Discovery Bay Marine Laboratory (DBML) of the University of the West Indies. The laboratory housed visiting scientists and students; so it could be considered as a contributor to 'scientific tourism' and to the economy of Discovery Bay.

There are far fewer tourists in Discovery Bay than in more popular spots on the north coast such as Montego Bay, Runaway Bay and Ocho Rios. Tourists can be seen in rental cars, minibuses, and buses, which speed along the north coast highway to other places. Some tours do stop at local attractions such as Columbus Park, a free, open-air museum sponsored by Kaiser Jamaica, with several souvenir stands and a beautiful view of Discovery Bay. Other stops include Green Grotto, limestone caves to the east of town which may have been a hiding place for the Spanish who were escaping the island in the mid-17th Century. Puerto Seco Beach, also sponsored by Kaiser, is on the coast, near the business center, but few tourists go there. On weekends it is crowded with local youngsters and adults, enjoying the sandy beach and shallow waters.

The final chapter for the RAMP publication was sent to Jeremy Woodley at the University of West Indies, Mona, and to Z. Sary at the Fisheries Improvement Program, Discovery Bay Marine Laboratory of the University of West Indies. The RAMP publication was distributed worldwide, providing insight and guidance on indicators of human factors related to coral reef management. These human factors have also been integrated into ReefBase, which has also been distributed to coral reef researchers and managers worldwide.
(Full reference in Pollnac 1998)

CHAPTER 2: RECONNAISSANCE AND PLANNING

This second phase, reconnaissance and planning, sets the stage for collecting the field data for a socioeconomic assessment. This is done by the assessment team and involves assessing secondary data, conducting a reconnaissance survey and developing a detailed plan for the field data collection. This builds on the information collected during the previous preparatory activities phase.

Throughout this phase the assessment team needs to involve the stakeholder groups as determined in *Chapter 1, Determine Level of Stakeholder Participation.* In addition, the team should constantly modify and adapt the objectives, stakeholders list, study area and sites, and parameters and sub-parameters based on new information.

ASSESS SECONDARY DATA

The assessment team should start by conducting a thorough assessment of all relevant secondary data on the identified parameters and sub-parameters. Secondary data are those that have already been collected, analysed and published in various forms, including:

- official and unofficial documents;
- statistical reports;
- reports of previous assessments and surveys;
- research reports;
- documentation of previous or ongoing projects, including monitoring and evaluation reports;
- maps;
- aerial photographs and satellite images;
- historical documents and accounts; and
- websites on the internet.

These data will be used to:

- identify gaps in existing knowledge in preparation for the field data collection;
- ensure the field data collection does not collect information that has already been collected;
- provide a basis for cross checking information collected during the field data collection;

- provide supporting documentation for field data collection (e.g. maps of the study area); and
- refine the lists of objectives, stakeholder groups, study sites and parameters.

This assessment of secondary data involves compiling, evaluating and reviewing the data related to the parameters and sub-parameters.

Compile relevant secondary data

The assessment team needs to compile as much relevant secondary data as possible from government agencies, universities, non-governmental organisations, private sector, and research institutions. The organisations identified in *Chapter 1, Identify Stakeholders,* are likely sources. The team may also be able to access information from the internet, either by downloading documents from websites or by ordering information from the websites. Typical sources of information are listed in *Table 2-1*.

These secondary data should be compiled so that they can be used during the rest of the assessment planning process, during the field analysis workshops and during the final analysis. The assessment team should extract useful tables of data and case studies that illustrate key issues or important conclusions from the research reports. If the documents contain detailed descriptions and complex information, the team may need to summarise them.

A filing system should be developed to code, record and store secondary data and information according to the parameter and stakeholder group concerned. For example, the team could file results of a study on the role of women in fishing communities under "social distribution and gender" (as a parameter) or under "women in fishing communities" (as a stakeholder group). *Chapter 2, Plan the Field Data Collection Phase, Develop a Coding System and Decide How to Keep Track of Information,* discusses how to code and keep track of information in more detail. At this early stage an extensive system may not be needed; the team may decide to wait until the field data collection phase to begin coding and filing data.

Review the secondary data

The assessment team should read through the secondary data to identify information related to the parameters and sub-parameters, including information on the basic characteristics of the stakeholders, such as size of groups, their location and types of reef use. This information will be particularly useful during the reconnaissance survey and while planning the field data collection. The assessment team should also consider whether the objectives, stakeholder groups, study sites and parameters need to be modified.

Modify all Worksheets Based on Review of Secondary Data.

Evaluate the quality of secondary data

Not all secondary data will be of the same quality. Therefore the team should assess the reliability of secondary data sources. This can be time-consuming, however it is necessary to ensure that important documents and information have been generated from reliable sources using reliable methods.
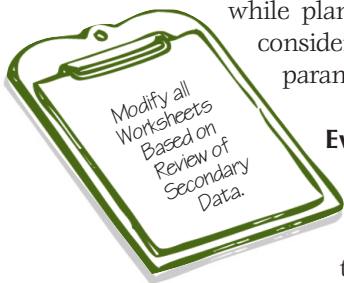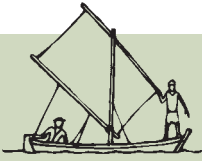
Table 2-1. Typical sources of secondary data.

General Sources	Specific Sources	Types of Secondary Data
Government agencies and institutions	Local councils, elected bodies, administrative offices	Voter lists, regional and local development plans
	Technical services (agriculture, fisheries, forestry, enterprise development, extension services)	Project reports, monitoring & evaluation reports, activity records, minutes of planning & co-ordination meetings, reports on enforcement activities
	Health and social services Enforcement agencies (police, coastguard, fisheries & environmental protection)	Population data, health reports Records of conflicts, legal action, enforcement activities
	Land registries	Land use surveys, records of auctions & leasing of government lands, land value assessments
	Statistical services	Census data, statistical survey data
Non-governmental organisations (e.g. environmental organisation, fishers cooperative, tourism development association)	NGO offices	Surveys, needs assessments, poverty assessments, monitoring & evaluation records
	Project offices	Project reports, appraisals, needs assessments, monitoring & evaluation reports
	Religious organisations	Lists of populations and congregations
Universities	Natural science departments	Maps, satellite images, research reports
	Social science departments	Research reports, social impact assessments
	Libraries	Historical documents, research reports
Websites	Sites for the above organisations	Maps, satellite images, background information

Planning

Assessing the Secondary Data

The assessment team starts the planning and reconnaissance phase by reviewing available information to learn about the stakeholder groups and reef-related activities. The team identifies useful sources of information, including the previously identified organisations - Mombuka Fisheries Division, Mombuka Planning Office, Biology and Anthropology Departments at Tebu College, NPA and GMCF – as well as the Mombuka Law Enforcement Authorities and the National Census Bureau. The team divides responsibility for contacting these organisations and finds the following documents:

Satellite images from Global Marine Conservation Fund: These show possible areas of high biodiversity just off Mombuka. Although the images do not indicate reef type, depth or species, they provide a general idea of where the fishers and watersports centre may focus their activities.

Census statistics: The National Census Bureau gives Lon basic demographic statistics on Mombuka residents including occupation, which he uses to determine the number of individuals in each stakeholder group and differences in gender and residency status. The statistics date back 100 years and show that the population of Mombuka has slowly increased over the past 30 years and that guesthouses started 15 years ago.

Local Law Enforcement Citations: Because Jack warned them about conflicts among the 3 types of fishers, Carol contacts the Mombuka Law Enforcement Authority. They give her a 5 year record of all written citations for fishers who have been caught cutting trap lines, catching undersized fish and exhibiting aggressive behaviour on the water. The citations have been increasing over the past years, confirming that the team will need to look at these conflicts during field data collection.

An Anthropological Monograph: Chi Lan finds an anthropological monograph at the College that described the fishing tenure rights 50 years ago, showing that the reefs off Mombuka belong exclusively to traditional Mombuka Fishers.

The team starts a filing system with each source filed according to the relevant stakeholder group, and then the relevant parameter and sub-parameter e.g. local law enforcement citations are filed under 'fishers' and then under 'stakeholder perceptions, conflicts among coral reef stakeholder groups'.

They also evaluate the quality of these data to determine their reliability. For example, Chi Lan finds a document on forestry practices on Tebu Island at the College by a former graduate student in the Forestry Department. The document has detailed information on various techniques used, as well as environmental impacts like sediment run-off and pesticide usage. But Chi Lan notes that the findings were based on 3 site visits to forestry operations on the other side of the island, and the Director of the Forestry Department says that the college considered the study to be inaccurate. Consequently, Chi Lan decides that they should not include this document in their secondary data.

As a general guide, the main indicators of the quality of a secondary data source are (based on Pollnac, 1998):

1. The source should have a description of how the information was obtained or generated.
2. The source should have a description of the sources for information and how they were selected (sampling strategy).
3. Where there are statistical data, there should be some indication of the degree of variability in that information.
4. Where a source contains descriptive or qualitative information, there should be some indication of what level of variability there was in that information.
5. The source should discuss possible biases that could have affected the information generated and how these were overcome.
6. Where the source includes accounts based on work in the field, it should indicate that the researchers spent sufficient time in the field.
7. The source should describe the background of the researcher, which should include sufficient experience to have conducted the field data collection.
8. Research documents should include complete literature reviews.

All critical secondary sources should be checked for the above features, and it may be valuable to develop a scale for scoring sources according to these indicators if there is a considerable amount of secondary data (see Pollnac, 1998). Otherwise this list can be used to develop an overall sense of the relative reliability of each secondary source. The *Suggested Readings* section lists several books on these topics.

CONDUCT A RECONNAISSANCE SURVEY

A reconnaissance survey, which is a brief survey of the study area, can provide the assessment team with valuable information to help plan the field data collection. The reconnaissance survey allows the assessment team to:

- Finalise the selection of study sites for field data collection;
- Collect preliminary information on the number and location of stakeholders;
- Identify logistical requirements based on local conditions and make arrangements for field data collection; and
- Refine study area and sites, and the objectives and parameters as necessary.

The extent and scope of the reconnaissance survey can vary considerably. Where the team is already familiar with the study area and there is a lot of background data available, a brief trip may be sufficient to check important elements of the assessment plan. If the team is unfamiliar with the area and there is little information available to plan field data collection, the reconnaissance should include a small survey. A reconnaissance survey involves visiting the study sites and collecting basic preliminary data.

Visit the study sites

During *Chapter 1, Identify the Study Area and Study Sites,* the study area and potential study sites were identified for the field data collection. During the reconnaissance survey, the assessment team needs to visit these study sites to:

- assess the logistics of the sites, including accessibility, distances between sites and time required to get to them, possible accommodation and transportation needs; and
- gain a general overview of the study site characteristics.

If, during *Chapter 1, Identify the Study Area and Study Sites,* the team did not have enough information to finalise the study sites, then a reconnaissance survey of the study sites should provide that information. To select the study sites the team needs to consider logistical arrangements, the diversity of socioeconomic conditions at the sites and whether issues of particular interest to the team occur at the site. The study sites should be defined and finalised at the end of the reconnaissance survey.

Modify Study Sites Worksheet!
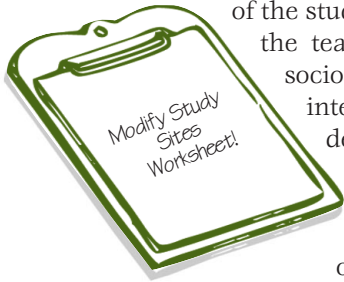
Conduct a rapid survey on stakeholder characteristics

The assessment team should have collected basic information on stakeholder characteristics, including size of the groups, their location and types of use, during the assessment of secondary data and consultations with stakeholder representatives. This information is important to determine the scope of the socioeconomic assessment and to plan the field data collection. If this information has not been collected, then the assessment team may need to do a rapid survey of all community members in the study area. In large communities, the team should survey a representative sample of the population (see *Appendix B).*

The basic questionnaire may include the following questions:

- What reef-related activities do you conduct?
- Where do these activities occur?
- Where do you live?

These results will help the assessment team identify the various reef-related activities, the number of people involved in these activities, and the location of the activities and stakeholders.

Conducting a rapid community-wide survey has the added benefit of being a good way for the assessment team to become familiar with the community.

Conducting a Reconnaissance Survey

Before collecting the field data, the team agrees to conduct a limited reconnaissance survey to finalise the study sites, determine the logistic needs and help plan field data collection. To save time, the team splits up and conducts rapid surveys of different stakeholders, as follows:

Guesthouses

Tom and Chi Lan survey the guesthouses since they are staying in two of them. They conduct a few informal interviews with the owners to learn more about this group before gathering the field data. Chi Lan tries to talk with Felicia, who owns one of the longest-running guesthouses, in the morning, but they are constantly interrupted by guests and deliveries. So Chi Lan makes a note to hold future interviews in the afternoon.

Felicia tells Chi Lan there are 2 main groups of guesthouses in Mombuka: Hodgson Hills and Ziwi Heights, and estimates there are a total of 9 houses, but adds new businesses are opening and others closing all the time.

To finalise the number of guesthouses Tom and Chi Lan conduct a rapid survey of households in Hodgson Hills and Ziwi Heights by knocking on each door and asking whether the owners rent rooms for overnight guests. They learn there are 7 guesthouses in Hodgson Hills, with plans for 2 more and 4 in Ziwi Heights. Tom and Chi Lan anticipate that with a car they will be able to survey all 11 guesthouses.

Planning
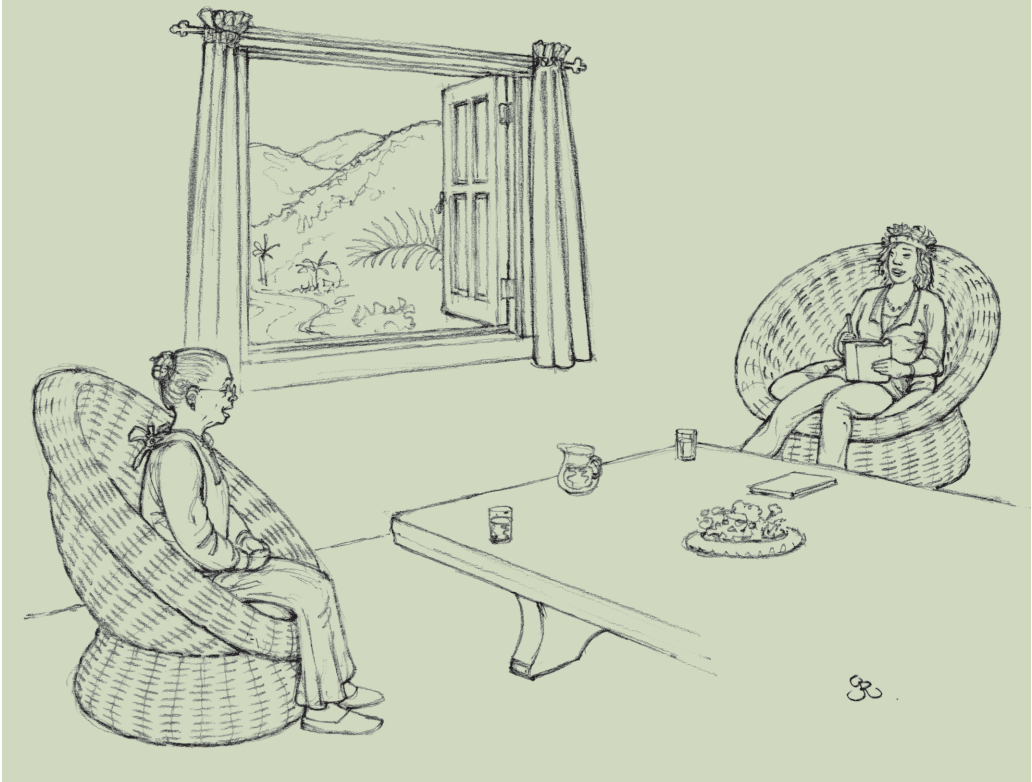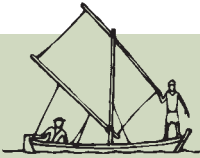
Traditional and ex-plantation fishers
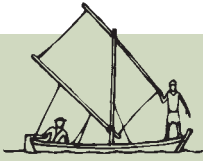
Tad and Ish survey traditional and ex-plantation fishers since they already know them. They spend 2 days visiting 6 fishing communities, with about an hour each talking with people they meet. They walk to the communities from the Park office, but it takes 2 hours each to reach Loh and Ceracas. They find that the fishers are less willing to talk to them in the morning when they are preparing to go fishing, so they decide they should do their interviews with fishers at the end of the day. They also notice that the best place to talk to the fishers informally is where they gather for meals, drinks and playing dominoes.

By talking with people and observing activities, Tad and Ish learn about differences in economic classes between the communities. They notice there are medium to large boats with outboard motors at the landing sites in the Ceracas, Sanya and Buru fishing communities; whereas there are small to medium boats, mostly without motors, in Loh, Sullivans and Tanzar, where the houses are also smaller than in Ceracas, Sanya and Buru fishing villages. So they select Buru and Sullivans as the study sites representing the two distinct economic classes of fishing communities which are both close to the Park office. They revise the Study Sites Worksheet to note Buru and Sullivans.

Ish and Tad also learn about another sub-group of fishers, women gleaners. While wandering the docks speaking with fishermen, Ish notices buckets of molluscs for sale. The fishermen explain that collecting molluscs is "women's work" and that they scour the shallow reefs for molluscs and shuck them in the afternoons on the sand banks by Tanzar and Sanya. One of the fishermen says his wife is a gleaner and he estimated there are 30 of them. Ish and Tad revise the Stakeholders Worksheets 1 and 2 to include this new group of fishers.

Tad and Ish feel that they have almost enough basic information on fisher characteristics to conduct the field data collection. They know the number of fishers from the census statistics, but they do not

know whether they are ex-plantation or traditional fishers, which is important to understand conflicts. So Tad and Ish conduct a rapid survey of fishers by walking through the fishing communities and asking: 'Do you fish in the area?' If 'yes', 'How long have you been fishing and what did you do before fishing?' From this information they develop a general sense of the portion of ex-plantation and traditional fishers.

The team revises the Study Sites Worksheet and summarises the logistical needs as follows:

Stakeholder Group	Best Location for Approaching Stakeholders	Best Time to Approach Stakeholder	Transportation Needs for getting to Study Sites	Preferred Gender for Field team Members
Watersports centre	Watersports shop	Morning or Noon	On Foot	M or F
Fishers				
Traditional	Gathering spots	Late Afternoon	On Foot	M
Ex-plantation	Gathering spots	Late Afternoon	On Foot	M
Townies	On the Water	Unknown	By Boat	M or F
Women Gleaners	Sand banks	Late Afternoon	On Foot	F
Guesthouses	Their houses	Afternoon	By car	M or F
Forestry Operations	Their offices	Midday	By car	M or F

Study Sites Worksheet

Stakeholder Groups	Locations	Study Sites
Traditional and Ex-plantation Fishers	Ceracas Fishing Community	Buru and Sullivans fishing communities
	Sullivans Fishing Community	
	Buru Fishing Community	
	Loh Fishing Community	
	Sanya Fishing Community	
	Tanzar Fishing Community	
Townie Fishers	Kela and fishing off of Mombuka	Fishing sites off of Mombuka
Women Gleaners	Tanzar and Sanya Banks	Tanzar and Sanya Banks
Forestry Operations	Four operations northeast of Mombuka	Forestry operations east of Mombuka
	Six operations east of Mombuka	
	Five operations southeast of Mombuka	
Watersports Centre	One watersports centre between Sullivans and Buru	Watersports centre between Sullivans and Buru
Guesthouses	Seven guesthouses in Hodgson Hills and four in Ziwi Heights	Guesthouses in Hodgson Hills and in Ziwi Heights

Planning

PLAN THE FIELD DATA COLLECTION PHASE

The assessment team should plan the field data collection phase in detail to ensure they will enter the study sites prepared to collect the data effectively and efficiently. Planning the field data collection involves several steps:

- Identifying the methods and visualisation techniques
- Preparing materials and tools for the methods
- Pre-testing the interview guides and questionnaires
- Deciding how to keep track of information
- Developing a coding system
- Defining plans for analysis
- Deciding on sampling units
- Deciding who to interview and survey
- Establishing the field teams
- Defining the schedule for the field data collection
- Training team members in data collection methods and visualisation techniques
- Providing a briefing on the local culture
- Arranging logistics

The entire assessment team needs to be involved in the detailed planning. This approach helps build team spirit and ensures everyone understands everything involved in the field data collection. Consequently, a workshop format is recommended for planning the field data collection phase. This involves assembling the team, discussing the issues with everyone participating, and distributing the tasks to different team members. Before beginning the workshop, the team needs to review and finalise the objectives, stakeholder groups, parameters and sub-parameters, and study sites that have been identified and modified throughout the previous steps. Some team members may have to travel to the study area to organise specific tasks of the field data collection, but the basic process should be carried out in one place where everyone can work together. Team members should get used to this way of working since regular workshops will be held throughout the field data collection.

Identify the methods and visualisation techniques

Having finalised the parameters and sub-parameters for the assessment, the team can now determine methods and visualisation techniques for collecting the data. Visualisation techniques are analytical tools for visualising and diagramming relationships among data, such as maps, timelines, and flow charts.

Complete the Parameters and Sub-parameters, Methods and Visualisation Techniques Worksheet!'

Table 2-2 provides a general guide on which methods and techniques are typically best for collecting data on which sub-parameters, and is drawn from *Appendix A.* The methods and visualisation techniques are described in *Chapter 3, Field Data Collection Methods and Visualisation Techniques.*
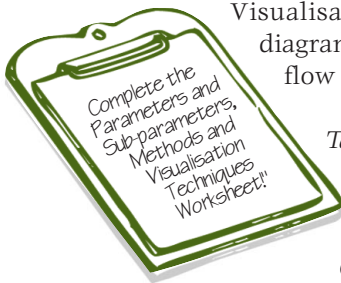
Table 2-2. Methods and visualisation techniques for each parameter.

Parameters	Subparameters	Methods	Visualisation Techniques
Reef Use Patterns	Reef-related activities	Ssi, Obs, Sur, Foc	Map, Tra, Lcl
	Reef Stakeholders	Ssi, Obs, Sur, Foc	Map, Dec, Ran
	Techniques for reef related activities	Ssi, Obs, Sur, Foc Ora	Flo, Tra, Imd
	Use rights	Ssi, Obs, Foc, Ora	Map, Tra
	Location of reef-related activities and stakeholders	Ssi, Obs, Foc	Map, Tra
	Timing and seasonality	Ssi, Obs, Foc	Tim, Scl
Stakeholder Characteristics	Inhabitants and households	Sur	Map
	Residency status	Sur	Map
	Ethnicity, caste and religious background	Sur, Obs	Smap
	Age and gender	Sur	
	Education	Sur	Map
	Social status	Sur	Ven, Smap
	Household economic status	Sur, Ssi	Wel, Wmap, Map
	Community livelihoods	Sur, Ssi	Ran
	Stakeholder livlelihoods	Sur, Ssi	Ran, Dec, Flo, Scl, Tim
Gender Issues	Practical gender issues	Sur, Ssi, Foc	Map, Ran, Tua Dec, Flo
	Strategic gender issues	Ssi, Foc	Ven, Dec, Tim
Stakeholder Perceptions	Reef conditions	Ssi, Ora, Foc	Map, Tra, Scl, Ran, Tim, Htr, Flo
	Threats to the reef	Ssi, Ora, Foc	Map, Tra, Tim, Htr, Flo, Ran
	Reef management	Ssi, Foc, Obs	Flo, Map, Tra
	Stakeholders	Ssi, Foc, Obs, Ora	Ran, Ven, Map, Tim, Flo
	Culture and beliefs	Ora, Ssi, Foc	
Organisation and Resource Governance	Political context	Ssi, Foc	Map, Ven, Flo, Ran
	Government administrative structure	Ssi, Foc	Ven, Ran, Flo
	Non-governmental organisations	Ssi, Foc	Ven, Tim
	Use and property rights	Ssi, Foc, Obs, Ora,	Map, Tra, Tim, Dec, Flo
	Management efforts	Ssi, Foc, Obs, Ora, Sur	Ven, Tim
Traditional Knowledge	Folk taxonomy	Ssi, Foc	Lcl, Map
	Local knowledge of Resources	Ssi, Sur, Foc, Ora	Hmap, Map, Tim Ran, Ven, Flo
	Variations in knowledge	Sur, Ssi, Foc	Ran

Planning

Table 2-2. *(Continued)*

Parameters	Subparameters	Methods	Visualisation Techniques
Community Services and Facilities	Medical services	Ssi, Obs	Map, Smap, Tra
	Educational and religious facilities	Ssi, Obs	Map, Smap, Tra
	Public utilities	Ssi, Obs, Sur	Tra, Wel
	Communication facilities	Ssi, Obs, Sur	Tra, Wel
	Markets	Ssi, Obs	Tra, Map
	Transportation	Ssi, Obs	Tra, Map
	Other facilities	Ssi, Obs	Tra, Map
Market Attributes for Extractive Uses	Supply	Ssi, Obs, Sur, Foc, Ora	Lcl, Ran, Tra, Lcl Flo, Tim, Scl
	Demand	Ssi, Foc, Obs	Dec, Flo, Map, Tim
	Market Prices	Ssi, Foc	Flo, Dec
	Market Structure	Ssi, Foc, Sur, Obs	Ran, Ven, Flo, Smap
	Market Infrastructure and Operation	Ssi, Obs	Map, Smap, Flo
Market Attributes for Non-Extractive uses	Demand for Tourism Activities	Ssi, Foc, Sur, Obs	Map
	Vulnerability of tourism market	Obs, Ssi, Foc, Sur	Imd, Tra
	Characteristics of tourism stakeholders	Obs, Foc, Ssi	Map
	Supply of aquaculture	Obs, Foc, Ssi	Map
	Characteristics of aquaculture stakeholders	Foc, Ssi	
	Aquaculture market structure	Obs, Foc, Ssi	Map, Flo
Non-Market and Non-Use Values	Indirect use	Replacement and damage costs methods	Not applicable
	Direct use	Travel cost method	Not applicable
	Option value	Contingent Valuation method	Not applicable
	Bequest value	Contingent valuation method	Not applicable
	Existence values	Contingent valuation method	Not applicable

Key: (Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

Selecting the Methods and Visualisation Techniques

The team meets in the Mombuka Park office to plan the field data collection phase. Carol reviews the goals and objectives, stakeholder groups, study sites, parameters and sub-parameters. She distributes copies of the worksheets, including the Goals & Objectives, Stakeholders 1 & 2, Study Sites and Parameters Worksheets, for easy reference while conducting the field data collection.

Carol leads the team through a discussion to decide which methods and visualisation techniques to use for assessing the sub-parameters. They agree to use surveys for sub-parameters that can be assessed with questions involving close-ended responses. This includes all sub-parameters within stakeholder characteristics and most of the sub-parameters within resource use patterns, including reef-related activities, changes in use, who is using the reef resources, and timing and seasonality.

The team decides to use observations, focus group interviews, oral histories and semi-structured interviews for the remainder of the sub-parameters, since parameters like use rights, gender issues, Park management, and conflicts among stakeholder groups are less straightforward and answers will often be anecdotal. They select more than one method for most sub-parameters.

The team then agrees that:

- semi-structured interviews will be the main data collection method for all stakeholder groups;
- focus group interviews will only be conducted for the 4 groups of fishers;
- oral histories will only be conducted with women gleaners and with traditional fishers;
- surveys will be used for all stakeholder groups to collect quantitative data; and
- observations will be conducted for each stakeholder group and will include going fishing with the sub-groups of fishers, visiting the fish market, touring the forestry operations, and taking a snorkel or dive trip with the watersports operator.

The team also decides on the visualisation techniques to gather information and improve the interaction between the team members and stakeholders. For example, Chi Lan, who is familiar with social maps from her studies, suggests developing these maps during focus group interviews to determine the spatial distribution of the various socioeconomic and ethnic classes within the stakeholder groups. Una suggests using Venn diagrams to illustrate conflicts among stakeholders, and Ish suggests developing seasonal calendars to track when different fish species are caught.

Carol is careful to note whether team members are familiar with the methods and techniques, to determine the amount of training and practice time required before they go out into the field. It is obvious that Ish and Lon need training with the semi-structured interviews and all require training with the visualisation techniques. Carol makes a note to hold a series of practice sessions on the visualisation techniques for everyone and on the methods for Ish and Lon and anyone else who feels they need a review.

The team completes the Parameters, Methods and Visualisation Techniques Worksheet.

Planning

Parameters, Methods and Visualisation Techniques Worksheet

Parameters	Sub-parameters	Methods	Visualisation Techniques
Resource Use Patterns	Reef-related activities and changes over time	Observation, Survey, Semi-structured Interviews, Focus Group	Timeline, historical transects, transects
	Who uses the reef resources	Survey	
	Means	Semi-Structured Interview	
	Use rights	Oral Histories, Semi-Structured Interview	Map
	Location	Semi-Structured Interview	Map
	Timing and seasonality	Survey	Seasonal calendar
Stakeholder Characteristics	Community characteristics	Survey	Timeline, social and wealth maps
	Individual characteristics	Survey	
	Livelihoods	Survey	
Gender Issues	Practical gender issues	Focus Groups, Semi-Structured Interview	Venn diagram
	Strategic gender issues		Venn diagram
Stakeholder Perceptions	Park management	Semi-Structured Interview, Focus Group	
	Conflicts among coral reef user groups	Observation, Focus Group, Semi-Structured Interview	Map, Venn diagram, ranking
Organisation and Resource Governance	Use rights	Oral Histories, Semi-Structured Interview	Social map
	Governance		Impact diagram
Market Attributes for Extractive Uses	Market supply & demand, Market structure	Semi-Structured interview, Survey	Flow charts
Market Attributes for Non-extractive Uses of Coral Reefs	Demand for tourism activities	Semi-Structured Interview, Survey	Flow charts

When considering which methods and visualisation techniques to use, the team should consider to what extent the team members are familiar with the methods and techniques. In cases where the team members are not familiar with particular techniques and methods, the team should plan training and practice (See *Chapter 2, Plan the Field Data Collection Phase, Train Assessment Team Members in Data Collection Methods and Visualisation Techniques)*.

Prepare materials and tools for the methods

Having identified the methods and visualisation techniques, the team now needs to prepare materials for them. The descriptions of the methods in *Chapter 3, Field Data Collection Methods,* include lists of requirements, which can be used to determine the materials needed for each method and for each visualisation technique. In most cases the team will need notebooks and pencils or pens and in many cases a flipchart or some other mechanism (e.g. posterboard, loose paper and pens) for recording information. Additional materials include cameras, binoculars, maps and Geographic Positioning Systems. The assessment team may also want to include a tape recorder or video camera as discussed in *Chapter 3, Field Data Collection Methods, Box: Selecting the Appropriate Media*.

Most importantly, the team should prepare the tools for the interviews and surveys *(see Table 2-3)*. For the semi-structured interviews, focus group interviews and oral histories, the team should prepare a list of key questions to guide these interviews, referred to as "interview guides". These questions need to be developed around the parameters and sub-parameters. The description of the parameters in *Appendix A* includes a list of questions related to the sub-parameters, which can be used to develop the interview guides. The team should consider the tips defined in *Chapter 3, Field Data Collection Methods, Box: Tips on Designing Questions for Interview Guides*.

For the surveys, the assessment team should prepare questionnaires, which include more specific, close-ended questions than the interview guides. The team can also use the lists of questions provided for each parameter in *Appendix A;* however, these questions are generally open-ended and, will, therefore, need to be modified as described in *Chapter 3, Field Data Collection Methods, Box: Tips on Developing Questionnaires*.

In the case of the interview guides and the questionnaires, the questions for the sub-parameters should be tailored to the identified stakeholder groups and to the situation.

Table 2-3. *Tools that need to be developed for each method*.

Method	Tool
Observation	None
Semi-structured Interview	Interview Guide
Focus Group	Interview Guide
Oral Histories	Interview Guide
Survey	Questionnaire

Planning

For example, if the assessment is focusing on fishing, then the question for the sub-parameter Reef Uses, "What type of reef resources are extracted?" *(Appendix A, Resource Use Patterns, Table A-1)* would be modified to "What types of reef resources are fished?" Similarly, the question for the sub-parameter Market Demand, "What kinds of markets are there for coral reef products?" would be modified to, "What kinds of markets are there for selling and buying fish?" *(Appendix A, Market Attributes of Extractive Uses, Table A-8)*.

Although the team does not need to develop interview guides or questionnaires for the visualisation techniques, they do need to consider what topics need to be addressed for each technique and how to facilitate the process. Often the best way to prepare for these techniques is through the training and practice sessions *(*See *Chapter 2, Plan the Field Data Collection, Train Team Members in Field Data Collection Methods and Visualisation Techniques)*.

Pre-test the interview guides and questionnaires
Before using the interview guides and questionnaires in the field, the assessment team needs to test them to ensure:

- The questions are easily understood, are not confusing and are not too long;
- The questions flow naturally from one to another;
- The questions are culturally and politically sensitive;
- The questions elicit the desired type of response;
- Responses can be recorded quickly and clearly; and
- The survey or interview takes an acceptable length of time (45 minutes is recommended).

Stakeholder representatives and key informants are often the best people to test the tools. Since they know the stakeholder groups, they can provide insight into how the stakeholders are likely to react to the questions. If they are not available, then the team can choose people at random to test the tools.

During the pre-testing the team should solicit feedback on the above points. Based on their feedback the team should revise the questions.

Decide how to keep track of information
The assessment team should develop a system to keep track of all the information that is being collected. By constantly updating the system throughout the field data collection the assessment team will know what information they have collected on each parameter and about each stakeholder group, which will be particularly useful in the analysis. All team members should contribute to keeping the tracking system up to date. It should be readily accessible to everyone for reference.

The tracking system should keep account of what information is being collected for which stakeholder group and on which parameters, where the information was collected (i.e. which study site), who collected it, and which data collection methods and visualisation techniques were used. The tracking system also should keep track of which type of informant was

interviewed during the semi-structured interviews, oral histories and surveys – households, groups, key informants or individuals (see *Appendix A, Semi-structured Interviews, Variations*). Within the types of informant section, the team can further note any particularly important characteristics (e.g. male, female, resident, non-resident). This is useful if the assessment team wants to ensure they have interviewed all types of informants.

Develop the Tracking Worksheet!
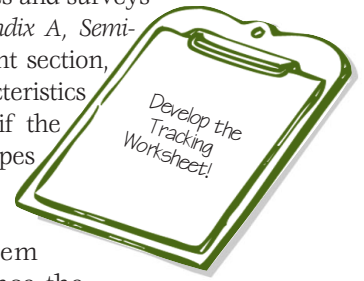
The assessment team should develop their tracking system worksheet using the Tracking Worksheet as a guide. Since the assessment team has already identified the stakeholder groups and parameters, this information can be included in the "stakeholder groups" and "parameters" columns. Since the secondary data has already been assessed, this information can be noted in the worksheet as well.

Develop a coding system

At the same time the team is developing a tracking system, they should determine how they are going to code their data as they collect it. Coding helps the assessment team to reference their field notes to particular parts of the tracking system and will be useful in synthesising and analysing the data according to stakeholder groups and parameters. During the field data collection, when assessment team members are reviewing their field notes, they should reference different sets of notes to the stakeholder groups and parameters about which they contain relevant information. For example, if fishermen has the code "FI" and resource use patterns the code 'ru', then notes taken during an interview with fishermen about their resource use patterns would be marked in the margin with the code 'FI ru'. Often notes on a parameter are dispersed throughout the interview and are often mixed with another parameter. Coding gives the team member a quick way to identify data for each parameter.

Define plans for analysis

It important to understand how the data will be analysed before starting field data collection. Most assessments will have two different sets of information:

- qualitative information primarily collected through semi-structured interviews, focus group interviews, observations, and oral histories; and
- quantitative data primarily collected from surveys, which are more structured.

Using the approach described in this manual, these two sets of information should be complementary, but they require different approaches to analysis.

Qualitative information should be continuously analysed while it is collected. This analysis should occur during field analysis workshops where the team meets regularly to review:

- what they have done;
- how they did it; and
- what they have learnt (see *Chapter 3, Field Data Analysis*).

Preparing Materials

Lon lists the materials needed for the field data collection, including flipcharts, a tape recorder, pens, and notepads, and also copies of a nautical chart of the area to use as a point of reference with stakeholders. The team also creates a list of the tools they need for the field data collection method. They create interview guides for the semi-structured interviews, focus groups, and oral histories and questionnaires for the surveys based on the parameters and sub-parameters for each stakeholder group.

These guides and questionnaires are pre-tested on stakeholders the team knows by asking them questions as in a normal interview or survey. For example, Ish and Tad interview Jack using the guides for the fishers. When Jack comments that the questions about conflicts are leading and accusatory, Ish and Tad rewrite them to be more open-ended and less accusatory.

The team prepares a system to record the interviews, surveys and observations based on the Tracking Worksheet, with stars representing activities completed. They all agree to record the type of informants during the semi-structured interviews, oral histories and surveys (households, groups, key informants or individuals) and to note gender and resident status. The following Tracking Worksheet includes an example of a semi-structured interview that Tad and Ish did with traditional fishermen at Sullivans. As indicated by the stars, a map and seasonal calendar were developed during the interview. The "M" and "R" indicate that the informants were resident men. Including "M, R" under "Group" indicates that the fishermen were interviewed in a group.
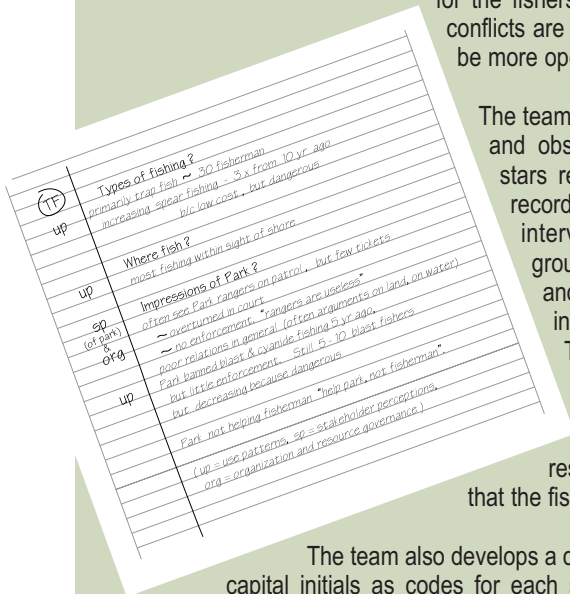
The team also develops a coding system for their field notes. They agree to use capital initials as codes for each stakeholder group and lower case initials for each parameter e.g. notes from an interview with traditional fishers are marked 'TF', and the sections in the notes about use patterns are marked "up" in the margin, while notes about stakeholder perceptions are marked "sp". They agree to follow this coding system so that they can easily scan their notes for relevant information during the final analysis.

Tracking Worksheet

Stakeholder Groups	Parameters	Study Sites	Data Collected By	Secondary Data	Field Data Collection Methods					Field Visualisation Techniques									Type of Informant			
					Obs	Ssi	Foc	Ora	Sur	Map	Tra	Tim	Scl	Htr	Dec	Ven	Flo	Ran	Key Informant	Individual	Household	Group
Traditional Fishers (TF)	Stakeholder Perceptions (sp)	Sullivans	Tad, Jsh			*				*			*									M,R

To prepare for the workshops, the team should ensure:

- that the data can be easily accessed;
- that there is a tracking system in place; and
- that time is allocated for the field analysis workshops (see *Chapter 2, Plan the Field Data Collection Phase, Define the Schedule for Field Data Collection*).

More planning is needed for analysing quantitative data, which often involves designing a database to analyse the data. The team should determine what type of information they expect to produce from the analysis and decide how they will use the results. The team should consider:

- what kind of analyses will be done, including simple calculations, descriptive statistics and more advanced statistical analyses (see *Chapter 4, Prepare the Quantitative Data*);
- what tables, figures and graphs will need to be produced; and
- how these tables will be used to explain which parameters and which stakeholders.

The team should design a database to record, analyse and produce the required sets of information. There are many electronic programs for creating databases, such as Excel, Access, SAS, dBase, ABstat, DataEase, Gauss, Lotus 1-2-3, MiniTab, Quatro Pro, RBase, SPSS, Stata, and LIMDEP. The team should select the program that will allow the data to be manipulated and analysed to fit their needs. All members of the team must clearly understand the structure of the database and the data entry forms.

The best way to check that the database will work is to enter hypothetical data or data collected from a small sample of the local population and then test all the analyses for problems or anomalies.

Decide on sampling unit

The team should define the basic sampling unit, which is the type of person(s) the team plans to interview and survey. The sampling unit could be individuals, households or some other unit, depending on the stakeholder group, e.g. the crew of

Planning the Analysis

The team plans to analyse qualitative information during the field analysis meetings. For the quantitative data Tom prepares an Excel spreadsheet. For each stakeholder group he lists the parameters and sub-parameters that will be addressed. For example, the guesthouse owners will be asked for the average number of guests per week. So the worksheet has a column for 'average number of guests per week', and a row that lists the guesthouses. After an interview, the team members will record the guesthouse owner's response under the column "average number of guest" and in the row with the guesthouse name. Tom enters some hypothetical data to test the database.

commercial fishing boats could be the sampling unit for commercial fishers; owners or managers of the businesses could be the sampling unit for aquaculture businesses.

The assessment team should carefully define the sampling unit since some terms have different meanings in different areas and cultures e.g. in some places "household" is a nuclear household of parents and their children, whereas in other cultures it refers to a much more extended unit with a range of related people living together in a compound, cooking and eating together and sharing certain resources and tasks. For simplicity, the following sections use individual stakeholders as the basic sampling unit.

Decide who to interview and survey

Next, the team should determine who to interview and survey, including how many informants within each stakeholder group they should contact and how to select those people. It is usually not possible to interview and survey all of the stakeholders because of the time and resources required, unless the stakeholder groups are small. Also, this may not be desirable since the team may get more in-depth information from interviewing a few key informants than from interviewing everyone. Therefore, the team should select a sample of the group, which will be used to understand the entire group; e.g. if watersports operations are the target, then a sample of operators should be interviewed or surveyed. Deciding on the sample is a complex task. Guidelines are given in *Appendix B.*

Establish the field teams

Assessment teams with more than three members should divide into several small (2 to 3 people) field teams. In situations where the assessment team consists of only 1 or 2 people, the assessment team is the field team. Several small field teams have a few advantages over one large team:

- They create less disturbance in the community and are less of an imposition;
- They can cover more stakeholder groups and study sites; and
- They can employ a larger range of data collection methods and visualisation techniques to gain a more detailed understanding of the issues.

If possible, each field team should include a mix of disciplines, with gender and ethnic balance. At least one person should know the local language (as discussed in *Chapter 1, Identify the Assessment Team*).

The field teams should assign roles to the members, including:

- *facilitator* – the team member who guides the interview by explaining the process to the informants, asking the pre-determined questions as well as follow-up questions, and engaging informants in discussion and analysis; and
- *record keeper* – the team member who records information and comments and reproduces visual images.
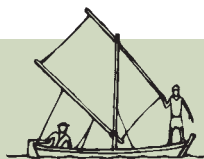
Sampling

The team decides to focus on individuals as the sampling unit for the stakeholder groups. For the fishers they decide to target boat captains as the most appropriate people to interview as they have the most experience. The only exception is women gleaners, where the focus is on the households as the sampling unit because they want to learn about the role of women in the family.

For the small stakeholder groups, the team plans to interview everyone including the 11 guesthouses, 6 forestry operations and 1 watersports centre. They decide to sample sub-groups of fishers, since there are so many. After reviewing *Appendix B,* the team decides to interview half of the ex-plantation and traditional fishers in the two fishing communities identified as study sites (64 traditional fishers and 36 ex-plantation fishers in Sullivans and Buru). They decide to survey 60 townie fisher (20% of the 300 townie fishers who operate off Mombuka) and half of the women gleaners.

They use random sampling of traditional and ex-plantation fishers to get statistically representative data. They draw the names of fishers from a list of fishers given by the Mombuka Fisheries Division. Ish uses the last column in the phonebook to select a random number. He selects fishers from the list using those numbers e.g. for random numbers 4, 6 and 3, he selects the 4th, 10th (4 + 6) and 13th (4+6+3) fishers. He continues selecting names until he has a sample size of 100, (64 for traditional fishers and 36 for ex-plantation fishers). Since there is no way to distinguish between traditional and ex-plantation fishers, Ish develops a filter question to identify the type of fisher.

The team is unable to get a list of fishers from Kela who fish off of Mombuka, so they decide to use non-random sampling to sample the townie fishers. They plan to use convenience sampling by selecting townie boats that are nearby and idling, thereby not disturbing fishing in progress.

The team decides to use non-random sampling, specifically *snowball sampling* of key informants, to sample women gleaners. Chi Lan and Una plan to ask women on the sand banks which of them are most familiar with the whole group. When the same names are repeated, these will be considered the key informants and the targets for interviews.

The team develops the following summary table on sampling.

Stakeholder Group	Sampling Unit	No. of Stakeholders	Sample	Sampling Approach
Forestry Operators	Operation owner or manager	6	6	All
Watersports Operator	Operation Owner	1	1	All
Guesthouse Owners	House owner or manager	11	11	All

Fishers
  Traditional
  (Sullivans and Buru only)
	Captain of the vessel	128	64	Random

Ex-plantation (Sullivans and Buru only)	Captain of the vessel	72	36	Random
Townies	Captain of the vessel	300	60	Convenience
Women Gleaners	Household	30	15	Snowball key informants

The facilitator and record keeper should be able to speak and understand the local language or else have a reliable interpreter. The facilitator also needs to have strong communication skills, including the ability to probe for information, encourage equitable participation from all informants and allow informants to express themselves in their own terms. The facilitator must also maintain neutrality, be knowledgeable of the discussion topics, have experience using the interview methods, and demonstrate sensitivity and respect for informants. The team member who feels most comfortable facilitating discussions or the team member who has the most experience with the stakeholders should be the facilitator. The background, skills and experience of the team members may also affect who is selected to be the facilitator; e.g. it is often best to have a female team member conduct focus group interviews with women.

A third team member can act as 'gate-keeper' to observe the process, prevent disruption and interference, elicit participation from the participants, and prepare appropriate tools for visual work. Otherwise this is the job of the record keeper.

The team members should rotate these roles and who works with which stakeholder groups, parameters and methods so that they develop a range of perspectives. This knowledge will be important when cross-checking the data (see *Chapter 3, Guiding Principles, Cross-Check Data*).

Finally, the field teams should establish their rules of interaction between each other; e.g. the team members may agree not to contradict each other in front of informants and not to interrupt each other during interviews.

Define the schedule for the field data collection

The assessment team should prepare a schedule for conducting the field data collection, including a timetable and allocation of tasks to team members. This is similar to the *Tracking Worksheet*, and will help the team determine whether the data are being collected on time or if they need to modify plans; e.g. if the assessment team finds that it takes twice as long as they expected to conduct the interviews, they may decide to cut out one study site, reduce the number of informants and/or change the interview guides.

The design of the schedule depends on which stakeholder groups are being assessed and what field data collection methods are being used. Therefore, the schedule should be based around the list of the stakeholder groups and the methods for assessing each group (see *Schedule Worksheet*).

The assessment team should also consider issues like seasonality and local events. For example, it may be better to wait until the end of the fishing season before interviewing the fishers. This way they will have more time to talk and it will not be an imposition. Similarly, weekends may be the worst time to interview tourism businesses since this is often the busiest time.

Complete the Schedule worksheet!
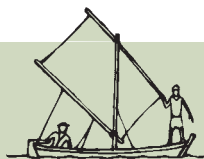
Defining the Field Teams and Schedule Worksheet

To be most efficient, the team decides to work in field teams of two and try to mix disciplines, balance genders and complement backgrounds to work with the different stakeholder groups.

Team Member	Gender	Training	Organisational or StakeholderLinks	Background
Carol	Female	Marine Biology	Mombuka Marine Park	National
Tom	Male	Economics	GMCF	International
Una	Female	Education	Mombuka Marine Park	Local
Lon	Male	Marine Biology	Mombuka Marine Park	Local
Chi Lan	Female	Anthropology	College, Anthropology Dept.	National
Tad	Male	Community development	Traditional fishers family, Community development projects	Local
Ish	Male	Fisheries	Mombuka Fisheries Division	Local

Chi Lan notes female team members should interview the women gleaners, and Ish suggests that a local should be in each team, since outsiders may not be readily accepted. In planning the teams, they keep in mind that Tom does not speak the local dialect, so he cannot interview the fishers. The field teams for the stakeholder groups are listed below, but they will alternate to ensure a balance in data collection.

The 3-month deadline to complete the assessment means that plans will need to be flexible to meet this deadline. Keeping this in mind, the team develops the following schedule:

Stakeholder Group	Methods	When	Field Team (facilitator & record keeper)
Ex-plantation Fishers	SSI, FGI, S, O	2nd to 6th weeks	Lon & Tad; Lon & Ish
Traditional Fishers	SSI, FGI,S, OH, O	2st to 6th week	Lon & Tad; Lon & Ish
Townie Fishers	SSI, FGI, S, O	3rd to 5th weeks	Tad & Carol
Women Gleaners	OH, SSI, S, FGI	1st to 5th weeks	Chi Lan & Una
Watersports Operator	SSI, S, O	4th week	Tom & Una
Guesthouses	SSI, S	6th week	Tom & Chi Lan
Foresters	SSI, S, O	7th week	Carol & Ish
Assessment team	Field analysis workshops	Every Friday afternoon	All

Key
SSI = Semi-structured Interview
FGI = Focus Group Interview
OH = Oral Histories
S = Survey
O = Observation

The assessment team should set aside regular times for field analysis workshops, when the team meets to discuss their progress and analyse their data (see *Chapter 3, Field Analysis*). The frequency of the workshops may be affected by travel and logistical arrangements.

Train team members in data collection methods and visualisation techniques
All team members should be trained to conduct the range of methods and visualisation techniques and to ensure they understand the goals and objectives of the socioeconomic assessment. This way team members will be able to follow the interview guides and, more importantly, ask follow-up and exploratory questions.
It is essential that team members understand why the questions are being asked, what they mean and the expected type of responses.

The level of training will vary depending on the experience and background of the team members. This should have been determined when selecting the team members.

As a minimum, all team members should review *Chapter 3, Guiding Principles, Data Collection Methods, and Visualisation Techniques.* This is essential for inexperienced team members, particularly to learn how to design and administer questionnaires and interview guides. More experienced team members should take the lead and explain the various methods and techniques and also work with inexperienced team members. But the best training is by practising the methods and techniques in the field. Several books on these topics are listed in the *Suggested Readings* section.

Provide a briefing on the local culture
The assessment team should understand as much as possible about the local culture before starting the field data collection. They should be briefed on local customs, treatment of outsiders, and forms of respect to the opposite sex, elders and figures of authority. Many rural communities have particular customs, traditions and behaviours that need to be followed, especially by visitors. These customs may involve long, formal meetings or ceremonies with officials or traditional leaders. Similarly, there may be particular etiquette regarding hospitality, e.g. some people will be offended if the guest does not accept a drink.

Someone closely familiar with the stakeholders should conduct the briefings about local cultures in the area, such as a stakeholder representative or key informant. This briefing is essential for teams of outsiders.

Arrange logistics
After finalising the structure and content of the field data collection, the assessment team should address the practical details of preparing for the field data collection. These logistic arrangements involve selecting a base of operations, accommodation and transport. Logistical arrangements can be complex and typically increase with the size of the assessment team and the number of field teams. For assessment teams larger than four people, it may be necessary to assign one person to be exclusively responsible for logistics.

Planning

The assessment team needs to inform the stakeholder representatives and any other appropriate local authorities when the team will arrive. The team also needs to obtain the official and unofficial clearances or permission required to work in the area.

The team will need a base of operations where they discuss plans and carry out the field analysis workshops. Ideally this base should be equipped with whiteboards and markers, flipcharts and pens, sufficient seating, large tables for spreading out materials and good lighting. Such bases will vary widely from a conference room in the fisheries department to the living room in the house where the team is staying.

Accommodation should be close to the field study sites to allow team members easy access to the stakeholders. Staying in the actual study sites allows the team to assess and interact with the stakeholders at all times. Discussions in the evening around a fire, in the local tea shop, or on a veranda before going to sleep can give different information from interviews conducted during the day, no matter how skilled the assessment team and how good the research tools are.

Accommodation may include staying in a local hotel, renting an apartment, or camping. The team may also consider staying with families of stakeholders; this will provide even greater opportunity for learning about the stakeholders. In these situations the team needs to consider:

- Whether staying with one stakeholder's house will affect the team's interactions with other stakeholders;
- Whether interacting closely with particular stakeholders may bias the team towards the viewpoints of those stakeholders;
- How large an imposition the team would be on the stakeholders; and
- Whether special arrangements need to be made for female team members (a sensitive issue in many cultures).

Finally, the team needs to arrange transport, which can be complicated if the area is large and there are few local means of transport. Ideally each field team should have their own transport so that they can be flexible. Depending on the extent of sea-based activities, the team may also require boat transport. Hiring local fishing boats is one way of putting some money back into the community and is cheaper than buying or bringing in a boat from outside.

Training and Briefing

Carol asks everyone to review *Chapter 3* on data collection methods and visualisation techniques before the 2-day workshop that Carol and Chi Lan arranged with Dr Xing. After explaining each method or technique, Dr Xing has the team members role play scenarios. For example, Tad facilitates while Una records a focus group interview with the rest of the team acting as ex-plantation fishers. Similarly, Carol and Tom conduct a semi-structured interview with Chi Lan acting as the owner of a forestry operation.

The team also has briefings on cultural traditions and customs specific to the stakeholder groups e.g. Cappy, an older fisherman who Tad knows and is well respected in the community, talks with the rest of the team about protocols and procedures for interacting with the fishers. He notes that only men should conduct the interviews as a matter of respect, because this is traditionally men's work. He also encourages the team members to go fishing when asked and stresses the need to be very clear about their objectives since fishermen may be suspicious of their intentions.

Una arranges all the materials (whiteboards, flipcharts, notepads, markers), research space, transportation, and accommodation for the field data collection. She arranges for the team to use the Park office for workshops and meetings. The Park also provides research materials and copying facilities and Carol agrees to let the team use her car to reach the forestry operations and guesthouses. They also have access to Jack's boat to interview the townie fishers. Chi Lan and Tom are staying in guesthouses, although Chi Lan hopes to find accommodation with one of the gleaner women once she knows them better.

So all is in place to begin field data collection.

CASE STUDY: SOCIOECONOMIC ASSESSMENT OF CHWAKA BAY – PAJE AREA, ZANZIBAR

The Chwaka Bay-Paje area on the east coast of Zanzibar is the pilot site of a joint UNEP/FAO project on Integrated Coastal Area Management. The area is intensely used for several activities, including fishing, seaweed farming, mangrove cutting and tourism. Resource conflicts are complex, and there is no formal management framework or protection of the area. The project developed a profile of the area, and identified the need for baseline information on environmental, economic and social parameters. In 1999, a rapid assessment of biophysical and socioeconomic conditions of the coral reefs in the area was done by the Institute of Marine Science (IMS) of the University of Dar-Es-Salaam in cooperation with the Commission for Land and Environment and Commission for Tourism. UNEP and FAO provided financial support for the assessment.

The overall objective of the assessment was to improve the management of critical marine habitats by providing baseline information, including habitat maps, a rapid assessment of coral reefs and information on the use of coral reef resources. The specific objectives for the socioeconomic part were to explore socioeconomic factors impacting on coral reefs, assess the use of marine resources and collect information on perceptions of their status and existing (traditional and formal) management systems.

The assessment was undertaken by three national Tanzanians with experience in socioeconomic assessments from IMS, the Commission for Land and Environment and the Commission for Tourism. A participatory rapid appraisal approach was used because of the day-to-day activities of the villagers and the short time available. The team used Kiswahili, the local language, and the local names of reefs, gear and fish species throughout the assessment.

As part of preparations, the district authority and the Sheha (Chief Local Administrator) in each village were contacted and informed about the survey through an official letter. The Sheha assisted in gathering the villagers for group interviews. Each group consisted of 20-30 villagers, including men and women of various ages. The selection included people undertaking as many different economic activities relating to natural resources as possible, e.g. fishing, seaweed farming, agriculture and mangrove cutting.

Informal interviews were held with village elders to compare the perception of the resources with the past. The assessment used semi-structured interviews based on an interview guide with open-ended questions. Flexibility was regarded as important, and allowed the facilitators to probe further and explore questions arising during the interview. The interviews took place in informal settings chosen by the villagers.

Direct observations and photographing of fishing gear and boats and their condition contributed to the knowledge on fishing activities. The relative importance of socioeconomic activities to each village was assessed by ranking. Data on boats and fisheries statistics were obtained from the Commission of Natural Resources. An officer from the Department of Fisheries was interviewed to give the Department's view on traditional and formal management systems.

At the start, the fishermen were suspicious of the assessment, fearing that the information collected could lead the government to take away their rights to fish in the bay, or to extend the ban on the use of beach seine nets (a common technique in the area). This influenced the way the assessment was conducted, i.e. the support of local leaders became extra important and the team took special care to listen carefully and to always remain neutral during interviews and discussions.

Information was collected on:

    i.   village cooperatives;
    ii. fishing activities – fishing/coral reefs, types of fish, fishing grounds, techniques and gear, fishing vessels, catch and markets, seasonality;
    iii. other activities – use of mangroves, seaweed farming, tourism, agriculture, lime production;
    iv. perceived causes of depletion of marine resources;
    v. values and indigenous knowledge; and
    vi. management systems – evolution of the practice of coastal management, traditional management systems, formal management system, villager's views on the traditional management system, villagers general views on management systems and the marine resources of the area, Department of Fisheries point of view.

Seaweed farming, one of the many intense uses of the coastal resources on the east coast of Zanzibar (Photo: Mohammed Suleiman).

Planning

The results were presented in descriptive text in a report under the same headings as above. The text also included recommendations based on the findings of the rapid assessment. Tables illustrated the findings on importance of economic activities by village, use of fishing gear, data on boats by village (number, types and people/vessel), fish catch for the past five years for the area and for Zanzibar as a whole and fish marketing places for each village. Maps of the area and photos of different types of fishing gear and boats complemented the text.

The report discussed traditional management systems, which are perceived to be collapsing despite the current government initiative to recognise local community management in the fisheries and in environmental laws. Lack of legislation supporting local management systems and the high population growth rate leading to increasing competition were quoted as reasons behind the failure of the traditional management system. Perceived reasons for resource decline included the use of fishing poisons, small mesh sizes and an increasing number of fishermen causing over-exploitation.

The assessment concluded that a better and more effective management system for the coastal and marine resources in the Chwaka Bay-Paje area was needed to avoid over-exploitation of resources, and resulting village conflicts. The socioeconomic team made a series of recommendations based on the findings of the report. These called for:

- strengthened community participation in the formal management of the area, and incorporation of by-laws for traditional management;
- raised awareness on coastal management compared to environmental legislation;
- support for alternative income generating activities in the study area to reduce pressure on the marine resources; e.g. provision of better vessels to facilitate offshore fishing, encouragement of seaweed farming, improvement of agriculture, and provision of village development loans;
- more effective enforcement of existing regulations and laws against destructive fishing techniques and gears; and
- strengthened relationships between the different villages in the area.

The report also recommended that similar rapid assessments should be undertaken in other areas with high biodiversity and little baseline information on the resources.

Chapter 3: Field Data Collection

When the assessment team members have completed the first 2 phases, they are ready to collect the field data and begin analysis. There is a variety of methods and visualisation techniques to collect socioeconomic data on stakeholders. Because all field data are collected at the same time, the information on how to conduct each method is organised by method and technique. But first, several important guiding principles essential for data collection are reviewed.

Guiding principles for field data collection

Field data collection depends on the skills, flexibility and inventiveness of the team and on the relationships they establish with the stakeholder groups. Throughout this phase the team should involve the stakeholder groups as determined in *Chapter 1, Determine Level of Stakeholder Participation.* In addition the team should constantly modify and adapt the previously identified objectives, stakeholders, study area and sites, and parameters and sub-parameters based on new information gained during this phase.

Following are the guiding principles that the team should follow throughout the field data collection.

Respect the stakeholders and communities
Team members must respect the stakeholders, particularly their knowledge, time and customs, as a matter of courtesy. This respect will benefit the team by helping them gain the trust of the community members. In particular, the team should recognise the stakeholders' knowledge of their communities and the surrounding environment, which can greatly assist data collection and reef management. The team should minimise disruption of the community's daily routines by selecting times for interviews and meetings that are convenient to the stakeholders and by limiting the time taken for them. As a general rule, interviews and surveys should be between 1/2 hour and 1 hour, depending on the cultural norms.

The team should follow local customs (see *Chapter 2, Plan the Field Data Collection Phase, Provide a Briefing on the Local Culture*), particularly since they may be perceived as disruptive and a potential threat to established power structures, and to the habits, traditions and norms of a community. Following these customs will help ensure the team is accepted by the community and can work in an atmosphere that is relatively free of tension.

Clarify the objectives of data collection

The team should always consider what impact they are having on stakeholders and the whole community by their presence and the questions they ask. A visit by outsiders to rural communities may be a rare event and people may be as curious about the team as the team is about them. The team should also be aware that people will interpret the team's presence according to their local reality and may presume that there are hidden reasons behind their visit, other than those revealed to them. The team cannot assume neutrality within the community.

Therefore, the team should be direct and clear with the community, stakeholders, and particularly informants about who they are and their objectives. The team should make it clear that they are there to learn from the community, not to impose their own knowledge on them. These points should be repeated throughout the data collection. Visualisation diagrams, such as a flow chart, can also help stakeholders understand what is being discussed and how it is being analysed. Stakeholders, particularly informants, should be given time to ask questions and satisfy their curiosity about the team members. Participation of stakeholders in the team can also help increase their confidence in the assessment.

Develop an interactive approach

Quality data collection depends on interactive, two-way communication between the team and the stakeholders. An interactive approach helps the assessment team explore topics that arise unexpectedly, question responses that are unclear, and directly confirm analysis with the stakeholders, all of which are critical to understanding complex, multi-dimensional socioeconomic conditions. In addition, the more comfortable the informants feel with the team, the more likely they are to trust them, to be open with them and to provide in-depth, honest responses. The interactive process itself can be revealing, e.g. the facilitator may find that some group members defer to others, indicating a hierarchy within the community.

By developing positive relations with the stakeholders, the socioeconomic assessment may be the first step toward involving local stakeholders in management. This interactive process also enables the stakeholders to develop a fuller understanding of the socioeconomic conditions in their community and gain a greater sense of ownership of the process and results.

Increasing the level of comfort and trust between the team and informants means making a conscious effort to become familiar with the stakeholders by meeting them informally in their own setting. Two-way interactions range from interviewing the president of the fishermen's association at the landing beach, to talking informally to the president of the small farmers association at the local bar. Team members using this approach should make a conscious effort to talk *with* the stakeholders, not *to* them, about their knowledge, opinions and perceptions.

Recognise the limitations of information

Regardless of any success in establishing a strong rapport with stakeholders and developing trust and openness, the team should recognise there are limits to these

interactions. Anthropological research in communities often lasts for years before local people really begin to open-up to the researchers. Spending a few days to weeks or months in an area may not be enough time for the team to be fully taken into people's confidence.

To overcome these limitations, the team should consider involving stakeholders in the field data collection and analysis. Stakeholders already have a rapport with other stakeholders and are, therefore, more likely to be given access to accurate information. Stakeholders also understand the community dynamics and can judge the accuracy of the information better than outsiders.

Recognise informants' biases

Stakeholders will have different perspectives, perceptions, priorities and interests. One purpose of the assessment is to solicit that diversity of perspectives by interviewing a range of stakeholders. However, the *individual* perceptions of informants need to be kept in mind when interpreting their responses because they can constitute an individual bias. By recognising these potential biases, the team can better understand how representative these views are of the larger group. For example, a traditional community leader may emphasise the value of traditional rules because they enhance his status, when other members of the community generally consider their influence to be much more limited. The informants' perceptions of what the assessment team is doing, and possible benefits to be gained or losses incurred from giving the assessment team certain information, may affect their responses.

Assessment teams can overcome these problems by:

- being fully aware of *who* different informants are and what stakes they might hold in the coral reef and its use;
- clearly explaining to informants *who* the team is, *why* they are there and *what* they are interested in talking about;
- cross-checking information generated from different informants, identifying contradictions and disparities; and
- following up and probing issues that have given rise to contradictory responses from informants.

Another form of bias is the effect of the surroundings where the interview or survey is conducted. For example, informants may respond differently when other stakeholders are around to when they are alone. To control this, the gatekeeper should try to restrict entry into the interview or survey area. Where the surroundings cannot be controlled, the team should consider how this may have affected responses when they are analysing the data.

Recognise and minimise biases of the assessment team

The perceptions of the team members are shaped by their environment, background, culture and knowledge. These biases can lead them to interpret what they see and hear in ways that fit into their views and perceptions. This can be a problem when the team members' views and perceptions differ from the stakeholders.

Assessment team members cannot entirely eliminate these biases, but they can learn to recognise them and become self-critically aware of how these may affect their interpretations of what they see and hear. Being 'self-critically aware' means continuously and critically examining their own behaviour and perceptions, accepting errors, and learning from them. This can reduce biases in their interactions and interpretations.

Following are some of the most common biases and measures that can be taken to minimise them.

Gender

Women may be excluded from the field data collection, or their opinions under-valued, if team members discount the importance of women's opinions and viewpoints. This occurs more frequently among male team members. Gender bias is a concern because many organisations that conduct assessments are dominated by men, leading to predominantly male assessment teams. Gender bias is also a problem when cultural norms make it difficult for women to talk to outsiders.

The team can address this bias by:

- talking specifically with women as a separate stakeholder group;
- including women on the assessment team; and
- including a gender specialist to specifically address gender related issues arising during data collection and to control gender bias in the results.

Roadside

When some sites are difficult to access, the assessment team may concentrate on easier-to-reach areas, which can save travel time. But ease of access also often means different socioeconomic conditions, including more options available to people and better overall conditions. If the team focuses on these areas, they may miss areas with greater problems, more poverty, limited options, greater dependence on reef resources and where the impacts of reef management strategies may be more severe.

The team can address this bias by:

- making a conscious effort to identify and reach less accessible, poorer areas far from roads, even if it takes more time and effort; and
- exploring the study area on foot to ensure that they reach areas away from the road.

Rich, urban and educated

For educated, articulate members of a team, accustomed to urban society and certain norms of communication, it may be easier to talk to community members who are most like themselves. This generally means the better-off and better-educated people in rural areas. Often these people can be key informants, since they can provide an analysis of local conditions that is informed and articulate. But focusing on these people may lead to the assumption that, because people talk and think like the team members, they are impartial and balanced in their judgements. Their perceptions of

local conditions may be considered as the truth at the expense of other people's perceptions that are less clearly articulated and more difficult to understand.

Similarly, urban-based team members may place greater importance on reef activities and products that relate to urban life (e.g. fish seen in urban markets, corals sold as jewellery in urban stores). Entire sets of resources and patterns of use may be overlooked as a result.

These biases need to be balanced by:

- analysing the backgrounds and potential biases of the various informants;
- identifying and assessing the non-urban activities, resources and stakeholders; and
- making special efforts to communicate with groups that are difficult to talk with (e.g. the poor, older people, children).

Outsider priorities

Any assessment has its own objectives, often largely determined by issues regarded as important by outside organisations or end-users. Even if stakeholders have been consulted extensively, outsider priorities may still dominate when it comes to deciding what to talk about in the field.

The team can address this bias by:

- reflecting on the objectives, priorities and concerns identified by the stakeholder representatives during the initial consultations and reconnaissance survey;
- consulting with stakeholders as often as possible regarding plans and progress with the field data collection; and
- asking general, open-ended questions during the interviews to allow the stakeholders to discuss topics they regard as important.

Language

Often the assessment team has to talk to people in the community using a language other than their local everyday language. This can lead to bias in several ways:

- translators can introduce their own interpretations into translations for the team;
- local people may express themselves poorly in a different language and distort their own meanings unintentionally;
- when the language used is an official language, local people may be accustomed to only talking about certain things (such as official matters) in that language and not about others (such as local traditions), which can limit the information they get across; and
- even if outsiders and local people speak the same language, the way they use that language may be so different that true communication may be limited and the team may misunderstand what is being said.

The team can overcome these biases by:

- making sure that the team includes people who speak the local language well; and
- carefully analysing *how* information has been generated, recognising the potential for misinterpretation of what they have said to local people and vice versa.

Disciplinary/academic background bias

Team members may have specialist training in an academic discipline, which can influence their ideas of what is important e.g. a fisheries specialist talking to reef stakeholders may focus on fisheries-related issues because these are familiar and considered important. Unconsciously they may encourage informants to talk about fisheries as well, even though fisheries may be only one minor use of the reef. Similarly, someone with formal scientific training may concentrate on trying to establish facts that can be demonstrated, and discount the perceptions, opinions and attitudes of stakeholders that are based on experience, observation and tradition.

These biases can be overcome by:

- making sure that the field teams include people from different disciplines – such as social and natural scientists;
- initiating interviews with open-ended questions that allow informants to describe their own priorities;
- checking that specialist team members do not focus exclusively on their specialist area; and
- cross-checking data and ensuring the team has opportunities to reflect on what they have learned and adjust the rest of the field data collection accordingly.

Take detailed notes

Throughout the field data collection, the team members should take thorough, detailed notes, which are critical for the analysis e.g. quotes can be particularly powerful. The notes should include not only *what* is said, but also *how* things are said, which is often just as insightful. These notes may include information on the informants' attitudes and behaviour, subjects they avoid, how much time they spend on different subjects and their interactions with each other.

Cross-check data

Cross-checking data is critical and involves comparing data to determine how thoroughly the stakeholder groups and parameters are being assessed, to determine the accuracy of the information and to identify potential biases.

Cross-checking is based on the principle of triangulation in which data are compared from at least three different sources, involving three different team members and using at least three different data collection methods. For example, when studying stakeholder characteristics, one team member may get demographic statistics from

the census bureau, a couple of other team members might conduct interviews with several key informants, and other team members might survey the community for additional, quantitative data on characteristics. The team members would then compare their findings. Where the various sources stated the same information, the information would be considered accurate; where there were differences, the team would need to investigate the topics further.

The team should meet regularly during field data collection to compare information and findings, and look for inconsistencies and contradictions in the information. Using triangulation as a guide, the team can plan further field data collection to check information that is unclear or requires more in-depth study.

Create opportunities to reflect on learning

The team should create opportunities to reflect on what they have learned. These reflections help ensure an adaptive planning process and improve the quality of understanding. Instead of only having one opportunity to collect information about each topic, or from each informant, the team can go back over areas they have investigated to clarify contradictions and unresolved issues. The main opportunity for reflection is during the field analysis workshops (see *Chapter 3, Field Analysis*).

Recognise when to stop

As data accumulate, it is easy for teams to fall into the trap of thinking they need more. This can become an end in itself, resulting in a mountain of interesting, but not necessarily *useful*, information. The team should always remember that an assessment will be judged on the relevance of the findings, not on the amount of information.

Knowing when to stop requires judgement by the team leaders and critical self-awareness. The team members should ask, 'Are issues being followed because they are interesting, or because they will really contribute to the assessment?' The Tracking Worksheet can help the team decide if they have enough information on all the parameters and stakeholders. Control over the quantity of redundant information being collected has to be balanced with the need to allow space for new learning that was not anticipated.

Collecting Field Data According to Guiding Principles

The team spends approximately 2 months collecting field data. They conduct 142 semi-structured interviews, 131 surveys, 8 observations, 4 oral histories, and 6 focus group interviews, and use a wide range of visualisation techniques, from maps to Venn diagrams. Most stakeholders willingly participate and are generous with their time.

They make numerous modifications to their original plans. For example, instead of studying Buru, the team shifts to Sanya because Buru will be holding the annual community festival in the middle of the field data study period.

The team quickly learns the value of respecting the local customs and beliefs, making their objectives clear to the informants and interacting with stakeholders. They make interviews at appropriate times, make sure local team members are always present during interviews, try to respect gender considerations, and follow the local customs. But they still make some errors. For example, during a focus group interview Lon and Tad do not acknowledge pre-existing personal conflicts among fishermen which result in a heated argument. This means that the fishermen are not comfortable and open during the rest of the interview. Also, Chi Lan makes the mistake of wearing shorts when she interviews the women gleaners, so that some of the older women shun her during the first meetings.

Throughout the field data collection the team always makes sure they explain the assessment objectives with stakeholders, particularly informants. They also give out a one-page summary of the project with the goals, objectives and the overall methods. But there are still some misunderstandings. For example, when Lon and Ish enter Sullivans they learn that the Sanya fishers have told the fishers in Sullivans that Park staff are collecting personal catch statistics and introducing new regulations to restrict their activities. Lon and Ish have to take extra time to explain the goals and objectives and assure the fishers that there are no new restrictions. Then they return to Sanya to explain their objectives again.

The team tries to interact with the stakeholders as much as possible. Lon, Tad and Ish focus on the fishermen, and often talk with them over drinks at the local bar, while Chi Lan and Una talk with the women gleaners over tea at the end of the day. But there are limitations e.g. the ex-plantation fishers will not give Lon and Ish information on incomes and profits. They all make a particular effort to get to know key informants e.g. Chi Lan and Una talk a lot with the older women gleaners who have been gleaning all their lives. These key informants provide valuable insights, clarify data from other sources, and advise on the best ways of collecting data.

The team is always on the lookout for biases among informants. For example, Steve, the watersports operator, tells Tom and Una that his guests are very environmentally conscious, and never kick the coral or take souvenirs. Tom and Una think this may be exaggerated because Steve does not want any restrictions on diving activities. So they go out on a dive trip one weekend with Steve and see his guests damaging coral. Moreover Steve does not provide any guidance or advice on how to avoid such damage. Such biases are considered when analysing the information from these informants.

The team also watches for biases within their own team, like when Chi Lan notices that Tom spends more time interviewing wealthier individuals, particularly foreigners. Chi Lan points this out to Tom, who was unaware of his bias.

By cross-checking data during the field analysis workshops, the team determines the accuracy of the information and identifies errors and inconsistencies. At the first workshop, team members realise they have contradictory information. The townie fishers said there were no conflicts among fishers when Tad and Carol interviewed them, but Tad and Ish saw many fishing vessels crowding into Park waters, which the traditional fishers noted was a common problem. Furthermore, during a focus group interview of traditional fishers, the participants stated these same concerns and drew Venn diagrams, showing extensive overlaps and conflicts. The team looks at the enforcement citations in their secondary data file and find that there have been numerous arguments between fishers. When they look at the census statistics they see that the traditional fishers are third and fourth generation Mombukans, whereas the ex-plantation fishers are from a different part of Tebu Island, which may contribute to the disputes between the groups.

Lon facilitates a discussion on these differences. He illustrates the sources of information by drawing a triangulation diagram, which shows that Tad, Ish and Carol collected data on the issue, they used 3 methods (semi-structured interview, observation, and focus group) and 1 visualisation technique (Venn Diagram), and there are 2 secondary sources with relevant information. The team decides that these findings are not conclusive and decides to investigate further with semi-structured interviews. Chi Lan suggests using a non-Park member for these interviews, since Carol noticed a bias among townie fishers who did not want the Park manager to see any conflict among fishers, which might lead her to restrict fishing activities. Chi Lan also suggests asking Steve whether he has seen disputes among fishers on the reef.
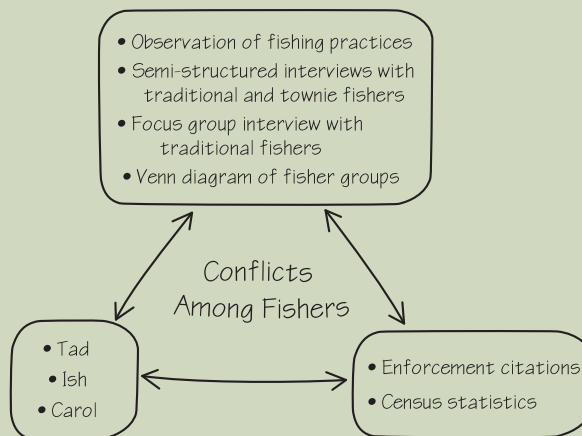
In a short 3-month study it is essential that the team members keep their focus on the objectives, so they monitor progress on collecting data for all stakeholders by regularly updating the Tracking and Schedule Worksheets. The team uses these worksheets to review their progress, identify gaps and where they need to focus their data collection, and incorporate new topics and issues into their data collection plans.

During one of these reviews Carol notices that Chi Lan is focusing primarily on gender issues, which are important for her graduate studies, but only one of many parameters the team is assessing. Carol points this out to Chi Lan and asks that she refocus on the full list of parameters.

Field data collection methods

Field data collection methods include observations, semi-structured interviews, focus groups, oral histories and surveys. In the next sections, each method is described, including its definition, purpose, requirements, suggested approach, strengths, weaknesses and variations.

Although listed separately, many methods may occur simultaneously or sequentially. For example, a team member may interview a dive operator during a dive trip, enabling the team member to learn first-hand how the operator runs the business by observation. The dive operator may tell about his experiences over time – these would be oral histories. Such events cannot be predicted, so the team should always be prepared to take full advantage of all opportunities.

Observation

Definition
Observations are qualitative descriptions of what the team member sees and are obtained by attentively watching and recording the surroundings. For example, a team member may notice bottles tied to the rear of an outrigger and ask "Why?", to be told that the bottles separate the lines while trolling, a type of fishing not previously mentioned. Observation is a useful method because the team learns first hand about complex activities involving motor skills such as farming, fishing, boat building, etc. Much of the behaviour involved in these activities is learned non-verbally by observing and doing, therefore it is difficult to describe e.g. it is difficult for fishers to describe all they do at sea.

Observation may be *directed* or *continuous*. During directed observation the team member looks at a specific activity, such as a fish landing, or tries to answer a specific question, such as, 'How are co-operative meetings conducted?' During continuous observation, the investigator seeks a broader understanding of activities and observes all activities throughout the day and night. Directed and continuous observations are not mutually exclusive.

Observations are conducted throughout the field data collection; although observations at the start of data collection are particularly useful to prepare interview and survey questions. Opportunities for observation often arise during semi-structured interviews.

Purpose
- Provides first-hand insight into activities that are difficult for people to describe.
- Provides descriptive information on relevant activities (e.g. tourism, fishing, farming, coral mining, etc.), stakeholders (males, females, young, old, roles, etc.), and material culture (e.g. housing, settlement and land use patterns, infrastructure, etc.).

Requirements
- Trained researcher with strong curiosity, keen use of all senses and an understanding of local nomenclature and taxonomies
- Binoculars
- Notebook & pen/pencil
- Camera
- Compass and Global Positioning System (optional)
- Boat (necessary)

Suggested approach
1. Determine useful activities to observe related to the parameters by reviewing the recommended data collection method for each parameter in *Appendix A*.
2. Walk through the area, introduce yourself and explain what you are doing.
3. Pay attention to everything and use all senses to observe. Use binoculars to observe from a distance. Travel by boat to observe activities on inaccessible coastlines or at sea.
4. Ask questions concerning things relevant to the parameters being investigated (e.g. while observing a fish landing, ask where and how the various fish were captured), particularly activities that you do not recognise. When possible, conduct observations with a key informant who can explain activities as you observe the area.
5. Observe activities at all times of day if possible e.g. if awakened at 3am by the sound of men talking while walking down a village path, ask what happens at that time. They may be departing for a specific coastal activity not mentioned previously.
6. Take photographs to record observations, particularly of short-term activities, to provide additional information not otherwise recorded (e.g. the number of people at the event or a gear type missed during observation), and to stimulate memories later. Ask permission to take photos.
7. Fully record activities taking place, the setting, etc. (e.g. the reactions of the fishermen at a fishermen's association meeting).
8. Sketch as many things as possible (e.g. the pier, a boat, the farm plots). Observe reactions to sketching and note-taking and act accordingly. If people seem to object (this is rare), take notes after leaving the scene.
9. Carefully review and analyse the observation notes to identify important statements, issues and patterns relating to the stakeholder groups and parameters as discussed in *Chapter 3, Field Analysis*.

Strengths
- provides a highly reliable source of information;
- generates extensive descriptive information about activities not easily described by stakeholders;
- allows the assessment team to become familiar with the community, organisation or stakeholder group and gain their trust by demonstrating sincere interest in their activities;
- provides an opportunity for community members to meet the assessment team and express their views;

- allows local people to get involved in data collection as they show the team members various activities and events; and
- does not demand valuable time from local people.

Weaknesses
- is limited by the time of day, phase of the moon and season when the observations are conducted;
- can be difficult to carry out in some locations (e.g. at sea) and in some conditions (e.g. bad weather);
- usually generates data that cannot be analysed statistically with confidence;
- generates data that is difficult to code and analyse; and
- can generate varying information depending on the observers and how they interact with the community, organisation and stakeholder group.

Variation

Participant observation involves a team member playing an active role in an activity e.g. a team member could help set and haul fishing nets, clean the fish and finally sell the catch. But before getting involved, the team member should ask a key informant whether participation in the activity is appropriate (e.g. it may not be appropriate for female team members to do certain things), and physically possible (e.g. joining a very small fishing boat may be difficult).

Participant observation helps the team member learn first hand about reef-related activities (e.g. watersports activities, hotel operations, fishing practices). However, there are several disadvantages. Participant observation requires time from local people to involve the team member in their activities, which can be intrusive since the team member may take the place of a skilled, productive worker. Interacting closely with particular stakeholders can affect interactions with other stakeholders, particularly when there are conflicts between and within groups. Also, some activities may involve some risk e.g. injury during fishing, piracy, marine smuggling.
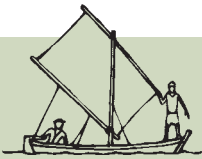
Conducting Observations

The team takes every opportunity to observe the stakeholders and understand their daily routines, cultural traditions, and relationships with other stakeholders. When Tom and Una go out for a dive with Steve, they observe his favourite locations, his interactions with fishermen on the water, and the information he provides to tourists about the Park. Tom and Chi Lan attend meetings of the Mombuka Tourism Association to observe the hoteliers' interactions and priorities, including discussions on environmental issues.

Lon and Tad make arrangements to go fishing with 2 traditional fishers, Mohammed and Juan. They plan to use this opportunity to observe fishing methods and to conduct semi-structured interviews with the fishermen. To help record the fishing methods and other interesting activities, Lon brings a camera.

Lon and Tad explain to Mohammed and Juan the project and their interest in learning more about fishing methods and talking with the fishermen about their ideas. While helping Juan and Mohammed set-up their gear, they ask a few questions relating to the gear and fishing grounds, including:

- What types of gear do you use?
- What species do you target?
- How much have your fishing practices changed since the Park was established?
- Where did you fish before the Park was established?
- Where do you fish now?

Lon notices that the other fishing boats all seem to be fishing in clusters and asks Juan why. Juan points to the chart showing that the best fishing spots are in the deeper water at the edge of the reef. Lon also notes that Juan seems to know most of the other fishers and asks 'What percentage of these fishers are from Mombuka? How well do you know them?' Juan says he knows most of the traditional and ex-plantation Mombuka fishers through the Cooperative, but he doesn't know the townie fishers who tend to keep to themselves.

While helping pull in the traps, Tad sees that one of the buoys has been cut, so he asks Mohammed, 'How often does that happen?' Mohammed answers 'Every once in a while', and adds that it was probably one of the new townie fishers. He notes there are more and more new boats in the area and as a result, more and more conflicts between the local and townie fishermen.

When they return Lon and Tad help Mohammed and Juan unload the catch and thank them for the day out and their time in answering questions. Tad and Lon go over their notes as soon as they can. They note that hook and line and traps were the main fishing gear; there was crowding among fishers at the best sites; there are conflicts with townie fishers, and that problems between fishers and the dive operator could happen in the future.

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Definition
Semi-structured interviews are based on a set of open-ended questions or discussion points, to generate qualitative information. The semi-structured interview is one of the most powerful methods, allowing the facilitator flexibility to probe for answers, follow-up the original questions and pursue new lines of questions. Therefore, the interview and information evolve allowing the facilitator to cover a range of topics. This flexible and open approach encourages two-way interactions, including exchanges of information between the facilitator and the informant. The semi-structured interview differs from surveys, which have specific questions with limited answers (e.g. multiple choice, true/false).

Semi-structured interviews are often the main means of data collection and are typically conducted throughout the field data collection.

Purpose
- Generates in-depth and explanatory, qualitative information on specific issues.
- Identifies local terminology, language and priorities to help the assessment team interpret other information received during the assessment.
- Allows an exchange of information between the facilitator and informant.

Requirements
- Facilitator
- Record keeper (optional)
- Notebook & pencil/pen
- Tape recorder or video camera (optional)

Suggested approach
Same as basic approach (see *Box: Basic Approach for Semi-structured Interviews, Focus Group Interviews, Oral Histories & Surveys*) with these additional steps:

1. Refer to *Chapter 3, Box: Tips on Designing Questions for Interview Guides* for guidance on developing the general questions and discussion points for the interview guide.
2. Begin the interview with the broadest questions on the interview guide. As the interview progresses, probe for details and ask questions in different ways to obtain further information. Ask follow-up questions to clarify answers and to ensure the original question is fully answered. Do not leave issues unanswered.
3. Start with simple questions that require descriptive answers and gradually add more complex questions. Do not ask more than one question at a time.

Basic Approach for Semi-structured Interviews, Focus Group Interviews, Oral Histories & Surveys

1. Develop the interview guide or questionnaire. Identify the parameters on which to focus the guide or questionnaire by reviewing the recommended data collection methods for each parameter in *Appendix A.* Use the questions for each parameter in *Appendix A* when developing the guide or questionnaire.
2. Conduct a practice interview with a key informant or other stakeholder to check that the questions are clear, they prompt the needed information, the process is smooth and the entire interview is completed within a reasonable time.
3. Select informants to be interviewed (see *Chapter 2, Decide who to interview and survey*).
4. Arrange a place and time for the interview that is convenient to the informant and where they will feel at ease, there will be minimal interruptions and there will be sufficient light and space to work.
5. Introduce yourself and describe the purpose of the interview. Discuss the confidentiality of responses. Offer relevant information about how the results will be used and answer any questions.
6. If there are plans to use a tape recorder or video camera during the interview, ask permission and let the informants know when it is in use.
7. Ensure the informant is comfortable throughout the interview or survey. Provide something to drink or eat if appropriate.
8. Obtain information from other people in the area (e.g. family members) as appropriate.
9. Be conscious of time and try not to conduct the interview longer than a reasonable time (less than 45 minutes is generally recommended).
10. Take notes during the interview or survey. Write them up as soon as possible after it is completed while it is still fresh. Record any visualisation diagrams developed during the interview.
11. Carefully review and analyse the interview notes to identify key statements, issues and patterns that relate to the stakeholder groups and parameters as discussed in *Chapter 3, Field Analysis.*

4. Adjust the questions, and the ordering of the questions, as needed during the interview to bring in new issues.
5. Encourage the informants to answer questions in their own words, to express opinions, experiences and memories, and to discuss issues as much as necessary.
6. Use visualisation techniques (e.g. ranking, decision trees) to help elicit information (see *Chapter 3, Visualisation Techniques)*. Allow for validation and correction of visualisation diagrams by informants. Leave one copy of the diagrams with the informants.

Strengths

- generates specific, in-depth and explanatory qualitative information;
- encourages informants to raise relevant issues that the facilitator may not know about;
- encourages involvement of the informants by allowing them to discuss issues of importance and at length;
- allows the assessment team to become well acquainted with a broad range of community members;
- allows informants to discuss sensitive issues and emotions;
- allows informants to tailor answers to their situation, experience and knowledge; and
- identifies local terminology, language and priorities.

Weaknesses

- usually generates data that cannot be analysed statistically with confidence;
- can generate varying responses depending on the facilitators and how they ask the questions;
- requires an experienced facilitator;
- is difficult to determine whether informants are providing information they think the team member wants to hear;
- can generate a large volume of extraneous data;
- is time consuming for both the assessment team and informants;
- is difficult to code and analyse the data;
- generates data that do not necessarily represent the views of the larger community or stakeholder group;
- requires some interpretation of responses by the person conducting the analysis; and
- can be sidetracked by hidden agendas.

Variations

Key informant interviews involve people who, because of their position, experience and knowledge, can provide extensive insight on socioeconomic conditions. Key informants were first identified during *Chapter 2, Reconnaissance Survey*. Key informants are questioned when the team wants to gain particular insight on an issue, or when they need to cross-check and obtain explanations on other information. But the disadvantage is that the team only obtains the views of that individual and it can be difficult to separate these from the views of the larger group.

Tips on Designing Questions for Interview Guides

Phrase questions so that they are open-ended, not closed:
~~Do you use gillnets?~~ How do you fish?

Avoid leading questions:
~~What kinds of problems are there between fishers and other users of the coral reef?~~ What kinds of interactions are there between fishers and divers?

Use unambiguous questions:
~~Do you go fishing very often?~~ How often do you go fishing?

Use indirect questions for sensitive issues such as income or use of illegal fishing methods:
~~Do you use cyanide?~~ Do you know if illegal fishing methods are used in your community?

Use the 6 questions words (what, who, when, where, how, why) as much as possible:
When do you go diving? How often do you go diving? Where do you go diving? What kind of diving do you do? Who do you go diving with? Why do you go diving?

Use questions that encourage informants to compare and contrast as a means of analysis:
How do fishers' relations with the hotel industry compare with their relations with the dive operators?

Group interviews involve groups of informants with an interest in a particular topic or issue, such as fishers or fish traders, and are usually not planned. Often the team member begins interviewing one person and others join the discussion. Alternatively the team member may approach several people at once. During group interviews, informants are likely to interrupt one another, or 'help each other out', instead of waiting for individuals to complete their thoughts. Therefore the facilitator must keep the discussion focused. In contrast, focus group interviews are planned with specific groups of informants around particular topics (see next section).

Group interviews have the advantage that information is obtained from several informants at once and the group dynamics often spur informants to think of other points. But they can be time-consuming when many informants get involved, it can be difficult to keep track of who is saying what, and they can easily get off the topic entirely.

Household interviews involve an entire household. These allow the team to understand the household, not just the stakeholders, and can help clarify household livelihood strategies and intra-household dynamics. These interviews also provide an opportunity to talk to people who are not directly involved in reef uses (e.g. women and children).
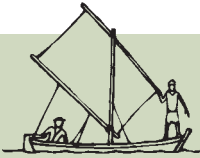
Conducting Semi-structured Interviews

The team uses semi-structured interviews as their main method, particularly to get explanatory and descriptive information on parameters such as stakeholder perceptions and traditional knowledge. They originally planned to do 100 interviews, but by the end of the field data collection had done 142 interviews, including a few times when they interviewed the same person again for follow-up information.

Tom and Una's interview with Steve about conflicts between stakeholders is particularly useful. In preparation they revise the interview guide that they prepared during the planning phase. They meet Steve at his dive shop and before starting.Tom and Una explain the purpose of the study and answer a few questions that Steve has. They start the interview by asking Steve to mark on a nautical chart where he takes his trips. He indicates several sites, both inside and outside the Park, and explains that he prefers the Park sites because they are closer to shore. This indicates to Tom that there may be competition for space between fishers and divers, so he asks about his perceptions of conflicts among stakeholders. He replies that most problems are with the townie fishers who come to Mombuka waters to fish the nearshore reefs. He knows most of the Mombuka fishers and they keep their distance, but the townies don't respect his right to be in the area. Tom steers the conversation to the topics of Park management by asking whether conflicts with townies has changed since the establishment of the Park. Steve replies that things are worse. There are more fishers, and many of the new fishers don't know or don't care about the Park rules. He adds that he has seen some blast fishing inside the Park, but the Park rangers did nothing when he called them. He is not impressed with the Park's enforcement efforts.

Their interview is cut short when Steve's tourists arrive. Tom and Una thank Steve for his time and promise him a copy of the final report. Tom and Una sit down afterward and go over the interview, adding to the notes that Una took. They discuss Steve's insights on conflicts with townie fishers, vessel crowding, an increase in the number of fishers on the water, and poor enforcement.

Interview Guide

Date, time: Thur Dec. 10, 7:30am
Location: Watersports shop

Informant: Steve (Watersports Operator)
Team members: Tom & Una

Watersports Activities
Where do you take your trips ? (mark on map)
When do you take your trips ?
What are the pros/cons of diving inside the Park ? Out side the Park ?

Perceptions of other stakeholders, Park management
What kind of relations do you have with other stakeholder groups (townies, local fisherman, gleaners, foresters, guest house owners)?
What kind of presence do law enforcement officers have on the Park waters ?
What are your impressions of Park management ?
What kinds of interactions do you have with the Park ?

FOCUS GROUP INTERVIEWS

Definition

Focus group interviews (FGIs) are a type of semi-structured interview. However, FGIs involve a selected group of informants (usually 4 to 10) who share a common background or knowledge (e.g. use patterns, language, organisation membership). Like semi-structured interviews, FGIs are based on a set of open-ended questions or discussion points, and generate qualitative information. This flexible method allows the facilitator to probe for answers, follow-up the original questions and pursue new lines of questions during the interview. Therefore, the interview and information evolve allowing the facilitator to cover a range of topics. The flexibility and openness of this method encourage two-way interaction, including exchanges of information between the facilitator and the informants.

FGIs are often conducted in the middle or end of the field data collection, after the team has a strong understanding of the stakeholder groups, their priority concerns and internal dynamics. The team can use this knowledge to focus the FGIs on particular topics and to ensure the appropriate participants are invited.

Purpose
- Generates primarily qualitative information on a range of topics and on specific issues.
- Provides information on the views of a particular stakeholder group as a whole.
- Identifies local terminology, language and priorities that may help the assessment team interpret other information received during the course of the assessment.
- Allows an exchange of information between the facilitator and the informants.

Requirements
- Facilitator
- Record keeper (optional)
- Selected media (i.e. flipcharts/pens/masking tape/fixative spray, loose paper/pens, posterboard/pens, ground and available resources – see *Box: Selecting the Appropriate Media*)
- Tape recorder (optional)

Suggested approach

Same as basic approach (see *Box: Basic Approach for Semi-structured Interviews, Focus Group Interviews, Oral Histories & Surveys* in *Semi-structured Interviews* section) with these additional steps:

1. Refer to *Box: Tips on Designing Questions for Interview Guides* in *Semi-structured Interviews* section for guidance on developing the general questions and discussion points for the interview guide.
2. Arrange the focus group interview in advance. Gather the informants in one comfortable, accessible location. Organise the participants into groups no larger than 10-15.

Selecting the Appropriate Media for Focus Group Interviews

An important decision for the field data collection, particularly the focus group interviews, is to select the appropriate media for recording information. The main kinds of media are:

- Flipcharts (large pads of paper clipped to board), multi-colour pens or pencils, masking tape, fixative spray;
- Loose paper, multi-colour pens or pencils, fixative spray;
- Posterboard, multi-colour pens, fixative spray; and
- The ground with available resources (e.g. shells, sticks, coral pebbles, seeds, leaves, grass, beans).

The team should select the media the informants will be comfortable using and is culturally acceptable e.g. it would be inappropriate to use beans if locals view playing with something edible as offensive. The team should be able to take a copy of the information recorded on the media with them. The media should also allow informants to see what is being recorded to verify the accuracy of the record. This visible record will also keep the group focused on the key issues and will allow the informants to review progress.

When using flipcharts, posterboards or loose paper, the record keeper usually notes the important information on the paper. If there are only a few informants, then they can record their information directly on the sheets. The paper should be placed so that all can see and completed sheets should be displayed for discussion. These materials have the advantage that the recorded information can be taken away; however, there is a risk that the record keeper will filter information.

Drawing on the ground has the advantage that informants have more control of what is recorded since they can easily add or erase things. They can draw on the sand or on a flat stretch of earth or they can arrange objects on the floor to indicate location and scale. Available resources, such as sand and earth, can be used to build a three-dimensional model. Drawing on the ground has the advantage that the drawings remain after the team leaves, providing local ownership of the information.

If the community agrees, it may be useful to record information on a tape recorder or video. These tools help ensure that all the information is captured and that material from local dialects is accurately translated. Video taping is often conducted when the assessment team wants a visual account of events. The disadvantage of these tools is that many communities will not be comfortable with them and, consequently, will provide less information. If the team decides to use them, they should also provide time for informants to discuss issues with the recorders turned off.

3. Begin the interview with the broadest questions on the interview guide. As the interview progresses, probe for details and ask questions in different ways to obtain further information. Ask follow-up questions to clarify answers and to ensure the original question is fully answered. Do not leave issues hanging.

4. Start with simple questions that require descriptive answers and gradually add more complex questions. Do not ask more than one question at a time.

5. Adjust the questions, and the ordering of the questions, as needed during the interview to bring in new issues.

6. Encourage the informants to answer questions in their own words, to express opinions, experiences and memories, and to discuss issues as much as necessary.

7. Use visualisation techniques (e.g. ranking, decision trees) to help elicit information (see *Chapter 3, Visualisation Techniques).*

8. Encourage everyone to participate equitably. Try to get those unwilling to speak to participate.

9. Allow conflicting opinions to emerge and try to have these differences either resolved or accepted by the group.

10. Record the major points of the discussion on the selected media (i.e. flipchart, chalkboard, etc.) so that the participants can see their responses and confirm they are being accurately recorded. If a chalkboard or posterboard is used, then record what is written on the board into a notebook.

11. Review the major points at the end of the discussion to confirm the accuracy of the record and to ensure all the topics have been fully addressed. Allow for validation and correction of visualisation diagrams by informants. Leave one copy of the diagrams with the informants.

12. Write-up a summary of the FGI, including points on attitudes and interactions, as soon as possible after it is completed. Provide a copy of the summary to the participants soon after the meeting.

Strengths
- prompts answers because informants may be more comfortable talking in a group of similar people and because their responses may stimulate others to respond;
- generates information about different points of view between different groups in the community;
- reaches a large number of people in a relatively short period of time;
- facilitates responses from particular segments of a community or people on the 'edges' of the community who may not readily or easily express their views;
- generates explanatory, qualitative information;
- encourages informants to raise relevant issues that the facilitator may not know about;

Focus Group Interviews

The assessment team finds focus group interviews are the best way to learn what the stakeholders think about reef conditions, impacts on the reefs and proposed management strategies. The interviews also show how stakeholders relate to each other. At first the team planned to only hold a focus group interview with fishers, but because that was so successful, they decide to hold one with each stakeholder group.

The first focus group interview that Lon and Ish conduct is with a group of ex-plantation fishers from Sullivans. Based on recommendations and their knowledge of the community, they invite 8 fishermen who can represent the views of the larger group. Before going out to Sullivans, Lon and Ish revise the focus interview guide they drafted during the planning stage to focus on the parameters they need more information on, particularly traditional tenure systems. They decide to use a flipchart to record the main points from the discussion so everyone can see what is being discussed and recorded. They decide not to use a tape recorder, because they think this will make the fishermen uncomfortable.
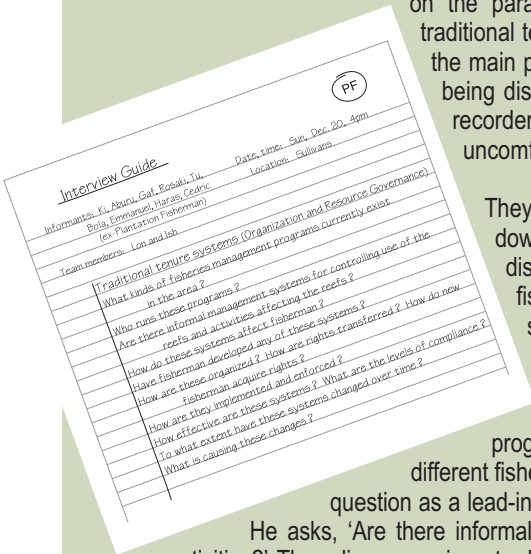
They hold the interview on the fishermen's day off. They meet down by the water where there is plenty of space and few distractions. Lon starts the discussion by thanking the fishermen for coming, explaining the purpose of the socioeconomic assessment, and explaining why they want to talk with them – to understand how they fish and how they manage themselves. When Lon asks the first question, 'What kinds of fisheries management programs exist in the area?', the fishermen reply by listing different fisheries regulations and discussing the Park. Lon uses this question as a lead-in to ask about management and traditional use systems. He asks, 'Are there informal management systems that you use to control fishing activities?' They discuss various traditional restrictions and agreements and then Lon asks some probing questions, like 'How was this system developed?' and 'Why was the system developed that way?' and 'How are these systems enforced?' He asks the fishermen to draw maps indicating the boundaries and any other features of their informal management systems. While mapping the area, they discuss the effectiveness of the system and changes over time. Lon asks, 'How effective are these systems?' 'What are the levels of compliance?', followed by 'How much have these systems changed over time? and 'What do you think is causing these changes?'

Lon guides the discussion with a few more specific and probing questions. Some of the statements seem contradictory so he asks, 'some of you mentioned something a little different earlier, how does that fits into what we are discussing now?' Throughout this discussion, Ish records the major points on the flipchart, periodically checking for accuracy with the fishermen. Lon tries to involve all of the fishermen by asking the quieter ones directly what they think and gently stepping around the more domineering talkers.

Toward the end, Lon asks the fisherman for any final statements and then summarises what has been discussed by reviewing the points on the flipchart. A few of the fishermen make some corrections and add extra points. The interview closes with Ish redrawing the map to leave with the fishermen and Lon and Ish thanking the participants and promising to bring them copies of the final report. For several hours after that Lon and Ish write-up a summary, including notes on the unspoken attitudes and interactions.

- allows for greater involvement of the informants in the data collection by letting them discuss issues of importance to them;
- allows the assessment team to become well acquainted with a broad range of community members;
- allows informants to discuss sensitive issues and emotions;
- allows informants to change answers to their situation; and
- identifies local terminology, language and priorities.

Weaknesses
- usually generates data that cannot be analysed statistically with confidence;
- generates varying responses depending on the facilitators and how they direct the FGIs;
- is time-consuming for participants;
- requires an experienced facilitator;
- generates responses that cannot be taken as necessarily representing the views of the whole community because of limited number of participants;
- requires some interpretation of participants' responses by the person completing the analysis;
- can be sidetracked by hidden agendas;
- is difficult to determine the extent that information provided is what the participant thinks the facilitator wants to hear;
- can generate a large volume of extraneous data;
- is difficult to code and analyse the data; and
- can be dominated by a few powerful individuals (because of status, verbal ability, etc.) who can intimidate other members of the focus group.

ORAL HISTORIES

Definition
Oral histories are verbatim, or near verbatim, accounts of stories, anecdotes or personal biographies told by informants using their own language and terminology. This method provides descriptive, qualitative information while giving the informants the flexibility to present the information in their own way. Oral histories encourage informants to tell their versions of the past. The way people deliver these stories – the language they use, the events they choose to talk about and the way they analyse them – often provides valuable clues for the assessment team about local priorities. Oral histories are conducted throughout the field data collection and are typically told by informants as part of semi-structured interviews.

Purpose
- Generates in-depth and explanatory, qualitative information on specific issues, particularly historical events and personal memories.
- Gives stakeholders the opportunity to recall their history, families, community and resources using their own language and reflecting their own priorities and analysis.

- Identifies local terminology, language and priorities that may help the assessment team interpret other information received during the assessment.
- Generates quotes, which are particularly powerful when presenting the report.

Requirements
- Facilitator with full understanding of local language
- Record keeper with full understanding of local language and ability to record speech quickly and clearly
- Pen/pencil & paper
- Tape recorder (optional)

Suggested approach
Same as basic approach (see *Box: Basic Approach for Semi-structured Interviews, Focus Group Interviews, Oral Histories & Surveys in Semi-structured Interviews section*) with these additional steps:

1. Refer to *Box: Tips on Designing Questions for Interview Guides* in *Semi-structured Interviews* section guidance on developing the questions for the interview guide. Include broad questions designed to get accounts of events, stories or personal biographies e.g. 'How have things changed since you were a little boy?' What happened when the first hotels were built? When was that gear first used?'
2. Ask the guiding questions to start the oral histories. Encourage informants to answer questions in their own words, to express opinions, experiences and memories, and to talk and discuss issues as much as they feel necessary.

Strengths
- generates in-depth and qualitative information, particularly on historical events and personal memories;
- encourages informants to raise relevant issues that the facilitator may be unaware of;
- encourages involvement of the informants in the data collection by allowing them to discuss issues of importance to them and at length;
- allows informants to discuss sensitive issues and emotions;
- allows informants to tailor answers to their situation, experience and knowledge; and
- identifies local terminology, language and priorities.

Weaknesses
- requires an experienced facilitator;
- can generate a large volume of extraneous data;
- is time consuming for both the assessment team members and the informants;
- is difficult to determine to what extent the information the informant is providing is information he/she thinks the facilitator wants to hear;

Oral Histories

The assessment team uses oral histories to learn from the ex-plantation fishers about coral reef uses. Chi Lan is particularly interested in the oral histories of the women gleaners because of her interest in gender roles for her graduate studies. So she teams up with Una and they arrange to meet with Fatimah who has lived in Mombuka for over 60 years and has been helpful in earlier interviews. They are careful to explain the purpose of the project and the interview when they set up a time to talk. In preparation they develop a brief interview guide of questions to get Fatimah talking about her experiences gleaning.

They meet Fatimah in the quiet of her home, where other gleaners won't interrupt them. Fatimah is pleased to share her past and present stories about gleaning. Chi Lan asks if she would mind using a tape recorder, explaining that it would help her with the translations and ensure she fully records what Fatimah says.

Before Chi Lan can ask a question, Fatimah starts telling them about growing up in Mombuka and her first experiences gleaning. With periodic nods and statements of encouragement, Fatimah tells them about gleaning. In this way Fatimah covers most of the topics Chi Lan wanted to address without prompting. So Chi Lan focuses on the topics Fatimah does not address, such as how gleaning has changed. Fatimah notes the importance of coral reef health and how the recent decline could mean that her grandchildren may not collect molluscs in the future. Chi Lan and Una thank Fatimah for her insights into gleaning, and promise her a copy of the report. They return to the Park office and spend a couple of hours going through the tape recording, adding to their notes, coding their notes and summarising the main points.

Interview Guide

Date, time: Mon, Dec. 14, 6.30pm
Location: Fatimah's home

GF

Informant: Fatimah
(woman gleaner fisher)

Team members: Una and Chi Lan

Oral History
When were you born? Where?
What did your mother do for work?
In what year did you start gleaning?
Where did you glean?
What changes have you noticed in gleaning since you started?
How has the tradition of women gleaning changed in your lifetime?
Have women always gleaned, instead of men?
How does gleaning affect the reefs?
How did the establishment of the Park effect how you glean?

- is difficult to code and analyse the data;
- generates data that does not represent the views of the larger community or stakeholder group;
- generates data that cannot be analysed statistically with confidence;
- can generate varying responses depending on the facilitators and how they ask the questions;
- generates data that do not necessarily represent the views of the larger community or stakeholder group due to the limited number of informants; and
- can be sidetracked by hidden agendas

SURVEYS

Definition
Surveys use questionnaires with highly structured, close-ended questions. The questionnaire has specific questions with limited answers (e.g. multiple choice, true/false) resulting in quantitative data that can be analysed statistically. Unlike semi-structured interviews or focus group interviews, this method does not encourage follow-up questions or explanatory answers. Surveys can be used throughout field data collection, but are often used at the beginning so that the team can explore the answers through semi-structured interviews, focus groups and observation. Alternatively, the team may conduct semi-structured interviews first to gain a general knowledge of the stakeholder groups, and then conduct surveys to get quantitative data on specific topics.

Purpose
- Generates quantitative data on specific topics.
- Generates data that can be statistically representative of the larger stakeholder group or community, depending on the sample size.
- Helps determine the distribution of variables (e.g. education levels, income) between and within stakeholder groups and the larger community.
- Helps draw comparisons between and within stakeholder groups and the larger communities and examine correlations between parameters.

Requirements
- Someone to administer the survey and record the responses
- Pencil/pen
- List or map of informants' locations (businesses or homes)

Suggested approach
Same as basic approach (see *Box: Basic Approach for Semi-structured Interviews, Focus Group Interviews, Oral Histories & Surveys* in *Semi-structured Interviews* section) with these additional steps:

1. Refer to *Box: Tips on Designing Questionnaires* for guidance on developing the questions.
2. Follow the questionnaire without asking questions simultaneously or

Conducting Surveys

Tom takes the lead in planning the surveys, since he has the most experience with questionnaires and because the team decides that surveys are the best way to question people about market attributes, including supply, demand and market structure. Tom works with Lon, who is familiar with the fishermen and speaks the local dialect, to develop a basic questionnaire focused on market attributes of fishing activities. They structure the questionnaire to first ask basic questions on market supply, including what fishing methods are used, which fish are caught, prices, landings and seasonality. The questions on market demand focus on the buyers and fluctuations in prices. The last questions about market structure focus on fishermen's trading practices.

They agree to conduct the first set of surveys in Sanya with Lon administering the questionnaires. Tom joins him for these first surveys in case there is anything unclear in the questionnaire.

They make a random selection of people to survey from a list of licensed fishers in Sanya. Their first survey is with an older, ex-plantation fisherman. Lon begins by explaining the purpose of the project and why they want to talk with him. Lon then begins to ask the set questions. As he goes through the questionnaire, he only modifies the questions slightly. For example, when the fisherman tells him which fish he targets, Lon asks specifically about those fish for subsequent questions as noted in the questionnaire. He also uses a seasonal calendar as a visualisation technique for the information on seasonality of the target species. This helps the fisherman explain when the target species are most available. The fisherman explains some of the answers in more detail and Lon takes notes; however, he generally stays focused on the questionnaire.

At the end of the survey, Lon thanks the fisherman. Lon then reviews his notes and briefs Tom on the responses. They make a few minor adjustments in the questions. Based on the responses from the Sanya fishermen, they have a strong understanding of the target species, seasonality, fish price fluctuations, and market channels. They make a note to compare these findings with the Sullivans fishing community and to other fisher groups as they continue the field data collection.

Questionnaire

Informant: Cedric (ex-Plantation Fisherman)   Date, time: Wed, Dec 16, 1 pm
Team members: Tom and Lon   Location: Sanya on fishing boat

Market Supply
What type of fishing is taking place in Mombuka?
What reef species are fished? (fish, mollusks, crustaceans, other invertebrates, algae)
What are your landings per day for (each fished species)?
At what price do you sell (each fished species)?
What are the five most important vertebrates for income?
        for home consumption?
What are the five most important non-vertebrates for income?
        for home consumption?
What are the five most important algae for income?
        for home consumption?
In what months are these most available? (use Seasonal calendar)

Market Demand
Who do you sell your catch to? (keep for home use, give away, sell to fish trader, sell directly to consumer)
What is the primary market for (each sold species)? (local, regional, national, international)
Is the demand for (each fished species) stable, decreasing or increasing in terms of price and quantity?

Market Structure
How many fishers in the Sanya community sell their fish to a fish trader?
What percentage of those fishers are residents of the Sanya community?
How many traders regularly operate in Sanya?

PF
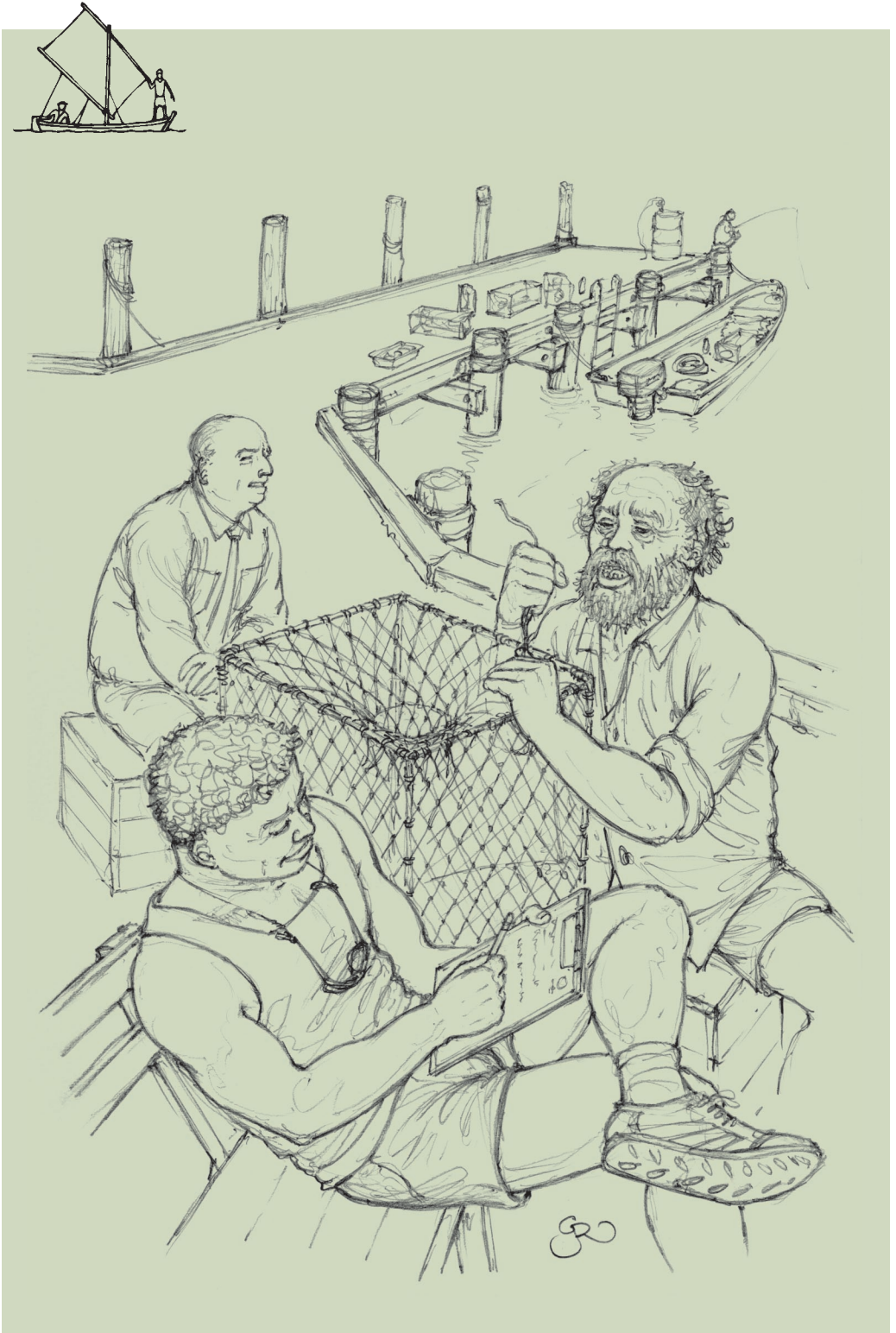
adding new questions. Ensure all questions are answered.

3. Record the responses on the questionnaire.

Strengths

- generates information statistically representative of the larger stakeholder group or community if a statistically representative sample is used;
- generates quantitative data amenable to statistical analyses;
- does not require a highly trained person to administer the questionnaire;
- generates data targeted to the needs of the assessment (i.e. little extraneous data);
- is relatively easy to administer;
- is relatively easy to code and interpret data; and
- requires little time of informants compared to interviews.

Weaknesses

- is time consuming for the team if a statistically representative sample of informants is surveyed;
- has limited boundaries of inquiry which discourage informants from raising relevant issues that the team member doesn't know about;
- is difficult to determine to what extent informants are providing information they think the team members wants to hear;
- discourages local people from becoming involved in data collection due to the rigid nature of the survey;
- is difficult to ask questions about sensitive issues; and
- provides ready-made answers that may not reflect what the informant thinks.

Tips on Designing Questionnaires

- Use close-ended questions only, including true/false answers, range of answers, multiple-choice answers
- Use unambiguous wording; use clear and simple syntax
- Avoid leading questions ~~'Not very many women fish in this area, do they?'~~ (e.g. How many women fish in the community?)
- Arrange questions in a logical order (e.g. by subject, chronological)
- Place those questions that will influence other questions last
- Put sensitive questions last (e.g. how much money do you make in a week?)
- Use local vocabulary, including local taxonomies and nomenclature
- Be realistic about what informants know
- If working in two or more languages or dialects, translate and back-translate from one to the other until all differences are resolved

VISUALISATION TECHNIQUES

Techniques for visualising and diagramming relationships in data include maps, transects, timelines, seasonal calendars, historical transects, decision trees, Venn diagrams, flow charts and ranking. These techniques are used to gather and present large amounts of complex information in a clear and concise, graphic and easily understood format. They also encourage interaction between the assessment team and the informants; however, they rarely produce data that can be statistically analysed. Each is described here in terms of its definition, purposes, requirements, suggested approach, strengths, weaknesses and variations.

These techniques are analytical tools used during field data collection, particularly during semi-structured interviews and focus group interviews. They can also be used during oral histories, surveys, and observations to enable the informants to visually articulate information.   The team needs to decide when to use visualisation techniques (i.e. during focus group interview, semi-structured interview, etc.) and select informants accordingly. The team should refer to the relevant method to understand the context of the visualisation technique, particularly the suggested approach.   For simplicity the following descriptions assume the techniques are conducted as part of focus group interviews.

MAPS

Definition
Maps illustrate the spatial distribution of resources, features and activities, including reef uses, in a community or area. They are produced in many forms and in varying levels of detail.

Maps provide useful baseline information and are usually developed at the start and middle of the data collection to establish the location of particular features, activities or resources. They may also be developed at the end of the field data collection as a decision-making tool to assess the impacts of various management strategies.

Purpose
- Identifies, locates, classifies and analyses past, present and predicted resource conditions, distribution, use and access.
- Reveals the significance participants attach to these variables.
- Provides a visual representation of past, current and predicted community features, resources and activities.
- Provides a focus for discussions on patterns of resource use, user perceptions of resources, problems and alternatives.
- Identifies critical locations such as areas known for illegal fishing, dive sites, and sewage outfalls.
- Illustrates traditional resource knowledge.
- Illustrates social, economic, occupational or ethnic groupings within the stakeholder community.

- Analyses and quantifies specific phenomena or issues within the community or area according to spatial distribution.
- Relates large amounts of information obtained during the course of an assessment to geographical location.

Requirements

Same as *Box: Requirements for Visualisation Techniques* with these additional requirements:

- Gatekeeper to observe the process, make suggestions to the facilitator based on those observations, ensure participation, prevent unnecessary disruption or interference from outside the group of participants and to identify and collect appropriate media (or encourage participants to do so) (optional)
- Compass and ruler (optional)
- Topographic map and/or nautical chart, including blow-up of study area (optional)
- Camera (optional)
- Global Positioning System (optional)

Suggested approach

1. Prepare a preliminary checklist of resources, activities, and features to be mapped, noting that only a few topics can be put on one map. Develop this list based on the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are conducive to mapping.
2. Begin by asking participants to identify the relative position of a few important landmarks on the selected media. Start with coastline, rivers, islands, mountains, paths, roads, human settlements, etc. Ensure participants have a common understanding of the map orientation. If necessary, demonstrate how to map an area. Agree on the local name for each feature.
3. Ask participants to locate the checklist of resources, features and activities on the map. Encourage participants to add things they think are important in relation to resource occurrence, distribution, use or access. Use symbols, colours and various materials (e.g. stones, branches) to represent information sets and generate a corresponding legend. Add information layer by layer on the map, but be careful not to overload the map with information so that it cannot be understood.

Requirements for Visualisation Techniques

- Facilitator
- Record keeper
- Record keeper
- Notepad and pen/pencil
- Selected media (i.e. flipcharts/pens/masking tape/fixative spray, loose paper/pens, posterboard/pens, ground and available resources) see Box: *Selecting the Appropriate Media for Focus Group Interviews* in *Focus Group Interviews* section

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4. Ask questions while drawing the map to stimulate comments about features on the map.

Strengths
- facilitates feedback from people who prefer to illustrate activities and resources, rather than talk about them; and
- is easily understood and implemented.

Weaknesses
- can be difficult to explain if participants who have no previous experience with them do not easily grasp the concept of a 'map'.

Variations
Historical maps illustrate changes and trends in geographical features. Once a map of current resources or communities has been prepared, changes over time can also be mapped by asking participants to show conditions in the past. Older community members are ideal participants for this technique.

The advantage of historical maps is that they visually represent changes over time in an easily understood format; however, the quality and accuracy of the maps depends on the memory of the participants.

Social maps represent the ways a community or group is divided into social, economic, ethnic or occupational groups. These maps can combine an analysis of the social and economic composition of the community with a representation of spatial distribution. Two approaches are possible: 1) prepare a base map of the community and then indicate the location of households or groups belonging to specific social, economic, ethnic or professional groups; and 2) ask participants to prepare a detailed map showing the location of all households in the community and use either symbols or objects to indicate different social and economic features of each household, such as social standing, source of livelihood, kin affiliations, ethnic group, etc.

Social maps have the advantage of presenting information on social dynamics in an easily understood visual format, which is otherwise difficult to understand and discuss. Social maps can also help the team define their sampling approach. However, these discussions can generate controversial information and result in conflict among participants.

Wealth maps illustrate and quantify the relative wealth of different people or households. This is a variation on wealth ranking (see *Chapter 3, Visualisation Techniques, Ranking*) and adds the spatial dimension to the process of ranking households in the community by economic condition. The households in the community are identified on the map and participants then distribute symbols to indicate different wealth features of each, such as assets, housing condition, number of working adults. The facilitator should encourage discussion among participants as they indicate relative wealth. The final map should provide a detailed picture of wealth distribution through the community and the basis for discussions about the factors influencing relative wealth and the relationships between different wealth groups.
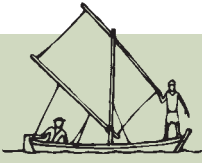
Resource Use Map

During a focus group interview about traditional tenure systems, Lon asks the ex-plantation fishermen about traditional fishing areas off Mombuka.   Lon provides a base map and the fishermen note the fishing grounds of the fishing communities, including places where the boundaries are in dispute.

Tanzar
Fishing
Grounds

Tanzar

Reef
areas

Sullivans
Fishing
Grounds

Sullivans

DISPUTED
BOUNDARIES

Buru
Fishing
Grounds

Buru

Sanya
Fishing
Grounds

Sanya

houses
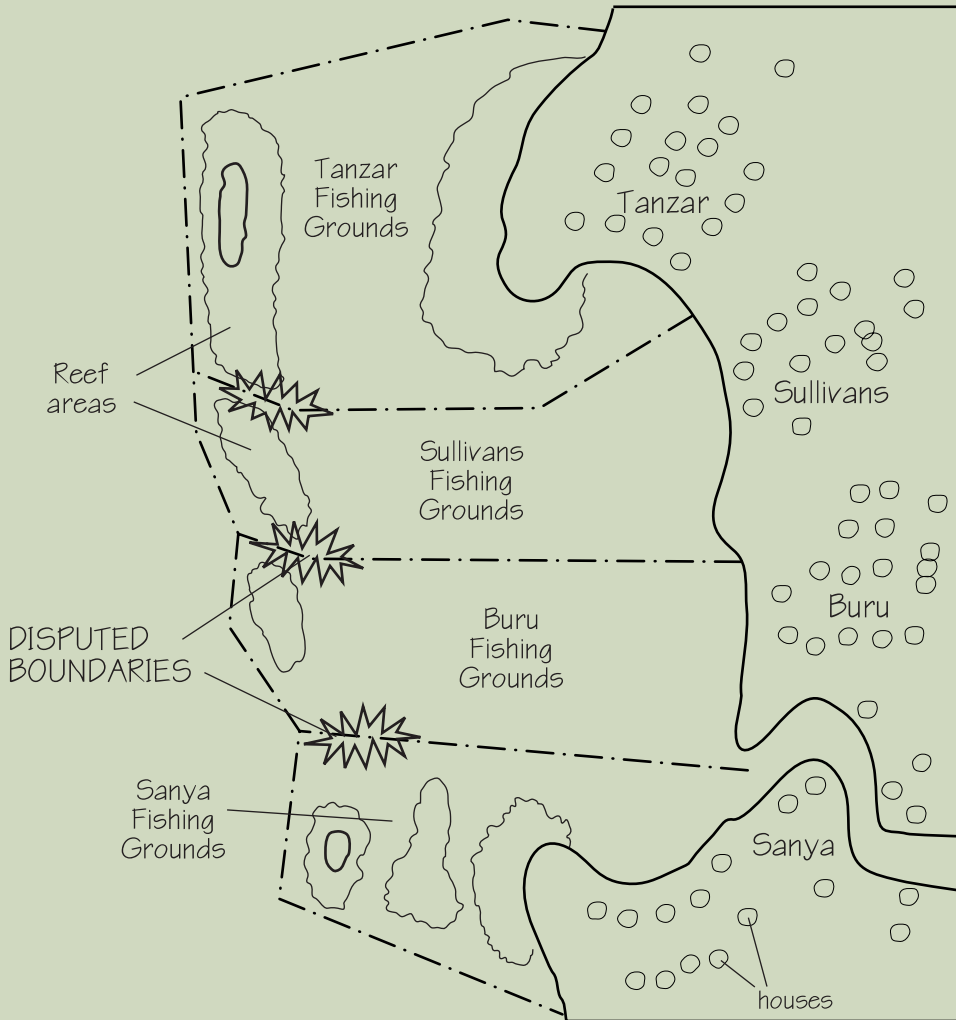
Historical Map

While interviewing Fatimah, Chi Lan and Una ask her about changes in mollusc collection during the past 20 years. Fatimah uses the base map to note changes in frequency of mollusc consumption, the number of collectors, mollusc abundance, the health of the reef and the size of the Sanya fishing community, where she lives.

Situation: 20 Years Ago

Frequency of Mollusc consumption: ● ● ● ● (3-4 times/week)

reefs

Number of collectors: ● ● ● ●

Abundance of Molluscs: (grid of dots)

Health of reef: ● ● ● ●

Sanya

houses
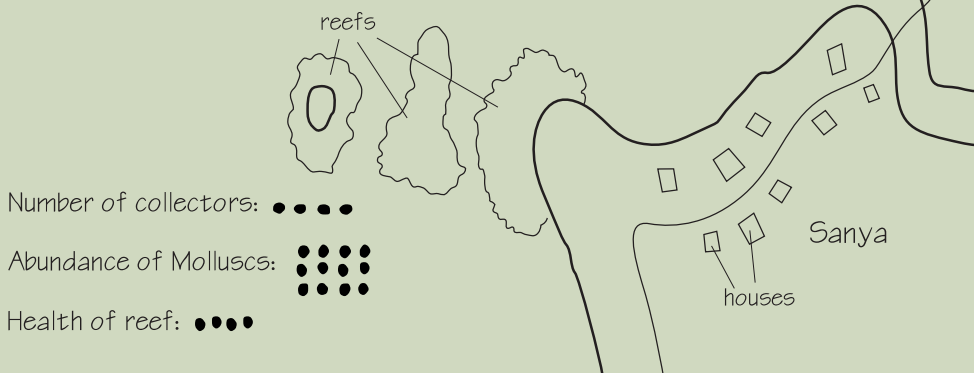
Situation: Present Day

Frequency of Mollusc consumption: ● ● (1-2 times/week)

Number of collectors: ● ● ● ●

Abundance of Molluscs: ● ● ● ●

Health of reef: ●
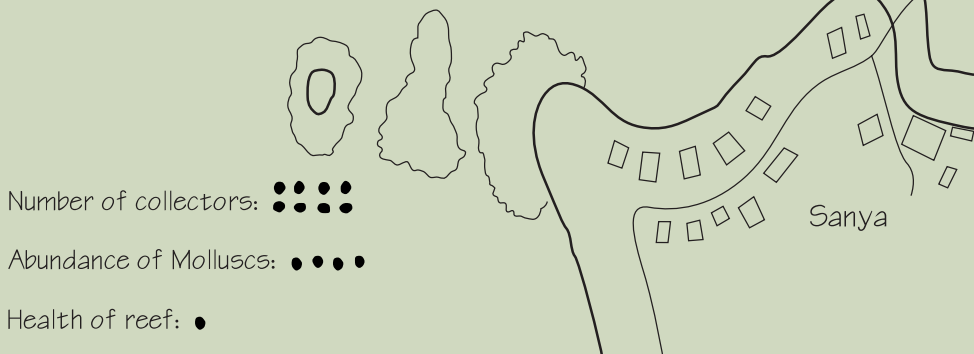
Sanya

Social and Wealth Map

In their semi-structured interviews with the Sanya traditional fishermen, Lon and Tad ask them to note on a map where the ex-plantation and traditional fishermen live to give them a sense of the social dynamics. They also note which fishermen sell directly to consumers and which sell to traders to show the links between the fishermen and the community. The fishermen are uncomfortable discussing income levels, so Lon and Tad ask them to place marks by the houses to show relative wealth.

Key:

| T | fisher sells to trader

| D | fisher sells directly to customers

TF   traditional fisherman

PF   ex-plantation fisherman

⋮ relative household wealth

Sanya Village
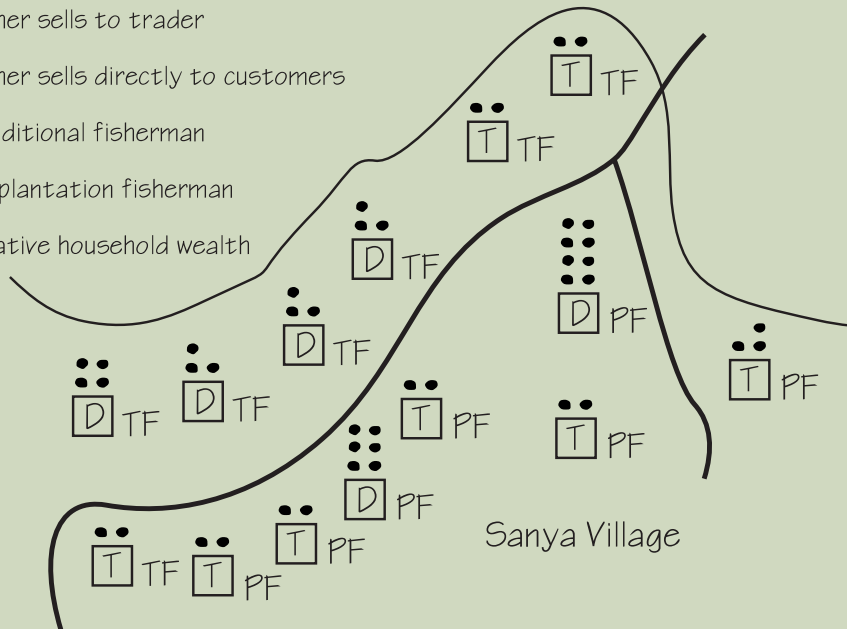
Wealth maps provide sensitive information in an easily understood, visual format. They can also help the team define their sampling approach in the community, but these maps may cause conflict among participants. Also they can be misinterpreted by participants if not introduced clearly. Finally, participants may not like talking about wealth.

TRANSECTS

Definition
Transects are visual records, often as maps, of a cross section showing the range of activities in an area (e.g. village, marketplace, beach, reef). The transect often crosses several zones, which may be shown by types of activities occurring there, problems encountered, the people living there, and the type of fauna or flora. Transects can be developed at any time during the field data collection; however, maps of the area should be developed first.

Purpose
- Identifies important agro-ecological and marine zones in the area.
- Familiarises the team with the area, its resources and their condition, local activities, and issues the stakeholders regard as important.
- Provides information on coastal livelihoods and resource use, particularly where the transect crosses from inshore to offshore.

Requirements
Same as *Box: Requirements for Visualisation Techniques* in *Maps* section with the following requirement:
- Compass and Global Positioning System (optional)

Suggested approach
1. Make a map of the area before starting the transect exercise (see *Chapter 3, Visualisation Techniques, Maps*).
2. Determine the priority topics for the transects (e.g. use patterns, residences, etc.). Develop this list based on the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are suitable for transects.
3. Identify areas or zones on the map where different resources are present, different activities take place or different groups within the community live or work.
4. Draw lines (transects) through the area so they cross as many different zones as possible. Extend the transects into the sea to cover reef areas, fishing grounds and other sea features.
5. Walk, drive, swim or motor boat the entire length of each transect (walking is preferred because it allows time for discussion and careful observation).
6. Ask key informants from the area to accompany you. While walking the transects, ask the informants probing questions (e.g. What is that activity? Why are they doing that?), stop and talk to other people along the way, and ask people to demonstrate different activities that take place in different areas.

Transect

Lon and Tad walk through Sullivans and Sanya with a few key informant fishermen, including Jack. They note the major zones in the area and their key characteristics. They talk with the fishermen about what is happening within each of the zones. Working with the fishermen, they complete this matrix of information on the resources, activities, people and problems in each zone.

Zone	Uplands	Settlement	Reef flats	Lagoon	Offshore reef/island	Drop-off
Resources	Fuel wood, Agricultural land, Wild produce, Grazing land	Landing place, Road to Mombuka, Transport facilities, School, Health center	Molluscs, Octopus, Small reef fish, Coral for building	Bait fish, Staghorn coral for souvenirs	Reef fish, Lobsters	Large reef fish, Deep-water lobsters, Large pelagics
Activities	Fuel collection, Food crops, Plantation crops, Livestock grazing, Collection of wild produce	Boat and fishing gear repairs, Fish drying, Fish buying/selling	Reef gleaning, Spear fishing, Coral collection	Bait fishing, Coral collection, Swimming, Snorkelling	Spear fishing, Trap fishing, Line fishing, Diving	Gillnet fishing, Line fishing, Longline fishing, Diving
People involved	Local farmers, Farmer-fishers, Plantation workers, Woman, Children	Traditional fishers, Ex-plantation fishers, Woman, Children	Ex-plantation fishers, Woman, Children	Traditional fishers, Ex-plantation fishers, Tourists	Traditional fishers, Ex-plantation fishers, Dive operators, Divers	Traditional fishers, Ex-plantation fishers, Townie fishers, Dive operators, Divers
Key problems	Fuel wood scarcity	Irregular transport	Decline in molluscs, Reef damage	Bait fish highly seasonal	Too many boats	MPA boundary unclear, Increasing townie fishers

7. Work with the informants afterwards to develop a matrix based on the information. Place zones in the column headings or y axis; place important topics of interest (e.g. use patterns, residences, tenure or access arrangements, problems) along the row headings or x axis. Using the most appropriate media (i.e. flipcharts, loose paper, posterboard or the ground), note the information along the various zones of the transect. Wherever possible, base the zones on local people's definitions of different resource areas.

Strengths
- provides for direct observation of local conditions and activities;
- provides a useful and easily understood structure for analysis by both the assessment team and local people; and
- complements the maps

Weaknesses
- requires the participants to be literate to prepare transect matrices;
- can involve complex topographies with many ecological zones, which may be difficult to represent; and
- is difficult to conduct transects over water.

TIMELINES

Definition
Timelines are time records of significant events either related to a particular issue (e.g. history of the tourism industry) or the history of the stakeholder group, community or area in general.

Timelines are often developed early during data collection to provide baseline information for the rest of the data collection. Long-term residents are ideal informants.

Purpose
- Generates historical information on changes in the community, significant events and how they occurred in sequence.
- Provides information on the historical events that community members feel are important (e.g. environmental, economic, technological, social, political) and information on how the community has dealt with problems and issues.
- Provides an overview of the community history which can help the team understand present practices and attitudes of the community.
- Identifies important events in the past that are remembered by the locals and can be used as 'milestones' when talking about historical processes.
- Provides historical documents that are useful for making future projections.

Requirements
Same as *Box: Requirements for Visualisation Techniques* in *Maps* section.

Suggested approach

1. Identify the issues to be discussed (e.g. history of the tourism industry, changes in fishing effort and catch over time) based on the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are suitable for timelines.

2. Explain the issues for the timeline to the participants. Allow for discussion among group members, including discussion of important events and when they occurred. Agree on time intervals, such as 5 or 10 years (the timeline may be wider at the start and become shorter closer to the present).

3. Draw the timeline on the selected media (i.e. flipchart, posterboard, ground). Ask informants to write the relevant major events on sheets of paper. For example, for 'History of tourism industry', the major events may include 'All-inclusive hotels first built on the coast', 'Ecotourism became dominant type' and 'Environmental awards first distributed by the environmental NGO'. If useful, categorise the events as natural event or human-made event. Ask the participants to place the events on the timeline. If there are difficulties in establishing dates, relate them to well-known events such as wars, natural disasters, elections, etc.

4. When the timeline is agreed, determine whether one or another type of event (for example, destructive fishing) is increasing or decreasing in intensity and frequency. Ask informants to identify possible reasons for the trends. Use probing questions about why, how, who and where to discuss the trends and processes and how the community has adjusted. Ask informants about efforts to address the problems.

Strengths

- complements data from the historical transects and historical maps; and
- is easily understood and implemented.

Variation

Matrix timelines allow events to be recorded for several categories (e.g. illegal fishing, fish catch, coral cover), enabling comparisons between categories. The categories are listed as rows (y axis) and the situation today, the situation in the past (5 or 10 years ago), and an explanation of changes are listed in the columns (x axis). The participants record significant events within each category. This approach is useful for establishing correlations between variables e.g. comparing how the number of fishermen and fish catches has changed over time. The disadvantages are that they can become complex and time-consuming.

Timeline

During a semi-structured interview, a group of ex-plantation fishermen develop this timeline to show the history of fishing activities and other relevant events in Mombuka.

Year	Event
1750	Mombuka settled, primarily by fisherman
1900	Plantation farms settled nearby
1950	Mombuka recognized for coral reef resources by NPA
1970	Severe droughts
1973	Most plantation farmers moved away or became fisherman
1980	Kela fisherman (townies) began to fish Mombuka reefs
1982	Mombuka Fisheries Devision established
1998	Mombuka Marine Park established / Blast fishing banned from Park

Matrix Timeline

During a focus group interview the traditional fishermen tell Lon and Ish how things have changed over the past 10 years. They use a matrix timeline to organise this information and explain these changes.

	Situation 10 years ago	Situation today	Explanation for change
Fish - variety - size - catch	More Big 100 kg/day	Less Small 20 kg/day	Illegal fishing Over fishing Townie fishers comming into area
Mangroves	More trees fewer saplings	Fewer trees more saplings	Sedimentation from forestry operations
Coral reefs	More	Less	Blast fishing Over fishing Gleaning
Fishing grounds	Few problems	Crowded	Townie fishers comming into area
Blast methods	Widespread	Banned some done illegally	Safty concerns
Income	Increasingly widespread	Less	Decling in fish catch
Education	Less	More	Improved government
Population	12000	15000	Population increases throughout island Tourism opportunities

S EASONAL   C ALENDARS

Definition
Seasonal calendars are visual means of analysing changes in conditions or activities through the year, and include visual representations of seasonal cycles. Within each cycle, major events or activities during that time are noted as well as relative indications of the intensity or quantity of different conditions. Seasonal calendars are developed at any time during the field data collection.

Purpose
- Provides information on changes in conditions and activities during the year and how different activities are combined through the year to ensure household livelihoods.
- Expands the team understanding of local conditions beyond the time they spend in the area.

Requirements
Same as *Box: Requirements for Visualisation Techniques* in *Maps* section.

Suggested approach
1. Identify the issues to be discussed (e.g. patterns of resource use) based on the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are suitable for seasonal calendars.
2. Start by discussing the activity or condition in general terms to focus the informants' attention.
3. Ask informants how this activity or condition changes through the year. Encourage them to represent these changes on a calendar. If necessary, begin the process by providing a basic timeline of the year. Use the form of the year appropriate for local people (e.g. a line from the beginning of the year to the end, or a circle indicating the annual cycle). Divide up the year (e.g. months, seasons). Ask for local names for months or seasons and note these along the top of the linear calendar or in appropriate segments of the circular calendar. Ask people to indicate when the various activities or conditions occur during the year.
4. Ask probing questions about the quantity or intensity of the activity and represent these on the calendar.
5. Ask about other related activities and conditions, such as rainfall or weather conditions that might influence the activities in question. Represent these on the calendar as well, gradually building up a detailed picture of the yearly cycle.
6. Use the calendar to ask about different livelihoods through the year. Note periods when different activities or conditions overlap.

Strengths
- is easily understood and implemented;
- provides a useful and easily understood structure for analysis by both the assessment team and local people; and

Field data collection

- links activities being discussed to concrete, easily recognised, changes that affect everyone i.e. seasons.

Weaknesses
- relies on memory of informants about changes;
- relies on a commonly accepted idea among informants about 'what normally happens' i.e. when different seasons start and end, what distinguishes one season or month from another; and
- requires some kind of measurement of time that is commonly understood by informants and facilitators.

Variations

Time use analysis describes events and activities over a much shorter time scale than seasonal calendars (e.g. daily cycle). Time use analysis uses a visual representation of the cycle that can then be divided into activities at different times.

For this method, the participants decide on the best time scale (e.g. 24 hours, dawn to dusk) and then concentrate on the daily routine at the time of year of the interview. Participants are asked to describe their activities starting from when they 'start the day' until it ends. Alternatively, participants are asked which activities absorb most time and when they are carried out, then about other activities before, after, or during those main activities. After this has been completed, participants are asked to prepare analyses for other times to clarify seasonal changes in time use. Ideally, time use analysis should be supported by direct observation of daily activities, but this can be time consuming.

This technique can be used to learn how different household members contribute to household livelihoods. It can also be used to focus attention on aspects of their livelihoods that they might not normally regard as 'important' i.e. children's contribution to household activities. The disadvantage to this technique is that it is time consuming.

Seasonal Calendar

The ex-plantation and traditional fishermen in Sullivans develop the following seasonal calendar during semi-structured interviews with Lon and Ish.

	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Weather	calm season			stormy season		hot season	wet season			calm season		
	dry			some rain			rains			dry		

Snapper — catches, prices

Grouper — catches, prices

Spiny lobster — catches, prices

Income from fishing

(The values for catches, prices, and income are represented by clusters of dots indicating relative magnitude for each month.)

Time Use Analysis

While interviewing fishermen and women gleaners, the assessment team members ask them to show how men and women spend their day. The assessment team compiles these time use analyses sheets based on the fishers' drawings.

Time Use - Wet Season

MEN

Preparations for fishing
Rest
Meal
Meet other fishers
Net repairs
Fishing
Unload fish
Meal
Sleep
Meal

WOMEN

Help husband depart for fishing
Meet other women at community center
Meal preparation
Household chores
Fish drying
Vegetable gardening
Net repairs
Rest
Meal
Sleep
Help unload fishing boats
Fish marketing
Meal preparation
Fish drying
Vegetable gardening

Time Use - Dry Season

MEN

Sleep
Meal
Meet other fishers, Drinking Sometimes fishing
Net repairs
Rest
Meal
Preparations for fishing
Fishing
Unload fish

WOMEN

Household chores
Meal preparation
Trading
Selling fish
Handicraft production
Shell collection
Net repairs
Household chores
Meal
Sleep
Help husband depart for fishing
Meal preparation
Fuel collection
Meet other women
Help unload fishing boats

Key

NIGHT
sunset   sunrise
DAY

H ISTORICAL TRANSECTS

Definition
Historical transects are pictorial representations of conditions over time (e.g. changes in population size, changes in reef conditions). They can be developed at any time during the field data collection, but timelines should be prepared first. Historical transects can be used with other time-related techniques and methods, such as seasonal calendars, timelines and oral histories.

Purpose
- Helps establish relationships or correlations between parameters over time.
- Determines how a community views local conditions and activities, including use patterns, in relation to changes over time.

Requirements
Same as *Box: Requirements for Visualisation Techniques* in *Maps* section.

Suggested approach
1. Develop a timeline before starting the historical transect.
2. Determine the topics (e.g. changes in population size, changes in fish catch) for the historical transects and link them to the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are useful for historical transects.
3. Discuss the issues and ask the informants to identify any additional topics to include in the historical transect. Use the timeline for additional insight and include issues topics previously identified. Limit the number of topics to less than 5 in order to keep the transect focused.
4. Draw rows and columns on the selected media (i.e. posterboard, flipchart, ground). Ask the informants to define reasonable time intervals for the transect, such as 5 or 10 years, and record the intervals down the first column. Note the topics in the first row.
5. Ask the informants to complete the historical transect by discussing the trends for each topic, focusing on quantities. Use pictorial representation to show quantity or size. Include a legend. Allow for validation and correction of the transect by all informants.
5. Ask the informants to identify possible reasons for the trends. Discuss the trends and how the community has adjusted over time. Use probing questions about why, how, who and where. Record these responses at the bottom of the historical transect.

Strengths
- is easily understood and implemented; and
- provides a useful structure for analysis by both the assessment team and local people.

Weaknesses
- provides general trends, not quantitative changes.

Historical Transect

Unlike the ex-plantation fishermen, the traditional fishermen are more comfortable with pictorial representations of events. So when they talk with Lon and Ish about changes in Mombuka they use a historical transect to organise and show this information.

Year	Mombuka population	Income from Tourism	Number of fishers	Fish Catch	Coral Reef
1960					
1970					
1980					
1990					
2000					
Trends	+	+	+	−	−
Indicators	• More citizens.	• More guest houses • More restaurants	• Crowding conflicts among fishers • More licenses	• Decreasing fisher income • Smaller reported catch	• Coral reef desease • Damaged reef structure
Reasons	• Fishery reputation • National growth	• National reputation for pristine coral reefs, fisheries	• Drought • Diverse fishery supported by reefs	• Over fishing • Coral reef habitat degradation	• Sedimentation • Blast fishing • Increased watersports

D E C I S I O N   T R E E S

Definition

Decision trees are visual representations of a problem, its causes and effects. Decision trees help analyse factors influencing important decisions, which help clarify priorities e.g. decision trees are useful to illustrate how fishers make decisions on resource allocation and alternative livelihoods. They are relatively simple to do and are usually developed after stakeholders have identified and prioritised their problems.

Purpose

- Provides information on decision-making processes and what influences them.
- Helps the team understand stakeholders' resource management strategies and why stakeholders take up or give up particular technologies or activities.
- Identifies problems, the causes and effects of those problems and the complex, interlinked relationships between causes and effects.
- Provides a focus for developing a plan of action for resolving an identified problem.
- Identifies people or organisations that influence decisions about resource use.

Requirements

Same as *Box: Requirements for Visualisation Techniques* in *Maps* section.

Suggested approach

1. Determine the issues of focus for the decision tree. Develop this list based on the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are useful in decision trees.
2. Explain that the focus will be on one problem, its cause and effects. To help explain, provide an example of a problem (e.g. cyanide use), cause (e.g. high demand for aquarium fish), and effect (e.g. destruction of coral reefs).
3. Draw an outline of a large tree trunk on the board without showing roots or branches. Write the problem on the trunk.
4. Let the participants discuss the causes of the problem by asking 'Why?' Draw a root for each cause, and write the cause on the root.
5. To find secondary causes repeat the question 'Why?' for each cause identified. Write these lower down the roots, below the primary causes. Allow informants to continue until they cannot identify any more secondary causes.
6. Ask participants to identify the effects of the problem by asking, 'What happened?' Draw a branch for each effect and write the effect on the branch. To reveal secondary effects, repeat the question 'What happened?' Place the responses higher up the branch above the primary effects.

Decision Tree and Decision Web

Lon and Tad use a decision tree during their focus group interviews with ex-plantation fishers to help clarify why the fishermen think catches are dropping and the likely consequences of declining catches.
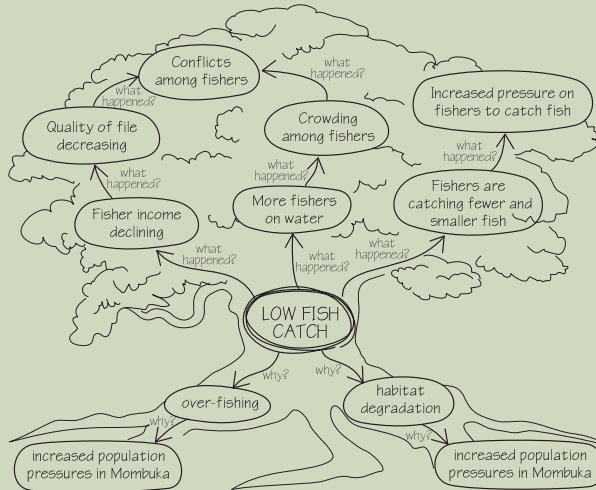
The assessment team compiles the concepts and ideas from the interviews and creates the following decision web illustrating the major uses of the reefs (fishing and diving and snorkelling), the factors affecting these activities, and the people involved. They include coral mining as a potential alternative activity (noted by dashed line) and the factors that have prevented mining from taking place. They plan to use this diagram in the data analysis.
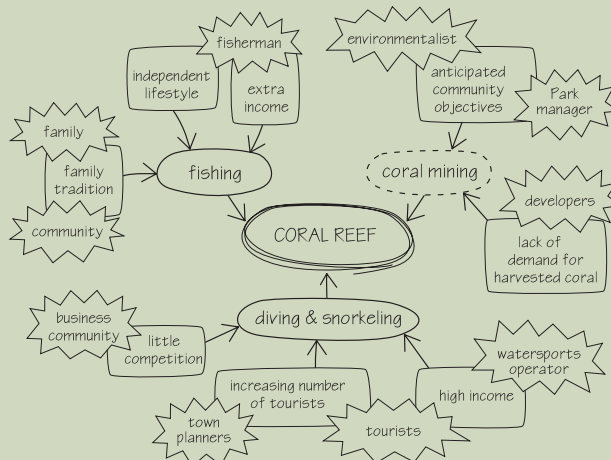
7. Allow the participants to continue until they cannot identify any more effects of the problem.

Strengths
- is simple to conduct and easy to understand; and
- provides a useful and easily understood structure for analysis by both the assessment team and local people.

Weaknesses
- requires an experienced facilitator;
- participants might identify some causes that they feel are beyond their power to change, leading to frustration; and
- requires literacy among participants.

Variation

Decision webs are similar to decision trees except that they use boxes and arrows instead of a tree. These can also highlight problems and causes as well as relationships between resources, uses and impacts. In the case of relationships between resources, uses and impacts, the informants begin by writing the selected resource (e.g. reef fishes) in a box at the centre of the selected media (e.g. large piece of paper, poster board, flipchart, ground). They then discuss how the resource is used (e.g. fishing, diving), noting these in circles around the resource. Alternative ways of using the resource (e.g. snorkelling) can be added in circles around the resource. The facilitator asks why those uses have been selected instead of alternatives, what factors influence decisions regarding them and what factors affect the activities people carry out (e.g. high income levels, employment available, training provided, family tradition, independence). These factors can be noted in rectangles around each activity. Finally, the facilitator asks informants who is involved in making those decisions (e.g. dive business owners, family) and when and where they are made. This information can be noted in stars around each factor. Arrows are then drawn from the resource box to the use circles to the factor rectangles and finally to the decision-maker stars.

Venn diagrams

Definition

Venn diagrams show the relationships between individuals and groups as a diagram, with circles or cut-outs representing different groups. The location of a circle relative to other circles indicates the closeness of relationships. Venn diagrams are most often used to analyse relationships within a community, but they can also be applied to well-defined stakeholder groups within a community or spread across several communities. Venn diagrams can be developed at any time during the field data collection.

Purpose
- Identifies groups, individuals, or organisations, both internal and external, to the community or stakeholder group.
- Determines the relationships among these individuals and groups,

including their level of influence within the community.
- Identifies potential conflicts between interest groups.
- Shows the relationship between different organisations concerning a particular subject or issue in the community.
- Clarifies roles of individuals and organisations.

Requirements
Same as *Box: Requirements for Visualisation Techniques* in *Maps* section and following:
- Coloured paper cut into circles of varying sizes

Suggested approach

1. Determine the issues of focus for the Venn diagram. Develop this list based on the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are useful in Venn diagrams.
2. Explain the meaning of shape, size and colour. Circles represent individuals, groups or organisations. The larger the circle the more influence that group has on the issue. Circles representing organisations that influence each other can be placed or drawn overlapping each other to show degree of influence or shared membership. Circle colours can show different groups such as government agencies, private businesses or non-governmental organisations. A rectangle represents the boundary of the community. Circles inside the boundary are internal groups; those overlapping the boundary are external groups with connections to the community; and external groups with influence in the community are placed outside the rectangle at a distance equal on their level of influence.
3. Draw the rectangle to define the community, or stakeholder group, boundaries. Ask participants to identify people, groups or institutions active in the community or stakeholder group, whether internal or external. Ask participants to write the name of each group or institution on a circle of suitable size. Then ask them to position the circles to reflect the relationships among the groups and their influences on the community.

Strengths
- is easily understood and implemented; and
- provides a useful structure for analysis by both the assessment team and local people.

Weaknesses
- information may be misinterpreted if the legend is lost;
- literacy is required among participants; and
- is difficult to use as supporting documentation in formal or legal contexts.

Venn Diagram

In almost all the interviews the assessment team asks the informants to show their relations with other stakeholder groups using a Venn diagram. Traditional fishers mark conflicts with townie fishers by overlapping and shaded circles; forestry operators place their circles separate from other stakeholder circles to show they have few interactions with them. The informants note their levels of interaction with the reef resources by placing their circles inside, outside or across the rectangle. For example, the guesthouse owners place their circle half way across the rectangle since most of their guests go diving or snorkelling on the reef. The assessment team combines the Venn diagrams from the various informants into this cumulative Venn diagram.

Guesthouses

Townie Fishers

Traditional Fishers

Watersports Operator

Ex-Plantation Fishers

Forestry Operators

Gleaners

Reef Resources

Symbol	Description	Symbol	Description
Sphere of influence		Partial use of reef resources	
Conflict		Dependent on reef resources	
No conflict (work together)		No use of reef resources	
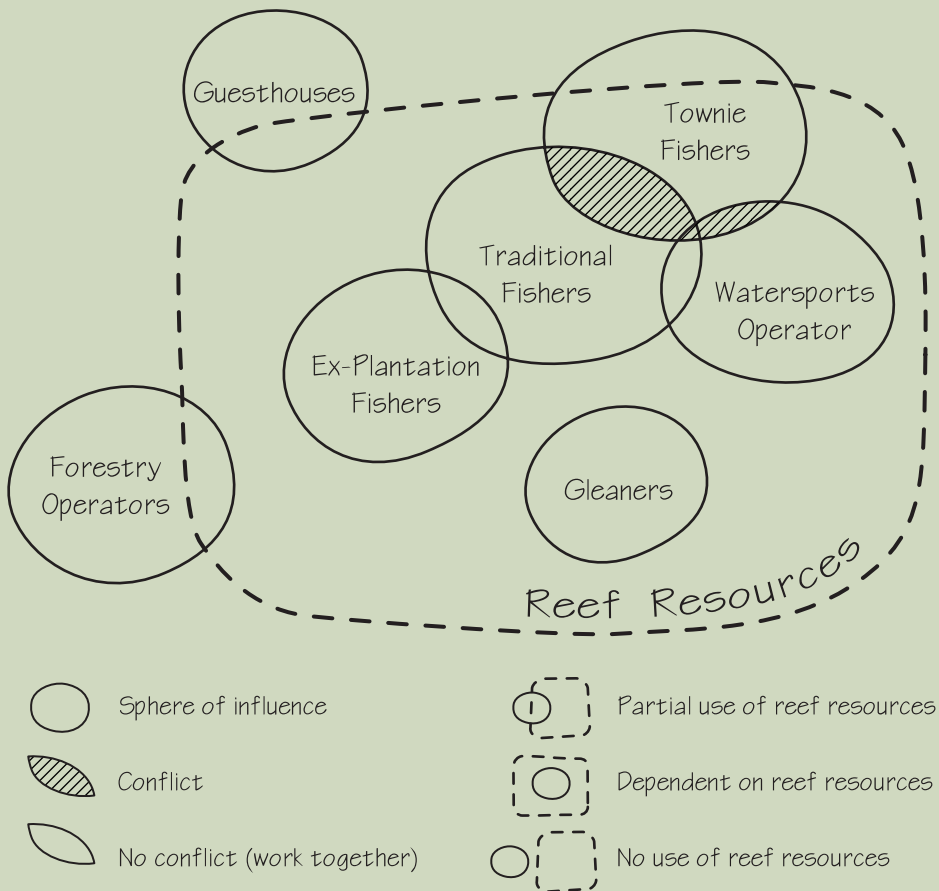
F LOW C HARTS

Definition
A flow chart is a diagram representing a series of events or activities, which shows a sequence, cycle or flow from beginning to end. Flow charts may be developed at any time during data collection.

Purpose
- Presents information in an easy to understand form that identifies activities and analyses how they are linked together in a process.
- Provides an understanding of the *how* and *what* of activities and processes.
- Identifies where problems and opportunities exist and where management strategies can have an impact.
- Provides an understanding of the complexities of linkages and relationships between events or activities.
- Helps the team and stakeholders plans strategies on projects.
- Helps identify important areas in complex procedures where reforms or efforts to increase efficiency can be directed.

Requirements
Same as *Box: Requirements for Visualisation Techniques* in *Maps* section.
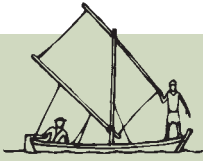
Suggested approach
1. Determine the issues of focus for the flow chart. Develop this list based on the parameters and sub-parameters previously identified. Refer to *Appendix A* to determine which parameters are useful in flow charts.
2. Ask the informants to discuss the process or series of events in order to identify the individual components. Be specific about identifying each step. Ask questions such as 'what happens first?' and 'what happens next?' Ask the participants to draw the steps in proper sequence on the selected media (i.e. posterboard, flipchart, ground). Use arrows to connect the items. Ask the informants to discuss the flow chart and identify problems and opportunities. Discuss whether the system they are describing has changed over time. Focus attention on the arrows linking different stages and clarify how and why those linkages take place.

Strengths
- is easy to understand and implement; and
- provides a useful and easily understood structure for analysis by both the assessment team and local people.

Flow Chart and Impact Diagram

During a semi-structured interview, Carol asks the president of the Mombuka Tourism Association, Margarite, to track the flow of tourists through Mombuka to show how the money flows through the local economy. Carol then uses this flow chart to ask Margarite how she sees tourism expanding in the future and what impacts expansions will have on the local economy.

```
        Tourists travel to
        Mombuka by car
                |
                v
          Stop by
      Tourism Association
        Office/Kiosk
                |
                v
          Stay in
        Guesthouses
       /       |       \
      v        v        v
Eat at Local  Shop at   Dive and Snorkel with
Seafood       Local     Watersports Operation
Restaurants   Stores
```
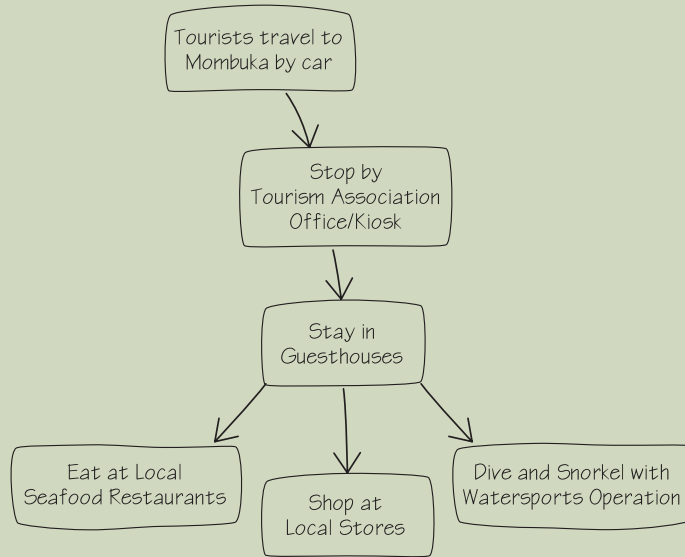
During their interview with Steve, Tom and Una ask him what he thinks will happen if tourism continues to increase in Mombuka. He predicts short-term expansion and profit, but long-term degradation of the Mombuka coral reefs, which will ultimately adversely affect the tourism businesses. He shows these ideas in an impact diagram.

```
        Tourism Continues to
        expand in Mombuka
                |
                v
          More Tourists
          visit Mombuka
         /              \
        v                v
Increased Profits      Coral Reef
        |              degradation
        v                  |
Expansion of               v
Watersports Operation  Decrease in profits due
                       to coral reef exploitation
                       and devastation

SHORT-TERM IMPACTS      LONG-TERM IMPACTS
```
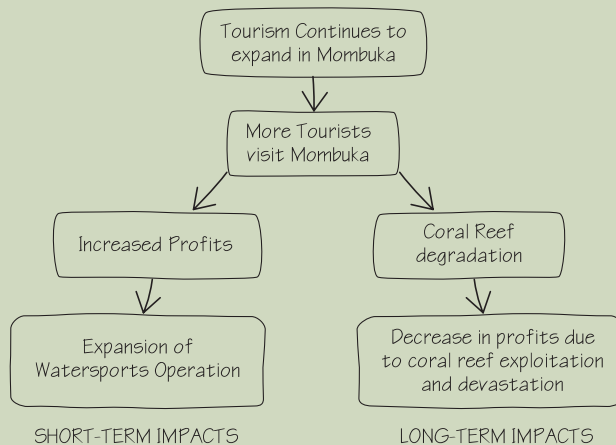
Weaknesses
- can become complicated and confusing if there is too much detail; and
- requires literacy among participants.

Variation
Impact diagrams illustrate the impact of a management strategy or activity. They help identify the anticipated and unexpected effects from the informant's perspective. The team member first selects a strategy or activity that may have an impact and writes the activity in a box in the centre of an area. The facilitator then asks the informants to identify the consequences of the activity, both positive and negative, and to write them by the activity and link them with arrows to indicate direction of flow. The informants identify primary, secondary and tertiary effects and discuss the diagram, focusing on how different impacts occur and why.

RANKING

Definition
Ranking is an open-ended, visual process for analysing sets of comparable items (e.g. activities, resources). These items are usually listed and then participants compare and prioritise them according to criteria. Ranking typically provides a relative hierarchy of the items (e.g. 'very important', 'somewhat important', 'not important at all') and can be conducted at any time during the field data collection.

Purpose
- Identifies and prioritises issues, resources, perceptions and activities using criteria identified by the informants.
- Generates detailed knowledge of items, phenomena, issues or activities that have been identified as important by participants.
- Provides information on how a community perceives and analyses complex issues.
- Quantifies the occurrence or importance of events, issues, activities etc. at least in relative terms.
- Identifies factors and issues that need to be measured more precisely, saving time and resources by avoiding efforts to precisely measure a wide range of parameters, many of which may turn out to be relatively unimportant.
- Provides an easily understood visual record of these analyses so that they can be directly communicated, discussed, validated by stakeholders, adjusted and compared with other analyses.
- Clarifies the priorities of reef stakeholders relating to specific resources, activities or issues.
- Helps stakeholders to analyse their own decision-making processes and present them to others.

Requirements
Same as *Box: Requirements for Visualisation Techniques* in *Maps* section with the following requirements:
- Gatekeeper to keep track of discussion and prevent interference from outside the participating group
- Examples of the items being classified (optional)

Suggested approach
1. Identify the category of items (e.g. reef uses) and the items (e.g. fishing, coral mining) to be ranked by considering the parameters and sub-parameters, previously identified. Refer to *Appendix A* to determine which parameters are conducive to ranking. Select items that are related and comparable and keep the number of items between 5 and 10.
2. Consider how the items can be divided up, arranged and analysed in a matrix form. This includes identifying meaningful comparisons, criteria for ranking (e.g. number of stakeholders, levels of impact on reef), issues to clarify using the ranking.
3. Start the process by discussing the category of items (e.g. reef stakeholders) and the items (e.g. dive operators, fishers). Refine the list of items based on these discussions. As the items are agreed, note them in the first column of a matrix.
4. Discuss how to analyse these items with the informants, agree on criteria for analysis (e.g. number of people, level of impact on the reefs) and list them as the column headings in the matrix.
5. Decide how to rank the items according to the criteria (see *Box: How to Rank Items*).
6. Ask informants to rank each item according to the criteria. Gradually develop the matrix with participants, focusing first on the list of items to be ranked, then completing the columns of analysis one-by-one. If necessary, demonstrate how the items might be ranked for one of the criteria.

Strengths
- facilitates analysis by people who don't normally visualise their ideas;
- provides a visual focus for thought processes and discussion; and
- provides an easy to understand visual output that can be directly used for reporting and can be discussed, validated, adjusted and compared to other analyses.

Weaknesses
- requires careful preparation and clear thinking on the part of the facilitator;
- can become very complicated if not handled carefully;
- can generate confusion if the facilitator is not clear about the criteria and measurements being used for analysis; and
- can result in large bodies of information that need to be further broken down into more manageable groups and classifications.

Field data collection

Variations

Local classifications (or *local taxonomies*) involve identifying the local terminology of items such as reef resources, sources of food from the reef, and use patterns and analysing these items. Local classifications are used to:

- familiarise assessment teams with local terminology;
- generate an understanding of the depth and breadth of local knowledge of the resources and the environment;
- identify important resources and issues for more detailed analysis (including analysis in other ranking exercises); and
- identify categories used by local users' for resources and other items.

Local classifications are often conducted early in an assessment to establish the local terminology, which is useful information for the rest of the field data collection.

When developing local classifications, the items for the category under discussion (e.g. reef resources) are listed in the first column. Participants are asked to name all the reef resources they know by local name and by species. The facilitator can seek additional names by asking informants to name organisms observed at landing sites and markets. Reef identification books and photographs (preferably in colour) can also be used to stimulate additional names. After making this list, the team can then take each name (e.g. sea urchin) and ask if there are any other types of that organism. Ideally, the list should be cross-checked with other informants. If someone with knowledge of reef fauna and flora taxonomy is present, they can attach the scientific nomenclature to the local name. If not, the facilitator or record keeper should take photographs (or collect samples) for later identification of species. Once the taxonomic list has been developed, informants then discuss the various items, including their attributes, qualities, differences among the items, and important features that link them. Based on these discussions, additional criteria for analysis can be developed and recorded along the first row of the matrix and the information completed for each item similar to the basic ranking process. Items can then be divided into classes according to the ways in which local people group them. For example, shells collected on the reef might be divided into edible and non-edible, marketable and non-marketable.

The main limitation of this technique is that taxonomies of natural resources can require the presence of an expert to translate local knowledge into scientific terms for a wider audience. Scientific identification of taxonomic items is also often difficult and time-consuming.

Well-being, or *wealth ranking,* analyses and ranks the make-up of a community according to social and economic status. Wealth ranking is used to:

- identify discrete social and economic groups within communities;
- understand local reef users' perceptions regarding well-being and wealth and thereby understand priorities and decision-making processes; and
- understand how changes in reef use are likely to affect different social and economic groups within the community.

How to Rank Items

Items can be ranked by number or comparative amount. The ranking matrix for the case study is used to demonstrate these two approaches (see following case study box). Regardless of the approach, the items to be ranked (e.g. traditional fishers, ex-plantation fishers, etc.) are listed in the x column, the criteria for ranking (e.g. number of people, percent men, etc.) in the y column.

For the *number approach* the informants focus on each item to be ranked, independently of each other. The informants record the actual number for each item. For example, when ranking traditional fishermen according to the criteria 'number of people', the actual number is the number of people who are traditional fishermen, which is 75. This number is independent of the number of ex-plantation fishermen, townie fishermen or women gleaners.

These actual numbers can then be analysed in different ways. For example, the number of traditional fishermen can be divided according to the percentage of men, women and children. Alternatively, once all the items have been ranked, they can be compared. For example, by comparing the numbers of fishermen it is clear that there are more traditional fishermen than any other group. This approach is most useful when working with small numbers (less than 20).

The *comparative approach* involves ranking all the items at once. For example, comparative ranking of the groups of fishers with regard to damage they cause to the reef requires thinking about how much each of these stakeholder groups affects the reef and then comparing their damage. In the example townie fishers are considered to cause the most damage, so they receive the ranking 'highest'.

Comparative amounts can be recorded as general categories (e.g. high, moderate, low) or percentages. For example, the comparative damage caused by spear fishers, line fishers and ornamental fish collectors could be recorded in general categories (spear fishers 'highest', line fishers 'least', ornamental fish collectors 'medium damage').

In many cases these findings can be recorded by asking the informants to state the actual or comparative amount, which the informants or the record keeper then records in the matrix as a number or general category. Alternatively the team can give the informants several indicators (e.g. pebbles) and ask them to distribute them according to how the items compare. In the case of damage caused to the reef, instead of asking the informants to state the relative amount of damage from each group (highest, medium, lowest), the informants could be given a stack of pebbles and asked to distribute them according to their relative impact. Townie fishers, which have the greatest impact, would receive the most beans (15), traditional fishermen the least (3), ex-plantation fishermen a medium amount (9) and women gleaners a medium-high amount (11). The number of pebbles assigned to each item can be counted to determine a more accurate assessment of relative impact than the general categories of 'highest', 'medium damage' and 'least'. This is known as 'scoring'.

Ranking

During the focus group interview, Chi Lan and Una ask the women gleaners to rank the four groups of fishers according to numbers, the proportion of women, men and children, and the amount of damage they cause.

Reef Stakeholders	Number of people	% Men	% Women	% Children	Damage caused to reef
Traditional Fishers	75	95 %	0 %	5 %	Least
Ex-Plantation Fishers	40	80 %	0 %	10 %	Medium
Townie Fishers	65	75 %	0 %	25 %	Highest
Women Gleaners	30	0 %	60 %	40 %	Medium highest

Local Classification

During a series of group interviews with the women gleaners, Chi Lan and Una ask them the local names of the molluscs. They also ask them their relative abundance, changes in conditions, and habitat. Based on this information they compile this ranking of local taxonomy, which they check with the women gleaners during a focus group interview.

Description/ English name	Species	Relative abundance	Changes in conditions	Habitat	Name in local language
Clam (very large, almost smooth)	unknown	•••	+	mud / mangrove	kai
Big spider shell	*Lambis lambia*	•••	O	reef	spider
Clam (large, white, vertical ridges)	unknown	••••••	O	reef	kai
Clam (large, brown, cross ridges)	*Anadara spp*	•••••••	+	mud	kai nalepa
Pearl oyster	*Pinctada margaritifer*	•••	O	sand / mud	vilavila kiki
Limpet	*Collisella striata*	••••	+	coral islands	kai rai
Sunset shell	*Asaphis violascens?*	•••••••	+	beach / mud	kai wi
Small top shell	*Trochus maculatus*	•••	O	reef edge	pere
Clam (tiny, gray, smooth)	unknown	•••••	O	sand beach, near rocks	sisa
Cone shell	unknown	•••••	O	reef	baukasua
Pen shell	*Pinna bicolour*	••••	O	sand / mud	mangali
Clam	unknown	•••••	O	sand	vilavila
Small green snail	unknown	••••	O	reef	ali mata parea
Cone shell	unknown	••••••••	+	reef	nangmera
Small spider shell	unknown	•••••••	+	reef	keleti
Big top shell	*Trochus maculatus*	•••••	O	reef	lela
Big frog shell	unknown	••	O	deep reef	nafila
Murex shell	*Haustellum haustellum*	•••••	+	sand	baukasua
Whelk ?	unknown	••••••••	+	reef edge	ali
Tiny white clam	unknown	••••••	+	sand	alure
Small white clam	unknown	••••••	+	sand	kai pari
Giant clam (smooth, vertical ridges)	*Tridacnidae sp.*	••••••	–	deep sea on sand	fiu
Giant clam	*Tridacnidae sp.*	•••••	–	reef	karau
Giant clam	*Tridacnidae sp.*	••••••	–	reef	natorok

Wealth Ranking

During the focus group interview with the forestry owners it becomes clear that they are not comfortable discussing income levels. So instead Carol and Ish ask them to identify wealth indicators which they can use to determine relative wealth. The forestry owners identify "amount of land", "numbers of chain saws" "numbers of people in household" and "house condition" as indicators, which Ish writes along the top of the matrix. He lists the names of the forestry owners along the side. Ish gives the owners pebbles and asks them to distribute the pebbles among the names of forestry owners for the first indicator, "amount of land cultivated". Bernardo has the most land, so he receives 7 pebbles; whereas Apona, Yalaoni and Yolanda have the least amount so they get one pebble each. Ish asks the owners to do the same with the rest of the indicators and provides more pebbles as needed. Once they have gone through all the indicators, the owners are able to determine the relative wealth of each owner.

Forestry operation owner	Amount of land cultivated (plots)	Number of chainsaws owned	Number of people in household			House condition		Overall ranking of relative wealth (10 max)
			Men	Women	Children	Tin roof	Own well	
Leo	● ● ●	●	●● ●●	●	●● ●● ●	●		● ●●
Bernardo	●●● ●●●●	●● ●	●● ●●●	● ● ●	●● ●●	●	●	●●●● ●●●● ●●
Elo	● ●		●	●	● ● ●			● ●
Acabo	● ● ●		● ●	●		●		● ●●
Fonu`	●● ●●●	● ●	●	●● ●●	● ● ●	●	●	● ●●
Jaimè	● ●		● ●	● ● ●	●● ●●	●	●	●● ●●
Yolanda	●	●		●	● ● ●	●	●	●● ●● ●
Karol	● ● ●	●	●	● ●	● ● ●			●● ●● ●
Yooni`	● ●		● ●	● ●	● ● ●			●● ●● ●
Yalaoni	●			● ● ●	●● ●● ●		●	●
Aponà	●		●	●	● ●			●●
Jon	● ● ● ●		● ●	● ●	●● ●●			●● ●● ●

Wealth ranking is similar to wealth mapping, and can be done at the same time (see *Chapter 3, Visualisation Techniques, Maps*). Wealth rankings are conducted throughout the field data collection. The items for comparison in wealth ranking are often households, however other items, such as stakeholders groups (e.g. hotel owners, farmers, aquaculture farmers) can also be used. When noting these households, it is important to ensure the informants are familiar enough with them to evaluate them. As in the basic ranking process, these items are listed in the first column of the matrix. The participants should discuss the concept of 'wealth' and 'well-being', including what being relatively more or less wealthy means. This discussion can help determine the criteria for assessing wealth (e.g. size of house, number of cars). These criteria are recorded along the first row of the matrix and the information completed for each item similar to the basic ranking process. The major limitation to this technique is that wealth and well-being are sensitive issues and it may, therefore, be difficult to get informants to discuss these sensitive topics. This approach is also time-consuming.

FIELD ANALYSIS

There are several advantages to conducting data analysis in the field:

- The focus of the assessment can be adjusted in response to learning acquired in the field, which is important to ensuring an adaptive process.
- The team's understanding of local conditions can be better used as not all their impressions and observations will have been recorded in a form that is easily reported.
- Stakeholders can participate in analysis, increasing their sense of ownership of the findings of the whole assessment.
- Mistaken assumptions that may have influenced the design of the assessment can be corrected.
- The process of final analysis and reporting can be speeded up and facilitated so that the findings of the assessment can be quickly incorporated into plans of action.
- The team members' learning are fresh in their minds, some of which may be forgotten if not discussed and recorded while they are in the field.

The whole assessment team should be involved in the field analysis to contribute their findings and learn from each other. A workshop format is recommended to facilitate interaction among team members. The time between workshops will depend on the size of the area being covered, the size of the team and the scope of the assessment. If the assessment is limited to a few neighbouring communities, the team may be able to meet every day. If the team is working in several communities spread over a large area, workshops may be infrequent. The workshops should be coordinated by one person, and when the team is larger than three people, this person should be the facilitator and another team member should be the record keeper.

Field data collection

The field analysis should identify key learning, which can take many forms, including:

- A set of information that is critical to the objectives set for the assessment
- A conclusion about a particular parameter
- A cross-cutting issue that draws on what the team learned about several different parameters
- An issue or group of issues that are priorities for a significant portion of stakeholders
- A particular problem that most stakeholders agree is important
- An activity, problem or issue that the team have identified as having a significant impact on the coral reef or on stakeholders
- A question that has not been answered and that may require further research
- An important conclusion arrived at by the team regarding local conditions, stakeholders or any of the other factors affecting socioeconomic aspects of coral reef use

In most cases, key learning will be identified by team members informally discussing what they have learned. By comparing what they have been told during interviews or what they have observed, the team can identify similar patterns and trends and new insights relevant to the goals and objectives of the socioeconomic assessment. During final analysis this key learning will often become the basic structure of the report.

The primary steps in the field analysis workshops are:

Review notes and questionnaires
At the end of each day, each team member should review the notes from field data collection, and edit them to ensure the responses are clear. Then they should write a summary of the findings highlighting key learning. At the same time they should encode the notes for future reference (see *Chapter 2, Plan the Field Data Collection, Develop a Coding System*). In the case of questionnaires, they should ensure there are no missing data or ambiguities in the responses and responses should be encoded so that they can be entered into the database.

Analyse quantitative data
The assessment team usually is able to conduct only simple, preliminary analyses of quantitative data during the field analysis workshops, because of the complexity of full-scale quantitative data analysis. These preliminary analyses involve entering survey data into the database, conducting the basic analyses planned during *Chapter 2, Plan the Field Data Collection Phase, Plan the Analysis of Quantitative Data,* and generating relevant tables and graphs.

Most importantly, the assessment team should review the results from the quantitative analysis to identify key learning. These can be identified by reviewing, correlating and contrasting the data to find:

- information essential to the objectives of the assessment;
- conclusions related to the socioeconomic parameters;
- priority issues and problems for the stakeholders;
- activities or issues with a significant impact on the reefs and stakeholders;
- patterns and trends in socioeconomic conditions; and
- questions that have not been answered and may require further research.

The assessment team should also assess the results from these preliminary analyses to determine if the information they need is being collected. If not, the questions may need to be modified or expanded. The team should also determine if these preliminary analyses raise new issues, and whether they need to add new questions to the questionnaires.

Preliminary analysis is also important in determining any problems with the questionnaire questions. By identifying these problems during the field data collection phase, the team can clarify them through additional questionnaires and other methods. Indications that the questionnaires have problems include:

- informants are having difficulties answering;
- informants often respond 'I don't know';
- informants are giving answers that do not make sense; or
- there are contradictions between the quantitative and qualitative data

These problems may be caused by the design of the questionnaire, the way it is administered by the field teams and/or the way informants were selected (sampling design). If the problem is minor, adjusting the questions may eliminate it. However, it may not always be possible to adjust the questions once the field data collection has begun because this might compromise its consistency. In this case, the team could collect additional data to help clarify the issue, which can be used when interpreting the final data. Inconsistencies in the way the questionnaire is administered by the teams can be discussed and eliminated for the rest of the survey. If sampling design seems to be the problem, this can either be adjusted, or additional information can be collected using other methods to compensate for possible sampling errors. Where none of the above seem to explain what appear to be inconsistencies in the data, other more exploratory methods may be needed. A semi-structured interview is one of the best methods for soliciting an explanation from informants.

Analyse qualitative information
Qualitative information resulting from observations, semi-structured interviews, focus group interviews and oral histories should also be subjected to field analysis. These methods rely on constant review, interpretation and adjustment to deepen the understanding of the stakeholders and related parameters.

Each team member should review, condense, and summarise his/her findings on each parameter. The coding system defined in *Chapter 2, Planning the Field Data Collection, Develop a Coding System* should assist the team members in compiling the

Field data collection

relevant information. They should then identify key learning as explained for quantitative data analysis.

Each team member should present his/her summary findings, including the key learning, to the whole team for discussion. The team should refine the key learning relating to particular stakeholder groups and parameters by comparing the findings presented by different team members, looking for correlations and drawing out those issues that have been identified by several team members. Possible cross-cutting lessons or issues that refer to several stakeholder groups or parameters should be given special attention. During these discussions the team should incorporate any relevant points from the preliminary analysis of the quantitative data. The team members also should make use of any diagrams or other visualisation diagrams produced during their field data collection.

Assess status of data collection and revise future data collection plans

The team should assess the status of data collection by determining how much information has been collected on each stakeholder group and on each parameter. This can most easily be done using the Tracking Worksheet and Schedule Worksheet. These worksheets should be constantly updated and plans adjusted as the field data collection progresses.

The team should check how thoroughly they have covered the different parameters, using triangulation as a guide (*Chapter 3, Guiding Principles, Cross-check data*). The team should also consider the key learning to determine if new parameters should be investigated and if some parameters should be eliminated from the field data collection.

The assessment team should:

- identify the parameters that require further data as well as new parameters for study;
    - identify methods and visualisation techniques that would be best for addressing these parameters, including methods and techniques that have not been used to date; and
        - assign stakeholder groups and methods to different field teams or team members.

Modify the Schedule Worksheet and Tracking Worksheet!

Field Analysis

The team meets almost every Thursday afternoon in the Park office to discuss their findings, compare notes, and revise plans. This is in addition to occasional meetings of a few team members. For example, Chi Lan, Una, Tad, Lon and Ish often meet after they have completed interviews with fishermen and women gleaners. They compare notes and often ask one of their key informants to join them to clarify things they find confusing or contradictory.

The team continuously reviews the status of their field data collection by updating the tracking and schedule worksheets. They modify their plans to address any changes and to address any gaps in the data. For example, they learn that they cannot interview townie fishers during the third week because Jack's boat is not available. So they shift the data collection to start on the fourth week, which means that they have to move the watersports operator interviews to the third week.

The team members quickly learn the importance of reviewing, editing and coding their notes immediately after conducting the interviews, surveys and observations. A good lesson is when Ish forgets to write up his notes from the first interviews with the ex-plantation fishers and then finds that he can not read his notes or remember key details. Ish and Tad set up a routine of immediately writing-up their notes after the interviews.

The team enters all its quantitative data from the surveys, semi-structured interviews, observations and focus group interviews into the prepared Excel spreadsheet. For example, Ish puts in the number and types of fishing boats at each landing beach into the column on boat type for each fishing community. The team runs a few basic calculations, like the average number of guests per guesthouse per week.

They also review their qualitative information from interviews and observations, and summarise their findings for stakeholders and parameters, noting particularly interesting or unexpected findings. For example, when Tad and Ish check their observations about the foresters, they summarise how the operations are run using a flow chart.

Before each meeting, each team member identifies their key learning from this information e.g. Lon notes that 80% of the boats in Sanya have motors compared to only 10% in Sullivans which indicates that Sanya fishers have better gear and can fish further off-shore. Tad notes conflicts between fisher groups and the potential for conflicts with the watersports operator.

These key learning points are discussed during the team meetings. The team members compare notes looking for findings that contradict or support each other's ideas. They also brainstorm on the findings. For example, Chi Lan notes that Ish's findings indicate that the fishers from Sullivans will be affected more by any future restrictions on fishing in Park waters since most don't have motors to fish further out. The team agrees that this is an important point to include in the final analysis since it relates to the objective about helping design reef management that is appropriate to local socioeconomic conditions.

Schedule Worksheet

Stakeholder Group	Methods	When	Field team (facilitator & record keeper)
Ex-plantation Fishers	SSI, FGI, S, O	1st to 5th weeks	Lon & Tad; Lon & Ish; Lon & Tom
Traditional Fishers	SSI, FGI, S, OH, O	1st to 5th week	Lon & Tad; Lon & Ish; Tad & Ish
Townie fishers	SSI, FGI, S, O	4th to 6th weeks	Tad & Carol; Tad & Lon
Women Gleaners	OH, SSI, S, FGI	1st to 5th weeks	Chi Lan & Una
Watersports Operator	SSI, S, O	3rd week	Tom & Una
Guesthouses	SSI, S	6th week	Tom & Chi Lan; Carol
Foresters	SSI, S, O	7th week	Carol & Ish; Tom & Ish
Assessment team	Field analysis workshops	Every Thursday afternoon	All

Key: SSI = Semi-structured Interview; FGI = Focus Group Interview; OH = Oral Histories; S = Survey; O = Observation

CASE STUDY: ECONOMICS OF BLAST FISHING IN SPERMONDE ARCHIPELAGO, INDONESIA

INTRODUCTION

There was a study from 1995 to 1997 to see how co-management could work for the fishery in Spermonde Archipelago in southwest Sulawesi, Indonesia. The aim was to assess how the perceptions of fishers and authorities at all government levels influence the status of the fish stocks in Spermonde. This was done to assess one important condition for management: to get agreement between fishers and managers on the status of the stocks, and show that there was a relation between fish status and fishing effort. Two major questions were asked:

*   did the status of the fishery and of the fish community in Spermonde change due to increased fishing effort?
*   who can perceive and evaluate such changes?

The fishery and fish community structure in Spermonde were studied for changes that could be related to increased fishing pressure. This involved the following steps:

Step 1: The fish populations were studied to assess changes over time using a simple time series analysis on fisheries data obtained from the standard Indonesian Catch and Effort Data Recording System (CEDRS). This showed that catches over time were related to increases in fishing effort. These data were regarded as the experience of fisheries authorities.

Step 2: Space and time patterns were studied in individual catch and effort, based on surveys at sea. Size and species composition of individual catches were described, as well as changes in daily catches for different gear types. These observations showed the experiences of fishers.

Step 3: The impacts of the fishery on the reef fish community structure were studied directly by comparing these structures underwater with differing levels of fishing effort and also indirectly by comparing the size and composition of catches of fishers at these sites.

Step 4: The perceptions of fishers and authorities at the district, provincial and national level were related to space and time boundaries, including variations and uncertainties in their experiences.

Step 5: The possibility of co-managing the fisheries in Spermonde was evaluated based on all this information.

The economics of blast fishing in Spermonde was also studied. At first the objective was to understand the economic reasons behind the behaviour of blast fishermen in the Spermonde Archipelago. An economic valuation exercise was added later with the help of Herman Cesar, a natural resources economist at the World Bank.

The fisheries study was part of a 5 year integrated coastal management (ICM) program in Southwest Sulawesi, Indonesia. This program started in 1994 with the aim of increasing the scientific knowledge needed to conserve the coastal ecosystems of Southwest Sulawesi. The multi-disciplinary effort involved marine biology, human and physical geography, anthropology, fisheries science, marine transport processes, and system dynamics. It was a collaboration between by the Dutch Universities of Amsterdam, Twente, Utrecht and Wageningen, the Dutch Museum for Natural History, the Centre for Estuarine and Marine Ecology and the Hassanudin University at Ujung Pandang, South Sulawesi.

DATA COLLECTION

Lida Pet-Soede, a doctoral student at Wageningen Agricultural University, carried out the economic study in collaboration with 2 Indonesians from the area who acted as boatman and dive assistant for 2 years. Lida monitored all fishing activities at sea, particularly blast fishing, counted the number of bombs and catch biomass, held interviews with local fishermen at sea, and made underwater estimations of the size of blast impacts on the corals.

All islands and major coastal villages were visited between 1995 and 1997. Blast-fishers and the middlemen were interviewed to collect data on the number of trips each month, the costs of the operations, and profit-sharing systems. During these visits, logbooks were given to a few fishers who recorded their daily catches for 2 months. Prices for those fish found in blast catches were obtained at fish auctions.

DATA ANALYSIS AND PRESENTATION

After completing field data collection, Lida gathered all the data from the interviews, logbooks and personal observations, and summarised the qualitative information to describe the blast fishing activities and blast fishers.

She included information such as the following:

- the large-scale operations used 10-15 m long boats with a crew of 15-20 men, who went out on week-long trips to patch reefs or fringing reefs of uninhabited islands up to a few hundred kilometers from home;
- the medium-scale operations were similar, but fished closer to home and often targeted schools of pelagic fish, away from the damaged reefs, usually for day trips in smaller boats (8-10 m) and a maximum crew of 5; and
- small-scale, single blast fishers used 4 m long, wooden canoes with one outrigger, with a 4 HP outboard engine, operated close to their home-islands, and fished in the same small area for many years.

Lida also analysed the data e.g. she calculated the yields and net incomes of the 3 blast fishing types (small-, medium-, and large-scale) and presented them in the following table:

Estimated net income (US$/month) for crew members and boat owners from blast fishing.

	Small-scale	**Medium-scale**	**Large-scale**
Fish sold (kg)	120	975	3500
Revenue	120	975	5250
Costs	65	142	1000
Income crew	55	585[1]	3150
Net income/crew member	55	146.2[5]	197
Net income/boat owner	55	393[2]	1100

Lida and Herman also calculated the costs and benefits of blast fishing to Indonesia as a whole. A small model was developed to calculate costs and benefits for an imaginary patch of 1 km² of coral reef, which was in pristine condition with no other threats. They analysed 2 different situations: 'with' blast fishing; and 'without' blast fishing. Calculations were also carried out for a 'high value' and 'low value' examples. In the 'high value' case, the coastal area was well developed, with a lot of coastal construction and high tourism potential. It was opposite in the 'low value' case, which was in a remote rural area. Valuation was calculated on a 'loss in value added' basis. Lida and Herman put the results in the following table to make it easier for the reader to see the costs and benefits of different parts of blast fishing and the rest of society.

Present value of costs and benefits of blast fishing at 10% discount rate over 20 years (US$1000 per km²).

	"High Value" case		"Low Value" case	
	cost	benefit	cost	benefit
Blast fishers				
Yield		90.0		90.0
Explosives	8.5		8.5	
Other costs	2.6		2.6	
Opportunity labour	3.1		3.1	
Net private benefits blasting	75.9		75.9	
Rest of society				
Foregone sustainable Fisheries revenues	102.2		102.2	
Lost tourism revenues	134.0		0.8	
Coastal protection	146.5		6.8	
Total Rest of Society	*-382.7*		*-109.8*	
Net Benefits of blast fishing	**-306.8**		**-33.9**	

Blast fishers in action in the Spermonde Archipelago (Photo: Lida Pet-Soede).

Lida and Herman also calculated the economic value of coral reefs based on 3 functions: fisheries; tourism; and coastal protection. These functions were calculated based on market prices. Herman would have based the economic value on Total Economic Value (TEV), which includes all direct and indirect use values as well as non-use values. However, most of the reef functions, such as biodiversity, research and possible medicinal use, could not be valued easily. He also felt that the analyses required, including contingent valuation methods, would undermine the credibility of the study for the policy makers who need to be convinced of the importance of reef protection. Finally, the economic valuation of the 3 functions proved that blast fishing is an economic cost to the Indonesia, so it was not necessary to add the indirect and non-use values to further prove the costs of blast fishing.

Lida also considered the impacts and losses from blast fishing, management options, the role of government and how they thought about the need for management. She concluded that co-management for fisheries in this area is not yet viable, with differing evidence:

- there was agreement in perceptions of fisheries authorities and fishers on the status of the fisheries and fish stocks in Spermonde Archipelago; but
- problems in administration and the physical location and weak contrasts within Spermonde made it hard for the partners to see a clear relation between catch and effort from their experiences.

Lida also found that better use of fisheries data would increase the management value of available official data. This could be done through a standard measure of fishing effort, including the fast developments in motors, and combining data on fisheries and ecological grounds instead of administrative grounds not only on administration values. Exchange of experiences between

local fisheries authorities and fishers from districts or provinces with very different levels of fishing would also help discussions on the need and benefits of effort regulations.

Lida published the results of the economic study in an academic journal, Environmental Conservation, with the headings: purpose; methods; and results of the study. The larger fisheries management study was written into Lida's thesis and some chapters were published in Fisheries Research, the Indonesian Journal Pesisir and presented at the Second Indonesian National Conference on the management of coastal resources. Lida also discussed the results with local and national authorities in Indonesia and presented the results in various meetings, giving more chances for policy-makers and scientists to learn about these findings. The information on economic valuation was used to develop and implement the World Bank/ADB sponsored Coral Reef Rehabilitation and Management Program (COREMAP) that is currently going on in Indonesia.

(Full reference in Pet-Soed et al. 1999)

CHAPTER 4. FINAL DATA ANALYSIS

During the final analysis phase the assessment team analyses and validates the data to prepare a useful report and presentations for the end-users.

Much of the data analysis, particularly of qualitative information, should have been completed during the field analysis workshops. Therefore, the final analysis involves:

- Refining the key learning;
- Collecting and ordering data to illustrate key learning;
- Presenting the key learning in an accessible form for end-users;
- Validating the key learning with stakeholders; and
- Incorporating the key learning into a useful report.

Key learning refers to issues identified or lessons learnt by the team (see *Chapter 3, Field Analysis*) that are essential to the objectives of the assessment or are needed to understand the socioeconomic context of the stakeholders. Key learning can take many forms, including:

- a set of information that is critical to assessment objectives;
- conclusions about a particular parameter;
- a cross-cutting issue that draws on lessons learnt about several different parameters;
- an issue or group of issues that are priorities for a significant proportion of stakeholders;
- a particular problem that most stakeholders agree is important;
- an activity, problem or issue that the team has identified as having a significant impact on the coral reef or coral reef users;
- a question that has not been answered and that may require further research; and
- an important conclusion by the team on local conditions, local reef users or any other factors affecting socioeconomic aspects of coral reef use.

In most cases, key learning will be identified by team members during informal discussions of their findings. By comparing what they have been told during interviews or what they have observed, the team can identify similar patterns and new insights relevant to the assessment goals and objectives.

Analysis

Basic principles for analysis

The following guiding principles should be followed throughout the final analysis.

Involve all team members in the analysis
No matter how carefully the team has recorded their data, much important learning from an assessment will still be in the heads of the team rather than on paper. Therefore, all team members should be involved in analysing and reporting the results.

Prioritise quality, not quantity
The success of an assessment is not measured by the quantity of information but by its quality. Quality is judged by the:

- extent that the reported findings reflect the collected information; and
- usefulness of the findings to end-users.

This principle is important for qualitative analysis, where the assessment team should focus on information relevant to the goals and objectives of the assessment. In contrast, it is important to have adequate sample sizes for the statistical analysis of quantitative data.

Prioritise learning, rather than information
It is not possible, nor useful, for the assessment team to report all the information that was collected. Instead, the team should focus on the key learning generated from the information.

Do not modify the results to the end-users' expectations
The team must avoid the temptation of modifying the results to accommodate the expectations of end-users e.g. if the funding organisation is particularly interested in poverty, the team should not report that the stakeholders are poor when they gathered no evidence of poverty.

Conduct the data analysis

There are several critical steps involved in conducting field data analysis.

Compile the information
The team first should assemble all the information obtained throughout the assessment (see *Figure 4-1*). The Tracking Worksheet can help identify all the sources of information, including:

- *information from consultations with stakeholder representatives, secondary data sources and the reconnaissance survey* should already have been reviewed and synthesised since this information was used in the initial planning of the field data collection;

- *written notes* from each team member during data collection should already have been synthesised in field analysis workshops. The team members may need to spend some time ordering and reviewing their notes;
- *visualisation diagrams* from field data collection should be readily available from the field notes with minimal revision and the team should already have a good idea of the most valuable ones for the analysis and presentation of data;
- depending on how much preliminary analysis has been done, some *quantitative data* should have already been analysed and available; and
- *outputs of the field analysis workshops* should be available since these were compiled after each workshop.
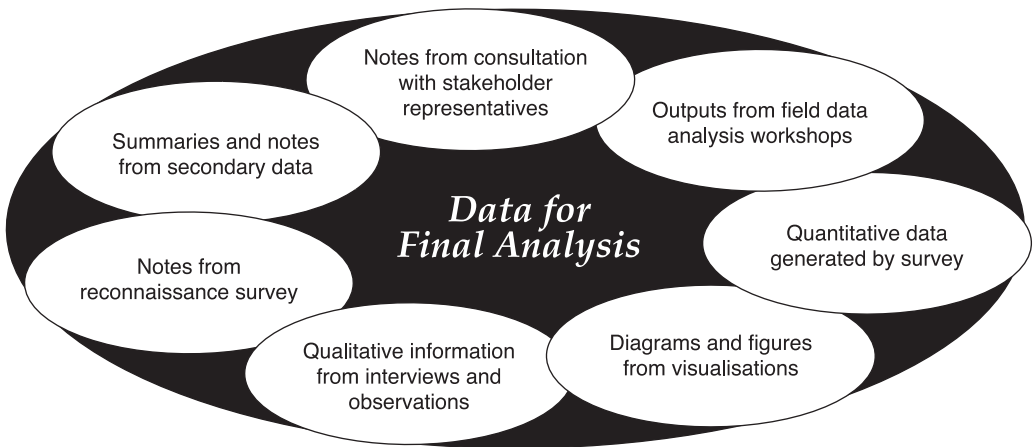
Figure 4-1: Multiple sources of data.

Prepare the quantitative data

The main part of the information set that may not be immediately accessible are the quantitative data from the surveys. During the field analysis workshops, preliminary analyses were conducted of the survey data, and the team should now complete these analyses and produce tables of key sets of information. If this information is not available during discussions of the data, the chances of it being used effectively are significantly reduced, as quantitative data should be discussed and compared with the qualitative information.
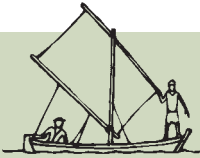
Analysis

Conducting the Final Data Analysis

At the end of the field data collection the team meet to discuss their findings in a room in the community centre where they can spread out their papers and have more privacy than the Park office. Before starting the group discussion, each team member reviews his/her notes, puts any remaining quantitative data into the database, summarises the qualitative information according to the stakeholders and parameters, and notes the key learning from all this information.

The team compiles all the relevant information:

- interview notes from Carol's initial consultations with stakeholder representatives;
- notes and copies of secondary data;
- notes from the reconnaissance survey;
- summaries from field data collection, including visualisation diagrams;
- quantitative data from the field data collection and analyses; and
- discussion points from the field analysis workshops.

The assessment team analyses the quantitative data using simple calculations e.g. they calculate the distribution of age and gender in each stakeholder group as follows:

Stakeholder Group	Age distribution				Gender Distribution	
	0-18	19-30	30-50	>50	Male	Female
Ex-plantation Fishers	25%	20%	40%	15%	100%	0%
Traditional Fishers	5%	30%	55%	10%	100%	0%
Townie fishers	40%	50%	5%	5%	100%	0%
Women Gleaners	40%	20%	20%	20%	0%	100%
Watersports Operator	0%	100%	0%	0%	100%	0%
Guesthouse Owners	0%	0%	25%	75%	40%	60%
Forestry Operation Owners	0%	5%	60%	35%	100%	0%
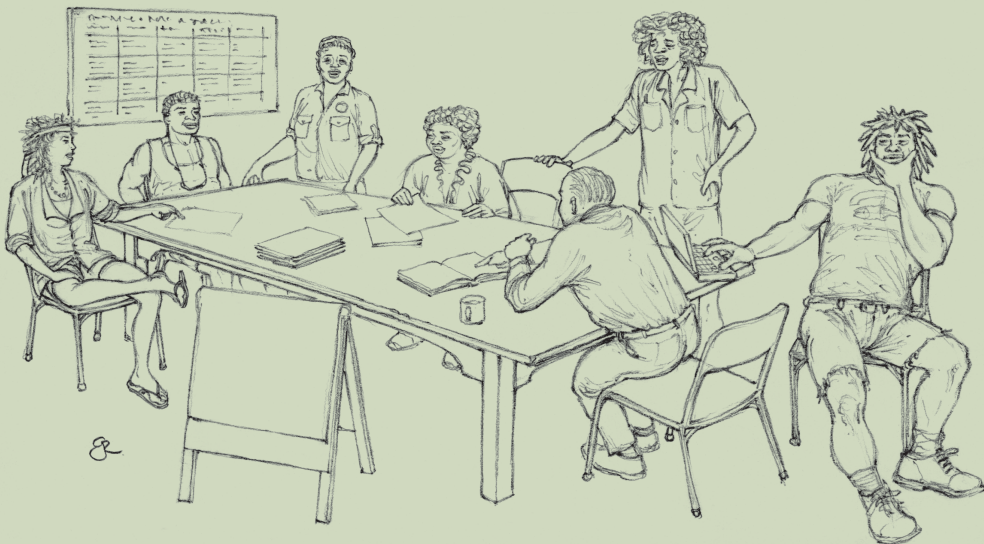
The quantitative data may be analysed using relatively simple calculations, such as sums and percentages e.g. if census data include occupation, then the total number of people in each stakeholder group and the percentage of the population in each occupation can be calculated. Trends over time may also be calculated in total numbers or in percentages e.g the total number of fishers may be reported as percentage changes between the years over a 10-year period. Comparisons may also be conducted between parameters e.g. the number of fishers over time may be calculated and compared with the catch rates to identify possible correlations. The results from these simple calculations may be presented in graphic forms, including pie charts, tables and diagrams. Descriptive statistics, including standard deviations, means and modes, and 't' scores, may also be calculated; however, these analyses require an understanding of basic statistics. Also, these analyses require that the data be collected from a statistically representative sample (see *Appendix B*).

The analysis of quantitative data needs to be carefully compared with the data collected from the other sources and reasons for discrepancies should be discussed by team members taking into account possible biases:

- of team members, that may be affecting their learning in the field;
- in the design of quantitative surveys; and
- in the way in which the surveys were conducted.

Where serious discrepancies cannot be explained, the assessment team may need to collect additional, focused data . This involves taking the contradictory information back to key informants for further discussion and validation to sort out the contradictions.

Assemble for a final analysis workshop

All the team members should gather for a workshop to review, analyse and report the findings. A workshop is the best mechanism for the analysis and finalisation of the assessment findings because it:

- allows comparison and discussion of findings;
- draws on the different experiences and viewpoints of team members;
- allows for other people, including end-users and stakeholders, to be involved; and
- can speed up the entire process of analysis and report writing significantly by focusing the assessment team on the analysis.

Outline the final report

The assessment team should decide what type of final report is required. This will depend on the goals and objectives of the socioeconomic assessment and what format will be most useful for the end-users.

Decisions must be made about the amount of description required in the report. Some end-users, such as senior policy or decision-makers, may have little interest in a general description of the area and communities studied, but may be interested in issues, problems and potential solutions. Other end-users, such as researchers, development

Analysis

Outlining the Final Report and Describing the Parameters

The team first discusses the outline for the final report, taking into consideration the original objectives and the interests of the end-users, which includes Mombuka Marine Park Management, other MPA managers, GMCF, NPA, Mombuka Fisheries Division, Anthropology Department, and the stakeholders who were the focus of the assessment. Looking at this list, they realise they need to make the findings as straightforward as possible and focused on the goals and objectives. They also agreed that since this assessment will be a baseline for future monitoring, it should include detailed information on the stakeholders and parameters. But there would be too much detail to include in the body of the report, so the team decides to include the major findings in the main body report and put the details in an appendix. This is the format they decide on after a few hours of discussion:

I. Introduction/Background on the socioeconomic assessment
    A. Goals and Objectives
    B. Methods, including background on the assessment team

II. Summary description of the parameters related to each stakeholder group
    A.   Traditional fishers
    B.   Ex-plantation fishers
    C.   Townie fishers
    D.   Women gleaners
    E.   Watersports operator
    F.   Guesthouses
    G.   Foresters

III. Implications of findings for Park management

IV. Recommendations for future participatory management

V. Recommendations to other MPA managers

VI. Recommended parameters for monitoring

They compile the information on each stakeholder group and then on each parameter e.g. for the watersports centre there are subsections on use patterns, perceptions of the Park, market attributes, etc. The tracking worksheet is used to locate the data, most of which are in summary form from the field analysis workshops. They check their notes again to locate any additional, relevant information.

Una compiles all the various sources into one electronic file, which she edits into a series of descriptions of the stakeholder groups. This will be the appendix. A summary version, with the important points highlighted, will be 'II. Summary description of the parameters related to each stakeholder group' in the final report.

agencies planning to work in the area, and reef managers, may want detailed descriptions of all socioeconomic conditions and factors relating the reef stakeholders.

The team should also determine how much quantitative data should be included in the final report. Socioeconomic assessments with monitoring as a major objective may need to identify quantitative indicators, which will require the inclusion of quantitative data in the report. A reef manager may use quantitative data as baseline information to monitor changes in socioeconomic conditions in the community over time.   If policy is the major objective, decision-makers may seek a precise understanding of the impact of alternative policies to determine where to allocate limited resources.   Alternatively, a reef manager may seek explanations for socioeconomic conditions and information on the major issues and concerns, therefore quantitative data may not be a priority.

The major components should be decided by the team while developing the outline for the report. Typically the report will include: an introduction discussing the major and specific objectives of the assessment; a description of the main points related to the socioeconomic parameters; a discussion of the key learning; and a description of the methods. More detail on the parameters may be provided in an appendix. An executive summary should be included in the start of the report.

Describe the parameters (optional)
If the assessment team decides descriptions are important to the findings, then the list of stakeholders and parameters in the Tracking Worksheet can be a guide. Thus the descriptions would be organised around the stakeholder groups.   Within each stakeholder group description, the parameters would then be described.   These descriptions should be developed by reviewing the data, relevant to the stakeholders and each parameter noted by the coding system (see *Chapter 2, Planning the Field Data Collection, Develop a Coding System*). These descriptions will provide a valuable resource for the team during the rest of the analysis workshop.

Finalise key learning
After field data collection, the team should have a strong idea of the key learning that they want to draw out of the analysis. This should be contained in the outputs of the field analysis workshops (see *Chapter 3,Conduct Field Analysis*), be reviewed by the team and compared with the other sources of data compiled for the final analysis workshop (*see Figure 4-1*). Key learning should be clearly laid out and matched with assessment objectives to see how they contribute. Through this process the assessment team should synthesise results, share conclusions and discuss insights and recommendations.

Once the team has agreed on key learning, the task of analysis of their findings becomes much easier and the analysis will have a clear goal – to demonstrate and illustrate the key learning.

Identify information to support key learning
The information that has generated key learning should be clearly identified by the team. Usually, the information on the parameters can provide a guide for ordering.

Analysis

Identifying Key Learning

The team spend a lot of time discussing the key learning for the final report by going back over the sources of information, particularly the key points from the field analysis workshops. Findings that contradict or support the key learning are discussed as well as the management implications of these findings. The major points related to the final key learning are drafted into the following structure:

Implications of findings for Park management
- Conflicts among stakeholder groups: existing conflicts between townie and traditional fishermen and potential in the future with watersports operators – indicates needs for conflict resolution for sea-based stakeholders, possibly zones.
- Significant socioeconomic differences between groups: fishers tend to be lowest economic class and are most dependent on the reefs for their income. Fishers and foresters are local, guesthouse owners and watersports operator are often foreigners – indicates that fishers would be the most heavily impacted economically by restrictions on their activities and that the new industry, tourism, is primarily foreign-run suggesting an opportunity to train fishers into the tourism industry to promote local tourism industry.
- Varying methods of fishing – Sanya fishermen have better equipment allowing them to fish outside of Park waters compared to Sullivans fishers – indicates Sullivans fishers will be more heavily affected by restrictions in Park waters.
- Perceptions of the Park – most of the stakeholders have little knowledge of Park activities. Fishers are concerned the Park will stop fishing, some groups and some individuals would like to be more involved – indicates need for better communication with the stakeholders regarding Park activities and need to develop partnerships to involve these groups in management activities.
- Traditional knowledge and tenure system declining due to influx of townies – indicates need to further investigate the tenure system to incorporate into future management plans and indicates need to preserve this knowledge.

Recommendations for future participatory management
- work with stakeholder representatives from Fishermen's Cooperative, Mombuka Tourism Association, etc;
- work with fisher sub-groups separately;
- keep stakeholders more up to date on Park activities and get them involved; and
- develop programs that will benefit stakeholders to demonstrate that the Park is intended to benefit local people – e.g. alternative income training.

Recommendations to other MPA managers considering conducting a socioeconomic assessment
- allocate 5 months to conduct a socioeconomic assessment;
- provide extensive training for the assessment team;
- have stakeholders more directly involved;
- visit all of the stakeholder groups (regretted not going to Kela to interview fishers)

Recommendations for future Park monitoring parameters
- use patterns – reef uses, locations, methods and means, timing & seasonality, changes in effort;
- stakeholder characteristics – all sub-parameters; and
- stakeholder perceptions – Park management, conflicts

The team reviews their data to locate information that supports key learning as in the following example:

Key Learning

Traditional tenure arrangements under pressure from commercial fishing

Information that contributes to key learning
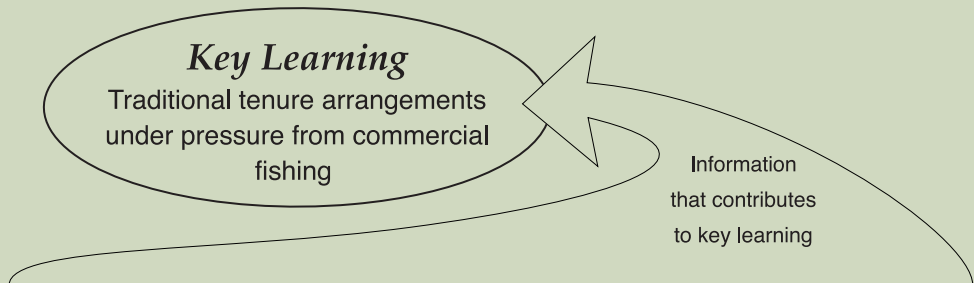
Parameters	Key points
Resource use patterns	• Local fishers limited to use of coastal waters because of lack of motors • Increasing number of commercial fishers
Stakeholder characteristics	• Increase in population in nearby towns due to increasing rural poverty leading to greater availability of unskilled labor for commercial fishing craft
Organisation and resource governance	• Subsistence fishers not represented in fisheries management forums • Government regulations undermining traditional authorities
Traditional knowledge	• Loss of traditional knowledge

Analysis

Regardless of whether the key learning is a conclusion about a particular parameter or a cross-cutting issue, the team can lay out the various parameters examined and review how the information they collected contributes to the key learning.

The main points that illustrate the parameters identified as contributing to key learning should be drawn out of the available information. These can take a variety of forms:

- material quoted from secondary sources;
- written accounts of information acquired during the assessment;
- verbatim records of responses by stakeholders (i.e. quotes);
- visualisation diagrams generated by stakeholders during field work;
- tables of information generated from quantitative data; and
- graphs or diagrams generated based on quantitative data.

Validate the findings

Once key learning, parameters and illustrations have been decided, it is time to validate these findings by presenting them to the stakeholders for comment. The findings should be in a clear and concise form, wherever possible using the visualisation diagrams that the stakeholders have developed during the assessment. Long, verbal explanations or complicated tables of data generated during the assessment may be difficult to understand.

Validation can take place in various forms:

- small discussion groups with key stakeholders;
- presentations to specific groups of stakeholders or interest groups;
- presentations to groups of selected representatives of different stakeholder groups; and
- community meetings involving a wider range of stakeholders.

Each approach has its good and bad points. Smaller groups are easier to manage but differing opinions about findings are less likely to emerge. Community meetings with a range of stakeholder groups are more difficult to manage and can give rise to increased expectations among those involved; however, they can provide a forum for discussing different opinions and attitudes regarding the assessment findings.

Discussions at these validation meetings should be recorded and the results incorporated into the final output. When stakeholders disagree with some of the results, the team must use its judgement to decide whether or not to change their results. Alternatively, it may be necessary to collect additional field data to clarify these discrepancies.

Prepare the report

After the validation workshop, the team should prepare the report using the agreed outline. Key learning should have its own section, with each point discussed, along with relevant data and visualisation diagrams. Any descriptive sections on the stakeholders and parameters may form a separate section in the text or be included as an appendix.

Distribute and discuss report

Finally, the report should be circulated to the end-users, and also presented in a forum where key learning can be communicated and discussed.

Validating, Preparing, Distributing and Discussing the Report

The team presents and discusses their key learning with the stakeholders, through:

- an informal presentation to all guesthouse owners and the dive operator;
- an informal presentation to key informant ex-plantation and traditional fishers;
- a presentation to key informant townie fishers;
- a discussion with women gleaners on sand banks one afternoon; and
- a presentation to all forestry owners in one of the forestry operations' conference rooms.

Based on the feedback from these people, the team reviews the findings and makes changes they feel are valid.

The team prepares the final report based on the outline and the feedback from the stakeholder meetings. Carol arranges for several copies of the final report to be given to the relevant organisations and other community organisations with an interest. The team also delivers copies to the key informants, stakeholder representatives and other informants. Team members discuss their findings with them and repeat their thanks for their assistance and insights.

They arrange presentations to larger audiences, including:

- GMCF, NPA and MPA managers;
- Fishers Cooperative Meeting in Mombuka and Fishers Cooperative Meeting in Kela; and
- Mombuka Tourism Association Meeting.

Carol and the Park staff start putting these findings, particularly those about management, into the revised draft Park plans e.g. they established an advisory board with stakeholder representatives to better involve them in the management process. In addition, NPA agrees to fund a 10-year monitoring program to build on this baseline socioeconomic information.

Analysis

CASE STUDY: RAPID ASSESSMENT OF SOCIOECONOMIC CONDITIONS IN KIUNGA NATIONAL MARINE RESERVE, KENYA

The Kenya Wildlife Service (KWS) is responsible for managing all protected areas, including marine protected areas. A few of the protected areas are managed in cooperation with non-government organisations. For example the Kiunga National Marine Reserve is managed with WWF (World Wide Fund for Nature). The Kiunga Reserve is in a remote and sparsely populated area in northern Kenya, and was given the status of marine reserve rather than a Marine Park to allow local fishing activities to continue, because people in the area are dependent on fishing for their livelihood.

KWS and WWF are jointly preparing a management plan for the Reserve. KWS is responsible for collecting biophysical data and management of the Reserve. WWF is responsible for providing socioeconomic data and forming partnerships with local communities. From January – March 1996, WWF and KWS did a socioeconomic Participatory Rapid Appraisal (PRA) to help prepare a management plan.

Two years later, KWS and WWF did a rapid assessment of biophysical and socioeconomic conditions in the Reserve, supported by UNEP (United Nations Environment Programme) and FAO (Food and Agricultural Organisation of the United Nations). The rapid assessment aimed to fill in gaps in the previous WWF and KWS PRA and to further examine the use of coral reef resources. The goal was to collect data to help develop a management plan, and contribute to the development of rapid assessment methods for Eastern Africa by UNEP and FAO. The specific objectives for the socioeconomic part were to determine how much user communities depended on coral reefs and fisheries resources in the Reserve, and to learn what locals considered to be problems in the use of these resources.

The regional partnership coordinator of KWS and the education and awareness officer of WWF carried out the assessment, with the assistance of a forest officer from Kenya Agricultural Research Institute (KARI). All three are Kenyan nationals with some experience in socioeconomic assessments.

During the preparations, the team visited community leaders to introduce themselves and their objectives. The visits also strengthened confidence of the villagers in the assessment. This was important as local fishermen are afraid that the legal status of the protected area may change from reserve to park, and exclude them from traditional fishing grounds.

They started the assessment by reviewing available secondary data, including the earlier WWF/KWS Participatory Rapid Appraisal. They used a combination of techniques to collect field data:

- semi-structured interviews of individuals and groups of fishermen;
- direct observations;
- site visits; and
- informal discussions with key informants (local administrators and village elders).

The team focused on 6 villages in the Reserve as the study sites. They interviewed 42 randomly selected women and 78 men, including 60 fishermen (approximately 25% of the total fishing population in the area). The other 18 men were either mangrove cutters or farmers. The women did household work, and sometimes subsistence farming or collection of cowry shells for sale. Fishermen from villages outside the Reserve who fished in the Reserve were interviewed in fishing camps near the Reserve, where they stay during their fishing trips.

The semi-structured interviews were based on open-ended questions to collect as much information as possible on people's knowledge and to allow more freedom in the answers. All interviews were done in Kiswahili, the local language in the area. The interviews focused on the following:

i.   household demographics;
ii. fishing grounds, seasonality and species caught;
iii. fishing techniques and gears;
iv. fish products and market characteristics;
v.   perceived trends in the status of the resources;
vi. perceived problems related to resource use and suggested solutions.

Landing site for fishermen in Kiunga (Photo: Mohammed Suleiman).

Analysis

The Department of Fisheries supplied fisheries statistics for the Kiunga Reserve area. Spatial data and time lines were not included in the rapid assessment, since these were collected in the previous PRA.

The biophysical and socioeconomic teams made visits to the fishing ground guided by two local fishermen. The socioeconomic team found that this visit gave much more detailed information about resource use than the fishermen told them in interviews. The field visits also assisted in the integration of the biophysical and socioeconomic data, by relating information on the use of resources (from the socioeconomic team) with the data on the status of the resources (from the biophysical team).

The results were presented in the report 'Rapid Assessment of Coral Reef Biophysical and Socio-economic Conditions in the Kiunga National Marine Reserve, Kenya', which had descriptive text and tables. These tables listed gear types and their condition, ownership of boats, seasonal use of the various reefs, and fisheries statistics on catch per month. Throughout the report, the local names of reefs (or parts of reefs that had specific local names), fishing gear and fish species were used. The socioeconomic part of the report was organised as follows:

> *Objectives*
> *Introduction*
> *The Survey Method and Process*
> *Results and Discussion* – including description of study villages, the role of women in fishing communities, fishing gear and techniques, fish catch statistics, indigenous knowledge, etc
> *Problems in Resource Utilisation* – use of destructive fishing methods, inadequate equipment, low prices of produce, loss of control of resources
> *Community Conservation*
> *Conclusions and Recommendations*

The *Problems in Resource Utilisation* section discussed the following issues identified by fishermen on the use of the coral reef resources in the Reserve:

- *use of destructive methods,* such as ring- or pull-seine nets with a small mesh size, which the fishermen say are destroying the reefs;
- *inadequate and poor equipment,* one reason why fishermen had low catches. No boats had motors or were large enough for offshore fishing;
- *low prices of fish,* lack of cool storage capacity and lack of an organised market structure keep prices of fish and other marine products down. Most of the fish (80%) are sold for about $0.7 per kg dried fish;
- *loss of control in management of the resources,* a serious problem in all villages. Though dependent on the resources, the villages have no

legal ownership over the land. Some tourism activities have started in the area, but the benefits (job opportunities and income) go to outsiders, and there is little support for reserving some areas for tourism. Questions over land ownership and acquirement of land add to the villagers' resistance to these investments.

In the *Conclusions and Recommendations* section the report recommended initiating the following:

- a program to raise awareness and enhance knowledge about the Reserve, its purpose and how it can contribute to improved resource management;
- empowerment of the local communities in management of resources and training in skills in recording fish catches;
- regular meetings between KWS, NGOs and local communities in the area;
- development of clearer procedures and regulations for resource use within the Reserve to facilitate for local communities; and
- a program for gear improvement. Better vessels that enable villagers to fish offshore would spread the fishing pressure over a larger area.

Analysis

APPENDIX A: SOCIOECONOMIC PARAMETERS

Following are descriptions of the socioeconomic parameters and associated sub-parameters. The sub-parameters are general guides, not a definite list of topics for each parameter. Sometimes there is overlap of sub-parameters between parameters, e.g. a sub-parameter for Resource Use Patterns is 'Reef stakeholders' which overlaps with the parameter 'Stakeholder Characteristics'. These overlaps are included where the information is important for both parameters.

Each section describes:
- why it is important to assess the parameter;
- the parameter and its sub-parameters in general terms;
- data collection methods and visualisation techniques; and
- analysis.

The assessment team should also refer to the information on secondary data analysis, data collection and data analysis in *Chapter 2, Assess Secondary Data*, *Chapter 3, Data Collection Methods and Visualisation Techniques* and *Chapter 4, Final Data Analysis.* These chapters provide information on the whole process, whereas the sections in this appendix focus on specific parameters.

The tables are lists of sub-parameters, relevant questions, indicators, units of measurement, methods and visualisation techniques. The questions should guide the assessment team in analysing each sub-parameter and in determining what questions to ask. However, the team members need to modify the questions to suit the stakeholder group they are interviewing.

1. RESOURCE USE PATTERNS

Introduction
Reef managers use information on resource use patterns to determine:
- what reef-related activities will be affected by development and management strategies;
- what reef-related activities should be monitored over the long-term;
- who benefits and who loses from development and management strategies e.g. if the reef manager is considering establishing a no-fishing zone, then the manager can review the use patterns information to determine how many fishers may be affected by this policy; and

- how to minimise impacts on the reefs e.g. if diving is determined to be one of the major activities impacting the reefs, then the reef manager may decide to install mooring buoys.

Description

Resource use patterns are the ways people use or affect reef resources. These involve assessing the following topics for each sub-parameter:

Reef-related activities
- activities that directly or indirectly affect reef resources, including land- and sea-based activities; and
- impacts that these activities have on the reef resources.
  (see *Chapter 1, Identify Stakeholders* and *Table 1-2* for potential reef-related activities and impacts on the reefs)

Reef stakeholders
- type and number of primary stakeholders (use the reef resources directly);
- type and number of secondary stakeholders (do not use reef resources, but can affect the reef); and
- basic characteristics of each e.g. gender, residency status, age (see *Appendix A, Stakeholder Characteristics*).

Techniques for reef-related activities
- technology used in reef-related activities;
- techniques for applying that technology; and
- ways people organise themselves in these activities.

Use rights
- formal legal arrangements;
- informal traditional systems that influence how stakeholders access reef resources and affect reef use patterns, including open-access, communal, group and private rights (see *Appendix A, Organisation and Resource Governance*).

Location of reef-related activities and stakeholders
- where reef-related activities occur;
- where stakeholders live and work; and
- reef location for comparison.

Timing and seasonality of activities
- daily, weekly and monthly patterns of resource use;
- seasonal changes; and
- long-term trends in resource use.

Data collection

The assessment team should start the data collection by assessing the sub-parameter, 'Reef-related activities', which will help understand the other sub-parameters.

When assessing secondary data, the team should look at the following sources:

- government agencies, including village and town offices; and
- agency reports, maps, statistical reports, and official regulations.

Refer to *Table A-1* to determine which data collection methods and visualisation techniques are appropriate for assessing each sub-parameter. Following are the most useful visualisation techniques and how they are often used:

- *local classifications* – to clarify the reef uses and associated species;
- *maps* – to show the location of activities, residence of stakeholders, and use rights;
- *timelines* – to show when activities occur and the seasonality of events; and
- *drawings* – to show different reef-related activities (e.g. how an aquaculture business is set-up).

Analysis

The team should focus the data analysis and presentation around the major reef-related activities identified in the sub-parameter 'Reef-related activities'. Summarise the relevant information on the other sub-parameters for each activity e.g. if coral mining is the major reef-related activity, then summarise the sub-parameter information about coral mining, including:

- impacts of coral mining on the reef resources (reef-related activities);
- type and number of coral miners and other people directly and indirectly involved in mining (reef stakeholders);
- how coral mining is carried out (techniques);
- what rules, regulations, rights and permissions govern coral mining (use rights);
- where coral mining is carried out and where the stakeholders live and work (location); and
- when coral mining is conducted (timing and seasonality).

These summaries should include text descriptions of the qualitative information and be illustrated with tables, figures and diagrams to clarify and highlight points. Diagrams can be drawn from the visualisation techniques. The descriptions may also include quantitative data, including calculations of totals and percentages, presented as text or in tables, mostly for these sub-parameters: techniques (e.g. number or volume of equipment); levels of impacts on the reef resources (% damage/year); and reef stakeholder (e.g. number and basic characteristics).

Key learning (e.g. where resource use locations overlap, the impacts of proposed management strategies on use patterns) should be developed from this information. This key learning is often reported as 'management implications' or 'recommendations for future management'.

Table A-1: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for resource use patterns.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation Technique
Reef-related activities	What reef-related activities are taking place at sea?	Identification of sea-based activities	Uses and associated reef resources	Ssi, Obs, Sur, Foc	Map, Tra, Lcl
	What reef-related activities are taking place on land?	Identification of land-based activities	Uses and associated reef resources	Ssi, Obs, Foc	Map, Tra, Lcl
	What impacts are these activities having on reef resources?	Types and levels of damage	Types, levels	Ssi, Obs, Sur, Foc	Map, Tra, Lcl
Reef stakeholders	Who is conducting these uses?	Types of stakeholders	Types	Ssi, Sur, Foc	Map, Dec
	How many people are conducting each use?	Number	Amount of each	Ssi, Sur, Obs, Foc	Ran
	What are their basic characteristics (i.e, age, gender, resident status)?	Basic characteristics	Approx. age, resident non-resident, male, female	Ssi, Sur, Obs, Foc	Ran
Techniques for reef-related activities	How are the uses conducted?	Techniques	Explanation	Ssi, Obs, Sur, foc, Ora	Flo, Tra
	What technology is used? How much is used?	Technologies, equipment	Equipment types, volume, area, weight	Ssi, Obs, Sur, Foc, Ora	Flo, Tra
	How is the equipment constructed? Who owns the equipment? How much does it cost?	Construction, Ownership, costs	Construction, owners, prices	Ssi, Obs, Sur, Foc, Ora	Flo
	How do these methods affect the reefs?	Effects on reefs	Quantity of impact	Ssi, Obs, Foc, Ora	Imd
	How are people organised to use reef resources?	Types of enterprise, Forms of ownership, Distribution of benefits	Types, numbers of each	Ssi, Sur, Foc	Flo, Dec
Use rights	What forms of ownership/use rights are recognised on coral reefs?	Forms of ownership /use rights	Open, communal, group, exclusive private	Ssi, Obs, Ora, Foc	Map, Tra
	What rules, regulations and laws govern reef use?	Rules, regulations, laws	Rules, regulations, laws	Ssi, Obs, Ora, Foc	
	How do these affect reef use patterns?	Effects of use rights on usage	Effects	Ssi, Obs, Ora, Foc	Map, Tra

Table A-1 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation Technique
Location of reef-related activities and stakeholders	Where do the uses take place?	Location	Location on chart or map, extent of area	Ssi, Obs, Foc	Map, Ta
Timing seasonality	When do the uses take place (time of year, etc.)? What changes occur at particular times?	Seasonality	Season, month, moon day, tide, hours	Ssi, Obs, Foc	Tim, Scl
	Why do these changes in use occur ?	Explanation	Explanation	Ssi, Obs, Foc	Tim

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

2. STAKEHOLDER CHARACTERISTICS

Introduction
Reef managers use information on stakeholder characteristics to determine:

- what types of people are affected by reef management and how to maximise positive and minimise negative impacts on them e.g. if a manager knows the ethnic diversity of the stakeholders, it is possible to determine if one group will be more affected by management programs than another and revise plans to ensure more even distribution of impacts;
- how important reef use is to the stakeholders and to the whole community; therefore, how much they will be affected by management strategies e.g. if most mangrove cutters are poor and dependent on mangrove cutting for much of their livelihood, they will be heavily affected by restrictions on mangrove cutting;
- how to work with the stakeholders e.g. if the reef manager knows most of the stakeholders only live in the area during the summer, then volunteer programs can focus on those times; and
- how to tailor management strategies to stakeholder needs and backgrounds e.g. if the fishermen have a secondary level education, then the reef education programs should be developed to that level.

Description
A comprehensive assessment of stakeholder characteristics involves understanding:

- what features distinguish coral reef stakeholders within the communities where they live;
- how those features affect the way they use, or create impacts on, coral reef resources; and
- the importance of reef-related activities to the stakeholders.

The following sub-parameters should be described for the whole community and for the particular reef stakeholders to determine their place within the larger community.

Inhabitants and households
- number of people in the community;
- number of households in the community; and
- number of stakeholders in the community;

Residency status
- number of resident stakeholders and community members;
- number of non-resident stakeholders (e.g. visiting tourists, migrant farmers) and length of stay; and
- number of community members living or working outside the community.

Ethnicity, caste and religious background
- number of community members and stakeholders in each ethnic, caste and religious group.

Age and gender
- number of community members and stakeholders in the different age groups; and
- numbers of men and women in community and in stakeholder groups.

Education
- number of community members and stakeholders of different educational levels.

Social status
- community and stakeholder membership in formal and informal organisations.

Household economic status
- relative economic status of households, including stakeholder households; and
- ownership of productive assets by community members and stakeholders (land, tools and equipment, boats, fishing gear, means of transport, etc.)

An important part of understanding stakeholder characteristics is livelihoods; the way people combine the resources and assets at their disposal to make a living for themselves and their families. In order to understand livelihoods, the team should assess the following topics for each sub-parameter:

Community livelihoods
Understanding livelihoods available in the community is important in identifying alternatives available to stakeholders. This involves assessing:

- principal sources of livelihood for different households in the community; and
- secondary sources of livelihood for different households in the community.

Stakeholder livelihoods
- household access to resources – access to coastal land, sea, forest, livestock that people own or have access to and terms of access (see *Appendix A, Organisations and Resource Governance*);
- household access to equipment and infrastructure – fishing gear, means of transport, roads, landing places, water supply, ice plants, agricultural tools etc. (see *Appendix A, Community Services and Facilities*);
- human resources – health of household members, dependence/labour

capacity of household members, education, traditional knowledge (*see Appendix A, Traditional Knowledge),* skills;

- household access to financial resources – income, credit, savings, barter and trade arrangements;
- social assets – family/social networks, patronage, membership of organisations;
- household strategies for combining these resources to create a livelihood;
- costs and benefits of household livelihood strategies;
- factors affecting these strategies – risks, seasonal changes, and calamities; and
- relative importance of reef-related activities to stakeholder livelihoods, including motivations and priorities.

Data collection

The assessment team should first collect secondary data to determine the main sources of income for households and sort out a few broad groups of people dependent on particular livelihood strategies, such as operating glass-bottom boats or fishing. The team may find it difficult to obtain information on stakeholders. Instead, they may need to collect secondary data at the community level. The following secondary data are most often available:

- number of inhabitants and households, residency status, ethnicity/caste/religious background, age and gender distribution and education levels;
- economic status (ownership of key assets such as land, fishing boats) and aspects of social status (particularly membership of formal organisations); and
- sources of livelihood of community members, which often only cover the principal economic activity of individuals or households (specific information on stakeholder households is often unavailable).

The team should refer to *Table A-2* to determine which data collection methods and visualisation techniques are appropriate for the sub-parameters. In general, semi-structured interviews of key informants are the most effective means of assessing characteristics. Household surveys are also useful for assessing sub-parameters that do not deal with particularly sensitive information, such as numbers of inhabitants, residency, ethnic background, age, gender and education. Both household surveys and key informant interviews can be used to identify different variations and combinations of livelihoods (e.g. operating the glass bottom boat during the tourist season combined with fishing during the off-season and part-time during the tourist season). A sample of individual households that employ these different strategies can then be interviewed in more depth.

Following are the most useful visualisation techniques and how they are often used:

- *ranking matrices* – to analyse the relative contribution of different activities to household income or food supply and to present the costs and benefits from livelihoods;
- *ranking matrices* and *time-use analysis* – to show the relative importance of different activities and how household resources are allocated;
- *well-being* or *wealth ranking* – to indirectly assess the sensitive topic of the economic position of households in the community and the way in which local people measure economic well-being;
- *well-being ranking* and *well-being maps* – to show the relative economic status and wealth of households within communities;
- *time use analysis* – to show the time spent by different family members working on different activities;
- *decision trees* and *flow charts* – to analyse how decisions are made about different household livelihood activities and how resources are channelled from one activity to another;
- *seasonal calendars* – to show how activities are combined during the year which are also essential to understand livelihood strategies;
- *seasonal calendars* and *timelines* – to analyse changes that take place over time and how they affect stakeholder households and their livelihoods;
- *social maps* – to show the distribution of different ethnic, caste and religious groups in the community;
- *Venn diagrams* – to show particular membership in formal and informal organisations;
- *flow charts* – to illustrate social assets, particularly linkages between different support networks;
- *decision trees* and *seasonal calendars* – to show how different livelihood activities are combined through the year; and
- *timelines* – to show particular events, shocks or trends that influence their decisions.

For sensitive sub-parameters, such as the relative economic status of households in the community, a mix of methods and techniques may be required e.g. the costs and benefits that households obtain from their livelihood strategies can be studied using semi-structured interviews supported by ranking exercises. Ranking can be used to show relative benefits (e.g. income, food supply) of the different strategies.

Analysis
The assessment team should first analyse the data on the sub-parameters related to general stakeholder and community characteristics (i.e. all the sub-parameters except livelihood). These data should be compared to identify correlations between the data e.g. by comparing information on residency status and age, the team may find that the residents are mostly retired people while the tourists are generally in their mid-20s. These data and the relevant information should be summarised into text and illustrated with tables to highlight the differences and similarities e.g. a table could list

the residency status, education levels and age of the various communities. When available, data on the stakeholders should be shown together with data for the whole community to show how stakeholders compare with the rest of the community e.g. if they have different levels of education than most people in the community, or come from different ethnic backgrounds etc. To further illustrate points in the text, it may be useful to include the diagrams from the visualisation techniques noted in the data collection section.

The analysis of stakeholder and community livelihoods should focus on identifying the ways different stakeholders combine their use of reef resources with other activities and the factors that affect livelihood strategies (e.g. tourism seasonality, fish life cycles). Household case studies are an effective way of presenting these data. These case studies should describe the composition and human resources of the household and their access to, and ownership of, different productive resources, infrastructure and financial resources. These can be presented using a combination of tables, descriptive text and diagrams from the visualisation techniques described in the data collection section.

Table A-2: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for stakeholder characteristics.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation Technique
Inhabitants and households	How many people and households are there in different communities?	Boundaries of community Number of inhabitants Number of households	Location Number of people Number of households	Sur	Map
	How many stakeholders are there in the community?	number of stakeholder households	Number of stakeholders households	Sur	Map
Residency status	How many resident stakeholders and community members are there?	Number of resident stakeholders and community members	Number of resident stakeholders and community members	Sur	Map
	How many non-resident stakeholders are there? What is the average length of stay?	Number of non-resident stakeholders Length of stay	Number of non-residents, including in-migrants Time of stay	Sur	Map
	How many community members live or work outside the community?	Number of community members that live or work outside the community	Number of community members	Sur	
Ethnicity, caste and religious background	How many different ethnic/religious /caste groups are there in the community?	Ethnic groups Caste groups Religious groups	types	Sur, Obs	Smap
	How many people/households are there in each groups and where do they live?	Ethnic groups Caste groups Religious groups	Numbers of members, location Numbers of members, location Numbers of members, location	Sur, Obs	Smap
	What ethnic/caste/religious groups do stakeholder households belong to?	Number of stakeholder households in different ethnic/caste/religious groups	Number of households	Sur	Smap
Age and gender	What is the age distribution in the community?	Number of inhabitants in different age groups	Number of people	Sur	
	What is the gender distribution in the community?	Number of men and women in the community	Number of people	Sur	
	What is the age and gender distribution in stakeholder households?	Number of stakeholder household members in different age groups Number of men and women in stakeholder households	Number of people Number of people	Sur	

Table A-2 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation Technique
Education	What are the educational levels of people in the community?	Number of people with different levels of education	Number of people	Sur	Map
	What are the educational levels of people in stakeholder households?	Number of stakeholders with different levels of education	Number of people	Sur	
Social status	What formal and informal organisations are there in the community and what is their function?	Types of organisations	Types of organisation	Sur	Ven, Smap
	Who participates in these organisations? How many stakeholders participate in these organisations?	Numbers of members Numbers of participating stakeholders	Members Members	Sur	Ven, Smap
Household economic status	What is the relative economic status of different households in the community?	Relative well-being ownership of productive assets (land, tools and equipment, boats, fishing gear, means of transport, etc.)	Well-being ranking Assets owned	Sur, Ssi	Wel, Wmap, Map
	What is the relative economic status of stakeholder households?	Relative well-being ownership of productive assets (land, tools and equipment, boats, fishing gear, means of transport, etc.)	Well-being ranking Assets owned	Sur, Ssi	Wel, Wmap, Map
Community livelihoods	What are the different sources of livelihood for households in the community?	Different types of livelihood activity Relative importance of different livelihood activities	Types of livelihood activity Relative importance of livelihood activities	Sur, Ssi	Ran
Stakeholder livelihoods	What natural resources do stakeholder households have access to?	Land/water/livestock ownership access arrangements for common resources	Quantity/numbers owned types of access arrangement	Sur, Ssi,	
	What knowledge and skills to stakeholder households have at their disposal?	Educational levels traditional knowledge Skills	Numbers of household Members with different levels of education types of resources, locations, causes & effects, techniques	Sur, Ssi	
	What equipment and infrastructure do stakeholder households have access to?	Tools and equipment Access to infrastructure	Types of tools and equipment, numbers owned, arrangements for used	Sur, Ssi	

Table A-2 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
	What financial assets do stakeholder households have at their disposal?	Income, credit access, savings, barter and trade	Amount of cash income, quantities of income substitution Amount of credit used, indebtedness,arrangements for credit, types of savings, amounts saved, amounts bartered or traded, Arrangements for barter and trade	Ssi	Dec, Flo, Ran
	What social networks do stakeholder households have access to?	Support from family networks, Reciprocal exchange with other community members, social security arrangements, patronage systems	Relations with family & relatives, amount/ type of assistance received Types of reciprocal exchanges, amounts exchanged Types of arrangement, amounts of assistance received types of patronage, benefits / costs	Ssi	Flo,Ran
	What formal and informal organisations do stakeholder households participate in?	Types/numbers of organisation participation in organisations	Types/numbers of organisation membership, participation	Ssi	Ven
	How do stakeholder households combine the resources at their disposal to support their livelihoods?	Resources used, timing of activities people involved	Types of assets, quantity/ numbers used time of day, seasons numbers of people, relationships between people,	Ssi	Ran, Dec, Flo, Scl
	What benefits do people get from their livelihood activities and what costs do they incur?	Earnings, other benefits, costs	Quantity of income, food, material, money labour, types of benefits	Ssi, Ran	Ran
	What factors influence stakeholders' livelihood strategies?	Risks, seasonal changes, shocks and calamities, trends	Types/occurrence of risks Seasons/seasonal events Occurrence of shocks and Calamities	Ssi	Scl, Tim

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being ranking).

3. GENDER ISSUES

Introduction
The roles, rights and responsibilities of the genders are important, to understand:

- how issues relating to coral reefs, including management strategies, affect women and men differently;
- how to change management strategies to the specific needs of the two genders e.g. it may be more appropriate for men to collect water samples for reef research while they are fishing; whereas women could assist with reef education programs in the schools;
- who to involve in reef management programs e.g. if older women play a critical role in the household, they may help with resource governance;
- the role women and men play in resource use and how to involve them in resource management e.g. if women use the reefs (e.g. women gleaners), but are not represented in decision-making bodies, the reef manager may need to develop particular approaches to consider their needs and involve them in management programs;
- the full range of activities affecting the reefs e.g. the reef manager may learn about new activities by asking the women directly; and
- the significance of reef-related activities to men and women e.g. gleaning may be an important means of socialising for women, which should be considered when deciding how to manage this activity.

Description
Gender issues refer to the different roles, rights and responsibilities of men and women that are determined by social and cultural norms, rather than by biology. For example, women give birth to children and play a key role in child nutrition in early infancy (biology), but women in some societies do all domestic work and have little influence in community organisations and decision-making (social and cultural norms).

Gender issues need to be assessed in terms of the following practical and strategic gender issues:

Practical gender issues
These refer to the different needs of women and men within their existing roles in society e.g. because of the roles in a society, men may be more concerned with fishing while women may be more concerned with gathering household water and collecting fire wood. Analysis of practical gender issues involves assessing the roles of women and men in resource use, livelihoods, and work within the household, including:

- involvement in income-generation;
- control over the benefits of their work;
- role in household work;
- time use;
- asset ownership; and
- access to resources.

Strategic gender issues
These refer to the structure of the relationship between women and men. For example, involving women in decision-making about coral reef resource use may mean changing perceptions about the position of women in society compared to the men. This may mean addressing issues such as women's access to education and their mobility within the community. Analysis of strategic gender issues involves assessing the local perceptions of:

- rights of women and men in the household (e.g. participation and influence in household decision-making, rights of inheritance);
- rights of women and men in the community (e.g. participation and influence in community decision-making, participation in organisations); and
- the security and vulnerability of women.

Data collection

Gender roles is a sensitive subject, which is often not easily and openly discussed. Therefore, the team should first study the less sensitive topic of practical gender issues, and then look at strategic gender issues. It is best to study the roles of men and women when assessing *all* the parameters e.g. if the team talks to people about resource use patterns, they can specifically ask about resource use by men and women, and why they use resources in different ways.

The assessment team may find there are few useful secondary data on gender issues other than the numbers of men and women in communities. Secondary data, such as census survey data and other statistics, normally do not list different gender roles.

Refer to *Table A-3* to determine the appropriate data collection methods and visualisation techniques for each sub-parameter. The most useful methods are generally semi-structured interviews, focus group interviews and oral histories. Key informant interviews with people knowledgeable of gender issues (e.g. professors in social science departments, people working with women's organisations) can be particularly useful. When doing focus group interviews the team should follow these guidelines:

- develop good relations with the participants before doing a focus group interview;
- ensure the facilitator is well-prepared and sensitive to the issues being addressed;
- ensure that participants are as homogeneous as possible because of the sensitive nature of gender issues;
- consider placing women and men into separate groups, but also work with them together as the interaction and discussion of relative roles and responsibilities can be informative;
- carefully assess whether male team members can effectively facilitate female focus group interview on gender issues, and vice-versa, which will depend on the social and cultural context; and
- start the discussion with practical gender issues as a way to approach

more strategic issues.

Following are the most useful visualisation techniques and how they are often used.

- *time use analyses* – to analyse how women and men allocate their time to different tasks;
- *seasonal calendars* – to assess the different activities carried out by men and women during the year and how they are affected by seasonal changes, which can show women's involvement in income-generation;
- *matrix ranking* – to establish household labour roles, women's control over benefits and their access to resources; and their participation in different activities relative to men;
- *decision trees* – to illustrate how women participate in decision-making and how they control the benefits of their work;
- *Venn diagrams* – to show women's participation in different formal and informal organisations; and
- *timelines* – to show changes and trends in gender roles.

Analysis
The assessment team should base analysis of the data collected specifically on gender issues and the data on all other parameters should be split to distinguish differences between men and women.

These data should be summarised into text descriptions of the different sub-parameters, based on the qualitative information from anecdotes and oral histories from semi-structured and focus group interviews. The assessment can also use diagrams from the visualisation techniques and case studies of households to illustrate specific points. Quantitative data, such as the gender distribution in the population, should also be included in the text or as a table. The team should identify key learning (e.g. how gender roles affect stakeholder relations with the reef resources; how increasing out-migration by male workers and the presence of female-headed households indicate that households are vulnerable to poverty) from these descriptions and include them in the report.

Table A-3: *Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for gender issues.*

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Practical gender issues	What is women's role in income-generating activities?	Income-generating and income, substitution activities that women are involved in, time spent on	Types of activity, time spent, seasonal distribution	Sur, Ssi, Foc	Map, Ran, Tua, Scl
		Income-generation and income-substitution, seasonal patterns			
	How much of the benefits of income-generating activities do women control?	Women's control over the benefits of their work	Decisions on expenditure, savings, resource use	Ssi, Foc	Dec
	What is women's role in household work?	Household tasks regularly performed by women, time spent by women on those tasks	Types of tasks, time spent	Ssi, Sur, Foc	Tua, Scl
	How do women spend their time?	Women's time use (daily), women's time use (seasonal)	Time	Ssi, Sur	Tua, Scl
	What assets do women own?	Assets owned, actual use of assets	Types of assets, quantity/numbers owned, use	Ssi, Sur	Ran
	What resources do women have access to?	Ability access to resources, actual use of resources, terms of access	Types of resources, patterns of use, terms of access	Ssi, Sur	Ran, Dec, Flo
Strategic gender issues	What are the relative rights of men and women at the household level?	Participation in household decision-making, ability to influence household level decisions, control over household resources, rules of inheritance and how they effect women	Types of issue where women make decisions, decisions taken reflecting women's priorities, assets owned	Ssi, Foc	Dec
	What are the rights of women at the community level?	Participation in community decision-making organisations, ability to influence community level decisions, control over community resources	Women members of decision-making bodies, organisations, decisions taken reflecting women's priorities resource use by women	Ssi, Foc	Ven, Dec
	What factors contribute to women's security?	Household stability, food security, civil unrest	Episodes of insecurity/vulnerability/violence affecting women, episodes of food insecurity, episodes of civil unrest	Ssi, Foc	Tim

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

4. STAKEHOLDER PERCEPTIONS

Introduction
Information on stakeholder perceptions of reef conditions, threats, management strategies, other stakeholders, and cultural beliefs is used by reef managers to:

- change management strategies to these perceptions e.g. a perceived crisis in stock depletion on the part of fishers and government can start successful co-management in fisheries (Pinkerton 1989);
- help predict and explain stakeholder reactions to management efforts and plan accordingly e.g. if fishermen believe the marine resources are linked to the spiritual world and that catches depend on their relations with the gods, it will be difficult to convince them that their fishing activities affect catch levels;
- sensitise management strategies to cultural beliefs e.g. if reef fish have religious significance, then the reef manager should seek the support of religious leaders to ensure management strategies do not offend these beliefs;
- anticipate stakeholder levels of compliance and support e.g. if watersports operators do not feel that anchoring on the reef is damaging, they may not use moorings without additional incentives;
- obtain ideas for measures to improve reef management e.g. fishermen banned from fishing may suggest alternative jobs that they would like training in;
- determine the extent stakeholders can work together and with the reef managers e.g. by knowing there are strong feelings of antagonism between the fishing communities, the reef manager may decide to work one-on-one with representatives of the communities rather than establishing a joint advisory board; and
- determine how past, current and future reef management programs are perceived and the level of support the reef managers have e.g. if dive businesses strongly support reef management, whereas the fishermen have a history of distrust, the reef manager can approach the dive operators about assisting with management programs while working on building better relations with the fishermen.

Description
Stakeholder perceptions should be assessed in terms of how stakeholders think about the following sub-parameters:

Reef conditions
- stakeholder perceptions of the condition of the reefs;
- the basis for these perceptions (e.g. first-hand knowledge, news reports, statements from the local reef management authority);
- how these perceptions affect the way they use the reef;

- how much consensus is there on reef conditions; and
- how they feel conditions will change in the short-term and long-term and explanations for those changes.

Threats to the reefs
- what human or natural events, activities or changes do stakeholders feel have affected or are affecting the reef resources;
- the extent to which stakeholders believe their own activities affect the reefs;
- what changes in reef conditions the stakeholders attribute to these threats; and
- how they compare the threats in terms of levels of impact.

Reef management
- how stakeholders define 'management';
- stakeholder familiarity with existing formal and informal management programs, including systems of tenure or ownership over reef areas;
- the purposes these programs serve in social, cultural and economic terms;
- what stakeholders perceive to be the responsibilities of management authorities, including formal and informal organisations;
- what stakeholders think of these management programs and authorities;
- ways stakeholders think the management authorities could improve their performance; and
- what management strategies stakeholders think need to be started.

Stakeholders
- what stakeholders think about their own group, their community, and other stakeholder groups, particularly in relation to the reef resources and reef-related activities;
- the extent that stakeholder groups have similar interests about reef management;
- what kinds of relations are there within and between groups and what factors influence these relations;
- current or past conflicts and issues regarding reef use and why stakeholders think they started, how they were resolved and what can be done to prevent them from occurring again; and
- perceptions of the roles played by different stakeholder groups in caring for the reef, including who they consider responsible for reef management, what they think are the different roles of different groups involved, and what they think their own role is or should be.

Culture and beliefs
- how stakeholders value the reef resources, other stakeholders, reef-related activities, and associated items in non-money terms e.g. a particular fish may be the symbol of the village;
- stakeholder beliefs and culture specific to reef resources, other

stakeholders, reef-related activities and associated items e.g. there may be a tradition of not fishing on Sundays; and

- how the local culture and general beliefs affect the way people think about reef resources, stakeholders, reef-related activities and associated items.

Data collection

Stakeholder perceptions are very difficult parameters to assess because people's perceptions, opinions and attitudes are highly variable and often there are few secondary data on stakeholder perceptions.

The assessment team should refer to *Table A-4* to determine the data collection methods and visualisation techniques appropriate for studying the sub-parameters. Semi-structured interviews, oral histories, and focus group interviews are often the most useful methods. Observations may also be used in a few cases, particularly to assess relations among stakeholders and to learn more about tenure and ownership rights; however, the team will usually need to talk directly with people to fully understand their beliefs, perceptions and knowledge.

Visualisation techniques are particularly important when assessing stakeholder perceptions because they provide visual and oral ways of communicating ideas. Following are some of the most important visualisation techniques and how they are often used:

- *maps* and *transects* – to identify stakeholder perceptions of where reef resources, reef-related activities, conflicting uses, stakeholders and tenure systems are located;
- *timelines* and *historical transects* – to help people explain when changes occurred in reef conditions, when past impacts took place and when conflicts occurred among stakeholders;
- *ranking exercises* – to compare and prioritise stakeholder perceptions of other stakeholders, reef conditions, changes in conditions, impacts on the reefs and priority reef management needs;
- *local classifications* – to understand stakeholder knowledge of the reefs;
- *decision trees, Venn diagrams* and *flow charts* – to help explain changes in reef conditions, management responsibilities, and relationships among stakeholders; and
- *Venn diagrams* – to provide insight into how different stakeholder groups view each other and consequently to what extent they may be willing to participate and co-operate in reef management.

Analysis

The assessment team should start analysis of stakeholder perceptions by developing text descriptions of each sub-parameter based on the relevant data. These data are often qualitative, including anecdotes, stories, historical accounts and legends, informant observations of apparent causes and effects, and opinions regarding how the reef should and should not be used. Therefore most of these data should be summarised and presented in written text. The team should illustrate the points in the text with diagrams from the visualisation techniques that ensure stakeholder perceptions are being accurately presented.

Table A-4: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for stakeholder perceptions.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Reef conditions	What are stakeholder perceptions of reef conditions? What is the basis of these perceptions?	Reef conditions, basis for those perceptions	Conditions	Ssi, Ora, Foc	Map, Tra, Scl, Ran
	How do these perceptions affect the way they use the reef?	Effects on use	Effects	Ssi, Foc	
	How have reef resources been perceived to have changed in the short and long-term?	Changes in reef conditions	Changes	Ssi, Ora, Foc	Ran, Map, Tra, Tim, Htr
	How do stakeholders explain these changes?	Explanations of changes	Explanation	Ssi, Ora, Foc	Flo
Threats to the reef	What events, activities or changes do stakeholders feel have affected or are affecting the reef?	Threats to reefs	Activities	Ssi, Ora, Foc	Map, Tra, Tim, Htr, Flo, Ran
	What changes in reef conditions do stakeholders attribute to these threats? How do stakeholders compare the threats in terms of levels of impact?	Changes in reefs due to threats	Changes, Ranking of threats	Ssi, Ora, Foc Flo	Ran, Map, Tra,
Reef management	What does 'management' mean to reef stakeholders?	Meaning of 'reef management'	Definition	Ssi, Foc	
	To what extent are stakeholders familiar with existing management programs and strategies?	Existing management programs	Level of familiarity	Ssi, Foc	
	What are the perceived responsibilities of the management authorities? Where is responsibility perceived to come from? To what extent are they perceived to be effective in fulfilling those responsibilities?	Responsibilities effectiveness	Responsibilities, level of effectiveness	Ssi, Foc	Flo
	How do stakeholders think the managers could improve performance? What management strategies do they think are needed to improve reef conditions and ensure sustainable use?	Means of improvement, proposed management strategies	Management strategies	Ssi, Foc	

Table **A-4** (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
	What formal and informal systems of tenure or ownership over reef areas are recognised by stakeholders? What purposes do they serve in social, cultural and economic terms? To what extent do these systems of tenure and ownership overlap?	Tenure and ownership, purposes, overlap	Tenure/ownership systems, purposes (social, cultural, economic), extent of overlap	Ssi, Foc, Obs	Map, Tra
Stakeholders	How do stakeholders perceive their own stakeholder group and others? To what extent do they have similar interests in management? What kinds of relations are there between groups? What factors influence their relations?	Perceptions of own stakeholder group and other groups, relations	Attitudes, relations (friendly, confrontational, neutral), factors	Ssi, Foc, Obs	Ran, Ven
	What current or past conflicts are there between stakeholder groups regarding reef use? Why do stakeholders think they arose? How were they resolved? What can be done to prevent them from occurring again?	Conflicts	Types of conflicts, factors	Ssi, Foc, Ora, Obs	Tim, Map, Ven
	Who do reef stakeholders think is responsible for reef management? What do they think are the roles of different groups involved? What do they think their own role is or should be?	Roles and responsibilities	Roles and responsibilities	Ssi, Foc	Flo
Culture and beliefs	What aspects of reef user culture affect the way they think about reefs? What specific beliefs do they have about reefs, reef users, or reef use? What attitudes to reefs do these beliefs indicate?	Culture and beliefs	Cultures, beliefs, attitudes	Ora, Ssi, Foc	

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

5. ORGANISATION AND RESOURCE GOVERNANCE

Introduction

It is important to understand the informal and formal organisations that influence how coral reef resources are used and the ways the reef resources are governed, to:

- determine existing levels of control over human activities, which will affect the extent that stakeholders are likely to accept additional management strategies;
- determine how to adapt new management programs to existing programs e.g. if tribal councils make decisions about how resources are used and who can use them, then the manager needs to understand these procedures and adapt plans to comply with these existing programs;
- identify the position of stakeholders and communities in the larger political context, which may influence management strategies and the potential for collaboration e.g. there is a greater chance for consensus if the local context includes 20 villages in one township than if the 20 villages are divided among three townships; and
- determine how to work with key organisations and individuals e.g. if the reef manager understands the goals of the community groups, then it may be possible to enlist their involvement in appropriate programs, such as awareness campaigns or data collection programs.

Description

Organisations are groups of individuals bound by a common purpose to achieve objectives (North 1990). These include formal and informal, government and non-government decision-making and representative bodies, cooperatives, associations, institutions and agencies. This manual is concerned with organisations that formulate, supervise, monitor and enforce the various rights, rules and regulations governing reef uses.

Resource governance is the way in which resource uses are managed by sets of rules, social norms and shared strategies and includes enforcement mechanisms, such as policing measures and punishments. Resource governance can include:

- formal and informal forms of ownership;
- use rights and the laws that support these rights; and
- the rules, rights and regulations that dictate how resources can and cannot be used.

Resource governance can be defined by formal organisations and law, by traditional bodies or by accepted practice.

Organisation and resource governance should be assessed with the following sub-parameters:

Political context
- the political structure of the nation (e.g. villages, municipalities, counties, countries, states);
- the key positions at each political level (e.g. village chief, municipal mayor);
- the extent to which, and ways in which, stakeholders are represented; and
- democratic processes and levels of representation.

Government administrative structure
- the government agencies that influence reef-related activities (e.g. Ministry of Tourism), including agencies that have jurisdiction over coral reefs and direct uses (e.g. Fisheries Division) (see *Chapter 1, Identify Stakeholders* in which the relevant institutions, including government agencies, were identified);
- the levels within the government agencies (e.g. Tourism Office, Environmental Unit);
- the key positions within these agencies (e.g. Town & Country Planner);
- the informal and formal responsibilities and authorities of these agencies and positions with respect to reef management; and
- interactions between this administrative structure and the political context.

Non-governmental organisations
- identification of non-governmental organisations associated with the stakeholders and communities that are not government agencies (e.g. universities, environmental groups, religious organisations, stakeholder-specific organisations, such as hotel associations and fisheries cooperatives) (see *Chapter 1, Identify Stakeholders* in which institutions, including NGOs, were identified);
- functions of the NGOs;
- structure of the NGOs, including membership;
- history of the NGOs; and
- interactions between organisations and spheres of influence.

Use and property rights
- existing use and property rights, including the type of property rights (e.g. state, open, common, private) and the types of use rights (e.g. access, withdraw, management);
- related rules and regulations, including transferability of rights and boundary distinctness;
- whether these rights exist by law (*de jure*) or by precedent (*de facto*);
- surveillance and enforcement measures, including how stakeholders with use rights monitor other stakeholders (e.g. post guards, patrol the area by boat, deploy spirits) and how they punish violators (e.g. fines, jail terms, social or physical banishment, supernatural sanctions); and
- compliance levels.

(see also *Appendix A, Resource Use Patterns* and *Appendix A, Stakeholder Perceptions*).

Management efforts
- existing management strategies and programs (e.g. protected areas, zoning for coastal development, reef restoration) and dates of implementation;
- conflict management, surveillance and enforcement measures (see *Use rights*);
- levels of organisations responsible for these management efforts (international, national, state, municipal or local authority, co-management, community management);
- the extent of stakeholder participation; and
- compliance levels.

Data collection

Many secondary data on organisation and resource governance can often be obtained from official publications, including court records, official statutes, organisational records, and other secondary data sources.

Refer to *Table A-5* to determine which data collection methods and visualisation techniques are appropriate for studying the sub-parameters. In general the main methods of collecting data are semi-structured interviews and focus groups with key informants, such as government officials, organisation officers, and other knowledgeable individuals involved in the organisations or reef-related activities. Following are some of the most useful visualisation techniques and how they are often used:

- *timelines* - to understand the history of organisations;
- *organisational charts* - to represent aspects of the structure of the political hierarchy and the structure of organisations as well as links between organisations and agencies; and
- *maps* - to illustrate areas covered by specific use rights.

Observations, surveys and oral histories can also be useful, particularly for assessing levels of stakeholder participation, surveillance, enforcement, and compliance. The team may find it difficult to ensure the accuracy of compliance information, since it involves reports of illegal behaviour (for a review of this problem see Viswanathan 1994).

Analysis

The assessment team should summarise the results from each sub-parameter in written text. Some of the governance information (e.g. use rights) logically forms part of the discussion of resource use patterns and may be more appropriately presented in that section. The quantitative data (e.g. frequency of violations) can be presented in text or as tables to complement the qualitative information. In addition, the text can be illustrated with diagrams from the visualisation techniques.

Table A-5: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for organisation & resource governance.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Political context	What are the major formal and informal levels of the political structure?How are they related?	Levels	Names of levels	Ssi, Foc	Map, Ven, Flo, Ran
	What are the key positions in this structure?	Positions	Names of positions	Ssi, Foc	Ven, Ran
	How are people (including reef stakeholders) represented in this structure?	Elected bodies, electoral mechanisms, forums for consultation	Names of bodies/forums, frequency of elections	Ssi	
Government administrative structure	What are the relevant government agencies?	Agencies	Names of agencies	Ssi, Foc	Ven. Flo
	What are the relevant levels within the government agencies?	Levels	Names of levels	Ssi, Foc	Ven, Ran, Flo
	What are the key positions in these agencies?	Key personnel	Names at each level	Ssi, Foc	Ven
	What are their informal and formal roles, responsibilities & spheres of authority?	Authority & Responsibility	Level of authority & scope of responsibility	Ssi, Foc	
	What kinds of interactions are there between the administrative structure and the political context	Interaction with political context	links	Ssi, Foc	Ven
Non-governmental organisations	What NGOs are concerned with reef resources or reef stakeholders?	Identification	Names of NGOs	Ssi, Foc	
	What is the purpose of the NGO and what does it do?	Functions/tasks/ Objectives	List of functions	Ssi, Foc	
	How is the association organised, who controls it, and who are the members?	Structure	Organisational chart	Ssi, Foc	Ven
	How and when was the organisation formed?	History	Time line of organisational activity	Ssi, Foc	Tim

Table A-5 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
	What types of relationships does the organisation have with other organisations, including government agencies, NGOs, development projects, etc?	Relationships Co-operative ventures	Types of relations with other organisations	Ssi, Foc	Ven
Use and property rights	What types of property rights are in place? How have they changed?	Property right types	State, open, common, private	Ssi, Foc	Map, Tra
	What types of use rights are in place? How have they changed?	Use right types	Access, withdraw, management	Ssi, Foc	Map, Tra, Tim
	What rules and regulations are associated with these rights? How have they changed?	Rules and regulations	Rules and regulations	Ssi	Tim
	How are the boundaries defined?	Boundary distinctness	Defined, diffuse, none	Ssi	Map
	How are rights held? To what extent are the rights transferable?	Transferability	Non-transferable, inheritable, free market, group membership	Ssi	
	How are other users monitored? How are rights enforced? How are violators punished?	Surveillance & enforcement	Who, how, and penalty	Ssi, Ora, Obs	Dec, Flo
	What are the levels of compliance?	Compliance violation	Frequency of violations	Obs, Sur,	Tim
	Does anyone ever describe a violation of the regulation being investigated? How frequently?			Ssi, Sec, Ora	
	What conflicts are there regarding use rights and why have they arisen?	Occurrence of conflicts	Frequency	Ssi, Foc, Ora	Tim
	Are these rights based on law or on precedent?	*De jure and de facto*	Law, precedent		
Management Efforts	What management measures are in place?	Management measures	Protected area, gear restriction etc	Ssi, Foc	
	When were these measures implemented?	Implementation	Year, month, day	Ssi	Tim
	Who has authority for these management efforts?	Authority	Government authority, co-management, etc	Ssi, Foc	Ven

Table A-5 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
	To what extent are/were stakeholder involved in these management measures?	User input	How involved	Ssi, Obs	
	To what extent do these measures address conflicts among users?	Conflict management	How address conflicts	Ssi, Foc	
	How are other users monitored? How are rights enforced? How are violators punished?	Surveillance & enforcement	Who, how, and penalty	Ssi, Obs, Ora	
	What are the levels of compliance?	Compliance	Violation rate	Obs, Sur, Ssi, Ora	

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

6. TRADITIONAL KNOWLEDGE

Introduction
Stakeholders' traditional knowledge of reef resources is used by reef managers to:

- contribute to their scientific understanding of reef ecosystems e.g. local fishermen may advise on reef fish behaviour, habitat and migration patterns;
- facilitate interactions with stakeholders by ensuring the managers know as much as the stakeholders, since fishermen may not respect a manager if he is not as knowledgeable about the reef as the locals; and
- facilitate accurate communication and data collection by ensuring the managers, scientists and stakeholders use the same terms.

Description
Traditional knowledge can be defined as knowledge held by stakeholders that is not based on scientific research but comes from stakeholder observations, experiences, beliefs or perceptions of cause and effect. Traditional knowledge about reef-related activities should be assessed by studying the following sub-parameters:

Folk taxonomy
The local names of:

- reef resources;
- location of reef resources, particularly significant places such as fishing grounds and landing sites; and
- reef-related activities.

This also involves understanding how these items are classified e.g. while scientists may divide fauna into families and species using scientific criteria, stakeholders may use very different groups such as edible/non-edible, species that live in similar environments, seasonal availability, etc.

Local knowledge of resources
This refers to stakeholder understanding of the reef resources, including:

- the location of the resources;
- mobility of reef organisms;
- quantity of organisms;
- interactions among organisms;
- feeding behaviours of the organisms; and
- breeding behaviour and locations.

This knowledge also involves understanding how these characteristics have changed over time and why. Local knowledge may be limited to commercially important species, with which stakeholders are often most familiar.

Variations in knowledge
This refers to the range of perceptions among different stakeholders e.g. fishermen may know more about changes in the fish populations because they harvest these resources; whereas divers may be more familiar with coral conditions since they see the corals while diving.

Data collection
The assessment team should start data collection by assessing the sub-parameter 'Folk taxonomy', which will provide important information for the other two sub-parameters.

The team will probably find that there are few secondary data on traditional knowledge, which is often passed by word of mouth from generation to generation. They should refer to *Table A-7* to determine which data collection methods and visualisation technique are appropriate for assessing each sub-parameter. Semi-structured interviews, oral histories, surveys, observations and focus group interviews are all important for collecting information (*Chapter 3, Ranking, Variations* has information on how to collect information on traditional knowledge). During data collection, it is particularly important to record who the informants are and their characteristics, which will be used to assess variations among people and stakeholder groups.

Following are some of the most useful visualisation techniques and how they are often used:

- *local classifications* – to identify local taxonomies;
- *ranking matrices* – to assess variations among individuals and stakeholder groups; and
- *ranking matrices* and *timelines* – to encourage discussion and analysis of changes in resource abundance or other features of local knowledge where relative quantities are important.

Analysis
The data should be summarised into descriptive text of the sub-parameters based on the qualitative information and quantitative data. Tables and figures can clarify and illustrate variations and trends e.g. knowledge of place names and beliefs about distributions of flora, fauna, and minerals can be put on maps; and ranking matrices and timelines created by informants during field data collection can be included to show stakeholder knowledge and perceptions of resource conditions and changes.

Analysis of variations is unique and involves comparing responses from informants to determine the basis of their differences. By comparing the responses on local taxonomies and local knowledge with the informants' basic characteristics, the team can determine the socioeconomic basis of their differences e.g. variation may be related to area of residence or work experience.

Table A-6: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for traditional knowledge.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Folk Taxonomy	What are these reef organisms called?	Local names of reef organisms	Names	Ssi, Foc	Lcl,
	What are the names of the places Where the reef resources are located?	Local names of reef locations	Names	Ssi, Foc	Lcl, Map
	What are these reef-related activities called?	Local names of activities	Names	Ssi, Foc	Lcl
Local knowledge of resources	How many of this resource are there? How has the quantity changed over time? Why?	Quantity	Number, changes, explanation	Ssi, Sur, Foc, Ora	Ran, Tim
	Where are they located (where are they caught or seen)? Does this change with time (hour, day, moon, month, season, year)?	Location	Location on map, changes, reasons	Ssi, Sur, Foc, Ora	Hmap, Map, Tim
	How has this changed over time? Why? What kinds of interactions are there among the reef organisms (which organisms are likely to be caught together?)?	Interactions	Explanation	Ssi, Foc, Ora	Flo, Ven
	What are their mobility patterns? Feeding patterns? Reproductive patterns? How have these changed over time? Why? Where do these occur?	Behaviour	Behaviours, changes, explanation, location	Ssi, Foc, Ora	Tim, Map
Variations in knowledge	To what extent do individuals agree on the taxonomy? To what extent do stakeholder groups disagree on the taxonomy?	Variations in taxonomy	Differences	Sur, Ssi, Foc	Ran
	To what extent do stakeholders have the same local knowledge? How do stakeholder groups differ in their knowledge?	Variations in local knowledge	Differences	Sur, Ssi, Foc	Ran

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

7. COMMUNITY SERVICES AND FACILITIES

Introduction

Information on community services and facilities is used by reef managers to:

- determine the level of community development, which can influence how stakeholders use local reef resources and how much they depend on them e.g. poor road access might mean that only fish species that can be dried or preserved are caught and sold commercially. The development of better access to urban markets might lead to greater exploitation of different species that can be transported and sold fresh; and
- provide insights on potential impacts on the reef resources e.g. lack of a sewage treatment plant may indicate raw sewage is being discharged directly into coastal waters.

Description

Community services are services provided by individuals or organisations to support the livelihoods of the community as a whole. Community facilities are the infrastructure that supports and facilitates the provision of those services, such as hospitals or clinics for health care, schools for education, television and radio for information, sewerage systems for waste treatment and landing sites or vehicles for transport.

This parameter involves assessing the availability of, and access to, the following services and facilities:

Medical services
- hospitals;
- medical clinics; and
- resident doctors and dentists.

Educational and religious facilities
- colleges;
- technical schools;
- secondary schools;
- primary schools; and
- religious institutions (e.g. churches, mosques, temples).

Public utilities
- sewage treatment facilities;
- electricity supply; and
- water supplies.

Communication facilities
- telephone lines;
- radio signals; and
- TV signals.

Markets
- food market;
- market for manufactured goods;
- market for medicines; and
- market for fuel.

Transportation
- public or private transportation services by road, rail or boat; and
- condition of access routes, particularly roads.

Other facilities
- any other community facilities or services that are significant to the community, such as hotels or inns, restaurants and banks.

Data collection
When researching secondary data on community services and facilities, the assessment team may find useful information in official statutes, courts records, and organisation records.

The team should refer to *Table A-7* to determine which data collection methods and visualisation technique are appropriate for assessing each sub-parameter. In general, surveys, semi-structured interviews and observations are the most useful methods. Surveys are often used to get quantitative data, such as the number of public utilities and communication facilities.

Analysis
The analysis and presentation of community services and facilities data is relatively easy. The team should summarise the data for each sub-parameter into descriptive text. Most of the data will be quantitative (e.g. number of educational facilities, percentage of homes with a telephone), which can be presented in tables to support the text.

Table A-7: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for community services & facilities.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Medical services	How many hospitals, medical clinics, resident doctors and resident dentists are there?	Hospitals, medical clinics, resident doctors, resident dentists	Number of each	Ssi, Obs	Map, Smap, Tra
Educational and religious facilities	How many colleges, technical schools, secondary schools, primary schools, and religious institutions (e.g. churches, mosques, temples) are there?	Colleges, technical schools, secondary schools, primary schools, and religious institutions (e.g. churches, mosques, temples)	Number of each	Ssi, Obs	Map, Smap, Tra
Public utilities	How many homes are connected to a sewerage system? (or have septic tanks?) How many homes have water pumped to their homes? How many homes have electricity?	Sewage treatment, water supply, electricity	Number or percent served	Ssi, Obs, Sur	Tra, Wel
Communication facilities	Does the community have access to the radio, television and/or the internet?	Radio, television, internet	Present/absent	Ssi, Obs, Sur	Tra, Wel
	What percentage of the homes have a telephone?	Telephone service	Percent served	Ssi, Obs, Sur	Tra, Wel
Markets and Retail Outlets	How many food markets, drugstores and gas/petrol stations are there?	Food markets, drugstores and gas/petrol stations.	Number of each	Ssi, Obs	Tra, Map
Transportation	What kind of public transportation is available?	Public transportation	Type and frequency	Ssi, Obs	Tra, Map
Other facilities	Are the roads sealed?	Sealed roads	Present/absent	Ssi, Obs	Tra, Map
	How many hotels/inns, restaurants, banks and other facilities?	Hotels/inns, restaurants, banks, other facilities	Number of each	Ssi, Obs	Tra, Map

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

8. MARKET ATTRIBUTES FOR EXTRACTIVE USES OF CORAL REEFS

Introduction

Information on market attributes is used by reef managers to:

- understand the value of coral reefs in economic, or monetary, terms, which are used to evaluate the costs and benefits of alternative development, management and conservation actions e.g. a decision to ban fishing may be partly based on the anticipated lost income to fishermen; and
- help determine total economic value, which is the sum of market value, non-market value and non-use value (see *Box: Total Economic Value of Coral Reef Uses*);
- indicate actual and potential pressures on reef resources e.g. high demand for coral for construction materials can increase the collection rate;
- provide a general indication of value e.g. the more people employed in fishing activities, the more important the reefs are to the community;
- provide an indication of future use e.g. if coral mining businesses are doing well, then more businesses may enter the market; and
- determine the perceived condition of the reefs e.g. if fishermen are being paid twice as much for their fish catch as in other areas, it may be because the fish are considered to be bigger and healthier.

Total Economic Value of Coral Reef Uses

Coral reef ecosystems provide a host of goods, services and functions that provide values, which combined generate total economic value (TEV). TEV is calculated from use and non-use values. Use values are calculated based on market and non-market values. Market use values are determined by extractive and non-extractive uses as discussed in the Market Attributes for Extractive Uses of Coral Reefs and the Market Attributes for Non-Extractive Uses of Coral Reefs sections. As described in the Non-market and Non-Use Values section, non-use value includes bequest, option and existence values.
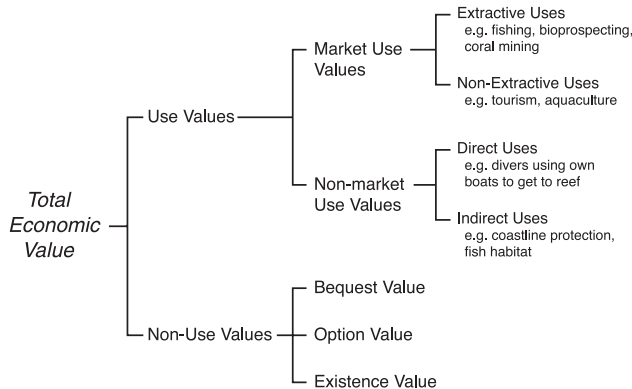
Description

Market attributes of extractive uses of coral reefs refers to the characteristics of buying and selling reef resources that have been removed from the coral reef. Extractive uses refers to activities that take a resource without replacing it. Extractive uses and the reef resources (or products) they typically extract include:

- commercial and recreational fishing – fish and invertebrates (e.g. lobsters);
- mining for construction material – coral/lime and sand;
- harvesting for the aquarium and ornamental trades – fish, invertebrates, coral; and
- harvesting for the pharmaceutical trade (i.e. bioprospecting) – coral, plants, invertebrates.

The market attributes depend on the market, which is an institution that enables product exchanges to take place. The market is the connection between the producer (e.g. fisherman, sand miner) and the consumer (e.g. resident, hotel developer). The market serves both a physical function (i.e. buying, selling, storage, processing, transportation, information) and an economic function (i.e. price, behaviour). Bartering, in which one commodity is exchanged for another, is common in some places, but most transactions are conducted using money. In money markets, the price is the amount of money to buy or sell a product. A market contains all potential buyers and sellers of a product, who come together in the market to set a price for a product. Each market is different and is shaped by different forces (e.g. economic, political, demographic, resource, social, legal). It is, therefore, necessary to conduct an analysis for each individual market.

The following sub-parameters need to be assessed to understand market attributes:

Supply

Supply is the quantity of a product offered for sale at different prices at a given time and place. Generally, the quantity supplied (or made available for sale) is greater when its price is high and smaller than when its price is low. Analysis of supply involves assessing the:

- types of extractive use taking place;
- reef products being extracted;
- value of the products;
- most import coral reef resources for income and for home consumption;
- trends in, and stability of, supply; and
- available markets for selling the products.

Demand

Demand is the quantity of a product that buyers purchase at different prices at a given time and place. Demand is greater at lower prices and less at higher prices because people tend to buy when prices are low. Demand can shift as a result of changes in population, taxes, income, prices of substitutes for a product, etc. When demand and

supply change, price goes up or down depending on the relative size of the shifts. Analysis of demand involves assessing:

- how the products are sold or distributed;
- the primary markets;
- the stability of the markets; and
- the trends in, and stability of, demand.

Market prices
Price is the value of a product determined by an exchange or trade between people. Prices can change over time (season to season, year to year) and are influenced by several factors including:

- supply (production decisions, weather, amount harvested, imports);
- demand (income, prices, tastes, preferences, population, exports);
- marketing (value-added activities, price and cost behaviour, buying strategies); and
- government measures (price supports, supply controls, laws and regulations, trade policies).

Prices are also affected by market structure. The way different buyers coordinate their decisions and actions and adapt to each other can impact upon the prices they pay for a product and the pressure they can put on a producer to harvest coral reef products (see below).

Analysis of market price involves assessing:

- where the prices are established;
- who establishes the local prices;
- the flow of price information, including price adjustment; and
- the effect of the market location on prices.

Market structure
Market structure involves assessing the following characteristics of the organisation of the market and their influence on the state of competition. The state of competition can be defined as perfect competition (many buyers and sellers and no one has control over buying or selling a product), oligopoly (a few people or groups have control over buying or selling a product), or monopoly (one person or group has control of buying or selling a product).

- *the number of buyers and sellers* – the number of consumers and producers, which can influence market prices and products e.g. if the market is dominated by a small number of fish buyers, then the ability of the fishers to get a fair price may be limited and they may be offered lower than competitive prices;
- *buying and selling practices and pricing behaviour in the market* – interactions between buyers and sellers, including *formal and informal*

rules and regulations, marketing and credit relationships, credit terms and price setting e.g. fisher and fish trader relationships often involve service relations, such as credit, processing, and transportation services. This also includes understanding the *ethics* of buying and selling practices e.g. if a seller misrepresents the quality of his products, this would be considered an unethical practice. Practices and behaviours can indicate non-competitive relationships between seller and buyer and impact upon coral reef use patterns. Collusive, predatory or exclusionary practices may result in a weakened bargaining position for sellers and thus an inability to make independent production decisions;

- *marketing channel* – the chain that connects the seller to the buyer. A product may be bought and sold several times before it reaches the consumer. This chain of buyers and sellers sometimes store, transport, grade and process the product; and

- *market concentration* – the number and size distribution of sellers and buyers in the market. Concentration influences the relationships among participants, which influences market behaviour. A simple measure of market concentration is *seller to buyer ratio*. One buyer with 20 or more sellers is considered high. Another measure is *the amount of product handled by a buyer*. One buyer handling over 60 per cent of the product is considered high and may indicate a monopoly or oligopoly. This can affect the prices paid and the production decisions made by producers as they harvest coral reef products.

Market infrastructure and operation
Market infrastructure and operation are the physical facilities and services of the local retail or wholesale market and its rules and procedures of operation. They provide the link between production and consumption. Analysis of market infrastructure and operation involves assessing the:

- market orientation;
- market services provided; and
- market rules.

Data collection
When assessing secondary data, the team should consider the following sources, which typically have information on market attributes:

- government and university reports; and
- daily records from buyers and sellers, which often have detailed information on the products being sold, the amounts sold, and market prices.

The team should refer to *Table A-8* to determine which data collection methods and visualisation technique are appropriate for assessing each sub-parameter. Semi-structured interviews and focus group interviews are the most widely used methods. Observations, particularly market visits, are also an informative way of checking on

prevailing types and prices of coral reef products in the market. The team can observe marketing channels by physically following reef products from their point of extraction through to their point of final sale to identify all the intermediaries involved and understand the relationships between them.

Analysis

The assessment team should focus the data analysis and presentation around the sub-parameters. The summaries of each sub-parameter should include descriptive text, tables and figures.

The team should first describe the market structure to help explain the rest of the market attributes. This analysis will depend on the team's subjective assessment of the situation. The summary may include:

- graphs and tables to illustrate activities such as market channels, trade flows and buyer concentrations;
- a summary table of important market characteristics; and
- flow charts and decision trees to illustrate the market structure.

The summaries of *supply* and *demand* may include:

- tables to show the species, quantity, value, seasonality, trends and market for each product; and
- figures to show changes in supply and demand over time.

The analysis of *market prices* should focus on pricing behaviour of the buyers to provide a systematic way of detecting indications of unfair or exploitative price-setting practices and how such practices are likely to occur. The analysis should address the conditions that may encourage such behaviour (e.g. location, availability of information), the results (e.g. limited marketing opportunities, the weakening of the bargaining power of the producer) and the links between market prices and market structure.

The analysis of *market infrastructure and operation* should include a physical description of the local market place and a description of rules and operation.

Throughout these analyses, the 'multiplier effect' should be taken into consideration. Multipliers are the relationships between some economic activity in the economy and the total change in economic activity throughout the greater economy. The economic activity of one business generates economic activity for other businesses supplying it with product. Many extractive uses of coral reefs have a multiplier effect throughout the economy on income and employment. For example, when a fishermen sells his fish on at the landing beach, that person may then sell the fish to a seafood export business, who in turn may sell the fish to a seafood retail business overseas. These multiplier or indirect economic impacts can be measured using several economic analysis methods, including input-output analysis and economic base study. These analyses are beyond the scope of this manual and should be done by a specialist.

Table A-8: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for market attributes for extractive uses.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Supply	What type of extractive use occurs in the area?	Type of extractive use	Type (e.g. commercial, small-scale, subsistence, recreational)	Ssi, Obs, Sur, Foc	Lcl
	What are the primary harvest methods used to supply each of the products?	Reef organisms harvested	Scale of operation/type of equipment and materials	Ssi, Obs, Sur, Foc, Ora	Ran
	What reef products (fish, molluscs, crustaceans, other invertebrates, algae, seaweed) are extracted?	Reef products harvested	Scientific name or local classification	Ssi, Obs, Sur, Foc, Ora	Tra, Lcl
	What are the primary uses of the products (e.g. coral harvested used to make ornamental jewellery)?	Uses of reef products	Type of use	Ssi, Obs, Sur, Foc, Ora	Flo Ran
	How much of each product is extracted?	Amount	Weight/volume/area	Ssi, Obs, Sur	Ran
	What is the value of each product?	Value	Local currency	Ssi, Obs, Sur	Ran
	What are the 5 most important coral reef vertebrates for income? for home consumption?	Species(local/scientific names)		Ssi, Obs, Sur	
	What are the 5 most important non-coral vertebrates for income? for home consumption?	Species(local/scientific names)		Ssi, Obs, Sur	Ran
	What are the 5 most important coral reef invertebrates for income? for home consumption?	Species(local/scientific names)		Ssi, Obs, Sur	Ran
	What are 5 most important reef plants (algae, seaweed) for income? for home consumption?	Species(local/scientific names)		Ssi, Obs, Sur	Ran
	When are the products available?	Month/season		Ssi, Obs, Sur	Tim, Scl
	How stable is the supply of the products? Are there periods of scarcity of supply that may affect price? Trends over time?	Stability of supply	Quantity over time	Ssi, Foc	Tim, Scl

Table *A-8* (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Demand	How are the products sold or distributed by the seller (home use, given away, sold to a buyer, sold directly to consumer, other)?	Primary market outlet	Type of market	Ssi, Foc	Dec, Flo
	What is the market orientation (export/local demand, retail/wholesale)?	Market orientation	Type of market	Foc	
	What are the primary money markets for the products?	Local, national, regional, international		Ssi, Obs	Flo
	Are these markets ready and stable for the products?	Ready markets for products	Number of markets	Foc	
	To what extent are the reef stakeholders linked to these markets (e.g. by roads and communication)?	Community location	Distance in miles from markets, types of communication	Ssi, Obs	Map, Flo
	To what extent does the market demand for reef products change over time? For which products?	Periods of changing demand	Month	Ssi	Tim
	How do the prices and demand for quantity change as a result? What are the reasons and patterns of change?	Stability of demand	Quantity	Ssi, Foc	Flo, Dec
Market Prices	Where are prices for each product established (e.g. locally, outside the community)?	Who sets prices	Number of buyers	Ssi, Foc	Flo
	Who establishes the local prices (e.g. one buyer or several buyers)?	Factors in price setting	Supply and demand trends	Ssi, Foc	Flo
	To what extent is there a free flow of price information between buyers and sellers?	Price information	Source of information	Ssi, Foc	Flo
	Do prices adjust freely to shifts in supply and demand?	Price adjustment	Producer and retail prices	Ssi, Foc	Dec
	Does the physical location of the market (isolated or accessible) affect prices?	Location of market	Distance to other markets	Ssi, Foc	Dec

Table A-8 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Market Structure	How many sellers regularly operate in the coral reef area?	Number of producers operating	Number	Ssi, Foc, Obs, Sur	Ran, Ven
	What percentage of the producers are residents of the area?	Percentage of resident producers	Number	Ssi, Foc, Sur	
	How many buyers regularly operate in the area?	Number of traders	Number		
	At the local market, what is the ratio of buyers to sellers?	Ratio of producers to traders	Number	Ssi, Foc, Obs	
	Is the buying and selling of coral reef products concentrated in the hands of a few people or many people?	Concentration	Quantity of product handled by each participant	Ssi	Ven
	How many buyers (primary buyer, wholesaler, processor, transporter, storage, retailer) does the product usually pass through from producer to consumer?	Market channels	Type of participants	Ssi, Foc	Ven, Flo
	Are there formal or informal marketing groups (cooperatives, associations) that operate in the area?	Marketing groups	Mandate/membership	Ssi, Foc	Ven, Smap
	What buying and selling practices are in place (e.g. auction, contract, first-come/first-served, other)?	Buying and selling practices	Type	Ssi, Foc	
	Are there observed unethical trading practices (collusion, predatory, exclusionary)?	Observed unethical practice	Collusion/price fixing	Ssi, Foc	
	Are there buyer/seller credit/marketing relationships present?	Presence of credit/marketing relationship	Existence of relationship	Ssi, Foc	Venn
	How does this credit/marketing relationship operate?	Operation of relationship	Description	Ssi, Foc	Venn
	Who sets the prices (producers, traders, others)?	produce free to set selling price	Yes/no	Ssi, Foc	Flo
	Is credit provided? If so, what are the terms of repayment?	Credit	Yes/no; terms	Ssi, Foc	

Table A-8 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Market Infrastructure and Operation	What is the market orientation?	Market orientation	Retail (sale to customer) /wholesale (sale to other	Ssi, Obs	Flo
	What market services are provided (e.g. water, processing facilities, storage, transportation)?	Market services	Type of service provided	Ssi, Obs	Map, Smap
	Are there rules about who can participate in market activities such as buying and selling?	Market rules	Types of rules, fees and procedures	Ssi	

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline; Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

9. Market attributes for non-extractive uses of coral reefs

Introduction

Similar to extractive uses, information on market attributes of *non-extractive* uses is used by reef managers to:

- understand the value of coral reefs in economic, or monetary, terms, which are used to evaluate the benefits and costs of alternative development, management and conservation scenarios e.g. a decision to allow diving in an area may be based on the expected income to the community from tourism activities;
- help determine total economic value, which is the sum of market value, non-market value and non-use value (see *Appendix A, Market Attributes for Extractive Uses of Coral Reefs, Box*);
- provide a general indication of value e.g. the more people employed in the aquaculture industry, the more important the reefs are to the community;
- provide an indication of future use e.g. if the number of aquaculture businesses is increasing and they are doing well, then more businesses may enter the market;
- provide an indication of actual and potential pressures on reef resources e.g. if tourism demand for dive activities is increasing, there may be an increase in the number of boats anchoring on the reef and people kicking, touching and taking coral; and
- determine the perceived condition of the reefs e.g. if divers are paying twice as much to dive in one area than another, it may be because the reef is perceived to be in better condition.

Description

As described in *Appendix A, Market Attributes of Extractive Uses,* a market is an institution that enables product exchanges to take place. Non-extractive uses are activities in which the resource is used, but nothing is taken or consumed as a result of the activity. The two main types of non-extractive use are tourism (including recreation) activities and aquaculture. In contrast to extractive uses, the value of goods and services in non-extractive uses is not directly valued in the market since non-extractive uses do not involve a reef 'product'. For example, divers do not purchase a fish; instead, they purchase the experience of seeing the fish, which reflects the service provided by the reef. Similarly, whereas fish are sold in the market, aquaculture does not extract any reef resources and, therefore, there is no reef product to sell. It is difficult to assess market attributes of non-extractive uses in the same way that they are assessed for extractive uses.

The sub-parameters that need to be analysed focus on the two main non-extractive uses, tourism/recreation activities and aquaculture. Due to the complex nature of assessing the various market attributes of non-extractive uses, only the key sub-parameters are discussed below. Where the assessment team wants more detailed information, specialists may be required.

Demand for tourism activities
This refers to the demand to participate in non-extractive tourism activities, including reef diving, snorkeling, pleasure boating, reef viewing, recreational fishing and beach activities. Demand for tourism activities can be examined by evaluating the following topics for each activity:

- number of customers;
- changes in numbers of customers;
- residence time of customers;
- average expenditure per customer; and
- total expenditure.

Vulnerability of tourism market
Negative impacts on reef resources can negatively impact on the tourism market. This vulnerability to impacts can be evaluated by examining:

- the various activities impacting on the reef resources;
- their levels of impact;
- changes in reef conditions; and
- related changes in numbers of customers.

Characteristics of Tourism Stakeholders
Tourism stakeholders include reef-dependent businesses as well as the businesses that support them, including: hotels, beach resorts, bed and breakfast/small inns, food and/or drink services, pleasure-boat operators, dive boat operators, reef viewing boat operators, recreational fishing boat operators, and retail stores. To understand their role in the market, the team needs to assess:

- number of tourism businesses;
- number of employees;
- characteristics of employees (male and female; local and non-local; seasonal and full-time);
- gross annual earnings;
- when the business opened;
- number of beds (where appropriate); and
- number of customers per year.

Since businesses grow over time, new businesses open, and businesses fail, it is important to collect information on historical trends for each of these topics.

Supply of aquaculture
This refers to the availability of aquaculture businesses, which can be assessed by evaluating:

- number of operators in the area;
- species cultured;
- purposes of culturing;

- culture methods;
- levels of management intensity;
- production periods;
- areas of production;
- amounts of production;
- value of production;
- revenue for each operation; and
- scale of operation.

Characteristics of aquaculture stakeholders

To assess the role of aquaculture stakeholders in the market the following need to be assessed:

- the number of employees in each business; and
- whether they are part-time or full-time.

Aquaculture market structure

This refers to the buying and selling practices regarding aquaculture products and involves assessing:

- number of operators in the area; and
- primary markets for aquaculture products (i.e. home, local, regional, national, international).

Data collection

Limited secondary data on tourism and recreation may be available from the following sources:

- local tourism office, chamber of commerce, related government agencies; and
- private sector groups (e.g. local hotel association).

Secondary data on aquaculture activities may be available from the departments of agriculture or fisheries, which may have information such as the names and locations of businesses.

The assessment team should refer to *Table A-9* to determine which data collection methods and visualisation technique are appropriate for the sub-parameters. In general, key informant interviews, focus group interviews and observations are the most useful methods e.g. a walk through the community can identify tourist facilities and services and aquaculture businesses. In communities where aquaculture is a traditional livelihood or cultural practice, community or fishing leaders may be the key informants. In communities where aquaculture on the reef is a more modern practice done for economic reasons, the key informants may be the owners or managers of the operations. For sensitive topics, such as annual earnings, the tourism and aquaculture businesses may be reluctant to provide information.

Information on average expenditure per customer can be obtained either by asking a sample of visitors how much they have spent for the trip or by talking with visitor-related businesses (hotel, restaurant, dive shop, etc.) and asking them the average expenditure per person. These average expenditures can be multiplied by the number of customers to determine total expenditures, and hence demand, for each activity.

Some of the most useful visualisation technique and how they are often used include:

- *maps* – to learn where tourists come from;
- *maps* and *transects* – to identify tourism and aquaculture businesses and related activities;
- *flow charts* – to illustrate the structure of the market; and
- *impact diagrams* – to illustrate the impact of tourism and aquaculture activities.

Analysis

The assessment team should focus the data analysis and presentation around the sub-parameters. The summaries of each sub-parameter should include written text, tables and figures e.g. a map can show the location of the activities on the coral reef and trends over time can be overlaid on top of the base map.

Demand for tourism activities should be analysed based on:

- how many people visit the area (the more people visiting, the higher the demand);
- whether more, the same or fewer people visit the area over time (increasing numbers indicates high demand);
- how far people travel to visit the area (in general the farther people travel, the higher the value and demand); and
- how much people spend to visit the area (the more people spend to enjoy the resources, the higher the value and demand).

The analysis of the *vulnerability of the tourism market* should use the information on reef conditions and impacting activities as potential indicators of the vulnerability of the tourism market. If reef conditions are declining, the number of visitors may be also declining. Quotes are useful to support general statements regarding perceptions of conditions and their impact on tourism activities. Analysis of the *characteristics of tourism stakeholders* mainly involves establishing growth trends based on the number of businesses, employees, customers and earnings over time.

The analysis of the *supply of aquaculture* should focus on understanding the growth of the industry, including whether culture methods impact the reef, trends in growth and production in the future, and the value of the industry. In cases when the existing businesses are profitable, new operations can be expected to come to the area in the future. The analysis of *characteristics of aquaculture stakeholders* should focus on growth in numbers of employees and how many are part-time vs. full-time, which can indicate the importance of the industry to local employment and income generation.

Analysis of the *market structure* should note the aquaculture business impacts on the reefs, especially in terms of demand for reef species.

Throughout these analyses, the 'multiplier effect' should be considered. Multipliers are the relationship between some economic activity in the economy and the total change in economic activity throughout the greater economy. The economic activity of one business generates economic activity for other businesses supplying it with product. Many non-extractive uses of coral reefs have a multiplier effect throughout the economy on income and employment e.g. when a tourist eats at a local restaurant this generates income not only for the restaurant and staff, but also throughout the greater economy – farmers and fishers may have a new market for their products. Multiplier or indirect economic impacts can be measured using several economic analysis methods including input-output analysis and economic base study. These analyses are beyond the scope of this manual and should be done by a specialist.

Table A-9: Table of sub-parameters, questions, indicators, units of measurement, methods and visualisation techniques for market attributes for non-extractive uses.

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Demand for tourism activities	How many customers per business per day/week/month? How has that number changed over time?	Numbers of customers, changes in numbers of customers	Number, trends	Ssi, Foc, Sur, Obs	
	Where are the customers from?	Residence of customers	Locations	Ssi, Sur	Map
	How much do customers spend on average?	Average expenditure	Amounts	Ssi, Obs, Sur	
Vulnerability of tourism market	How are tourism activities affecting the reefs? What level of impact are they having?	Impacting activities	Impacting activities (walking and anchoring on coral/solid waste/collecting/pollution/sedimentation/high number of users/other)	Obs, Ssi, Foc, Sur	Imd
	What changes are there on reef conditions? To what extent are these changes attributed to tourism	Changes in reef conditions related to tourism activities?	Conditions	Obs, Ssi, Foc	Tra
	To what extent has the number of customers changed? To what extent are those changes related to reef conditions?	Related changes in numbers of customers	Numbers	Ssi, Foc	
Characteristics of tourism stakeholders	How many tourism businesses are there? What kinds of businesses are they?	Number of tourism businesses and types (hotels, resorts, bed and breakfasts, restaurants, etc.)	Number and kind	Obs, Foc, Ssi	Map
	How many employees are there for each business? How many male/females? Local/non-locals? Seasonal/full-timers?	Number of employees and basic characteristics	Number and characteristics	Foc, Ssi	
	What are the gross annual earnings of each business?	Gross annual earnings	Amount	Foc, Ssi	
	When did the businesses first appear in the area?	When the business appeared in the area	Year	Foc, Ssi	
	How many customers are there? How many beds (where appropriate)	Number of customers, number of beds (where appropriate)	Number	Foc, Ssi	

Table A-9 (continued)

Sub-parameters	Questions	Indicators	Unit of measurement	Method	Visualisation technique
Supply of aquaculture	How many operators are there in the area?	Number of culturists in the area	Number	Obs, Foc, Ssi	Map
	Why do people enter the aquaculture business?	Purposes of culturing	Reasons	Foc, Ssi	
	What aquaculture methods are used? What are the areas of production? What species are cultured?	Culture methods, production periods, areas of production, species cultured	Methods, areas, species	Foc, Ssi	Map
	What is the level of management intensity? What is the scale of operations? How much is produced by each operation?	Levels of management intensity, scale of each operation, amount of production of each operation	Levels, scales of operation, amount of production	Foc, Ssi	
	What is the value of production? What is the revenue for the operations?	Value of production, revenue for each operation	Value, revenues	Foc, Ssi	
Characteristics of aquaculture stakeholders	How many employees are there in each business?	Number of employees	Number	Foc, Ssi	
Aquaculture market structure	How many aquaculture businesses are there in the area?	Number of culturists in the area	Number	Obs, Foc, Ssi	Map
	What are the primary markets for aquaculture products?	Primary markets	Types (e.g. home, local, regional, national, international)	Obs, Foc, Ssi	Flo

(Obs- observation; Ssi- semi-structured interview; Sur- survey; Foc – focus group interview; Map – map, Smap – social map; Wmap – wealth map, Hmap – historical map; Tra – transect; Tim – timeline, Scl – seasonal calendar; Tua – time use analysis; Htr – historical transect; Dec – decision tree; Web – decision web; Ven – venn diagram; Flo – flow chart, Imd – impact diagram; Ran – ranking, Lcl – local classification; Wel – well-being).

10. NON-MARKET AND NON-USE VALUES

Introduction

Equally important to the market attributes of reef resources are the value of reef resources that are not traded on the market (non-market values) and the value of the resources to the portion of society that does not use these resource (non-use values). Information on non-market and non-use values is used by reef managers to:

- understand the value of coral reefs in economic, or monetary, terms, which can be used to evaluate the tradeoffs between alternative development, management and conservation scenarios e.g. a decision to allow diving and fishing on a reef or to leave the reef in its natural state may be based on the value of the reef to people who do not use the reef, which may be equal to or greater than market value;
- help determine total economic value, which is the sum of market values, non-market values and non-use values (see *Appendix A, Market Attributes for Extractive Uses of Coral Reefs, Box*);
- demonstrate the importance of the reef resources to the larger population by calculating the value of the resources to people who do not actually use the reef, but still value it e.g. 100 fishermen and 50 divers may use the reef while an additional 500 people value knowing it is there; and
- illustrate that reef resources are more than products to be bought and sold – they provide value that is difficult to quantify, and is significant e.g. the reefs may have value as a waste receptacle for aquaculture production; however, this value is not bought or sold in the market.

Description

The concepts of non-market values and non-use values are largely abstract and theoretical. An assessment of these values involves understanding the following:

Non-market value
This is the value of reef-related activities that are not traded in any market, which includes:

- direct uses, such as divers who have travelled to the reef by private means; and
- indirect uses, such as biological support in the form of nutrients, fish habitat and coastline protection from storm surge.

Non-use value
This represents values that are not associated with any uses and include the following:

- *option value* – the value of knowing that the resource is available should one decide to use it at some future time. Option value can be

seen as the potential future direct and indirect uses of the coral reef ecosystem and viewed as the equivalent of buying an insurance policy to preserve the current conditions for possible future uses (Leeworthy and Bowker 1997). Option value is considered by some economists to be a non-use value because it is not associated with *current* use. Others consider it a use value in that 'use' is a critical aspect of its future value;

- *bequest value* – the value of knowing that the resource will be available to future generations. The large donations given to environmental NGOs in wills are examples of bequest value; and

- *existence value* – the value of knowing that the resource exists in a certain condition. This reflects the idea that there is a value of an ecosystem to humans irrespective of whether it is used or not. The contributions that are given to protect endangered species, even though the donors never plan to see these species, are examples of existence value.

Data collection and analysis

Calculating non-market and non-use values is much harder than calculating market values, which can be directly observed in the market place. For non-market and non-use values it is not possible to determine people's preferences in markets. Instead, the data collection methods have to interpret other forms of data to show value.

These methods, particularly travel costs and contingent valuation methods, are too complex to be carried out without thorough training. It is, therefore, highly recommended than an experienced economist conduct these methods and analyse the results. Due to of the complexity of these methods, detailed descriptions of these methods and the analyses of the results are not provided. Instead this section provides a general overview of the 4 methods, how to use them and how to analyse the results. This section concludes with a discussion of benefit transfer, an alternative means of assessing these values.

There are 4 methods for assessing non-market and use values (see *Table A-10*): replacement costs, damage costs, travel costs and contingent valuation. When they are used depends on the value and use being examined.

Replacement cost and damage cost methods
Replacement cost and damage cost methods are used to assess the non-market values of indirect uses, such as the values reefs provide as coastal protection, as waste receptacles for aquaculture industries, and as fish habitat for fisheries. The replacement cost method uses existing data on investment needed to replace these functions to determine the indirect, non-market value of the resources e.g. to determine the value of coastal protection provided by a reef, economists calculate the cost of replacing the coral reef with protective walls (e.g. groynes, revetments and underwater wave breakers off the coast).

Table A-10: *Type of values, types of use/subtypes of value, examples, and data collection methods for assessing non-market and non-use values.*

Type of Value	Type of Use /Subtype of Value	Example	Data Collection Method
Non-market Values	Indirect Use	Protection from storm surge; nutrient receptacle for aquaculture; Fish habitat for fisheries	Replacement & Damage Methods
	Direct Use	Divers who access the reefs by private means	Travel Cost Method
Non-Use Values	Option Value Bequest Value	Option to use the reefs Future generations will be able to use the reefs	Contingent Valuation Method Contingent Valuation Method
	Existence Values	The reef exists	Contingent Valuation Method

The damage costs method uses existing data on the losses incurred by businesses associated with the indirect uses as a result of damage to the reef to determine the value of the reef e.g. if a reef is damaged or destroyed, then it may no longer provide coastal protection and result in shoreline erosion. The resulting loss of property-value and income from lost-land use opportunities (e.g. loss of agricultural land) determine the coastal protection value of the reefs.

Travel cost method
Travel cost method is used to assess the non-market values of direct uses, such as the value to divers who have travelled to the reef by private means (and therefore have not paid a market price). The money they spent to get to the dive site (e.g. train, bus or airline tickets) is used as a proxy for how much they value diving on the reef. This approach is used when there is a zero or nominal admission fee to use the resources. It considers that the value the person attaches to the resource is more than the admission price (if any) and that people who travel different distances incur different costs to visit the site. If the value people place on a site does not vary systematically with distance, the cost to travel to a site can be used as a proxy for the price of visiting a site. With travel cost and visitation information (as well as other relevant variables) the researcher can estimate the demand curve for the resource.

Contingent valuation method (CVM)
CVM is used to assess non-use values, including bequest, option and existence values. The CVM collects information on consumer preferences by asking them what they are willing to pay for a benefit ('willingness-to-pay', WTP), or what they are willing to accept by way of compensation to tolerate the loss ('willingness-to-accept', WTA). These questions can be asked using either a survey questionnaire or experimental techniques in which subjects respond to different stimuli in laboratory conditions e.g. to assess WTP for a coral reef, people could be asked how much they would be willing to pay in extra taxes for the government to compensate coral miners forced to stop mining to preserve reef. To assess WTA, people could be asked how much compensation they would demand from the government for coral miners to be

allowed to carry on mining a reef until it was destroyed. WTP is constrained by the income level of the informants, whereas willingness to accept payment for a loss is not constrained. Therefore, estimates of WTA tend to be orders of magnitude greater than WTP estimates.

There are a number of biases associated with CVM, which have made the method controversial. Biases include (Barton 1994):

- *hypothetical bias* – this refers to the potential error inherent in any process that does not deal with an actual situation. Informants may not take the interview seriously enough to give values that reflect their true preferences;
- *strategic bias* – informants may answer strategically if they consider their reply will influence real events (i.e. if they feel that their willingness-to-pay bid may entail actual payment, then values maybe lower than if they did not have this bias); and
- *information bias* – the way in which the hypothetical situation is described can have a powerful effect on the reply. There are several kinds of information biases. *Design bias* refers to how the questions are structured. *Instrument bias* results if the informant reacts either way to the hypothetical instrument or vehicle of payment that is suggested (e.g. entry fee). *Starting-point bias* refers to the observation that the starting bid may affect the final outcome in a converging bidding process.

Despite these biases, as well as the complications of designing, implementing and interpreting questionnaires, CVM is often the only means for estimating the non-use values of coral reefs. CVM is therefore often required and should be done by a specialist.

Benefit transfer
It is often quite costly to carry out original research to estimate non-use and non-market values (e.g. benefits) in a precise location, such as a marine park. As an alternative, it is sometimes possible to use studies that have been carried out in other, comparable areas e.g. if an extensive study has been carried out for fisheries and/or tourism potential in one marine reserve, these values may be used as a proxy in another marine reserve, given that certain requirements are met. This practice of transferring monetary values is called 'benefits transfer'. To perform a benefits transfer, the team must assess the extent to which the original site and the study site are similar in terms of: resources involved, time periods and stakeholders. Valuation studies that could be used for coral reef-related benefits transfer are presented in Cesar (2000) and in Cartier and Ruitenbeek (2000).

APPENDIX B: SAMPLING APPROACHES

The assessment team should develop their sampling approach to determine who to interview and survey (see *Chapter 2 , Plan the Field Data Collection Phase, Decide who to interview and survey)*. The team should decide how many people to contact in each stakeholder group and how to contact them.

There are two ways to use to select people to sample: *random sampling;* and *non-random sampling (*see *Table B-1).*

Table B-1: Approaches for sampling, including advantages and disadvantages of each.

Sampling Method	Method	Advantages	Disadvantages
Non-Random Sampling	Oral history, focus group, observation, survey, semi-structured interview	Relatively inexpensive, not time-consuming, uncomplicated, does not require a well defined stakeholder group, helps achieve better representation of diversity in the group	Resulting data are not statistically representative of the stakeholder group
Random Sampling	Survey, semi-structured survey	Data are statistically representative of the stakeholder group	Expensive, time-consuming, complicated, requires a well-defined stakeholder group (e.g. list of all stakeholders)

NON-RANDOM SAMPLING

In this approach the team selects specific people as informants to gain a better understanding of the different viewpoints, attitudes, perceptions and concerns of the whole group. Because the informants are selected and not taken randomly from a clearly defined group, the information is not representative of the whole group (i.e. the information is not statistically representative).

To overcome the statistical weakness of non-random sampling, the team should select people who can represent different perceptions and viewpoints. These people can help the team understand the complex patterns of how different people view local

conditions, and particular issues. By cross-checking information from these different people, the team can increase their confidence that the information represents the whole group (see *Chapter 3, Guiding Principles, Cross-check data*). The team can be reasonably confident that these opinions and perceptions are held by the whole group, but these will be *impressions* and not *statistically sound findings*.

When to use non-random sampling
Non-random sampling is typically used when:

- the team does not have the resources to conduct a full, statistically representative sample;
- the team wants to interview specific people;
- the stakeholder group is not well enough defined to select people at random; or
- the team does not expect to analyse the data statistically (e.g. qualitative information).

This approach is most useful for focus group interviews, oral histories, and observations, which involve interviewing particular people or observing specific events. This produces qualitative information, which usually cannot be analysed statistically. Non-random sampling is often used for semi-structured interviews because these interviews can be time-consuming and the results are usually qualitative. This approach can also be used for surveys when there is not enough time or resources to survey a statistically representative group, or the team wants a rapid overview of the stakeholder group.

The main advantage of non-random sampling is that it is less expensive, takes less time and is less complicated than random sampling. It also does not require a well-defined stakeholder group and can help gain a better representation of diversity in the group. However, the resulting data cannot be statistically analysed and cannot, therefore, be taken as necessarily representing the perceptions of the whole stakeholder group.

How to select informants
The most common approach for non-random sampling is *purposive sampling* in which team members use their judgement to select the stakeholders to sample. Usually these stakeholders are key informants, who can provide insights about the larger stakeholder group e.g. the president of the hotel association or the first owner of one of the oldest hotels may be selected as key informants for the hotel industry. This approach is most valuable for focus group interviews and oral histories, which involve interviewing particular people.

A common type of purposive sampling is *snowball sampling* in which the selected informants are asked to give the names of other key informants in the same stakeholder group. Each new informant is asked for the names of other key informants until the team keeps hearing the same names at which point the group

can be regarded as fully sampled. The snowball approach is best used when the group being sampled is small enough to have almost complete coverage.

Another type of purposive sampling is *sidewalk sampling* (or convenience sampling) in which the team interviews people who pass by and are willing to participate in the study. This allows the team to assess a large number of people at minimal cost e.g. if the team wants to interview tourists who buy coral merchandise, they could interview tourists exiting coral curio shops. This approach is most useful for conducting semi-structured interviews, observations and rapid surveys.

The team should be sure that the full range of perceptions is represented when using any of these non-random sampling approaches e.g. older fishermen may have different perceptions of the cultural value of fishing than younger ones. So the team should interview both older and younger fishermen about the cultural value of fishing. Important factors to consider in identifying this range of perceptions include:

- Gender;
- Age (e.g. young fishermen, older fishermen);
- Socioeconomic levels (i.e. wealth, education, social standing);
- Occupational group (e.g. small-scale farmers, plantation farmers);
- Residency (e.g. tourist divers, resident divers);
- Ethnic group, tribe or nationality; and
- Location (e.g. fishermen living by the landing site, fishermen living inland).

The team should use all they have learned during the previous steps to identify those people who will provide the full range of perceptions. It may also help to make simple sampling rules, such as selecting every fifth person coming out of a shop. This helps ensure the range of people are surveyed, not just particular types of people e.g. only wealthy tourists, or older people.

The number of stakeholders who need to be assessed should be based on the team's best judgement. A general rule is to interview people until the answers become repetitive and no new information is being generated.

RANDOM SAMPLING

If the assessment team feels that it is important to be highly confident that the results of their assessment are statistically representative of the whole group, then they should select a random sample of informants. A "random sample" means that the people talked to have been selected without bias influencing the team's selection – the probability of each person being selected as an informant is equal. In random sampling the team assesses a statistically representative sample of the group. So the data are statistically representative of the whole group.

When to use random sampling
Random sampling is typically used when the team wants statistically representative data and has the time and resources to conduct this intensive approach. This

approach requires that the stakeholder group is well-defined so that the team can randomly select people. The group can be defined in a comprehensive list of all stakeholders e.g. list of fishermen registered with the Fisheries Department, list of hotels from the Tourism Department. Alternatively a map of their locations (e.g. map of boats in a marina from a harbour master, property tax maps indicating locations of hotels), can allow the team to randomly select their sample and then locate those people to interview.

This approach is most appropriate for surveys, which are designed to gain quantitative data for statistical analysis. Observations can also be conducted using random sampling. For example, if the assessment team is interested in the percentage of dive boat anchors that hit coral heads when anchoring, then the team could select a statistically representative number of dive boats and observe their anchoring practices. Informants for semi-structured interviews can also be selected using random sampling; however, the results from semi-structured interviews are typically qualitative due to the exploratory nature of the questions, which usually cannot be analysed statistically.

The main disadvantages to this approach are that it is expensive, time-consuming and complicated and it requires a well-defined stakeholder group. In addition, determining the appropriate sample size often requires a statistician. However, the advantage is the data are statistically representative of the whole group.

How to select informants
As a general rule, when selecting informants for random sampling, the larger the sample size, the greater the level of accuracy and the more certain the assessment team can be that the results represent from the sample represent the whole group.

To determine how many informants to interview, the assessment team must first decide on two interrelated factors – their *confidence interval* and their *level of confidence.* The confidence interval indicates the accuracy of the results e.g. if the confidence interval is 10 per cent, then the results are accurate +/- 10 per cent. If the average age is 50 and the confidence interval is 10 per cent, then the average age is considered to be 50 +/- 10 per cent or between 45 and 55.

The *level of confidence* is the level of error the assessment team is willing to accept in the results e.g. if the level of confidence is 95 per cent, the team can be 95 per cent certain the results, including the confidence interval, are correct. Putting these two factors together, if the team selects a 95 per cent level of confidence and a 10 per cent confidence interval, then they can be 95 per cent certain their results are representative of the whole group plus or minus 10 per cent. Therefore, if the sample informants' average age is 50 and the informants were selected using a 95 per cent level of confidence and a 10 per cent confidence interval, then the team can be 95 per cent certain that the average age of the larger stakeholder group is between 45 and 55.

There is no rule for selecting a level of confidence or a confidence interval. The team should determine these factors on a case-by-case basis taking into consideration the

specific goals and objectives of the study as well as time and budget constraints. The team should consider the sensitivity of the study results, including the potential consequences of these results if they are incorrect. If the study is particularly sensitive, the team may decide to use a high level of confidence and a high confidence interval (e.g. 99per cent level of confidence and a 1per cent confidence interval).

In general 99per cent is considered a high level of confidence, 95 per cent is average and 90 per cent is low. Similarly a 1per cent confidence interval is high, 5 per cent is average, and 10 per cent is low. In most situations it is widely accepted to use a 95 per cent confidence level and a 5 per cent confidence interval.

Table B-2 lists the sample sizes for various stakeholder group sizes for confidence intervals of 5 per cent and levels of confidence of 95 per cent and 99 per cent. In general, the larger the group, the larger the sample size. However, the smaller the group, the larger the portion of people that should be interviewed. This is because the smaller the sample size, the greater the effect of biases on the results. To prevent a small number of people from biasing the results, the sample size should be as large as possible for small groups, especially if biases are known to be present in the group. In general, for groups of less than 500 people, no more than half of the group should be interviewed. The exact sample size for these small groups varies depending on several factors particular to the situation and beyond the scope of this manual (see Rea and Parker 1997 for more information).

Table B-2: Number of informants to interview for various stakeholder group sizes (Rea and Parker 1997).

Sample Sizes		
Stakeholder group size Less than 500	95% Level of Confidence 5% Confidence Interval Generally no more than half the group	99% Level of Confidence 5% Confidence Interval Generally no more than half the group
500	218	250
1000	278	399
1500	306	460
2000	323	498
3000	341	544
5000	357	586
10000	370	622
20000	377	642
50000	382	655
100000	383	659

Having determined how many people to survey, the team now needs to determine *who* to survey. The assessment team can use the *simple random sampling approach* or the *systematic random sampling approach*. In the simple random sampling approach (or "the hat method") the team numbers all the stakeholders either on the list of stakeholders or on the map of their locations and then selects stakeholders by:

- selecting numbers from a table of random numbers (e.g. the first 2 digits of phone numbers in a telephone book); or
- putting the numbers on small cards in a bowl or a hat and pulling a number, making sure to replace the card chosen so as to maintain the probability of choosing any card with each draw.

This selection process should be repeated until the desired sample size is reached.

Systematic random sampling (or "the walking method" or "interval method") is used when the stakeholder group is large, making it difficult to assign numbers to people for simple random selection. In this approach, the team selects informants from the list at fixed intervals. The informants are selected in proportion to the percent of the group the sample should represent. For example, if the assessment team has identified 1000 fishing households and has determined that the sample size should be 400, then the assessment team should survey 400/1000 households, or 1 in 4 households. The team would then randomly choose a starting point between the first and fourth household on the list, and work their way down the list selecting every fourth name to survey. In the case of a map, the team could walk through the area selecting every fourth household to survey. This approach can be made more random by combining by selecting the house on the left or right based on the flip of a coin.

GLOSSARY

Assessment – a study to collect data at one time

Assessment team – the people who do the socioeconomic assessment

Biophysical assessment – study to collect data on corals, fishes and other organisms and physical parameters

End-users – people or organisations that use assessment findings to make decisions and policy about reef management, identify research needs, or plan development in coastal areas

Extractive uses – activities that take a resource without replacing it, including fishing, coral and sand mining, harvesting for the aquarium trade and bio-prospecting.

Facilitator – team member who guides interviews by explaining the process, asking the questions and follow-up questions, and engaging people in discussion and analysis

Field analysis workshop – meeting of assessment team to analyse the data while team is in the field

Field team – small (2-3) team to collect field data

Gatekeeper – team member who observes interviews, prevents disruption and interference, encourages participation from participants, and prepares tools for visualisation diagrams

Informants – people who answer surveys or participate in interviews

Key informants – people with rank, experience or knowledge who can provide extensive insight on socioeconomic conditions

Key learning – particular issues identified or lessons learned that are essential to the assessment objectives or are needed to understand the socioeconomic background of reef management

Monitoring – continuous studies to collect data, usually at set times

Natural scientist – someone who studies science based on objective quantitative hypotheses, such a biology, chemistry or physics

Organisations – groups of people with a common purpose to achieve objectives (North 1990), including formal and informal, government and non-government decision-making and representative bodies, cooperatives, associations, institutions and agencies. For coral reefs, the organisations of interest for a socioeconomic assessment are those that formulate, supervise, monitor and enforce the various rights, rules and regulations governing the use of reef resources

Parameters – the elements, components or topics that are the focus of an assessment

Primary stakeholders – people who directly depend on the reef for a living and who make direct use of reef resources (e.g. fishermen, dive operators)

Reconnaissance survey – brief survey of the study area before collecting field data

Record keeper – the team member who records information and reproduces visualisation diagrams

Reef managers – individuals linked to the government, local community, non-government organisations, or universities who have formal, informal, traditional or legislated responsibility to govern uses of the reef

Reef-related activities – activities affecting, or associated with, coral reefs (see *Table 1-1*)

Reef resources and services – fish, other edible items, corals and other curios, cultural items, rock and sand; and shoreline protection, fisheries habitats, tourist attractions, potentially useful drugs, biodiversity

Resource governance – the rights, rules and regulations that determine the ways resources can be used

Secondary stakeholders – people who do not use reef resources directly, but use reef products or services (e.g. fish traders) or whose actions may affect the reef (e.g. upstream farmers)

Secondary data – data that have been collected, analysed and published

Self-critically aware – team members continuously and critically examine their own behaviour and perceptions, accept any errors they make, and learn from them, which helps them ensure they do not bias their interactions and interpretations

Social scientist – someone who studies society and individual relationships in, and to, society, including sociology, psychology, anthropology, economics, political science and history

Socioeconomics – social, cultural, economic, and political sciences. In this manual, the term refers mostly to the social, cultural, economic and political aspects of coral reef stakeholders

Socioeconomic assessment – study of the social, cultural, economic and political conditions of people, groups, communities and organisations

Stakeholder representatives – people who represent the views of stakeholders because of the positions they hold in formal or informal organisations

Stakeholders – people, groups, communities and organisations who use and depend on the reef, whose activities affect the reef or who have an interest in these activities, including government agencies, non-government organisations, local users, universities and researchers

Study area – the area covered by the socioeconomic assessment

Study sites – small areas or communities within the study area

Visualisation techniques – analytical tools used to visualise and diagram relationships among data (e.g. maps, transects, timelines, historical transects, decision trees, Venn diagrams, flow charts and ranking)

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WORKSHEETS

Goals and Objectives Worksheet

Goals	Objectives	Specific Objectives

Stakeholders Worksheet 1

Reef-Related Activities	Primary Stakeholders	Secondary Stakeholders	Relevant Organisations

Stakeholders Worksheet 2

Primary Stakeholders	Level of Participation (inform, consult, partner, owner)	Stakeholder Representatives	Key Informants

Secondary Stakeholders	Level of Participation	Stakeholder Representatives	Key Informants

Relevant Organisations	Level of Participation	Stakeholder Representatives	Key Informants

Study Sites Worksheet

Stakeholder Groups	Locations	Study Sites

**Parameters, Methods and
Visualisation Techniques Worksheet**

Parameters	Sub-parameters	Methods	Visualisation Techniques

Tracking Worksheet

Stakeholder Groups	Parameters	Study Sites	Data Collected By	Secondary Data	Field Data Collection Methods					Visualisation Techniques									Type of Informant			
					Obs	Ssi	Foc	Ora	Sur	Map	Tra	Tim	Scl	Htr	Dec	Ven	Flo	Ran	Key Informant	Individual	Household	Group

Key:

Field Data Collection Methods
Obs– observation
Ssi – Semi-structured interviews
Foc – Focus group interviews
Ora – Oral histories
Sur – Surveys

Visualisation Techniques
Map – maps, including social, wealth and historical maps
Tra – transects
Tim – Timelines
Scl – Seasonal calendars
Htr – Historical transects
Dec – Decision trees, including decision webs
Ven – Venn diagrams
Flo – Flow charts, including impact diagrams
Ran – Ranking, including local classification, preference, well-being

Types of informants
M - male
F – female
R - resident
N - non-resident

Schedule Worksheet

Stakeholder Group	Methods	When	Field team (facilitator & record keeper)