

# Socioeconomic baseline study: Eastern Marovo Lagoon, Solomon Islands

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# Glossary

<i>bangara</i>	chiefs
<i>bunarakoroko</i>	derris root
<i>butubutu</i>	corporate groups or tribes
<i>heheuku</i>	small red snapper
<i>hinoho</i>	wealth
<i>hope</i>	spiritually sanctioned taboo
<i>hope chinaba</i>	fishing taboo for general marine resources
<i>hope valusa</i>	fishing taboo for tuna
<i>horevura</i>	downward migration from the bush to the sea
<i>kastom</i>	custom
<i>ke'e</i>	shellfish ( <i>Beguina semiorbiculata</i> )
<i>kuarao</i>	a type of fishing involving all the community
<i>kurila</i>	shellfish ( <i>Atrina vexillum</i> )
<i>mara</i>	trevallies
<i>nginira</i>	strength
<i>pajara</i>	groupers, trouts and cods
<i>pigin</i>	Melanesianised English, used as a <i>lingua franca</i>
<i>poata mala</i>	shell for making ceremonial money
<i>poda</i>	ancestral spirits
<i>puava</i>	resource estate
<i>tabu</i>	prohibit
<i>tabu sela</i>	shell for making ceremonial money
<i>tarasi</i>	surgeonfish
<i>tilo</i>	dog-tooth tuna
<i>toba</i>	barrier reef

## Acronyms

CAPS	Community Assessment and Participation Specialist
CFC	Christian Fellowship Church
CITES	Convention on the International Trade in Endangered Species
CRCDP	Solomon Islands Community Resource Conservation and Development Project
DFMR	Department of Fisheries and Marine Resources
IWP	International Waters Project
LRFFT	live reef food fish trade
MBDF	Marovo Butubutu Development Foundation
MPA	marine protected areas
NGO	nongovernment organisation
NTF	National Task Force
PCU	Project Coordination Unit
RFC	rural fisheries center
RFEP	Rural Fisheries Enterprise Pprogram
RMO	Resource Management Order
SDA	Seventh Day Adventist
SOPAC	South Pacific Applied Geoscience Commission
SPREP	Secretariat of the Pacific Regional Environment Programme
TOR	terms of reference
UNESCO	United Nations Educational, Scientific Cultural Organisation
WWF	World Wide Fund for Nature

## Units of measure

C	celsius
km	kilometre
km <sup>2</sup>	square kilometres
SBD	Solomon Island dollar
t	metric tonne

## Executive summary

The International Waters Project (IWP) aims to strengthen the management and conservation of marine, coastal and freshwater resources in the Pacific Islands region. It is financed through the International Waters Programme of the Global Environment Facility, implemented by the United Nations Development Programme, and executed by the Secretariat of the Pacific Regional Environment Programme (SPREP), in conjunction with the governments of the 14 participating independent Pacific Island countries.

IWP's focus in the pilot villages of Mbili Passage and Chea in the eastern Marovo Lagoon, Solomon Islands is the improved local management of important commercial resources, in particular sea cucumbers.<sup>1</sup> The IWP Solomon Islands staff coordinated a participatory consultation process (see Kinch et al. 2005) and a series of socioeconomic and biological surveys to gather the information needed to guide project implementation. The IWP Community Facilitators, Patrick Mesia and Nelly Kere, and IWP scholarship recipient, Julia Maniloli, conducted these surveys. A recent *bêche-de-mer* fishery survey, coordinated by Jeff Kinch,<sup>2</sup> has added to the foundation built by these previous socioeconomic surveys. This report describes in detail the socioeconomic baseline survey findings and incorporates the findings from the *bêche-de-mer* fishery survey.

Marovo Lagoon, located in the Western Province of the Solomon Islands, is the world's largest and best defined double barrier reef-enclosed lagoon; it is home to approximately 19% of the population of the Western Province (currently about 12,000 people), who reside in some 70 villages and hamlets.

Mbili Passage Village is a very old village situated on Mijanga Island, on the eastern end of Marovo Lagoon, belonging to the Getu *butubutu* (tribe). Chea is the primary settlement of the Babata *butubutu*. It was established in 1958 on a pre-Christian ceremonial ground and is situated on the northern side of Marovo Island. Both communities have a population of around 300 people each.

Both communities belong to the Seventh Day Adventist (SDA) Church. Church doctrines, policies and practices have promoted somewhat contrasting patterns in village-level material production and cash reliance, and in turn have generated certain differences in lifestyles and in career patterns beyond the village. The followers of the SDA Church tend to follow the Old Testament ban on eating "fish without scales",<sup>3</sup> and are subsequently prohibited from eating a large proportion of locally available food resources, notably shellfish, turtles, crustaceans, and rely almost exclusively on finfish for their protein requirements. Pigs are also excluded from consumption.<sup>4</sup>

Most households obtain income from various activities, including: woodcarving; harvesting marine resources; growing food crops, copra, and betel nut; intervillage marketing; running stores, "hawker" canteens, fuel depots, and bakeries; making and selling handicrafts; ecotourism; fishing; and royalties and remittances. *Bêche-de-mer* is an important source of income, but only for young men who are to some degree alienated from the SDA faith. There are approximately 20 youth in both Chea and Mbili Passage involved in the exploitation of *bêche-de-mer*. In contrast, Chubikopi, a United Church community adjacent to Chea, has about

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<sup>1</sup> Primarily of the families Holothuridae and Stichopodidae; sea cucumbers are also referred to as holothurians, and as *bêche-de-mer* in their processed form.

<sup>2</sup> Coastal Fisheries Advisor, University of Papua New Guinea.

<sup>3</sup> Leviticus 11: 9-12. You may eat any kind of fish that has fins and scales, but anything living in the water that does not have fins and scales must not be eaten. Such creatures must be considered unclean. You must not eat them or even touch their dead bodies.

<sup>4</sup> Leviticus 11: 7-8. Do not eat pigs. They must be considered unclean; they have divided hoofs, but do not chew the cud. Do not eat these animals or even touch their dead bodies, they are unclean.

100 bêche-de-mer fishers, including both males and females, and adults and children.

The predominant sea cucumber species presently harvested in the eastern Marovo Lagoon are the medium value brown sandfish, and several high value species (peanutfish, curryfish (including brown curryfish) and stonefish). These species accounted for 87.75% of all bêche-de-mer sold (in terms of value) at Mbili Passage and Chubikopi (Uvilau) during the period of 22 December 2004 to 18 April 2005. Of the lower value species sold, elephant trunkfish, red lollyfish (pinkfish) and snakefish are the most important by volume and value.

From extrapolation of purchasing records obtained from Mbili Passage and Chubikopi (Uvilau), an estimated 5,250 kilograms (kg) of bêche-de-mer with an approximate value of 634,500 Solomon Island dollars (SBD) was purchased during the period 22 December 2004 to 18 April 2005. If the catch and price remained consistent throughout the year, this would result in a potential annual production for eastern Marovo Lagoon of approximately 15,750 kg of bêche-de-mer, with an estimated value of SBD 1,903,500.

Anecdotal evidence suggests that the diversity of bêche-de-mer species in the eastern Marovo Lagoon is now being altered due to increasing exploitation. This represents a threat not only to community livelihoods, but also to the fishery itself and overall biodiversity. Traditionally, specific bans concerning types of fish or certain fishing grounds were explicitly announced and enforced by reef-holding *butubutu*. These bans were defined as *hope* (spiritually sanctioned taboos), and were of two main varieties, each protected by the powers of specific *poda* (ancestral spirits).

Due to concerns of increased exploitation and lower abundances of bêche-de-mer, some United Church and Christian Fellowship Church (CFC) communities in the early 1990s began to enforce an increasing variety of management measures on bêche-de-mer harvesting in their own areas. In the majority of SDA communities, because of church doctrine, bêche-de-mer was considered of nil value and therefore did not warrant management. The Chea community was an exception to this, and in 1991, developed a Resources Policy Framework to control the collection of marine resources and to avoid overexploitation.

IWP's specific focus for fisheries management in Marovo Lagoon is accordingly the bêche-de-mer fishery. For this to happen there needs to be greater involvement with United Church communities who are also utilising the resource, particularly those neighbouring Chea. The Mbili Passage community conducts most of their harvesting in neighbouring *puava* (resource estates).

Due to the limited time remaining to implement IWP activities it is proposed that fewer activities be undertaken in Mbili Passage and that work instead concentrate at Chea. This is because Mbili Passage Village already has an arrangement with Seacology, an international nongovernment organisation (NGO), which provides material assistance to communities in an exchange for establishment by the community of protected areas of a certain size and duration. Mbili Passage has decided to establish a Marine Protected Area (MPA) at Totolave Island, in exchange for the construction of a new school classroom.

In addition, many of the divisive issues currently facing the Mbili Passage community cannot be resolved in the immediate future (discussion in greater detail below). Chea is consequently the better focus, although it also faces problems. The emphasis should now be on involving the surrounding United Church communities, and building on the Marine Resource Policy Framework that Chea developed in 1991 to manage the bêche-de-mer fishery and other marine resources.



## Recommendations

1. Extend IWP's work at Chea to encompass the neighbouring United Church communities, particularly at Chubikopi and Sasaghena.
2. Conduct surveys in CFC and United Church communities to determine what management measures (if any) have been put in place for the management of bêche-de-mer.
3. Update Chea's Resources Policy Framework and ensure participation and acceptance by neighbouring United Church communities (who use the same sea territories and reef systems).
4. Conduct awareness activities that include the interrelationships between sexual maturity (size-limits), reproduction (spawning) and good fisheries production.
5. Conduct awareness on the ecological role of bêche-de-mer in generating and maintaining living reefs.
6. Continue to strengthen community-based management and establishment of MPAs.
7. Determine clear definition of the marine boundaries of fishing and management areas, which incorporate all resource users.
8. Develop a simple monitoring program to verify and qualify catch-per-unit-effort trends.
9. Conduct extension work on better processing and grading for bêche-de-mer.
10. Investigate a cooperative relationship with marine resource buyers, who could be involved in extension work, through delivery of management and quality control messages.
11. Assess the feasibility of lifting the ban on blacklip pearl shell to potentially allow pulse harvesting (thus diversifying income opportunities).
12. Implement the process for developing bêche-de-mer management plans at either the provincial or national level and pursue the appropriate legislative mechanisms.
13. Extend the collaboration with the University of Queensland's Conserving the Marine Biodiversity of Marovo Lagoon, Solomon Islands project, to look at habitat and bêche-de-mer distribution (this will help in determining appropriate reserve areas).

# 1 Background

## 1.1 The International Waters Project

The International Waters Project (IWP)<sup>5</sup> is a 7-year, USD 12 million initiative concerned with management and conservation of marine, coastal and freshwater resources in the Pacific islands region, and is specifically intended to address the root causes of environmental degradation related to trans-boundary issues in the Pacific. The project includes two components: an Integrated Coastal and Watershed Management (ICWM) component, and an Oceanic Fisheries Management component (the latter has been managed as a separate project). It is financed by the Global Environment Facility (GEF) under its International Waters Programme. The ICWM component is implemented by the United Nations Development Programme and executed by the Secretariat of the Pacific Regional Environment Programme (SPREP), in conjunction with the governments of the 14 independent Pacific Island countries: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. The ICWM component focuses on integrated coastal watershed management, and supports national and community-level actions that address priority environmental concerns relating to marine and fresh water quality, habitat modification and degradation and unsustainable use of living marine resources through a 7-year phase of pilot activities, which started in 2000 and will conclude at the end of 2006.

The theme and location of each pilot project was selected on the basis of community and government consultation. Each project is expected to have adopted an interdisciplinary approach involving the three pillars — economic, social and environmental — of sustainable development. Each project is intended to address the root causes of degradation affecting one or more of four focal areas:

1. marine protected areas;
2. coastal fisheries;
3. freshwater resources; and
4. waste reduction.

## 1.2 IWP Solomon Islands

IWP in Solomon Islands is a collaborative effort between traditional resource owners and the Solomon Islands' Ministry of Natural Resources, through the Department of Forestry, Dept. of Environment and Conservation, and Dept. of Fisheries and Marine Resources (DFMR). It is also supported by non-government organisations (NGOs) and other stakeholders, notably the private sector involved in dive and ecotourism.

During a review of the priority environmental concerns in Solomon Islands (see Horokou 2002) two focal areas were highlighted as IWP priority action areas:

- sustainable coastal fisheries management<sup>6</sup>, and
- protection of fresh water resources.

The project in Solomon Islands is steered by the Solomon Islands' National Task Force (NTF), which includes representatives from the pilot project sites, government and NGOs. The National Coordinator provides the day-to-day national management, while Community

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<sup>5</sup> IWP is formally titled Implementation of the Strategic Action Programme of the Pacific Small Islands Developing States.

<sup>6</sup> A thorough review of coastal fisheries problems and critical ecosystems has been carried out by IWP (see Dalzell and Schug 2002; Bleakley 2004).

Facilitators are responsible for capacity building of community members and village-based implementation of IWP activities.

Under guidance of the NTF, IWP has decided to focus on promoting sustainable coastal fisheries by establishing a system of Marine Protected Areas (MPAs).<sup>7</sup> It also seeks to promote increased community involvement and responsibility for local resource management and conservation.

National-level efforts to address coastal fisheries management and MPAs are supported through the use of village-level activities that target fisheries management. Village-level activities are conducted at selected "pilot sites". The process of pilot site selection (see IWP 2002) involved soliciting expression of interest through a three month, nationwide media campaign by the Solomon Islands Broadcasting Corporation with the assistance from the Solomon Islands Development Trust drama team. A total of 35 communities eventually registered their interest. A preliminary short listing was then conducted using a ranking process,<sup>8</sup> and this eventually led to the identification of four possible project sites:

- Marovo Lagoon,
- Gizo, Kolombangara and Rarumana,
- North Malaita, and
- Kia and the Arnavon Islands.

These short-listed communities were then visited to confirm their interest and to garner any information of coastal fisheries problems through the preliminary use of participatory tools and techniques. This process took roughly three months, with a total of 18 communities being visited. Following this process, Mbili Passage and Chea communities, both located in the Marovo Lagoon of the Western Province, were selected.

### 1.3 Aims and objectives

Before making a commitment to a given area, programs such as IWP must collect information on local institutions, community history, social and political structures, livelihood strategies and opportunities for, and constraints to achieving program activities. This information provides insights that can help in dealing with specific local issues and in identifying key issues, as well as factors for improved management of marine resources.

Because of the complex cultural setting of the Solomon Islands, a series of phased activities involving key stakeholders from the pilot communities and other relevant groups have been implemented. These include:

- stakeholder engagement and planning for stakeholder consultations;
- conducting participatory consultations using appropriate participatory tools and techniques;
- implementing social, economic and environmental baseline assessments to assess the scale of problems and causes;
- identification and selection of solutions to address root causes; and or
- development of action plans for implementation.

To this end, a series of activities related specifically to the pilot communities have occurred to date. These include:

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<sup>7</sup> The IWP has also prepared a synopsis of the benefits and impacts of MPAs and the practicalities of implementation (see Huber and McGregor 2002).

<sup>8</sup> This system was utilised in the specific hope that political interference, manipulation by *wantoks* and staff bias would be minimised.

- preliminary investigation of issues and socioeconomic baseline assessment in the pilot communities in March and April 2004;
- community engagement workshop and further socioeconomic enquiry and observation in June 2004;
- environmental baseline assessment in September 2004;
- further socioeconomic baseline assessment in December 2004;
- bêche-de-mer fishery survey, confirmation of previous socioeconomic baseline assessments and further environmental baseline assessment in April 2005.

### *1.3.1 Data collection*

As mentioned above, information for this report was collected over four periods. Phase 1 was conducted by IWP Community Facilitator, Patrick Mesia, phases 2–3 were conducted by the Solomon Islands IWP Community Facilitators Patrick Mesia and Nelly Kere, with assistance from the IWP scholarship recipient Julia Manioli; and the last phase (the bêche-de-mer fishery survey) was coordinated by Jeff Kinch with assistance from Patrick, Nelly and Julia.

#### *Phase 1*

Patrick Mesia, IWP Community Facilitator, conducted a partial survey and familiarisation visit in March–April 2004. The questionnaire used during this visit (see Appendix A) was based loosely on a format used by The Nature Conservancy for the establishment of the Arnavon Marine Conservation Area (see Leary and Mahanty 1993a, 1993b, 1993c). Preliminary data on community structure and household characteristics (including occupancy, occupations, income and expenditures) were gathered.

A total of 12 households in Mbili Passage and 10 households at Chea were surveyed, representing about 30% of all households in each village, respectively. It was difficult to conduct further work at Mbili Passage at this time due to tension within the community over logging issues (Patrick Mesia 2005, pers. comm.). This first visit was also used to elicit information on the history of the two communities.

Information about spawning aggregations for certain fish species was also collected during this first phase. This was done via a questionnaire (see Appendix B) and interviews with fishers. While it was possible to determine spawning periods for certain species, no information was collected on catches, which could have assisted in determining pressure on marine resources.

#### *Phase 2*

Further socioeconomic information was elicited during the participatory consultation and Village Facilitator's<sup>9</sup> training workshop and from observation by the IWP Community Facilitators. During the participatory consultation, several villagers were identified by the respective communities' Project Committees for training as Village Facilitators (Table 1). The criteria for selection of these Village Facilitators were simply that they fairly represent all village members. These identified villagers then participated in the workshop, with the intention that they subsequently assist the IWP Community Facilitators, by conducting a participatory consultation with other members of their own community. Instead, the selected Villagers Facilitators were found to have sufficient experience with the problems facing the wider community to enable the IWP Community Facilitators to conduct the participatory consultation directly with the Village Facilitators.

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<sup>9</sup> IWP Community Facilitators are IWP staff members responsible for implementing training and capacity building activities and gathering data in the pilot communities. Village Facilitators are local counterparts from the pilot villagers who are the beneficiaries of the training and capacity building activities; the intention is that they continue IWP activities when the IWP Community Facilitators are not present.

Table 1: Village Facilitators

Mbili Passage	Chea
Moloka Luten, Fox Ata, Kenroy Robert, Samburo Soga, Mamutu George, Horton Posala, Nathaniel Koli, Paul John, Clement Pana, Peterson Poghoso, Rivoqani Pita	Osmond Patteson Dioni, Ronald Ronter, Puiki Taddy, Ms Rillance Lekezoto, Winter Buka, Ms Louna Resley, John Nelson, Morgan Jimuru, Frazer Dioni, Lapae Meani, Hemes Namusu, Ms Tonia Silas

### *Phase 3*

Following the difficulties encountered during the first survey, and the subsequent paucity of the data, it was decided by the National Coordinator, Kenneth Bulehite, that a follow-up survey would be conducted. Subsequently, a second set of survey questions was prepared (see Appendix C). This survey was conducted in December 2004. During this period, 15 households were interviewed in Mbili Passage (5 of these households had been sampled in March–April 2004) and 24 households in Chea (3 had also been sampled in March–April 2004). The questionnaire used in Phase 3 was based on a socioeconomic questionnaire used by the East Choiseul constituency in 2000, and attempted to elicit additional information regarding the households.

It was envisaged that the Village Facilitators trained in June 2004 would assist the IWP Community Facilitators in conducting this survey. Unfortunately, most of the Village Facilitators were busy with their own work. Subsequently, the IWP Community Facilitators, Patrick Mesia and Nelly Kere conducted the survey, with assistance from IWP's postgraduate scholarship student, Julia Manioli.

Various problems were encountered during the December 2004 survey:

- The survey questions did not elicit the specific information required.
- The survey was conducted during the Christmas period, with the expectation that most community members would be present. This proved not to be the case, however; for example, almost 60% of all households at Mbili Passage were away at other village gatherings or in Honiara at the time of the survey.
- Inadequate time was arranged to conduct the surveys, given that people in most households were unavailable.
- Many interviewees were reluctant to give accurate information, due to shyness or for other personal reasons.

Lessons learned from the previous socioeconomic surveys include the need to:

- conduct preliminary awareness raising;
- conduct a literature review of the pilot area so as to determine what information is available and also to allow for familiarisation with the cultural and environmental setting;
- allow for adequate preparation time by IWP Community Facilitators;
- field test surveys to ensure the questions are comprehensible and suitable;
- spend more time in the community so as to thoroughly interview all households, and to allow for follow-up in areas of specific interest to the project;
- determine appropriate times for conducting surveys so as not to conflict with community activities and also to ensure adequate representation by community members;
- redesign some of the questions so as to gather realistic and reliable information,

especially regarding expenditures and income; and

- improve communication with IWP's Community Assessment and Participation Specialist (CAPS) and other specialised personnel. The CAPS is responsible for all community engagement activities in the target countries, and is an important source of advice, expertise and technical assistance.

#### *Phase 4*

Following the above activities, the IWP Project Coordination Unit (PCU) at SPREP, in consultation with the Solomon Islands IWP team, contracted Jeff Kinch<sup>10</sup> to conduct a series of socioeconomic and consultative activities aimed at enhancing the socioeconomic data to support IWP's work.

After reviewing the data that had already been collected, it became apparent that many of the activities proposed under Jeff Kinch's terms of reference (TOR) had already been addressed by the Solomon Islands IWP team, but both the process and results had not been clearly documented. Subsequently, the revised TOR (see Appendix D) called for (i) collating and analysing the existing information; (ii) drafting documents; (iii) finalising the reports on (a) the participatory consultation conducted in June 2004 (see Kinch et al. 2006) and (b) the socioeconomic baseline<sup>11</sup> and (iv) conducting a bêche-de-mer fishery survey in eastern Marovo Lagoon. The latter was necessitated by a change in project emphasis from general fisheries management to a more focussed strategy targeting the bêche-de-mer fishery.

During the period of 10–19 April 2005, the bêche-de-mer fishery survey was conducted by the authors (with the exception of K. Bulehite) in the Mbili Passage, Chea and Chubikopi villages; visits were also made to the bêche-de-mer buyers located at Rukutu and Chupikopi (Uvilau). Fishers were interviewed in focus group settings using a questionnaire, maps and bêche-de-mer identification sheet (see Appendices E and F for details). Visits were also conducted to bêche-de-mer camps on the outer islands.

To finalise the socioeconomic baseline data, which incorporates the results of the bêche-de-mer fishery survey, an extensive review of the literature was also conducted. Specific documents that greatly assisted in the production of the socioeconomic baseline report include, Bayliss-Smith (1993), Hviding (1996), Shearman and WWF (1999), LaFranchi and Greenpeace (1999) and Donnelly (2001).



**Plate 1: Community members at Chea welcoming the inauguration of IWP activities**

<sup>10</sup> Coastal Fisheries Advisor, University of Papua New Guinea.

<sup>11</sup> The IWP Solomon Islands Community Facilitator, Patrick Mesia initially developed a draft document for the socio-economic baseline after the phase 1 survey in March-April 2004. This draft document was then added to after the second survey in December 2004, and was then turned over to the National Coordinator, Kenneth Bulehite for review and input. The document was never finalised.

## 2 Introduction

### 2.1 The Solomon Islands

The Solomon Islands has a tropical climate with a relatively high and stable temperature, high humidity and abundant rainfall. There are six main islands and approximately 1,000 smaller ones forming two chains of islands between latitudes 5° and 12° south and longitudes 154° and 162° east. These "archipelagos" extend over 1,700 kilometres (km) in length; the land area of the Solomon Islands is almost 30,000 km<sup>2</sup>, the coastline about 4,000 km, and the Exclusive Economic Zone covers 1.34 million km<sup>2</sup>.

The majority of the country's estimated 500,000 inhabitants live in coastal or island communities. Approximately 85% of all land and marine areas are held under traditional or customary tenure systems as villagers rely mainly on fishing, trade and subsistence agriculture for their food security and livelihoods. The population growth rate is around 3.4% annually, with approximately half the population under the age of 20. The rapidly growing population, combined with changing lifestyles and ongoing economic development (associated with the commercialisation of resources and development of the market economy) is increasing the pressure on natural resources, as people strive to maintain or improve their standard of living. There is also high rural to urban drift.

Solomon Islanders have one of the highest per capita seafood consumption rates in the world, with over 80% of the population deriving their protein from marine resources. The annual production from subsistence and artisanal fisheries has previously been estimated at SBD 60 million (Kile 2000) and the sale of marine resources provides the nation's second highest foreign exchange earnings.

### 2.2 Marovo Lagoon

Marovo Lagoon, located in the Western Province of the Solomon Islands (Map 1), is the world's largest (approximately 150 km long) and best defined double-barrier reef enclosed lagoon in the world (Dahl 1986), encompassing 12 major islands and some 200 smaller islets. An extensive reef system surrounds New Georgia Island, Vangunu Island and Nggatokae Island, which are all of volcanic origin and cover an area of about 2,500 km<sup>2</sup>. The area of the lagoon shelf is about 700 km<sup>2</sup> (Stoddart 1969; LaFranchi and Greenpeace 1999).

Landforms within the Marovo Lagoon include sediment filled river mouths, mangroves, swamps, extensive rolling plateaus, higher ridges, and some volcanic peaks (Wall and Hansell 1975). Large tracts of coastal rainforest cover remain and in some places extend from coast to coast (Bayliss-Smith et al. 2003; Hviding and Bayliss-Smith 2000), with forest types varying according to soils,<sup>12</sup> slopes and altitude (Mueller-Dombois and Fosberg 1998; Whitmore 1969; 1984).

The climate in the Marovo Lagoon is normally wet (Webb 1973). Southeasterly trade winds predominate from May through October, and the northwesterly monsoon from December through March. Mean daily temperatures throughout the year average around 28° C. Sea surface temperatures are also consistently in the high twenties, with small annual variation. Tides are diurnal (see Womersley and Bailey 1969; Morton and Challis 1969).

### 2.3 Human history

Human habitation in Marovo Lagoon stretches back possibly 30,000 years (Flannery 1994). The first encounters between Marovians and Europeans occurred during the 1800s. In 1844 Captain Cheyne traded tomahawks for turtle shell and gathered fresh provisions at New

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<sup>12</sup> Soils are of poor quality, being mostly young, acidic oxisols derived from deep weathering of basaltic lavas and are highly susceptible to erosion (Wall et al. 1979; MFEC 1995).

Georgia Island (Cheyne 1971). The British Naval vessel *HMS Penguin* also spent several months in Marovo Lagoon during 1893–94 (Somerville 1897). Somerville refers to Mbili Passage as a center for the manufacture of clamshells rings and a place much involved in interisland sociopolitical systems.



Map 1: Solomon Islands detailing the location of Marovo Lagoon Source: Solomon Islands Government (2003).

The patterns of human habitation that we find today in Marovo Lagoon are a result of agricultural intensification, interisland contacts and sociopolitical transformations, many of which resulted from encroachment by Europeans. By the early 1900s most inland-dwelling groups or bush people had migrated to the coast and abandoned their taro pond-fields. Population and resource pressure increased on the coasts following abandonment of inland areas, resulting in an increase in raiding and head-hunting.<sup>13</sup> During the 18th and 19th centuries, Mbili Passage became a major stronghold of coastal head-hunting (Hviding 1996; Bayliss et al. 2003). In 1850, a massacre of people at Mbili Passage was carried out by warriors from Russel and Isabel Islands, in retaliation for their continuous raiding (Hviding 1996). Dysentery outbreaks were also common and contributed to the decline of many coastal polities. The Methodists and the Seven Day Adventist missionaries arrived in the early 1910s and began to pacify and change the social environment of Marovo even further (discussed in detail below).

During the World War II, areas of Marovo Lagoon saw various incidents of fighting with many villagers joining a guerrilla army headed by the coast-watcher Donald Kennedy (Boutilier 1989). Many others found employment with the Allied Forces as carriers, scouts and barge pilots. The US occupied a large base on Vangunu until 1944.

Ethnographic work in Marovo includes earlier works by Woodford (1888; 1890), Burnett (1911), Capell (1944), Russell (1948), Cheyne (1971), McKinnon (1975) and Tedder (1974). The most thorough and recent research on the Marovo Lagoon is by Edvard Hviding who was based at Chea during the 1990s (Hviding 1988, 1989, 1990, 1991, 1992, 1993, 1995a, 1995b, 1996, 1996a, 1996b, 1998, 2000, 2001, 2003a, 2003b; Hviding and Baines 1994; Hviding and Bayliss-Smith 2000, Hviding and Ruddle 1991; Baines and Hviding 1992, 1993).

<sup>13</sup> Head-hunting was the practice of taking the skulls of individuals killed in raids on neighbouring villages and islands.



## 2.4 Population and demography

The population of the Western Province in 1999 was nearly 63,000. The Marovo Lagoon is home to approximately 19% of the Western Province population (or about 12,000 people), residing in some 70 villages and hamlets.

Table 2: Population increase by census year, density and annual increase for the Western Province

Place	Census Year				Person/km <sup>2</sup>		Annual increase		
	1970	1976	1986	1999	1970	1999	1970–76	1976–86	1986–99
Western Province	24,214	29,980	41,681	62,739	3	8	3.6	3.1	3.2

Source: Solomon Islands Census 1999.

The annual population growth rate for the Western Province for the last census period was 3.2% per annum (Table 2), and the province shows the same trends as the Solomon Islands as a whole.<sup>14</sup> A full list of development indices for the Western Province is given in Appendix F.

The growth rate in the Marovo Lagoon a decade ago was around 4.1% (Hviding and Baines 1994) and is assumed to have remained constant to the current period.<sup>15</sup> This increase in population growth can be attributed to a decrease in mortality rates combined with a slower decrease in fertility. During the next decade, child mortality is expected to decline by another 50%, while life expectancy is projected to lengthen by six years for both males and females (*cf* Aswani 2002). At the current rate of increase, the population of the Marovo Lagoon is expected to double from its 1999 level by the year 2027 (Shearman and WWF 1999; also see Chun and Means 1997). This high growth rate for the Marovo Lagoon bears watching, as a rapidly growing population makes increasing demands on the environment and also affects the amount of natural capital available per person.

Population growth is offset to a limited extent by outmigration to Gizo and Honiara, though it should be noted that most outmigration is circular, with people moving back and forth from villages to urban centers. At present, communities in the Marovo Lagoon remain homogenous with little in-migration or settlement by those from other provinces. With the development of an oil palm estate on Vangunu Island, it was estimated that up to 5,000 migrants would move into the Marovo Lagoon to work as plantation labour (Shearman and WWF 1999) (see below).

The Marovo Lagoon consists of five wards, which include Kusaghe, Kolombaghea, Mbuni Tusu, Nggatokae and North Vangunu. The Mbili Passage community is located in the Nggatokae Ward, and Chea in North Vangunu (Table 3). Marovo Lagoon is composed of around 24 named *butubutu*<sup>16</sup> (tribes) (Hviding 1991). The average number of persons residing in a *butubutu* two decades ago was around 330 (Hviding and Baines 1992). People now live on the coast in varying sizes of villages, smaller hamlets and settlements.

Mbili Passage Village (Plate 2; Map 2) is a very old village and is situated on Mijanga Island, on the eastern end of Marovo Lagoon, belonging to the Getu *butubutu*. In 1986, Mbili Passage had a population of 132 (Hviding 1996). From a combination of the three IWP socioeconomic surveys, it has been estimated to have a current population of around 300 people in 38 households,<sup>17</sup> with some members also residing at Tibare and Kalekavo.

<sup>14</sup> Estimated annual population growth for the Solomon Islands in 2004–2005 was 2.3% (SPC 2004).

<sup>15</sup> Economic growth in the Solomon Islands has not kept pace with the rate of population growth. Consequently, a very large proportion of future labour force entrants will continue to remain in the subsistence or semi-subsistence sector.

<sup>16</sup> Of the 24 *butubutu*, 10 are considered to be "bush" groups, 7 "salt water" groups and 7 mixed groups (Hviding 1991).

<sup>17</sup> During the survey it was sometimes difficult to define households precisely, because eating and sleeping arrangements may involve an individual in different households. Added to this was the inclusion of people in households that were not currently resident, as they were living elsewhere while working or attending school.

Table 3: Population characteristics for Nggatokae and North Vangunu Wards

Category	Nggatokae	North Vangunu
Number of households	388	363
Average household size	6.1	6.2
Total population	2,377	2,251
Males	1,177	1,211
Females	1,211	1,040
Total population under 25 years	1,468	1,301
Males under 25 years	721	694
Females under 25 years	747	601

Source: Solomon Islands Census 1999.

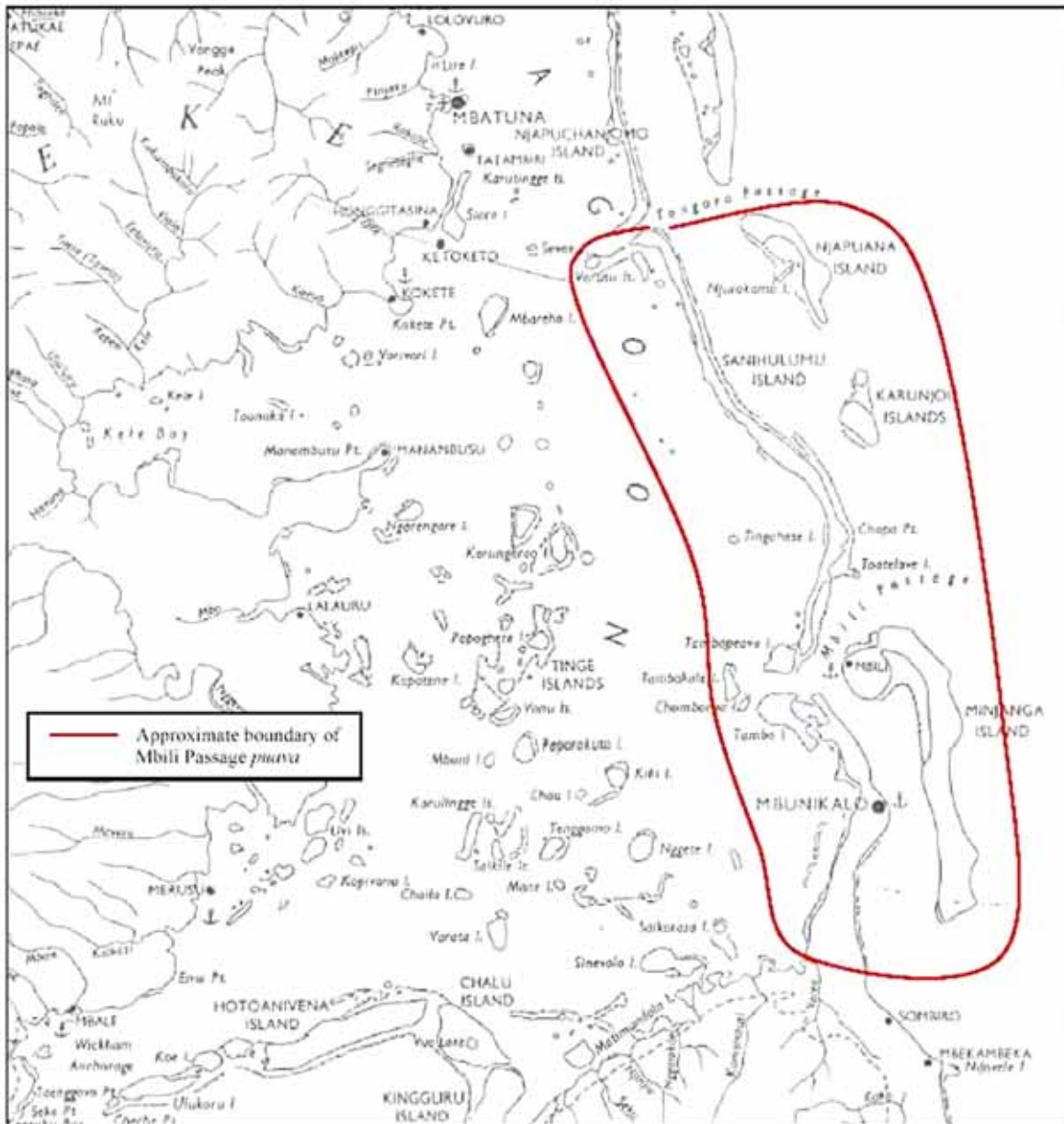


Plate 2: Aerial view of Mbili Passage

Chea is the primary settlement of the Babata<sup>18</sup> *butubutu* and is considered to be a typical medium sized Marovo village (Map 3; Plate 3). It was established in 1958 (Hviding 1996) on a pre-Christian ceremonial ground and is situated on the northern side of Patu Laiti (Marovo Island) in central Marovo Lagoon. It shares the island with two neighbouring *butubutu*, Kalekogu and Olovotu. In 1987, it had a population of 149 people, 45 of whom were under the age of fifteen. The *butubutu* at that time included 27 in-laws (12 of them women), and 27 people who were descendents of two male captives, and subsequently adopted (Hviding 1996). In 1998, Chea was reported to have a population of a 120 people living in 25 households (LaFranchi and Greenpeace 1999). During the three socioeconomic baseline surveys it was determined that Mbili Passage had an approximate population of 300 people (a significant

<sup>18</sup> The Babata *butubutu puava* (tribal resource estate) extends from Kataghoghoto on the coast to Jangan, Toa Kiki, Toa Gete to Payubichere, Tagire to Palingutu. Reefs and sea territory extends from Kataghoghoto to Opoani piu (Kemu Island) to Ebolo Passage, and returning to Kara River (see Liligeto 1997).

increase if the 1998 data is correct) residing in 35 households (Table 4).



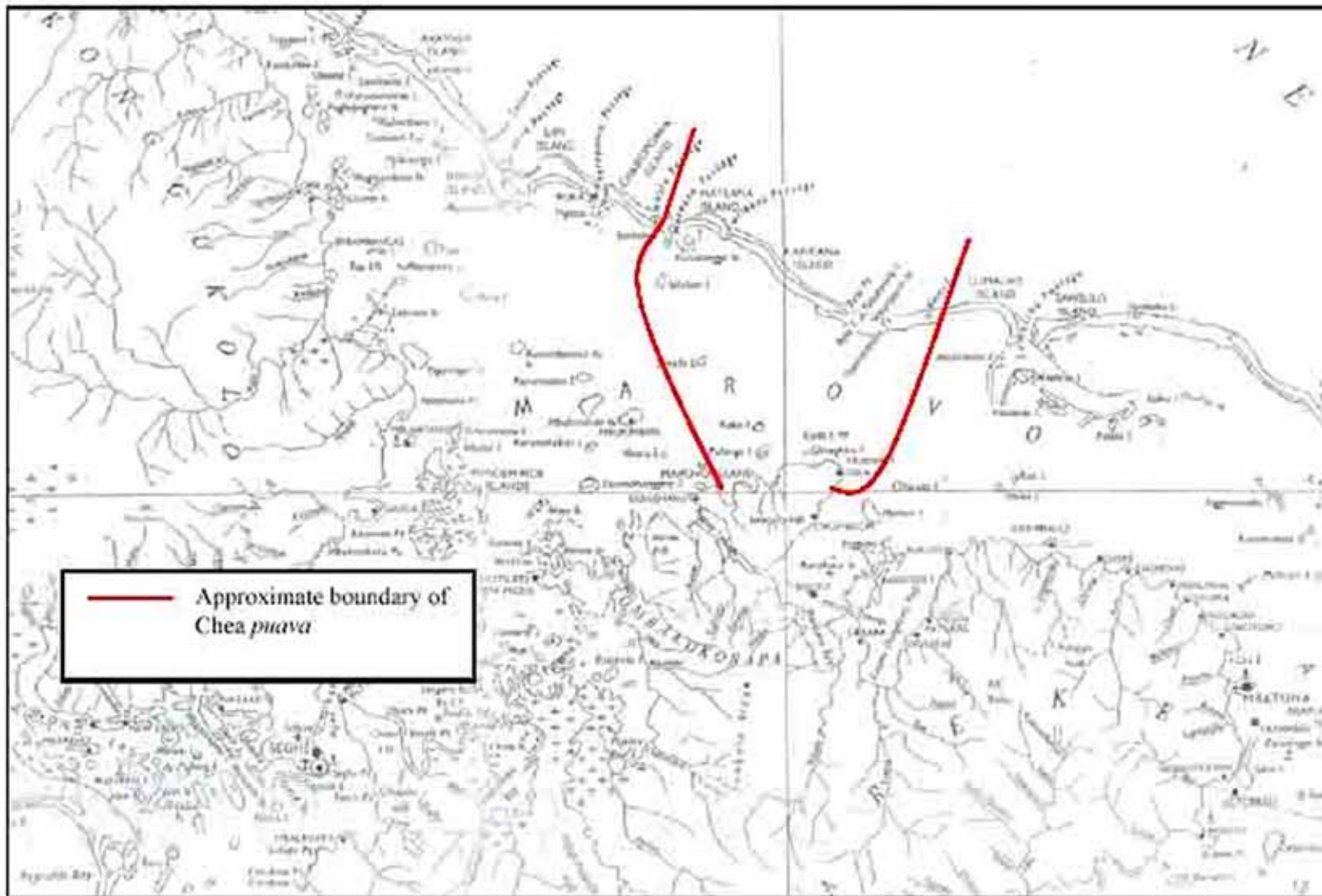
Map 2: Mbili Passage

## 2.5 Language

There are five language groups in Marovo Lagoon (Table 5):<sup>19</sup> Bareke, Hoava, Kushage, Marovo and Vanguu (Tryon and Hackman 1983; Hviding and Baines 1994; Shearman and WWF 1999), all of which belong to the northwestern and central Solomons Austronesian family (Ross 1986).

Marovo is the dominant language in the Marovo Lagoon, and could be considered a lingua franca for the region. Most people in Marovo Lagoon also understand Solomon Islands Pigin and many have a good working knowledge of English. The Mbili Passage and Chea communities both speak Marovo.

<sup>19</sup> The Chipuru language was replaced by Marovo in the 1800s (Bayliss-Smith et al. 2003).



Map 3: Chea



Plate 3: Aerial view of the barrier reefs north of Chea

Table 5: Language by age and type in the Marovo Lagoon

Language	Speaking own language						Also speaking SI Pigin					
	All ages	>14	15–29	30–44	45–60	60+	All ages	>14	15–29	30–44	45–60	60+
Bareke	399	107	128	74	51	39	348	77	125	74	42	30
Hoava	459	171	114	88	43	43	336	69	111	86	39	31
Kushage	2,395	1	715	447	212	110	1,782	382	691	433	193	83
Marovo	8,094	634	536	1,620	810	494	7,302	1,983	2,510	1,607	784	418
Vanguu	508	172	156	95	47	38	398	96	153	93	43	13

Source: Solomon Islands Census 1999.

## 2.6 Church

The primary differentiating element for each "tribal" group in the present day Western Province is church affiliation. Church groups in Marovo Lagoon include the United Church, Christian Fellowship Church<sup>20</sup> (CFC), and Seventh Day Adventist (SDA) Church and other smaller evangelical groups, with the United Church and SDA predominating (Table 6). The United Church is the modern version of the Methodist Church, which arrived in the Marovo Lagoon in 1912; the SDA Church followed in 1914.

Different Church doctrines, policies and practices have promoted somewhat contrasting patterns in village level material production and cash reliance, and in turn have generated differences in lifestyle and career patterns beyond the village. For example, the United Church promotes a more communal style of living, emphasising working together and sharing. In contrast, the SDA Church is characterised by a more individualistic orientation in terms of both money making and salvation. In SDA villages, individuals and households are obliged (but not all do) to contribute at least one-tenth of all cash income, crop harvest and fish catches as tithe

<sup>20</sup> The CFC is an indigenous church, which blends Methodist doctrine with indigenous beliefs, and is a major player in the cultural, social, political and spiritual life of the inhabitants of the Roviana and Vonavona Lagoons. CFC followers see their church as independent and not bound to the colonial legacy of other Christian denominations; adherence to the CFC church transcends the traditional spiritual role of other Christian denominations in the Solomon Islands and translates into political regionalism, with adherents institutionally and communally unified (see Aswani 1997 a,b 1999; Harwood 1978).

to the church. A stronger reliance on the cash economy is evident in SDA villages such as Mbili Passage and Chea.

**Table 6: Religious affiliation in the Western Province**

Religion	Western Province			
	Males	Females	All	% of total population
Church of Melanesia	1,964	1,111	3,075	4.9
Roman Catholic Church	2,729	2,229	4,958	7.9
South Seas Evangelical Church	940	683	1,623	2.6
Seventh Day Adventists	8,863	8,518	17,381	27.7
United Church	12,721	11,548	24,269	38.8
Assembly of God	93	107	200	0.3
Bahai	139	121	260	0.4
Baptist Church	14	14	28	0.0
Christian Fellowship Church	4,582	4,322	8,904	14.2
Christian Outreach Church	290	278	568	0.9
Church of the Living Word	54	56	110	0.2
Jehova's Witnesses	72	67	139	0.2
Rhema	39	30	69	0.1
S.I. Customary beliefs	2	1	3	0.0
Other religion	567	407	974	1.6
No religion	25	4	29	0.0
Not stated	96	53	149	0.2
<b>Total</b>	<b>33,190</b>	<b>29,549</b>	<b>62,739</b>	<b>100.0</b>

Source: Solomon Islands Census 1999.

Other differences also occur in the utilisation of resources. The followers of the SDA Church tend to follow the Old Testament ban on eating "fish without scales"<sup>21</sup> and are consequently prohibited from eating a large proportion of locally available food resources (notably shellfish, turtles, and crustaceans), and rely almost exclusively on finfish for their protein requirements. In periods of bad weather tinned fish is substituted for fresh fish by SDA adherents, whereas villages with differing church affiliation typically eat shellfish in such periods, which is gathered by women from the mangroves. SDA doctrine also precludes followers from consuming pigs.<sup>22</sup>

Churches in Marovo Lagoon (regardless of denomination) are the focus for village activities and communal gatherings, serve as a provider of utilities, services, and religious values, and promote community cohesion. Church services are also an important venue for village announcements. Groups such as Women's Group and Pathfinders and Adventurers Youth Groups have activities throughout the week. There are about 13 members of Women's Group in Mbili Passage and around 40 in Chea.

## 2.7 Governance

Previously the Marovo Lagoon was under the control of the Area Council,<sup>23</sup> which was disbanded in 1998. The Marovo Council of Chiefs has been established as a "traditional" body

<sup>21</sup> Leviticus 11: 9-12. You may eat any kind of fish that has fins and scales, but anything living in the water that does not have fins and scales must not be eaten. Such creatures must be considered unclean. You must not eat them or even touch their dead bodies.

<sup>22</sup> Leviticus 11: 7-8. Do not eat pigs. They must be considered unclean; they have divided hoofs, but do not chew the cud. Do not eat these animals or even touch their dead bodies, they are unclean.

<sup>23</sup> The Area Council was a government administrative body.



to govern the affairs of the inhabitants of the Marovo Lagoon. It has largely been ineffective, partly due to the high levels of dependency on aid projects and royalties (Foale 2001). There is also a lack of a charismatic leader with the ability to unite and motivate both the chiefs and people of the Marovo Lagoon (Foale 2001). In the Marovo Lagoon, chieftainship is hereditary (Hviding 1996).

Chiefs Raeboy Logara, Harrington Logara, Luten Hilakolo and Johnson Poghoso head the Mbili Passage community, though there is some contention within the community over their leadership with respect to the problems associated with royalty monies and access fees.

The Chea community incorporated itself in 1983 as a formal entity, and has had a constitution and elected village committee consisting of the chief, elders and other community members. In 1991, the constitution was updated and amended.<sup>24</sup> Chief Herick Ragoaso currently heads Chea village. There are also other key office holders such as community leader, radio operator and chief spokesman.

Although village politics now includes many new participants, including church pastors, school teachers, politicians, entrepreneurs and businessmen, belief and support of traditional political power over *butubutu* and *puava* are still thought to remain strong (Hviding 1996). However, the church leaders do appear to be acquiring greater legitimacy. One possible reason that the people are showing greater respect to the church as an institution is that it provides a source of community harmony in the face of the general disgruntlement that has arisen over the distributions of baitfish and logging royalties and dive agreements (Patrick Mesia 2005: pers. comm.).

## 2.8 Education and literacy

The literacy rate in the Western Province is high with around 79% of all people being literate in one language (either their own, pigin or English). The majority of the people living in Mbili Passage and Chea have at least a primary school level of education. Most people that have gained tertiary and vocational education have left home to seek employment, and are an important source of remittances (see Table 7 for Western Province education levels).

School attendance in the eastern Marovo Lagoon is also relatively high. Unfortunately, the data collected during the IWP socioeconomic surveys were incomplete and no reliable figures were obtained on current education status. It was, however, possible to determine overall percentages of school attendees. At Mbili Passage, 21 households responded to the questions on education, indicating that 30% of household occupants were studying, two people at the tertiary level. At Chea 19 households responded to the questions on education, with 36% of household occupants studying, one at the tertiary level.

At Mbili Passage, the SDA Mission administers the primary school, while children at Chea must attend the neighbouring Hinakole Primary School, which is also administered by the SDA Mission. The government assists by paying for staff salaries. Students needing to attend high school must travel to neighbouring villages where these are located. Some students also attend school in Honiara or Gizo.

Hinakole Primary School has one permanent building that houses all the students, the office and a library. It has a total student population of 83. Some of the students also come from the neighbouring village. Mbili Passage has one classroom and a student population of 30. Facilities at the two schools (Table 8) are in poor condition (see Plate 4). Recently, Mbili Passage has entered into an agreement with the NGO Seacology to pay for the rehabilitation of the school in return for a 10-year agreement to protect its marine environment (discussed below). Costs associated with school attendance are presented in Table 9.

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<sup>24</sup> The committee and constitution was established and operated within the framework of the Marovo Area Council and the Marovo traditional society.

Table 7: Education levels in the Western Province

Education Level	Population 5-29 years of age attending school and educational attainment			Population 5 years and over not attending school and educational attainment		
	All	Male	Female	All	Male	Female
No education	443	227	216	5,173	2,664	2,509
Pre-school	2,372	1,202	1,170	515	234	281
Standard 1-3	5,890	3,059	2,831	4,420	2,125	2,295
Standard 4-6	4,002	2,114	1,888	20,820	10,624	10,196
Form 1-3	1,903	1,021	882	3,558	2,173	1,385
Form 4-5	242	142	100	961	685	276
Form 6	74	45	29	164	119	45
Vocational	27	18	9	642	408	234
Tertiary	49	38	11	1,193	892	301
Not stated	53	29	24	605	359	246
Total	15,055	7,895	7,160	38,051	20,283	17,768

Source: Solomon Islands Census 1999.

Table 8: Primary school infrastructure for Mbili Passage and Chea (Hinakole)

Village	Students	Desks	Teachers	Teachers' houses	Water tanks
Mbili Passage	30	20	2	2 permanent	2
Chea (at Hinakole)	83	45	3	2 semi-permanent	4

Source: Solomon Islands IWP.



Plate 4: Dilapidated school building at Mbili Passage



**Table 9: Schools and costs for the Mbili Passage and Chea communities**

<b>School</b>	<b>Level</b>	<b>Cost in SBD</b>
Mbili Primary School (SDA)	Primary	100/t
Hinakole Primary School (SDA)	Primary	100/t
Pahike Community High School (government)	High school	500/t
Betikana High School Batuna High School Bekabeka High School Kukudu High School (all SDA)	Form 1	1310/s
	Form 2	1310/s
	Form 3	1340/s
	Form 4	1360/s
	Form 5	1510/s
	Form 6	1730/s
	Form 7	1670/s

Note: Cost is per term (t) or semester (s). Source: Solomon Islands IWP.

## 2.9 Health

There are few health facilities in the Marovo Lagoon, and none at Mbili Passage or Chea. Previously, the Western Provincial government supplied a health clinic at Mbili Passage but this was closed some time ago due to vandalism. Villagers that are sick must now travel some distance to the nearest aidposts or clinics. The main health clinics for the area are at Batuna and Seghe (Map 4).<sup>25</sup> For more serious injuries or illness, people must travel to Honiara, Gizo or the Atoifi Hospital in Malaita Province. Some people also seek treatment from the logging companies operating in the area.

## 2.10 Community infrastructure

Results from the 1999 Census showed that 39% of all households in the Western Province had access to piped water, 43% to water tanks, 4% used wells, and 14% utilised rivers or streams. Both Mbili Passage and Chea have an adequate water supply, though at Mbili Passage this has been recently affected by vandalism of the main water reservoir<sup>26</sup> that fed standpipes in the village. Standpipes are placed within the community and are accessible to all, while water tanks are usually attached to an individual family's house and only accessible by family members and occasionally neighbours (see Table 10).

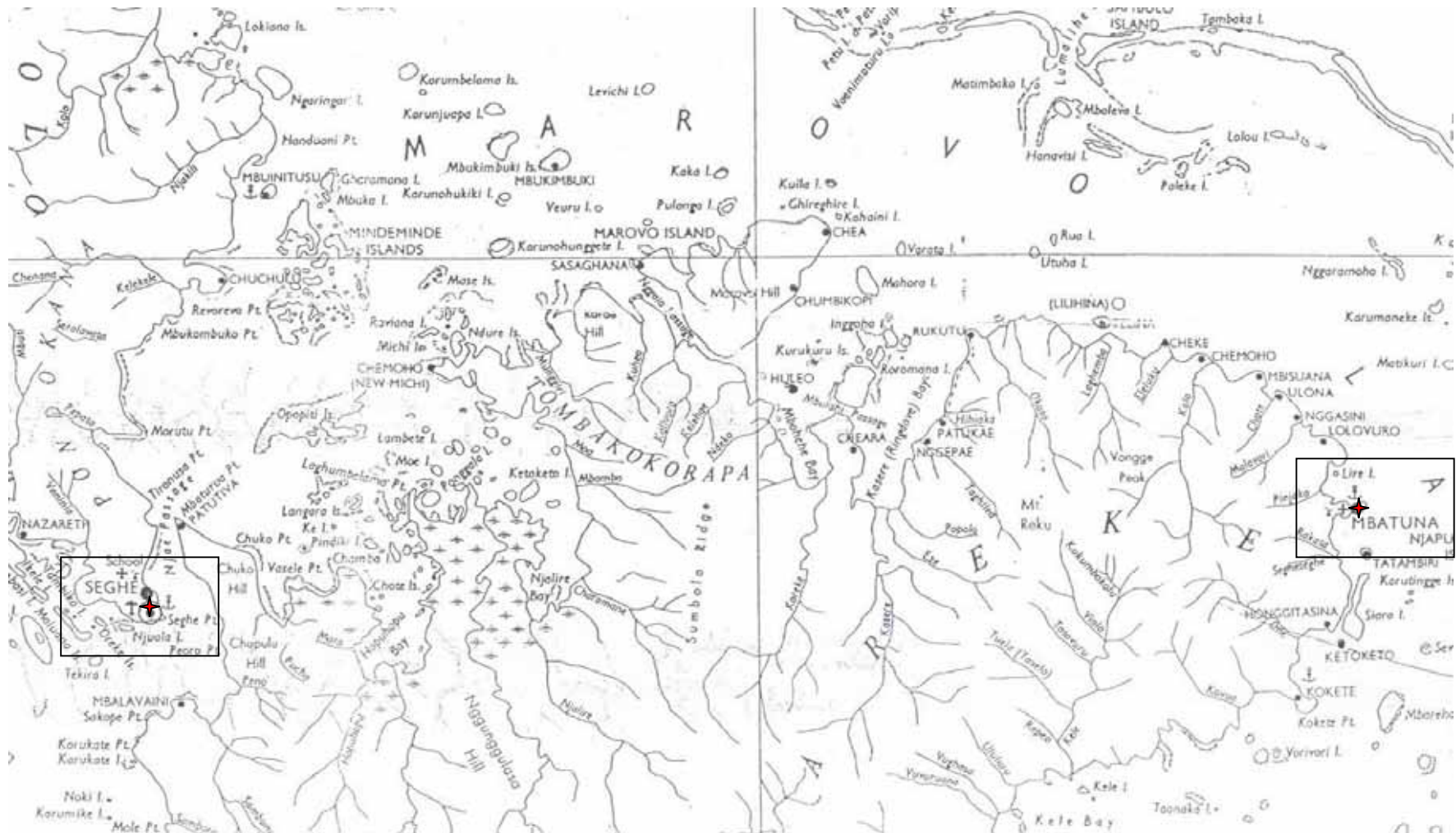
Most of the households at Mbili Passage and Chea lack proper sanitation, with most people utilising the beach and mangroves for their daily toilet needs. At Chea, however, several households have constructed pit toilets near their homes.

There are no trade stores at Mbili Passage, although there are two hawkers or "canteen" owners who stock basic goods such as sugar, rice and salt. Other services at Mbili Passage include two bakeries and a fuel depot for petrol. People needing to purchase store foods and goods usually travel to Bunikalo. There are two trade stores in Chea, and two people operating as hawkers. There are also two bakeries, but these operate intermittently, usually baking buns for school and church fundraising events. Two people operate fuel depots,<sup>27</sup> while another sells kerosene (Table 10). People needing to purchase store foods and goods usually travel to Batuna. There are also well stocked stores at Seghe.

<sup>25</sup> Seghe is the seat of government for the Marovo Lagoon and includes a provincial substation, extension services, several stores, fisheries center and a police station.

<sup>26</sup> This reservoir was built by the Adventist Development and Relief Agency in 2000, and utilised a diesel generator to pump water to the storage tank, which then gravity fed the standpipes. This project also faced problems in getting someone within the community to take responsibility for starting and caring for the diesel generator.

<sup>27</sup> Owners commented during the IWP socioeconomic surveys that petrol sales are significant, as outboard-powered boats are the primary means of transport in the lagoon.



Map 4: Location of major health clinics in the eastern Marovo Lagoon

Housing in the Marovo Lagoon has changed over the period of colonial contact, with most residential houses now having European-style pitched roofs. At Mbili Passage there are 14 permanent<sup>28</sup> and 5 semi-permanent houses, and 19 built of local materials. At Chea there are 25 permanent houses, 8 semi-permanent houses and 12 built from local materials. House built of local materials are usually kitchens, which typically last 5–10 years, with some minor repairs on the walls and roof during that time (Table 10).

With the advent of logging and the availability of chainsaws, more houses are being constructed from cut timber. Carpentry is a skill held by most villagers, with some specialising in it as a trade and a source of income. It is not uncommon for people in Marovo Lagoon to pay for the construction of their homes. Nails and roofing materials are typically purchased from hardware shops in Honiara.

In most cases, the church or the school owns community assets (Table 10).

## 2.11 Transport

There are regular boat and air services to Marovo Lagoon. Mbili Passage has good access to transportation links, as it is close to Bunikalo Port (which is 5 minutes away by outboard canoe) and the airfield at Sombiro on Nggatokae Island (which is about 10 minutes away). Mbili Passage is the main entry point for Marovo Lagoon. The main airstrip for the Chea community is Seghe airstrip, which is about 20 minutes away by boat. The other nearby airstrip is Batuna, which is owned by the SDA mission. The Chea community is a regular destination for passenger vessels, which stop off at the Marovo Lagoon on their way to Gizo. Because of the high cost of air travel, most people prefer to travel by boat to Honiara, which is much cheaper (Tables 11 and 12).

Table 10: Community Infrastructure

Infrastructure	Mbili Passage	Chea
<b>Water Supply</b>		
Standpipes	7	
Water tanks	21	11
wells	several	several
<b>Public services</b>		
Trade stores/hawkers	2	4
Bakery	2	2
Fuel depot	1 petrol	2 petrol, 1 kerosene
<b>Community assets</b>		
Fibreglass canoes	0	2
Outboard motor	1	2
Chainsaw	0	1
Portable sawmill	1	0
Generator	0	1
Solar panel	0	1
Two-way radio	0	1
Water tanks	0	2
<b>House types</b>		
Permanent*	14	25
Semi-permanent	5	8
Local material	19	12

\* Permanent houses are those built of sawn timber, with a corrugated steel roof. Source: Solomon Islands IWP

<sup>28</sup> Permanent houses are those built of sawn timber, with a corrugated steel roof.

Table 11: Air-routes and costs for the Marovo Lagoon (in SBD)

Route	Frequency	Adult Fare (one-way)
Honiara-Sobiro	Weekly (temporarily closed)	523.50
Honiara-Batuna	Weekly (temporarily closed)	572.60
Honiara-Seghe	Daily	572.60
Honiara-Ramata	Weekly	644.60

Source: Solomon Airlines.

Table 12: Sea-routes and costs for the Marovo Lagoon

Route	Adult Fare (one-way)	Child Fare (one-way)	Student Fare (one-way)
Honiara-Bunikalo	145	80	125
Honiara-Gasini	145	80	125
Honiara-Chea	145	80	125
Honiara-Seghe	145	80	125

Source: Shipping providers and Solomon Islands IWP.

## 3 The general economy

### 3.1 Income and expenditure

The communities in the Western Province are very fortunate in having a number of different income-earning opportunities. Most households obtain income from activities such as wood-carving (particularly SDA communities); marine resource harvesting; growing of food crops, copra, and betel nut; inter-village marketing; running stores, hawker canteens, fuel depots, and bakeries; making handicrafts; ecotourism; fishing; royalties<sup>29</sup> and remittances (Table 13).

From the IWP economic survey it was determined that women from Mbili Passage and Chea sell cooked food at Bunikalo Port to boat passengers, garden produce<sup>30</sup> at Batuna, ornamental shells to tourists, and handicrafts in Honiara. Men sell *bêche-de-mer* at the main stores at Mbili Passage, Rukutu, Chubikopi (Uvilau). Both men and women sell reef fish<sup>31</sup> at Bunikalo, Sobiro, Batuna (there is a weekly market on Thursdays), Merusu, Bekabeka school, and to local loggers and Bilikiki Cruises.

Marovo Lagoon is characterised by traditional woodcarving (predominantly a SDA community activity) and is one of the main sources of income, though it is hampered slightly by inadequate infrastructure and planning. Most men at Mbili Passage and Chea are skilled carvers; as highlighted by the IWP socioeconomic surveys, carvers can receive very high returns for their carvings, which are mainly made from kerosene wood and ebony (Plate 5). However, the demand for the wood is high, resulting in localised depletion, and carvers now have to purchase suitable timber from Choiseul and other provinces. Many women are engaged in weaving handicrafts for sale. Wood carvers and the handicraft weavers mainly sell their products at the Uepi Resort, to Bilikiki Cruises, in Honiara, and to the overseas yachts that frequently visit the lagoon (Plate 6). Some carvers also have contracts with buying agents from overseas, notably Fiji and Vanuatu. There is no canoe making at Mbili Passage or Chea.

<sup>29</sup> People receive (i) baitfish royalties from Solomon Taiyo to harvest baitfish, (ii) access fees from the vessels MV Bilikiki and MV Spirit of Solomon (for visits by both divers and tourists), (iii) fees from logging companies and from the Merusu oil palm estate.

<sup>30</sup> It has been previously estimated that 50% of adult women in the Marovo Lagoon are involved in the sale of garden produce, which on average returns SBD 80 per person per week (Shearman and WWF 1999).

<sup>31</sup> Fish is sold for SBD 12/kg for kingfish and SBD 5 for a bundle of reef fish.

Fishing is also a primary activity of the people at Mbili Passage and Chea, with nearly all the members of the community participating. Trochus, bêche-de-mer, crayfish, ornamental shells, shells for making shell money and pearl shell are also important commodities.<sup>32</sup> They are harvested unevenly but are very important sources of income, particularly for day-to-day cash needs. Because Mbili Passage and Chea are SDA communities, SDA doctrines prohibits the consumption of bêche-de-mer and trochus. These invertebrates are usually harvested by younger men who are alienated from the church.

Table 13: Economic Production by number of individuals in the Western Province

Product	Subsistence production			Marketed production		
	Yes	No	Not stated	Yes	No	Not stated
Coconut	7,423	2,465	104	5,405	4,434	153
Chillies	2,160	7,471	361	509	9,120	363
Betelnut	4,710	5,141	141	2,968	6,795	229
Rice	1,348	8,241	403	283	9,304	405
Cocoa				1,151	8,475	366
Yam	6,930	2,952	110			
Pana	6,940	2,948	104			
Cassava	8,817	1,093	82			
Taro	6,160	3,686	146			
Banana	8,861	1,048	83			
Pineapple	7,657	2,228	107			
Sweet potato	8,750	1,161	81			
Ngali nut	6,203	3,604	185			
Other fruit tree	8,024	1,835	133			
Pigs	2,671	7,097	224			
Other livestock	3,545	6,138	309			
Fish	8,652	1,259	81	4,397	5,303	292
Shellfish	4,577	5,275	140	1,379	8,233	380
Crab/lobster	4,227	5,610	155	1,128	8,463	401
Turtle	2,068	7,709	215	468	9,027	497
Bêche-de-mer	444	9,277	271	1,558	7,993	441

Source: Solomon Islands Census 1999.

In 1999, the main sources of income for householders in the Marovo Lagoon included “esky fishing”,<sup>33</sup> gardening and farming, and the sale of carvings. Nearly a quarter of the Marovo respondents indicated that they dived for bêche-de-mer. The sale of garden produce contributed to the income stream of some 84% of householders. Remittances from relatives working elsewhere were received by 28% of Marovo households (Donnelly 2001).

Unfortunately it was not possible to get a full understanding of income and expenditure from the IWP socioeconomic surveys (Table 14), because the information collected was generally incomplete. However, it is possible to say that carving, fish sales and the sale of cooked and garden food contribute most to the day-to-day income of households at Mbili Passage and Chea. None of the households are dependent on a sole income source, and instead utilise many opportunities to earn cash. The sale of bêche-de-mer seems to contribute more to cash earnings at Mbili Passage than Chea, but this could be just a reflection of the households surveyed. In 1998, Chea ranked bêche-de-mer as the highest money earner followed by carving, sale of reef fish and trochus (LaFranchi and Greenpeace 1999).

<sup>32</sup> Non-perishability is an important consideration in rural areas and outer islands where preservation facilities and transport services are limited or irregular.

<sup>33</sup> Esky fishing refers to fish caught for sale in Honiara; they are transported on ice, in eskies (portable coolers) on the weekly transport vessel. The average number of fish caught per trip was 20 (Donnelly 2001).



Plate 5: Carvings for sale at Mbili Passage

In 1993, Bayliss-Smith (1993) recorded expenditures in two SDA communities at Bareho and Bisuana in Marovo Lagoon. During his surveys, he found that 55% of income was spent on the purchase of trade-store foods and goods, 10% spent on the purchase of local market foods, around 20% given to the church, and the rest spent on petrol and kerosene. From the second IWP socioeconomic surveys all households surveyed for expenditures in Chea (n = 14) bought market food, 71% purchased trade-store goods and foods, 71% also purchased kerosene, and 50% of all households spent money on transport. Schooling is another significant cost; 90% of households at Mbili Passage (n = 21) that responded to the education question in the two socioeconomic surveys faced this cost; at Chea, 100% of households that responded to the education question in the two previous socioeconomic surveys (n = 19) spent money for education.



Plate 6: MV Bilikiki, a regular visitor to the Marovo Lagoon

Table 14: Income sources for Mbili Passage and Chea

Income Source	Mbili Passage (n=29)		Chea (n=26)	
	Number of HH	Proportion	Number of HH	Proportion
Retail (Trade store, fuel depot or hawker)	4	21%	3	12%
Bakery	1	5%	1	4%
Bêche-de-mer	12	63%	7	27%
Betelnut	1	5%		
Carving	18	95%	18	69%
Sale of cooked food	13	68%	14	54%
Eco-tourism	1	11%		
Fishing	15	79%	16	62%
Sale of fruits	8	42%	9	35%
Sale of garden food	10	53%	16	62%
Handicrafts	7	37%	6	23%
Hire of equipment (dinghy, outboard engine, chainsaw, etc)	7	37%	2	8%
Marketing			3	12%
Plantation	4	21%	5	19%
Remittances	5	26%	6	23%
Royalties	6	32%	4	15%
Sewing			1	4%
Shell money	4	21%		
Ornamental shells (also for handicrafts)	3	16%	1	4%
Wages	3	16%	3	12%

HH = households. Source: Solomon Islands IWP.

Based on household assets, Mbili Passage appears to be a wealthier community than Chea (Table 15). This is probably because of the greater income from both logging and baitfish royalties. Royalties are usually paid to the leaders for distribution to community members. In Mbili Passage, 32% of households surveyed during the two socioeconomic surveys (n = 19) responded that they received royalties, although no distinction was made between baitfish and logging royalties. At Chea, the community has placed a ban on baitfishing and therefore receives no royalties from that activity; however, 15% of households surveyed during the two socioeconomic surveys (n = 26) indicated that they receive royalties from logging.

Table 15: Ownership of household assets for Mbili Passage and Chea (% of households)

Household Assets	Mbili Passage	Chea
Fiberglass canoe	73%	38%
Canoe		17%
Outboard	73%	42%
Chainsaw		
Sawmill		4%
Carving tools	87%	71%
Two-way radio	7%	
Generator	53%	17%
Solar panel	20%	13%
Sewing machine	33%	25%
Video	4%	

Source: Solomon Islands IWP.

As reflected in the above income sources, carving tools are ubiquitous in both communities. A fisheries equipment survey would also yield interesting results.

Commercial transactions are more accepted in SDA communities than traditional reciprocal exchange and cooperative labour arrangements; for example, wages are paid even to close kin who assist in gardening or other activities that support the household.

### 3.2 Time allocation

Surveys conducted by Bayliss-Smith (1993) in four villages in other parts of Marovo Lagoon<sup>34</sup> (Table 16) indicated that on average men spent 34% of their productive time on the sea or in related activities, but only 29% on gardening. The women are more land-based, spending 74% of their productive time in gardening or other bush activities, with only 13% of their time spent at sea.<sup>35</sup>

Subsistence food production<sup>36</sup> accounted for 34% of men's time, 11% was devoted to non-food production,<sup>37</sup> 20% to marketing,<sup>38</sup> and 16% to social obligations (cultural or church). This left 19% for domestic work, leisure and illness. Women recorded similar trends for subsistence food production (33%), but only devoted 5% to non-food production, 4% on marketing and 19% on cultural or church obligations, leaving 38% for domestic work, leisure and illness. As would be expected, women are the main care-givers and cooks, and a larger percentage of their time is spent on these activities.

In contrast, the IWP socioeconomic surveys and observations by the IWP Community Facilitators found that while men did most of the fishing, marketing was predominately a women's activity. Bayliss-Smith (1993) found that fishing, carving and handicrafts were usually done at night, while the IWP socioeconomic surveys indicated that carving was a primary daytime activity for men.

Time allocation of household activities fluctuates depending on economic activities. Donnelly (2001) found that the level of participation in everyday household activities declined significantly when the live reef food fish trade (LRRFT) was in operation. For example, arts and crafts, symbolic of Marovo Lagoon, was practiced by about 20% of Marovo men in 2001 compared to 45% in 1999, with most men spending 10 hours a week less during periods when the LRRFT was active (Donnelly 2001).

Table 16: Time allocation (%) in the Marovo Lagoon

Gender	Subsistence food production	Non-food production	Marketing	Social obligations	Other
Men	34	11	20	16	19
Women	33	5	4	19	38

Source: Bayliss-Smith 1993.

<sup>34</sup> Two of the villages were SDA, while the others were United Church villages.

<sup>35</sup> Unless married, men and women aged 15–29 tend to do much less work than older groups, apart from the elderly, who are usually confined to sedentary activities (Bayliss-Smith 1993).

<sup>36</sup> Food production means gardening, wild plant and nut collecting, hunting, animal husbandry, fishing and shellfish collecting.

<sup>37</sup> Non-food production refers to canoe building, timber and thatch preparation, house construction and repair, handicrafts, firewood and water collection.

<sup>38</sup> Marketing incorporates agricultural wage labour, copra production, carving, livestock, shellfish collecting, sales of foods and other goods, and store keeping.



### 3.3 Food consumption

Solomon Islanders have one of the highest per capita seafood consumption rates in the world with over 80% of the population deriving their protein from marine resources. A 1983 National Statistics Office survey reported an average per capita fish consumption of 26 kg/year (Sulu et al. 2000). A subsequent unpublished 1988 survey indicated consumption as 22 kg/year for fish and 12 kg/year for shellfish (Leary 1991). Skewes (1990) gives an estimate of 35 kg/year. People in the Western Province eat approximately 54 kg of fish/person/year, which is the highest per capita amount in Solomon Islands (Richards et al. 1994).

Results from the 1999 Census detail the dependence of the people of the Western Province on marine resources. Of all households, 90% took fish for subsistence, 48% took shellfish and 22% took turtle. Forty-six percent of all households in the Western Province trade in fish, 14% in shellfish, 16% in *bêche-de-mer*, 5% in turtle and 12% in crayfish (see also UNDP 2002; UNDAF 2002). Other surveys conducted in the 1990s also confirm the importance of marine resources in sustaining livelihoods in the Western Province (see Oreihaka and Ramohia 2000).

Breakfast is often a simple meal of sweet potato or rice, leftovers from the night before and sometimes tea and biscuits. At midday generally no more than a snack is eaten. The evening is when people usually eat the main meal of the day, consisting of sweet potato and/or tapioca cooked often in coconut cream,<sup>39</sup> and eaten with protein (usually seafood, either tinned or fresh) and often with a green vegetable such as *Hibiscus manihot*. Tinned fish is frequently eaten in SDA villages, in part because of SDA food taboos and in part because of their more monetised economy.<sup>40</sup>

### 3.4 Gardening

Gardening is an extremely important facet of village life in Marovo Lagoon. Land is usually cultivated for short periods before going fallow, with most gardens cut from secondary forest in a 1–2 km radius of the village. All gardens contain mixed crops, but are primarily dominated by sweet potato, yams and tapioca.

Limited rice farming is practiced at Mbili Passage, where the IWP socioeconomic surveys found that two people had small plots; one farmer in Chea had planted about 30 m<sup>2</sup> of rice. Common plant foods utilised in Marovo Lagoon are detailed in Table 17.

Table 17: Plant foods utilised in the Marovo Lagoon

Staple	Common Plants	Less Common Plants
Bananas	Cabbage	Apple
Beans	Chilli	Breadfruit
Corn	Cocoa	Cutnut
Cucumber	Coconut	Five corner
Peanut	Eggplant	Garlic
Pineapple	Ginger	Guava
Pumpkin	Mango	Lettuce
Shallot	Melon	Ngali nut
Slippery cabbage	Pawpaw	Osi
Sugar cane	Snake bean	Pepper
Sweet potato	Tomatoes	Soursop
Tapioca		
Taro		
Yam		

Source: Shearman and WWF 1999.

### 3.5 Village plantations

For many years following the arrival of the Methodists, copra was the mainstay of the rural economy of Marovo Lagoon, with many villagers who came under their influence moving into the plantation economy. Smallholder cropping was soon expanded by other villages.<sup>41</sup> In 1933, a cooperative was formed in Marovo

<sup>39</sup> Coconut is the most common source of fat in the diet.

<sup>40</sup> From surveys done by Bayliss-Smith (1993), tinned fish was consumed approximately 25% of the time.

<sup>41</sup> One effect of this was the localised removal of mangroves to make space for coconut plantations.

Lagoon (Bennett 1987), but like most cooperatives, it did not survive. There are still four major copra buying centers in Marovo Lagoon (at Mahoro, Chikikopi, Kieru and Bunakalo), although copra production has declined in recent decades (see Jones et al. 1987), and is now considered a small-scale activity (Donnelly 2001).

The Christian Fellowship Church has begun teak plantations, especially in areas that had previously been logged. This is more frequent on the New Georgia Islands and further to the west in the Roviana and Vonavona Lagoons. Currently, several people at Mbili Passage and Chea have started teak plantations. The IWP socioeconomic surveys indicate that two farmers at Mbili Passage planted teak trees, with around 70 and 110 trees respectively. At Chea, there are three people growing teak, with 200, 70 and 30 trees. The major problem with teak is that, like oil palm, it is destructive to the soil.

Unlike in Papua New Guinea, cocoa and vanilla are not marketed extensively and no one at Mbili Passage or Chea was found to be growing these two commodities.

### 3.6 Tourism

Marovo Lagoon attracts tourists wishing to see the natural beauty of the area. There are numerous accommodation choices (Table 18) ranging from the expatriate-owned Uepi Resort<sup>42</sup> to several local guest-houses made of traditional materials. Mbili Passage has a lodge at Tibare, while the Chea community is currently constructing one.

Table 18: Tourist lodges in the vicinity of Mbili Passage and Chea

Lodge	Location	Islands
Rapiko Lodge	Sombiro	Ga
Tibare Lodge	Mbili	Nggatokae
Roguchakeana Lodge	Gasini	Vagunu
Rapita Lodge	Michi	New Georgia
Lagoon Lodge	Rukutu	Vagunu
Seghe Lodge	Seghe	New Georgia
Atora Lodge	Cheke	Vagunu
Uepi Resort	Uepi	Uepi
Wilderness Lodge	Peava	Nggatokae

Source: Solomon Islands IWP.

Tourism at all levels — from village-based to five star resorts — requires detailed attention to the organisation of the tourist experience and marketing. There has been much discussion about eco-tourism in Marovo lagoon for many years, but little has been realised, especially in recent years following the problems associated with "ethnic tension".<sup>43</sup> Specific problems that have arisen from tourism in the Marovo Lagoon include concerns that dive tourists will take rare shells and precious corals, a lack of respect for community members<sup>44</sup> and chiefs, and trespassing, especially near sacred areas. Prohibitions have already been made on diving and

<sup>42</sup> Before the problems associated with "ethnic tension" (see footnote 45) in the Solomon Islands, Uepi Resort had an annual occupancy rate of about 45%, or an estimated 2,000 people a year (Shearman and WWF 1999). There is substantial room at Uepi for growth in the number of tourists that it can cater for. Despite being expatriate-owned, the resort contributes to the local economy through the purchase of food and carvings, village visitation sacred sites and dive fees.

<sup>43</sup> The tension in the Solomon Islands began in 1999 due to disgruntlement between local land owners on Guadalcanal Island and Malaitan immigrants. Quasi-military forces were formed, notably the Malaitan Eagle Force, the Isatabu Freedom Movement and the Guadalcanal Revolutionary. Cessation of hostilities in August 2000 led to signing of the Townsville Peace Agreement in October 2000. Despite this agreement, a rapidly deteriorating law and order situation prevailed and in mid-2003, the Solomon Islands Government requested help from Australia and the Pacific Islands Forum. This resulted in the deployment of the Regional Assistance Mission to Solomon Islands in July 2003, which has improved the law and order situation.

<sup>44</sup> A view common among many people in Marovo Lagoon is that they do not want tourists walking through their village taking photos of them as if they were an exhibit (Shearman and WWF 1999).

anchoring at Chea to prevent these difficulties. During the most recent *bêche-de-mer* survey it was observed that villagers were selling ceremonial clamshell money that and skulls had been stolen from cliffs from Charpoanna Island (Jeff Kinch 2005, pers. obs.). If communities such as Mbili Passage and Chea wish to pursue ecotourism they will need to balance their desire for cash with the inconvenience of looking after tourists and the effect tourists will have on village life. Yachts from a number of nations are regular visitors to Marovo Lagoon throughout the year. Most yachts enter through the passage at Mbili and work their way around the north coast of Vangunu, usually stopping at Chea to buy carvings. Yacht are a good and reliable source of income from the sale of foodstuffs and carvings and trade in various goods.



Plate 7: Guesthouse under construction at Chea

### 3.7 Logging

Logging has been occurring in the northern and eastern parts of Marovo Lagoon since the 1960s (LaFranchi and Greenpeace 1999; Shearman and WWF 1999; see Table 19). The first major logging operation was conducted by Levers Pacific Timbers in north New Georgia, which lasted until 1986. Logging on Vangunu started in the early 1990s, when the Malaysian company Kumpulan Emas Berhad began clearing for the development of the Sylvania (Merusu) Oil Palm Project (Kumpulan Emas Berhad 1994; Riumana 2001).

Logging operations have been carried in the Mbili Passage area and on Japuana Island and are the cause of some disputes within the community over the royalty money for timber access. The logging company had its licence suspended after it was determined that it was logging illegally, but that suspension has now been lifted.<sup>45</sup> There is no logging operation on Marovo Island where Chea is situated, but there are three logging companies operating in the neighbouring villages. Anecdotal evidence suggests that marine life around Chea had been affected by siltation and oil spills from logging barges; during the recent *bêche-de-mer* surveys, Mbili Passage *bêche-de-mer* divers raised a similar concern.

In the Marovo area, in the vicinity of logging area, villagers report huge sediment plumes following heavy rain. Once the rain has stopped it may take between 24 hours and a week for the water to clear. This means that in the rainy season the plumes are a semi-permanent feature

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<sup>45</sup> The logging industry in the Solomon Islands is allegedly very corrupt, relying on corporate bribes, political influences and the general ignorance (or greed) of local resource owners (Foale 2001).

(Moseby and Read 1999). There have been limited studies<sup>46</sup> on the effects of such sedimentation on the lagoons and the coral reefs in Solomon Islands, but, sediment obviously reduces water clarity. Any acceleration in sediment deposition rates will also affect corals<sup>47</sup> and increase water turbidity. If coral mortality becomes high, changes would be expected in the diversity and abundance of fish and other invertebrates.

Table 19: Logging Companies within the Marovo Lagoon

Names of Licensee	Islands	Area
Voge Timber Export	Vangunu	Arovo and Gae
Lupa Development Company	Nggatokae	
Geruana Sawmilling	Vangunu	Geruana
Kongungaloso Timber Co Ltd	Nggatokae	Kongungaloso
Kuvotu Development	Vangunu	Kuvotu
Solfeed Milling Enterprises	New Georgia	Vahole
Peokana Alekeru	New Georgia	Hetaheta
Leeroy Joshua	Vangunu	Bareke, Tadove and Bukale
Silvania Products	Vangunu	Lot 16 of LR515
J P Enterprises	New Georgia	Seghe
Nama Development	Vangunu	Nama
Lagoon Eco Timber	New Georgia	Tirobuma, Chochole and Chenana
Bulo Enterprises	Nggatokae	Mbili Passage
Metro Pacific	Mirjanga	Mbili Passage

Source: Solomon Islands IWP.

Most villagers with experience of logging report soil and stream damage followed by a reduction in the abundance of building materials and wildlife, disturbance of tabu sites and damage to gardens (Shearman and WWF 1999). In most cases damage to mangroves is reported; in all operations, land disputes, prostitution of women and inequities in royalty distribution are reported. The latter results in divisions within the community.

Some members of the Mbili Passage community are planning to engage in portable sawmilling (Patrick Mesia 2005: pers. comm.).

### 3.8 Mining

Mineral prospecting has occurred in the Marovo Lagoon since the early 1990s. Special Prospecting Lease 186 is situated in the Kele River area on Vangunu Island, and is 404 km<sup>2</sup> in extent (Newmont Proprietary Limited 1986). It is considered to have high copper and gold potential to sustain a small to medium-scale industrial mine. Mining has not begun at this writing.

### 3.9 Oil palm

In the late 1990's, the Solomon Islands Government proposed the development of an oil palm project to be situated in the Marovo Lagoon at Vangunu Island. In July 1999, the Solomon Islands Government agreed to allow Kumpulan Emas Berhad, a sister company to Silvania Products Limited, to clear more than 10,000 hectares of land for the planting of oil palm.

Concerns have been raised about the level of soil erosion and the resultant siltation of the

<sup>46</sup> Previously, WWF and ICLARM investigated this, and it is the current focus of a research program by the University of Queensland.

<sup>47</sup> Coral growth is reduced because of diminished light penetration (corals are dependent on symbiotic algae, which rely on light for photosynthesis to manufacture food) and smothering.

lagoon, as well as the fear that toxic effluent<sup>48</sup> produced during oil palm production may enter the lagoon, causing severe pollution. The extent and severity of these impacts is unknown but are expected to affect at least the eastern side of the Marovo Lagoon between Vangunu and Nggatokae Islands<sup>49</sup> (Shearman and WWF 1999).

The development of the Merusu plantation area has seen an increase in fishing for cash rather than for subsistence. Fishermen from Nggatokae have started selling fish to Merusu.

## 4 Fisheries

### 4.1 The Live Reef Food Fish Trade (LRFFT)

The LRFFT<sup>50</sup> began operations in the Western Province at Vella Lavella in 1994 (Johannes 1999; Johannes and Lam 1999), later spreading to Roviana and Marovo Lagoons (Donnelly et al. 2000; Smith and Johannes 2000), where pulse fishing<sup>51</sup> and the targeting of seasonal grouper spawning aggregations was adopted (Donnelly 2001)<sup>52</sup>.

The introduction of this new income source for the Mbili Passage and Chea areas (Table 20) resulted in several disputes over primary rights to spawning aggregation sites. Other disputes arose also over the misappropriation of royalty payments<sup>53</sup> by village chiefs (Johannes and Lam 1999). This was exacerbated by the fish buying companies, as they often would negotiate with the wrong villagers, who were not the primary owners of the fishing grounds in question.

An example of this for the Chea area resulted in a major court dispute between the Telina and Rukutu villages over ownership of Lumalihe Passage (Johannes and Lam 1999), when Telina village was paid the royalty but the people of Rukutu village claimed that the primary user right belonged to them and, therefore, the royalty should have been paid to them. Allegations of misappropriation of a royalty by village chiefs did not help matters and only served to undermine the authority of and respect for the chiefly system.

During the LRFFT, most fishers in the Mbili Passage operated on a daily basis, moving out from the village in the morning and returning in the evening. Some fishers at Chea established camps on islands nearby to passages (as they do now for *bêche-de-mer*). Daily life during the LRFFT was focused heavily on maximising fishing effort, with men, women and occasionally children exerting varying levels of fishing effort in order to maximise the catch. Tasks that were typically carried out by men and women in the household were left solely to women or they remained uncompleted as women also fished, resulting in the neglect of vegetable gardens, poor house maintenance and reduced general family unity (Donnelly 2001). Interestingly, the LRFFT did not impact church attendance or monetary contributions to churches. Money earned from the LRFFT did help villagers pay school fees and better provide for their families, but mostly of the money was squandered.<sup>54</sup>

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<sup>48</sup> About 0.6 tonnes of palm oil sludge is produced for every ton of fresh fruits processed (Chin 1980).

<sup>49</sup> Under Solomon Islands legislation, an environmental impact assessment (Solomon Islands Government 1996) should be conducted to assess the project's probable impacts.

<sup>50</sup> The LRFFT is driven by Chinese demand for live fish, based on the belief that the best tasting fish are those eaten almost immediately after being caught. This has resulted in an increase in wild caught live fish, which are transported live to markets and killed only moments before they are cooked. As Chinese stocks became depleted and prices in Asian markets increased, LRFFT operators began (in the mid-1980s) to extend their activities into the Pacific.

<sup>51</sup> Pulse fishing is the intensive targeting of a species for a limited period of time.

<sup>52</sup> Fishers were targeting spawning aggregations in great numbers at this time, often for two periods of six to eight hours, six days per week. Sometimes there was up to 30 or more fishers in close proximity to each other for up to 16 hours per day.

<sup>53</sup> Royalty payments were SBD 0.50/kg.

<sup>54</sup> Overall, the LRFFT resulted in reduced future subsistence catches (for a time), neglect of important village activities, increased dependence on cash and (to varying degrees) social dislocation.

Table 20: Live fish (kg) purchased from the Mbili Passage and Chea areas: 1996-1998

Place	1996	1997	1998	Total
Telina	12,585	11,668	8,459	32,712
Vacambo	7,660	5,968	5,886	19,514
Uepi (Charapoana)	5,014	6,800	8,666	20,480
Ketoketo	43	6,874	4,823	11,740
Tamaneke		2,646		2,646
Ramata			3,036	3,036
Mbili Passage			3,469	3,469
Total	25,302	33,956	34,339	93,597

Source: Johannes and Lam 1999.

One result of the LRFFT was firsthand experience with the effects of overfishing, which in some instances resulted in preparation of management plans and establishment of marine protected areas (MPAs). For example, Michi villagers, the primary owners of Charapoanna Passage, which is also used by fishers from Chea, declared that due to the heavy depletion of grouper spawning aggregations, they were going to close the passage to all commercial fishing. The villagers of Rukutu (primary owners of Lumalihe Passage), people of Ramata (primary owners of Veravera Entrance/Ramata Passage, and Lolomo and Pipa passages), and the people of Vacambo all followed suit (Johannes and Lam 1999). See Table 21 for villagers' perceptions of LRFFT impacts.

Table 21: Villagers' perceptions of the LRFFT in the Mbili Passage and Chea areas

Village	Passage fished	Fish numbers decreasing	Fish sizes decreasing
Telina	Lumalihe	Yes	Yes
Rukutu	Lumalihe	Yes	Yes
Chubikopi	Lumalihe	Yes	Yes
Sasaghana	Charapoanna and Lumilehe	No opinion	No opinion
Chea	Charapoanna	Yes	Yes
Michi	Charapoanna	Yes	Yes
Vacambo	Monggo	Yes	Yes
Ramata	Veravera	?	?

Source: Johannes and Lam 1999.

Concerns were also raised over the level of bycatch, which is estimated to have ranged from 50–80% of the catch (Johannes and Lam 1999). The company would not buy the bycatch, and because there was often too much bycatch to be consumed by villagers, it sometimes went to waste. Bycatch that was caught in the day or two before the passenger vessel arrived was sent to Honiara to be sold at the market, and the esky fishery became an important part of overall fishing activity (Donnelly 2001).

In the Mbili Passage and Chea areas, the close proximity of villages to passages had a profound effect on the relative importance of the target species in the LRFFT to the diet of villagers, as a major component of the diet of these people are species of grouper and coral trout, known collectively as *pajara*.<sup>55</sup>

A moratorium was eventually placed on the LRFFT, much to the unhappiness of many villagers who called for the moratorium to be lifted; at the time many expressed exasperation at

<sup>55</sup> Most groupers are protogynous, or sequential hermaphrodites, with individuals beginning their reproductive life as females but changing later to males as they age and grow (Randall et al. 1997). When fishers target the aggregations in great numbers the resulting removal of large numbers of breeding-aged females may have disastrous ramifications for the availability of fish in future spawning aggregations at a particular site, and for the sex ratios that typically occur within the aggregations.

the closure of the fishery. Nearly 60% of the Marovo respondents believed it was important to target spawning aggregations in order to make money (Donnelly 2001). They tried to justify their participation in the fishery by stating that spawning aggregations had been fished for generations and that the money from the LRFET alleviated the sometimes prohibitive cost of living in the villages. Some Marovo fishermen, primarily secondary owners of fishing grounds (see below for discussion) justified their continued fishing by echoing the sentiments of one Telina man, who said, “we know it is destructive, but the government gives us no alternative to make money from our fish” (Johannes and Lam 1999).

## 4.2 Fisheries centers

The SDA Church has tried several times to set up fisheries enterprises in the Marovo Lagoon, but with little success. Their most recent effort was the establishment of a fisheries station at Batuna in the mid-1990s. The longest established fisheries center is the Rural Fisheries Center (RFC) at the district center, Seghe, which was first constructed in 1984 under a Japanese aid program and has operated on and off since then. With the start of European Union Rural Fisheries Enterprise Program (RFEP), the RFC recommenced operation in 2001. Relying primarily on dugout and a few fibreglass canoes owned by fishermen in the area, the RFC recorded constant sales of fish from the surrounding areas of the Marovo Lagoon, though very little was purchased from Mbili Passage or Chea due to the costs of fuel in transporting fish to the center.

In its first year of operation under the RFEP, the Seghe RFC landed 12.831 tonnes (t) of fish, with SBD earning SBD 86,284 in sales. During the second year of operation, fish sales amounted to 5.446 t, as well as 1.193 t of crayfish<sup>56</sup> and trochus, worth SBD 44,651. The lower fish catch for this year was mainly due to a significant deterioration in transport options to Honiara, due to the downturn in economic activity caused by the ethnic tension. Fish catch in the third year increased to 10.285 t of fish, and 1.241 t of crayfish and trochus, earning SBD 91,644 (see Table 22).

Table 22: Total Purchases for Marine Product and Value: Seghe RFC (2001 to 2004)

Year	Fish Purchases (kg)	Crayfish and trochus Purchases (kg)	Fish Sales (kg, Seghe RFC)	F.o.c and Discards (kg)	Sales (in kg, Honiara)	Value (in SBD for crayfish and fish, Honiara)
2001-02	12,831	86	10,842	1,564	511	86,284
2002-03	5,446	1,193	5,175	653	869	44,651
2003-Feb 04	10,285	1,241	9,085	2,195	246	91,644

Source: Russel and Buga 2004.

Seaweed farm trials have been undertaken at Nggatokae and Seghe RFC, but have proved ineffective.

## 4.3 Baitfish fishery

The skipjack tuna (*Katsuwonus pelamis*) fishery is the largest and most commercially valuable fishery in Solomon Islands, contributing roughly 40% of the country’s foreign earnings during the 1990s. Most of the commercial tuna catch is made using the pole-and-line method, a technique that relies on live baitfish.<sup>57</sup> Up to 60% of the baitfish are caught in Marovo Lagoon

<sup>56</sup> Seghe is also fortunate to have an airstrip, so crayfish can be regularly air-freighted to Honiara.

<sup>57</sup> Once a fishing vessel locates a school of surface tuna, live baitfish are thrown into the sea in order to keep the tuna on the surface and within range of the fishers.

(Hviding and Baines 1994). Mbili Passage is one of the most frequented fishing sites (Shearman and WWF 1999).

Traditional owners who open their reefs to bait fishing receive royalty payments that are paid on a per-night, per-vessel basis, calculated according to data by kept by the catcher boats (Evans and Nichols 1986). Inequities in the distribution of these royalty payments are a constant source of disputes, which are again notable at Mbili Passage. The apparently consistent problem is that village chiefs, lacking a sense of civic duty and of obligation to other members of the *butubutu*, try to monopolise the right to profit from access fees paid by outside tuna vessel operators.

In addition to generating royalties, the baitfish also constitute an important food item in the diets of predatory fish that make up a large part of the traditional subsistence catch in the Marovo Lagoon.<sup>58</sup> Twenty-eight species of predatory fish have been identified as major baitfish predators, most being scombrids, carangids, sphyraenids, lutjanids (snappers) and serranids (groupers) (Blaber and Milton 1990; Blaber et al. 1990a, 1990b; Rawlinson 1989; Johannes et al. 2000).

#### 4.4 Aquarium fish

The aquarium fishery in the Western Province of the Solomon Islands first started in the mid-1990s with the establishment of three groups in the Marovo Lagoon, whereby fishers were supplied with the necessary equipment and given basic training in collection, handling and packing for shipment to Honiara (Kinch 2004a). The aquarium trade was supported by the EU RFEP, but was eventually closed after pressure from Uepi Resort, because they thought the collection of amenonefishes would infringe on the aesthetic qualities of the reefs, when marketing the Solomon Islands to dive tourists (Kinch 2004a; MAC 2001; Russel and Buga 2004).

#### 4.5 Artisanal fisheries

##### 4.5.1 *Bêche-de-mer*<sup>59</sup>

The *bêche-de-mer* fishery in the Solomon Islands is believed to have started as early as 1845, and was definitely well established by the late 1870s and early 1880s, when up to 90 t of *bêche-de-mer* were being exported to Australia annually (Bennett 1987). The *bêche-de-mer* fishery in Marovo Lagoon also began at this time, organised by traders who followed in the wake of earlier whalers, convict and East India merchant ships. The men on these vessels came in search of food, wood, water and women and to barter for *bêche-de-mer* and turtle shell<sup>60</sup> (Hviding 1996; Hviding and Bayliss-Smith 2000).

The *bêche-de-mer* fishery in the Solomon Islands today remains an artisanal activity involving (i) coastal and island communities as fishers, (ii) buyers who buy the processed *bêche-de-mer* products from the fishers, and (iii) exporters who export the processed *bêche-de-mer* to the international market, mostly to Hong Kong. It is currently a multi-million dollar industry, and is the second-most valuable marine resource, after tuna, to the Solomon Islands national economy (Ramofafia 2004). Total exports rose from 7.3 t in 1981 (Skewes 1990) to a peak of 715.4 t in 1992 (Holland 1994; Kinch 2004a). In 2004, 408.7 t were exported (see Appendix G for details).

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<sup>58</sup> Hamilton's (1999) research in the Roviana Lagoon revealed that the barracuda species *Sphyraena jello* and *Sphyraena putnamiae* were a dominant component of subsistence fishers catches, making up 56.4% of the total catch by weight.

<sup>59</sup> This section has been produced from information collected in the recent *bêche-de-mer* fishery survey, which was coordinated by Jeff Kinch.

<sup>60</sup> The main exchange item at this time for these commodities was iron axes, which were in high demand because of their usefulness in warfare and headhunting, but also in gardening and construction of canoes (McKinnon 1975).



From the initial exploitation in the 1800s, the *bêche-de-mer* fishery in Marovo Lagoon began to increase in the 1960s and then increased dramatically in the mid-to-late 1980s, with large volumes of sandfish and brown sandfish harvested<sup>61</sup> (Holland 1994).

Marovo Lagoon remains a large contributor to overall exports from the Western Province, while the province has consistently contributed significantly to total *bêche-de-mer* exports from the Solomon Islands (Table 23).<sup>62</sup> For example, in 1989, the Western Province yielded 58% of the total *bêche-de-mer* production for Solomon Islands for that year, in 1990 it was around 20%, 38% in 1991 and 32% in 1992 (Holland 1994). In recent years, the Western Province contributed 24% of annual production in 2000, 35% in 2001, 11% in 2002 and 17% in 2003 (Ramofafia 2004).

Table 23: *Bêche-de-mer* Production by Percentage by Province: 1989-1992; 2000-2003

Province	1989	1990	1991	1992	2000	2001	2002	2003
Central	2	9	5	1	7	3	8	1
Choiseul					18	21	5	43
Guadalcanal	1	10	3			3	2	2
Isabel	14	4	22	8	29	13	16	17
Makira	1		3	1	2	4	7	5
Malaita <sup>63</sup>	19	55	23	56	16	13	51	4
Rennell-Bellona							1	
Temotu	5	2	6	2	3	3		10
Western	58	20	38	32	24	35	11	17

Source: 1989-1992 from Holland (1994); 2000-2003 from Ramofafia (2004).

Because of the village-level nature of the *bêche-de-mer* fishery, it has a direct impact on the sociological and economic well being of these communities that cannot be overstated, with immediate and direct financial benefit. Cash incomes in areas like the Marovo Lagoon from the sale of *bêche-de-mer* can be considerable and sometimes leads to quite conspicuous consumption,<sup>64</sup> particularly among the youth of SDA communities. There are approximately 20 youth in both Chea and Mbili Passage involved in the exploitation of *bêche-de-mer*. In contrast, Chubikopi, which is a United Church community adjacent to Chea, has approximately 100 *bêche-de-mer* fishers, including both men and women, and adults and children. Chubikopi fishers are not restricted by SDA doctrines and have no church regulations restricting the *bêche-de-mer* fishery, which constitutes a main source of income; United Church communities are not very active as carvers (Hviding 1996; Hviding and Bayliss-Smith 2000).

Because of the restrictions imposed on SDA villagers by their faith, the collection and processing of *bêche-de-mer* in the Marovo Lagoon has previously been an almost exclusive activity by followers of the CFC and/or United Church. Except for a small number of younger men more or less alienated from the church, the SDA communities do not exploit this resource<sup>65</sup> (even though it was previously far more abundant on their reefs than blacklip or trochus (Hviding 1996)). Previously, *butubutu* from SDA villages would allow nearby United Church villages to freely exploit *bêche-de-mer* with no concerns of localised extinction,

<sup>61</sup> The Marovo Lagoon has large areas of shallow sandy bottoms, providing an ideal habitat for many sea cucumber species.

<sup>62</sup> Interestingly, earlier observers had stated that the fishery in the Marovo Lagoon was already considered depleted in 1991, only three years after the fishery was officially considered to be opened (Adams 1993).

<sup>63</sup> The marked fluctuations for the Malaita Province are due to rotational management employed by the fishers of Ontong Java, whereby they originally harvested every second year.

<sup>64</sup> It has been estimated (conservatively) that beer sales at Varata possibly exceed SBD 900,000 each year.

<sup>65</sup> Most older and stricter adherents of the SDA faith think that *bêche-de-mer* is a repugnant animal, making the prospect of gathering, handling, cleaning, smoking and drying quantities of prohibited and repugnant *bêche-de-mer* totally unacceptable (see Hviding 1996).

indicating that local knowledge of the ecological linkages among peoples of the Marovo Lagoon does not include ideas about the role of bêche-de-mer in the processes that generate and maintain living reefs.<sup>66</sup> See Maps 5 and 6 for delineation of bêche-de-mer harvesting grounds used by Mbili Passage and Chea villages.

Harvesting of bêche-de-mer is usually conducted by paddle canoe. Night harvesting involves either spearing bêche-de-mer in shallow waters from canoes fitted with lanterns, or free-diving to shallow-to-medium-depths using underwater torches. A fishers' toolkit therefore may include diving goggles, fins, underwater torch, lantern, spear, containers, and canoes. Some fishers also use a "rocket", which is a lead weight with a small harpoon embedded in the bottom; it is used to collect bêche-de-mer at depth.

The bêche-de-mer fishery in the eastern Marovo Lagoon has the following characteristics:

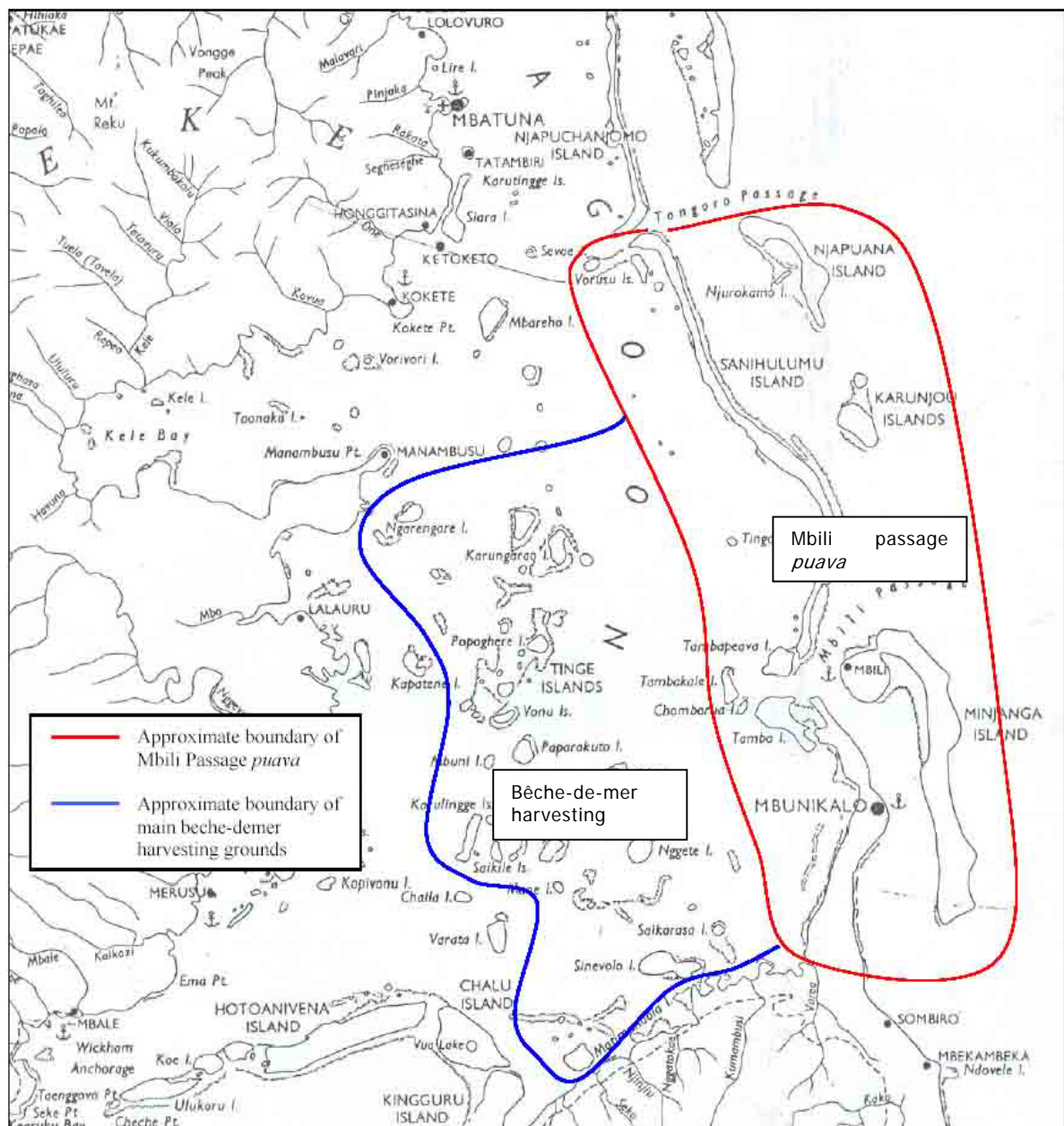
1. Sea cucumber harvesting is conducted year-round, with all sizes taken.
2. During the recent bêche-de-mer surveys fishers stated that they usually go out 5–6 times a week, depending on the weather, with average trip times being between 2–4 hours at Mbili Passage and 4–6 hours for Chea (if people at camp on the outer barrier reef island then trip times maybe greater than 6 hours).
3. Most trips involve between 2–5 people who are usually relatives, in-laws or friends. Recent bêche-de-mer surveys indicate that catch-per-unit-effort (from 4 groups) is about 18 sea cucumbers caught per person per trip (see Table 24; note the sample size is extremely small and the figure is given here only as an example of fishing effort). There are no restrictions on harvesting areas except at Tengommo Island, which has a resort, and Kokono Passage, which is intended for resort development.

Processing in the Marovo Lagoon involves cutting the live animal before boiling, which cause problems in quality, and thus reduce price because it results in misshapened bodies. Processing techniques observed elsewhere in the Solomon Islands (see Kinch 2004a), such as using pawpaw when boiling to aid the removal of the outer skin of sandfish or packing salt inside white teatfish, are not practiced in the eastern Marovo Lagoon. The major exporter (Sunking) provided training in processing in the 1980s and there has been little training since then except by passing Gilbertese.<sup>67</sup>

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<sup>66</sup> The ecological consequences of removing bêche-de-mer are relatively unknown, but they have been shown to have important functions in the environment (Massin 1982; Birkeland 1988). Because these animals digest bacteria, diatoms, and detritus (Yingst 1976; Moriarty 1982), they remineralise large quantities of organic nutrients and may increase the benthic productivity of coral reef ecosystems by bioturbation and oxygenation of the sea floor (Uthicke 2001a, 2001b; Uthicke and Klumpp 1998; Uthicke et al 2004). Intensive collection of beche-de-mer may therefore cause adverse changes to the overall productivity of affected coral reefs. Extirpation of bêche-de-mer may also have serious consequences for the survival of other species that are part of the same complex food web, as the eggs, larvae and juveniles constitute an important food source for other marine species including crustaceans, fish and molluscs (Kinch 2004a). In addition, several species have unique symbionts, including molluscs and fish.

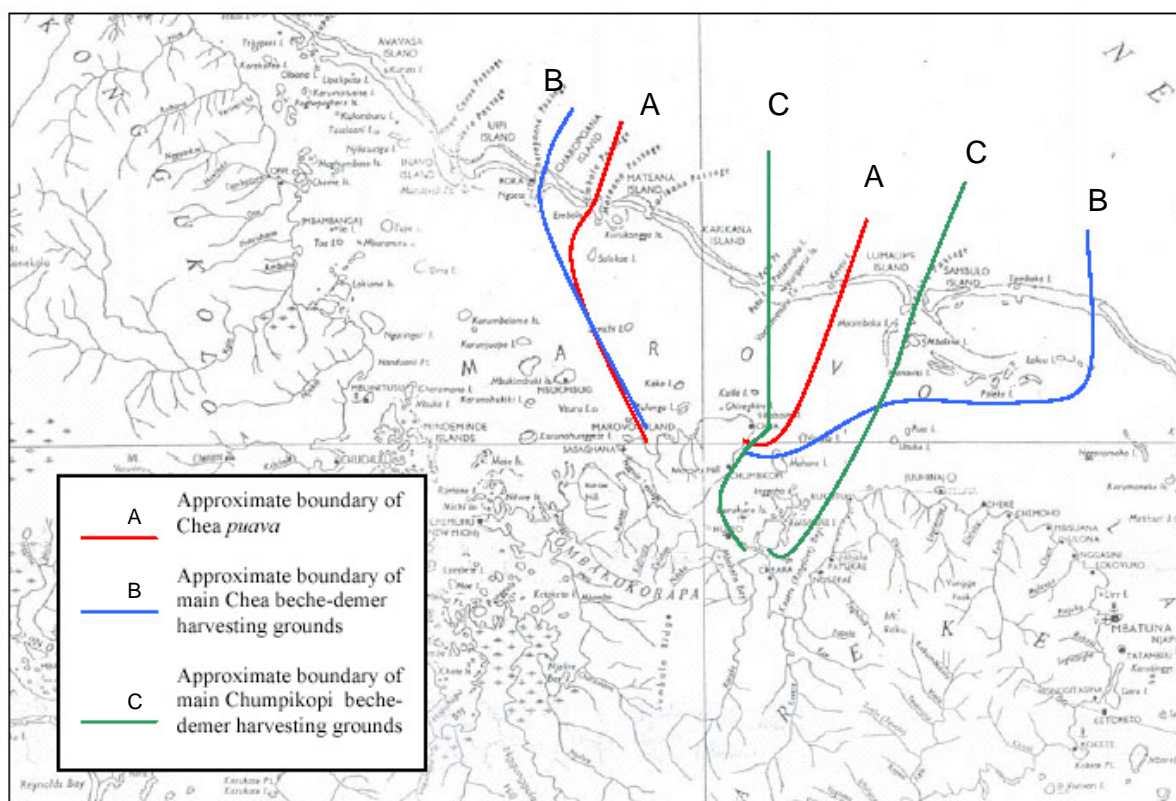
<sup>67</sup> During our visit, Gilbertese bêche-de-mer divers from the Gilbertese community in Gizo were staying in Chea and camping on Sambulo Island. They had been granted access via their friendship with a young man at Chea, who also accompanied them when diving.



Map 5: Mbili Passage and bêche-de-mer fishing grounds

Fishers around the Marovo Lagoon have local knowledge about sea cucumbers and many have local names in the Marovo language (Table 25). They have an intimate knowledge of where to find certain species. Fishers have also built up knowledge of spawning and aggregation behaviour for many marine resources including sea cucumbers (Hviding 1996) via continued observation. Brown curryfish and curryfish are considered to be more abundant just after full moon; stonefish are more prevalent on the new moon, and peanutfish during the last quarter (see Kinch 2004a also for elsewhere in the Solomon Islands). By harvesting at these times, fishers cause the fishery to decline faster. There is no preferred state of tide or time of day for harvesting.

The predominant species harvested at present are the medium value brown sandfish, and the high volume species (e.g., peanutfish, curryfish (includes brown curryfish) and stonefish, which accounted for 88% of all bêche-de-mer sold at Mbili Passage Chubikopi (Uvilau) during the period of 22 December 2004 to 18 April 2005. Of the lower value species sold, elephant trunkfish, red lollyfish (pinkfish) and snakefish are the most important by volume and value.



Map 6: Chea and Chubikopi and associated bêche-de-mer fishing grounds

Table 24: Catch-per-unit-effort

Species	Mbili Passage	Sambulo Island	Sambulo Island	Chubikopi	Total
Amberfish	1				1
Brown curryfish	4				4
Brown sandfish	29	6	4	1	40
Curryfish		1			1
Elephant trunkfish	1		1		2
Peanutfish	25	8	13	59	105
Pinkfish		14	14		28
Ribblefish		4	4	1	9
Snakefish				2	2
Stonefish	5	19	6	1	31
Tigerfish	2	1			3
Total	67	53	42	64	226
Number of Divers	2	4	4	2	12
Number of Trips	2	1	1	1	5
Average number collected per person per trip	16.75	13.25	10.50	32	18

Source: IWP bêche-de-mer survey.

From extrapolation of purchasing records obtained from Mbili Passage and Chubikopi (Uvilau), an estimated 5,250 kg worth of bêche-de-mer with an approximate value of SBD 634,500 was purchased during the period encompassing the period of 22 December 2004 to 18 April 2005 (Table 26).<sup>68</sup> This suggests a possible annual production for eastern Marovo Lagoon of approximately 15,750 kg of bêche-de-mer, with an estimated value of SBD

<sup>68</sup> During interviews with buyers, it was estimated that the buyer at Chubikopi (Uvilau) made 35% of all purchases for the East Marovo Lagoon. His brother at Rukutu thus obtains about 65%. The figures for estimated weight and value were determined by working out the percentage ratios for the two buyers above by weight and then adding the purchases made at Mbili Passage.

1,903,500<sup>69</sup> ( see Table 27; assumes consistent catch and prices throughout the year). As noted above, the harvesting of sea cucumbers in the eastern Marovo Lagoon is a year-round activity. In 1999, it was suggested that the annual returns to a village community from a sustainably managed sea cucumber harvest can reach SBD 75,000–100,000<sup>70</sup> (Shearman and WWF 1999).

Table 25: Marovo Names for Different Sea Cucumber Species

Marovo Name	Common Name
Puhaka	Generic term for all bêche-de-mer species
Puhaka arungi	Brown curryfish
Puhaka bisili	White teatfish
Puhaka bubuhele	Possible curryfish
Puhaka ikutacho	Snakefish
Puhaka juka	Lollyfish
Puhaka omo	Stonefish (similar in appearance to breadfruit)
Puhaka omo lupa	Surf redfish
Puhaka pea	Brown sandfish (from the word to excrete)
Puhaka ramoso	Generic term for spiky or prickly bêche-de-mer species
Puhaka ramoso gete	Prickly redfish
Puhaka ramoso kiki	Greenfish

Source: IWP bêche-de-mer survey.

During the 1999 Census, 16% of all households in the Western Province traded in bêche-de-mer (Solomon Islands Census 1999; UNDP 2002; UNDAF 2002). In 1999, Donnelly (2001) also conducted a household survey, as part of a research program into the economics of the LRFFT. He stated that a quarter of all households in the Marovo Lagoon were obtaining cash from the harvesting and processing of bêche-de-mer with an annual income range of between SBD 166–2,920, giving an average of SBD 496 per household. During the recent IWP surveys in 2004, it was determined that 63% of households at Mbili Passage stated that bêche-de-mer contributed to household income, while 27% at Chea<sup>71</sup> stated likewise. From the recent bêche-de-mer fishery survey, all fishers stated that they earned between SBD 1001–2000 per week from the sale of bêche-de-mer (this figure should be considered unreliable, as most respondents were young men, and bravado may have played a part in their answer), which does not correspond with figures obtained from buyer’s records, where the norm appeared to be small lots sold for immediate cash needs.

There is a significant competition among Honiara-based buyers, which results in fluctuating bêche-de-mer prices (see Appendix G for details). Currently there are 3 buyers in the eastern Marovo Lagoon. There is one buyer at Mbili Passage, who has been operating since December 2004 and has been set up as a means to pay for a relative's higher education fees, and two brothers who operate independently, one based at Rukutu and the other at Chubikopi (Uvilau). The Mbili Passage operation sends bêche-de-mer to a relative in Honiara who then looks for the best buyer. The two brothers sell to MSL, which is located in ChinaTown. Previously there were several other buyers but they have ceased purchasing.

Anecdotal evidence suggests that the diversity of sea cucumber species in the eastern Marovo Lagoon is now being altered due to increasing exploitation. This represents a threat not only to community livelihoods, but also to the fishery itself and overall biodiversity. There have been

<sup>69</sup> Since sea cucumber collection is a year-round activity, this figure was calculated by treating the December 2004 to April 2005 (a four-month period or one third of a year) harvest as typical and then multiplying by 3 to give an annual production rate.

<sup>70</sup> In 1999, SBD 1=USD 0.1946

<sup>71</sup> In 1998, Chea ranked bêche-de-mer as the highest money earner followed by carving, sale of reef fish and trochus (LaFranchi and Greenpeace 1999); these figures are unexpected, because as noted, Chea is a SDA community. Only youth alienated from the church harvest bêche-de-mer.

noticeable declines in some areas and logging was stated to have had an impact on bêche-de-mer stocks in the harvesting grounds utilised by Mbili Passage fishers. During the recent bêche-de-mer survey, fishers stated that areas close to the village were already depleted. It was noted by Mbili passage fishers that greenfish were no longer abundant and in Chea it was claimed that harvesting in areas fronting the village resulted in the decline of hongpai. Blackfish, black teatfish and greenfish were considered to be rare.

Table 26: Species Composition from Sales Records, 22 December 2004 to 18 April 2005

Species	Weight ( kg)	% of All Species	% of Low Volume Species
<b>High Volume Species</b>			
Mixed Peanutfish/Curryfish/Stonefish	1049.54	69.39	
Brown sandfish/Brown sandfish 4	277.70	18.36	
<b>Low Volume Species</b>			
Amberfish	5.67	0.37	3.06
Blackfish	0.43	0.02	0.23
Black teatfish	0.63	0.04	0.34
Elephant trunkfish	18.93	1.25	10.22
Greenfish	0.53	0.03	0.28
Hong pai	9.38	0.62	5.06
Lemonfish	0.15	0	0.08
Lollyfish <sup>72</sup>	13.19	0.87	7.12
Prickly redfish	4.10	0.27	2.21
Red lollyfish (Pinkfish)	27.69	1.83	14.95
Red snakefish	17.01	1.12	9.18
Ribblefish	9.91	0.65	5.35
Sandfish	12.75	0.84	6.88
Snakefish	45.89	3.03	24.78
Surf redfish	2.15	0.14	1.16
Tigerfish	7.12	0.47	3.84
White teatfish	9.49	5.12	5.12
<b>Total High Volume Species</b>	<b>1,327.24</b>	<b>87.75</b>	
<b>Total Low Volume Species</b>	<b>185.14</b>	<b>12.25</b>	<b>100</b>
<b>Total All Species</b>	<b>1512.38</b>	<b>100</b>	

Source: IWP bêche-de-mer survey.

The current status of commercially valuable invertebrates in Marovo Lagoon, and the Solomon Islands generally, is poorly known. There have been no thorough or comprehensive resource assessment surveys. DFMR has an acute shortage of money for research and very little for assessing compliance in nearshore waters.

Previous surveys in the Marovo Lagoon have shown low densities, with patchy species distribution (see Appendix I for details). In a recent IWP survey, Manioli (2005)<sup>73</sup> records low abundance in the Mbili Passage and Chea areas, as does Ramohia (2004)<sup>74</sup> during a rapid

<sup>72</sup> Lollyfish is typically considered to be *Holothuria atra*, which is a small (<20cm) specimen found in shallow areas, usually covered in sediment. Another larger species is usually (but not always) found in deeper water. The two forms are indistinguishable based on spicules and exhibit the typical red holothurine dye (Uthicke, S. 2004, pers. comm.).

<sup>73</sup> For each site, two stations (one in deep and the other in shallow water) were selected, with six transects per station. A 2 m T-bar was used along the 50 m transects in shallow water, while two divers diving along a 50 m tape used a 5 m rope in deep water (Manioli 2004).

<sup>74</sup> At each site, the number and size of key invertebrate species were noted using SCUBA in two different habitats (shallow and deep) and geographical locations (sheltered and exposed) at depths between (i) 5–10 m (sampling was done using 50 m long by 2 m wide transects, 6 transects were laid over the terrace or slope at each site within this habitat) and (ii) 18–30 m (sampling was done using 50 m long by 5 m wide transects, 5 transects were laid approximately parallel to the reef crest and over soft substratum or rubble, hard or rocky bottoms were avoided). No sampling was done at sites where the reef base or the perceived sea cucumber habitat was deeper than 30 m. The deep habitat included the slope below the terrace to the base of the reef (Ramohia 2004).



ecological assessment conducted by The Nature Conservancy (he estimates mean densities of between 0.17–2 sea cucumbers per 100 m<sup>2</sup> for shallow transects and 0.20–0.80 sea cucumbers per 250 m<sup>2</sup> for deep transects for the Mbili Passage and Chea areas). Moseby and Read (1999)<sup>75</sup> estimated a density of 1 individual per 10–288 m<sup>2</sup>.



Plate 8. Passage youth with his harvest of beche-de-mer

These density levels are lower than other comparable bêche-de-mer fisheries in the Solomon Islands (see Lincoln-Smith et al. 2000; Ramohia 2004a, 2004b), and also PNG (see Kinch 2002; Skewes et al. 2003; Lokani 1991; Lokani and Chapau 1992; Lokani et al. 1992; Mubiha et al. 1993, 2000; Gisawa 2002).

Surveys for giant clam in the Marovo Lagoon by Foale (2000) at the Hele Bar Islands near Tungu Island recorded low densities of *T. crocea*, *T. derasa*, *T. maxima* and *T. gigas*. During the IWP biological surveys at Mbili Passage and Chea stocks were also low. The giant clam *Tridacna crocea* was the most abundant invertebrate species across the study area. The other species giant clams such as *Tridacna maxima*, *T. squamosa* and *Hippopus hippopus* were present only in low numbers. The larger species *T. gigas* and *T. derasa* were not encountered at all during the survey. The absence of these larger species may indicate possible overexploitation of the species within the study area (Manioli 2005). This was also confirmed by Ramohia (2004) for the areas around Mbili Passage and Chea.

Giant clams are highly vulnerable to stock depletion. Their reproductive biology requires that a certain minimum density be maintained in order for giant clam populations to be self-sustaining (Munro 1993). In addition, their large size, shallow distribution, conspicuous appearance and sedentary habits makes them vulnerable to over-exploitation. Even though Mbili Passage and Chea are SDA communities, and are therefore prohibited from consuming clam meat, they still exploit it commercially. There is still local demand from restaurants and hotels in Honiara for the adductor muscle.

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<sup>75</sup> Six coral reefs within each sampling arc were identified prior to field sampling using reef maps of the area. A GPS was used to locate the reefs and record their position. A 50 m tape was then laid along a random edge of the reef at a depth of approximately 2 m. An observer snorkeled along each side of the tape, recording all sea cucumbers observed within 4 m either side of the tape (Moseby and Read 1999).

Table 27: Bêche-de-mer sales by species from sales records, 22 December 2004 to 18 April 2005

Species	Mbili Passage			Chubikopi (Uvilau)			Total			
	Volume (kg)	Average parcel size sold (kg)	# of parcels sold	Volume (kg)	Average parcel size sold (kg)	# of parcels sold	Volume (kg)	Average parcel size sold (kg)	# of parcels sold	Estimated value (SBD)
Amberfish				5.67	0.33	17	5.67	0.33	17	198.45
Blackfish				0.43	0.43	1	0.43	0.43	1	64.50
Black teatfish				0.63	0.12	5	0.63	0.12	5	53.55
Brown sandfish	34.2	0.63	54	237.55	0.61	385	271.75	0.62	439	19,022.50
Brown sandfish 4	0.5	0.25	2	5.45	0.2	27	5.95	0.22	29	148.75
Curryfish	0.8	0.26	3	15.6	0.45	34	16.4	0.35	37	3,052.50
Elephant trunkfish	1.7	0.24	7	17.23	0.37	46	18.93	0.3	53	473.25
Greenfish				0.53	0.1	5	0.53	0.1	5	28.09
Hong pai	1.1	2.75	4	8.28	0.18	44	9.38	1.46	48	206.36
Lemonfish	0.3	0.15	2				0.3	0.15	2	6.60
Lollyfish	2.6	0.21	12	10.59	0.25	41	13.19	0.24	53	197.85
Peanutfish	134.76	2.07	65	212.4	0.81	260	347.16	1.44	325	64,224.60
Mixed Peanutfish /Curryfish				120.47	1.05	114	120.47	1.05	114	22,286.95
Mixed Peanutfish /Stonefish				105.08	1.01	104	105.08	1.01	104	19,439.80
Mixed Peanutfish /Curryfish/ Stonefish				411.88	1.98	207	411.88	1.98	207	76,197.80
Prickly redfish	1.05	0.17	6	3.05	0.3	10	4.1	0.23	16	758.50
Red lollyfish (Pinkfish)	8.85	0.49	18	18.84	0.48	39	27.69	0.48	57	553.80
Red snakefish				17.01	0.16	102	17.01	0.16	102	595.35
Ribblefish	3.15	0.24	13	6.76	0.13	52	9.91	0.18	65	148.65
Sandfish				12.72	1.15	11	12.72	1.15	11	1,912.50
Snakefish	1.3	0.43	3	44.59	0.54	82	45.89	0.48	85	1,376.70
Stonefish	9.25	0.77	12	39.3	0.78	50	48.55	0.77	62	8,981.75
Surf redfish	1.75	0.58	3	0.4	0.2	2	2.15	0.39	5	322.50
Tigerfish	0.75	0.25	3	6.37	0.24	26	7.12	0.24	29	498.40
White teatfish				9.49	0.55	17	9.49	0.45	17	1,233.70
<b>Total</b>	<b>202.06</b>		<b>207</b>	<b>1,310.32</b>		<b>1,681</b>	<b>1,512.38</b>		<b>1,888</b>	<b>221,983.40</b>
Purchases from Mbili Passage and Chubikopi (Uvilau) (22/12/2004 – 18/04/2005)							1,512.38			221,983.4
Estimated Purchases from Rukutu (22/12/2004 – 18/04/2005)							3,740			412,500
Estimated Purchases from East Marovo Lagoon (22/12/2004 – 18/04/2005)							5,250			634,500
<b>Estimated Total Purchases from East Marovo Lagoon for the Whole Year</b>							<b>15,750</b>			<b>1,903,500</b>

Source: IWP bêche-de-mer survey.



### 4.5.3 Crayfish

The main species that are found in Solomon Islands are the double-spined ornate lobster (*Panulirus pencillatus*). Other species harvested in lesser numbers include *P. femoristiga*, the painted coral lobster (*P. vericolor*) and the spiny lobster (*P. ornatus*). There is limited commercial exploitation of crayfish at Mbili Passage and Chea, with crayfish being sold at Uepi Resort, and to dive boats, yachts and passenger vessels.<sup>76</sup> The (typically) high variability of lobster catches mitigates against commercial exploitation.

### 4.5.4 Trochus and other shellfish

In the 1980s and early 1990s trochus was the most important non-fish resource in Solomon Islands (in terms of export earnings). Exports have previously ranged from 280 t in 1982 to an all time high of 660 t in 1986 (Skewes 1990). The fishery has declined since that time.

Although the doctrines of the SDA Church forbid the eating of shellfish as well as all other sea creatures without scales or fins, fishers frequently exploit pearlshell and trochus for commercial purposes, discarding the meat and packing the shells for sale. Trochus are usually harvested during the full moon, when they aggregate on the reef face front.

During recent IWP surveys around Mbili Passage and Chea, trochus were found in relatively low abundance, indicating that this species is heavily exploited (Manioli 2004). Blacklip pearl oyster were abundant everywhere and this is attributed to the more than ten-year ban on exports imposed by the government. These results confirmed the findings of Ramohia (2004).

The people at Mbili Passage and Chea also harvest molluscs used by other Solomon Islanders for the manufacture of "kastom" shell money.<sup>77</sup> The main two species are *Cardita* clams, locally known as *ke'e* (*Beguina semiorbiculata*) and *kurila* (*Atrina vexillum*). The former was found in abundance around Mbili Passage and Chea. Harvesting of ke'e has only recently begun, with villagers selling them to Langalanga-bound vessels for SBD 250 per 20 kg rice bag. Kurila was found in low abundance (Manioli 2005). Other shells are harvested for sale to craft makers, especially macramé, for shell inlay on carvings and as ornamental shells to tourists and visitors on yachts.

Red tides have been occasionally observed in the Marovo Lagoon, resulting in a high level of shellfish mortality (Foale 2000a).

### 4.5.5 Coral

There is a small market for valuable corals for tourists and yachts, notably black corals that are manufactured into jewellery.

The recent IWP biological surveys indicate the coral reefs around Mbili Passage and Chea are generally in good health, with high live coral cover on the barrier reefs and lower live coral cover recorded at the mid-lagoon reef stations. Corals consisted primarily of massive and submassive corals (*Porites*), fire corals (*Millepora*) and soft corals. Crown-of-thorn starfish (*Acanthaster planci*) numbers and associated coral damage were minimal and insignificant. There was no evidence of coral bleaching and damage to corals due to blast fishing. Siltation as result of land runoff was a major problem, however, especially within the lagoon. Extensive areas of black coral are to be found around Mbili Passage.

### 4.5.6 Reef fish

Fishing is also one of the main sources of protein and income for the people in the Western

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<sup>76</sup> Villagers from Marovo Lagoon could transport live crayfish on passenger vessels without the need of refrigeration by layering the crayfish in wet copra sacks (see Prescott 1980).

<sup>77</sup> There is also a market for these shells among the Tolai people of New Britain Island in Papua New Guinea.

Province, with nearly all the members in the community (including men, women and children) engaging in this activity. Villagers in the Western Province have developed a wealth of local knowledge and recognize fishing grounds as productive depending on daily, lunar, and seasonal events<sup>78</sup> (see Aswani 1997a, 1997b; Sabetian 2002; Hviding 1996; Johannes and Hviding 2000; Hamilton and Walter 1999; Hamilton 2003; Aswani and Hamilton 2004a). Local fishers therefore organize their fishing activities according to a traditional lunar calendar that they use to reliably predict the movements, aggregations and feeding behaviour of target species.

There are more than 60 different fishing methods used in the Marovo Lagoon (Hviding 1996). The wide variety of fishing methods used in Marovo is adapted to the habitats and behaviour of a similarly wide variety of target species. Some fishing methods have a fairly general scope, aiming at many types of fish, while others are more specialised, being geared to the capture of a specific species. Some fishing methods are of ancient origin, while others are more recent introduction using modern materials (one of the latter being spearfishing). Hook and line is the preferred method for fishing<sup>79</sup> in the Marovo Lagoon and is probably more selective than many other methods, such as "strike-line" (trolling), and derris root (used to poison fish). There are also 40 terms for distinct reef features, water depths and bottom types. Marovo people also classify fish into nearly 400 types, with many names referring to the fish's habitat or behaviour of some fish species (Hviding 1996; see Foale 1998a, 1998b; and Kinch 1999 for elsewhere).

Results from the first IWP socioeconomic survey confirm the spawning times of cod (Serranidae), trigger fish (*Balistoides* spp.), and parrot fish (Scaridae) during the months of February and June at Mbili Passage and Chea. These findings are supported by research that has also determined that brown-marbled grouper (*Epinephelus fuscoguttatus*), camouflage grouper (*E. polyphekadion*) and coral trout (*Plectropomus areolatus*) spawn at these times in the Marovo Lagoon (Johannes 1988; Johannes and Lam 1999; Donnelly et al. 1998). Carangids (trevallies), known collectively as *mara*, predominate in catches taken from the lagoon, and are known to concentrate in dense numbers around new and full moons. Local fishers also report that a defined barracuda season runs from late August until the end of December. During this time, a large proportion of male fishing effort is directed towards catching these fish, mostly at night.

On the whole subsistence fishing by Marovo people seems to be quite productive. Hviding's (1996) analysis of subsistence catch per unit effort during a one-year period (collected in 1986-1987) estimates mean output in whole fish of 2.7 kg per hour. This is twice as high as other areas in Solomons Islands (see Bayliss-Smith 1990). During trials carried out by World Wide Fund for Nature (WWF) in the Marovo Lagoon, target fish species<sup>80</sup> were estimated to occur at about 11.78 kg per hectare at Saikalara Island (Foale 2000a).

Hviding (1996) notes that the perception of most Marovians was that the people at Chea, being SDA and relying on finfish as their only source of animal protein, are regarded as some of the best fishers in the Marovo Lagoon. Fishing crews from Chea will sometimes visit people in Patutiva or Chubikopi to obtain permission before proceeding to fishing grounds at Ligutu (Hviding 1996). An example of the diversity and range of fishing at Chea is given below (Box 1).

During recent IWP biological surveys, commercially important reef fish<sup>81</sup> at Mbili Passage

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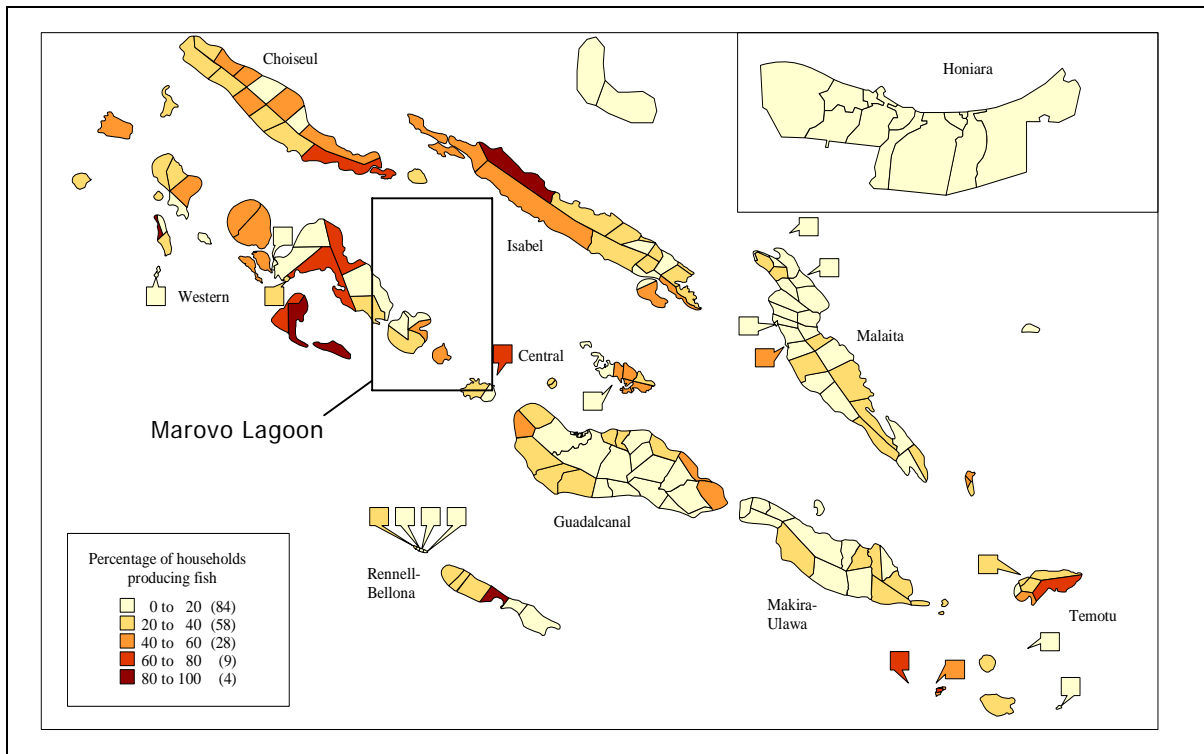
<sup>78</sup> During full and new moons, the difference between low and high tides is at its greatest, providing special opportunities for fishing. Fish come up along the reef slope and drop-off during the extreme high tide, and pearl shell reefs are particularly accessible at low tide.

<sup>79</sup> Fish caught in this way include *Cephalopholis miniata*, small (female) *Plectropomus* spp. and some smaller *Epinephelus* spp.

<sup>80</sup> Fish species caught included *Cephalopholis cyanostigma*, *C. miniatus*, *C. miniatus*, *C. miniatus*, *Epinephelus polyphekadion*, *E. macrospilos*, *E. fasciatus*, *Lethrinus erythropterus*, *Balistapus undulatus*, *Plectropomus leopardus*, *Chelinus fasciatus*, *Scolopsis* sp., *Mulloidides vanicolensis*, *Lethrinus erythracanthus*, *Lutjanus kasmira*, *L. semicineta*, *L. vitta*, and *L. carponatus*.

<sup>81</sup> Commercial species include the large and charismatic food species such as snappers, sweep-lips, parrot-fish, groupers, emperors and jacks.

were not dominated by any particular family. Acanthuridae, Serranidae, Lutjanidae, Labridae and Scaridae were the dominant families and were found in moderate quantities throughout the surveyed sites. Other families were either localized or present in smaller numbers. In Chea, commercial reef fish species are clearly dominated by the Lutjanids and Scarids<sup>82</sup> and to a lesser extent the Serranids. The other families were present in smaller quantities. Fishing pressure, which has removed carnivorous species, has led to the change in population structure to more herbivorous surgeonfish (Lasi 2005).



Map 6: Percentage of households fishing in the Marovo Lagoon

Source: Solomon Islands Census 1999.

Some members of the Mbili Passage and Chea communities buy fish from the locals for transport to Honiara in eskies. Lack of refrigeration dictates that those fishers in Marovo Lagoon fish for the Honiara market for two days before the weekly appearance of the transport vessel. The transport vessel for the Honiara markets arrives, with eskies and ice, once per week.

#### 4.5.7 Turtles

Vaughan (1981) notes that the Hele Passage and Vanguna Island in Marovo Lagoon were important nesting areas for hawksbill, green and leatherback turtles. During the second IWP socioeconomic surveys, it was determined that hawksbill nesting sites were located in the Mbili area at Japuana. Several islands in the Chea area were also identified as nesting beaches. No leatherback nesting sites were identified. Because the Mbili Passage and Chea communities are SDA they are prohibited from eating turtles.

<sup>82</sup> Large schools of *Bolbometopon muricatum* (Topa), maori wrasse (*Cheilinus undulatus*), and various snappers were seen. These species are vulnerable to some of the popular fishing methods currently in use by fishermen like night diving and gillnetting; anecdotal information indicates stocks of these species are overfished (Lasi 2005).

#### 4.5.8 Mangroves and seagrass

Mangrove shoots and some seagrass species, particularly *Caulerpa racemosa*, are eaten in the Marovo Lagoon. According to Oreihaka (1997), there are 26 species of mangroves in 13 families in Solomon Islands. Mangroves are very important as nursery grounds for crustaceans, molluscs and fish, as are seagrass beds. Predominant seagrasses in the Marovo Lagoon are *Enhalus acoroides*, *Cymodocea rotundata*, *Halimeda* sp. and the edible *Caulerpa racemosa*. Seagrass fields are also important habitats for turtles and grazing dugong. The expansion of village and clearing for houses is the main causes of the present removal of mangrove forest along the coastal area.

##### **Box 1: A day's fishing at Chea**

Braven and Vula left early, paddling out to the barrier reef in Vula's canoe before seven o'clock, after spending some time on the village wharf, taking anchovy and small squid for bait. Arriving at the barrier islands before the tide had started to go out, they went quickly to the rocky area on the lagoon-facing reef slope at Petu, where *tarasi* (surgeonfish) usually spend the night in groups in the days around the full-moon. Diving with their long spearguns in about two fathoms of water, they speared some large, still "sleepy" *tarasi*. As the tide started to go out and flow out over the submerged barrier reef, it was time to fish with baited hooks for *heheuku* (a small red snapper), over the outer reef gullies of Vaenihope, into which this fish usually retreats with the tide.

By midday it was low tide, and most fish had retreated to deeper waters beyond the reach of the diver. While Vula went ashore at Vaenihope, lighting a fire to smoke the *tarasi*, Braven paddled out to the reef drop-off at Patu Suvulu, to try deep-water handlining. Having caught one, he went ashore to join Vula resting in the shade of the coconut trees.

As the scorching midday sun started to move down a bit, they decided to look for some blacklip pearlshell over near Kemu Island, while the tide was still low and the five-to-six fathoms deep blacklip reefs were still accessible. They paddled up to Kemu, bringing their fish catch, covered by coconut leaves. As they were diving for pearlshell the tide started to come in again, and they went out to the ocean-side reef drop-off at Vaenimoturu Island, where Vula has a special place for spearing barracuda around full moon. Underwater spearfishing for barracuda is not a sport that just anyone could attempt. Vula is experienced at it, and when he found the predicted milling aggregation of barracuda, in four fathoms of water off the steep reef-slope between Vaenimoturu and the small islet of Patu Vio, he dived down and soon had speared three of them, including one so large that it almost swam off with the speargun. Braven anchored the canoe and dived down himself, spearing on barracuda. They decided against going further up to Lumalihe Passage, where large *tilo* (dog-tooth tuna) are to be found. The reason was not so much that Lumalihe is in the waters of the Repi people, to whom neither of the two men is closely related, but rather that the days around full moon are known as the time when sharks (which are abundant at Lumalihe) are particularly aggressive. Instead, satisfied with the day's catch, which included even some fine commercial pearlshell, they left the barrier reef and returned home well before sunset.

Excerpt taken from Hviding 1996: 224-225.

## 5 Management

### 5.1 Tenureship

In the Solomon Islands, coral reefs and adjacent coastal areas such as lagoons are usually owned on a kinship group basis (Oreihaka and Ramohia 1994). Tenureship systems in the Marovo Lagoon have been extensively studied by Hviding<sup>83</sup> (1988, 1989, 1990, 1992, 1996). All land and sea of the Marovo Lagoon is controlled by "corporate" groups or *butubutu*, each of which controls access to the use of resources of a paava (estate). At a general level of

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<sup>83</sup> Following Hviding's (1989) definition, most researchers have taken Customary Marine Tenure (CMT) to mean a social process of activities maintaining control over marine areas.

meaning, the puava is the whole territory of a *butubutu*, covering land, reefs and sea. Within the boundaries of the marine portion of the puava, all living and non-living resources are collectively claimed and controlled by a *butubutu*, not by individuals.

Also fundamental to customary resource tenure in Marovo are the twin concepts of *nginira* and *hinoho*, which refer to two main types of rights in a puava (Hviding 1996). *Nginira* translate as strength and in effect means the power to speak directly about how resources are allocated and used. Most people who hold *nginira* rights are those that are permanent residents of the puava in question. Hereditary male *bangara* (leaders or chiefs) hold the *nginira* on behalf of the group and are supposed to make decisions jointly with other elders and influential community members. *Hinoho* translates as wealth, which means entitlement. Inlaws hold *hinoho* rights only, whereas resident *butubutu* members have *hinoho* rights as an extension of their own or their parents puava.

The principles of descent and kin reckoning in a *butubutu* are cognatic, involving bilateral inheritance where a person receives *butubutu* membership and rights in corresponding puava from a mother's and father's side<sup>84</sup> (though matrilineal descent carries more weight). Each named puava is delimited by boundaries in the form of mainland rivers, estuaries, reefs, islands and passages through the barrier reef. Boundaries are further marked and validated by ancient shrines.<sup>85</sup>

The bilateral system also creates a wide set of formal *butubutu* memberships for everyone, so his or her set of potentially usable rights will usually cover a number of puava.<sup>86</sup> However, the extent to which potential rights are actually used and recognised depends on additional factors, most important of which is a person's place of residence, as rights will be stronger in the ancestral puava where he or she lives or has grown up. A person can also obtain access to resources by virtue of his or her spousal affiliation, or location of residence. People can also justify access to other territorial waters by invoking their kin relations to the area's dominant lineages or by citing prior customary binding agreements between their group and that of the visited territory.

Hviding (1996) described the Marovo *kastom* regarding mutual help and food giving as being a crucial link in the premise that everyone (from Marovo Lagoon) is allowed to fish anywhere for subsistence.<sup>87</sup> Primary rights owners decide who can fish in the waters of the marine estate of a particular *butubutu*. In this way, the number of people removing fish from home reefs is generally known.

A pan-Morovian awareness, though, does give rise to the legitimisation of poaching across boundaries, and intrusions are noticed regularly as many young fishers transit throughout other *butubutu*'s puava during commercial forays. People are often reluctant to evict friends or relatives found fishing within their own judicial areas. Some fishers also tend to ignore individual claims to reefs and fishing areas based on the rationale that marine habitats are a common property asset, open and accessible to all. Commercial fishing also promotes the crossing of boundaries, because of an increased desire to enter less frequently targeted areas further away from accessible barrier reefs, due to localised depletion of fish and commercial shell stocks in the latter (Hviding 1996).

The Mbili Passage community's puava extends northwards to Japuana and Kaurujeu Islands. These two islands have deep reef slope areas around them with favourable habitats for trochus, bêche-de-mer, fish and other clams. From the IWP socioeconomic surveys it was determined

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<sup>84</sup> Kinship relations also extend inter-regionally to include bonds with Rendova, Simbo, Kolombangara, Ranongga, Choiseul, Vella Lavella, Isabel, and other parts of the Western Solomon Islands (see Aswani 1997).

<sup>85</sup> Shrines are usually stone chambers and contain skulls of named ancestors, together with heirlooms such as sacred clamshell artefacts.

<sup>86</sup> While the bilateral kinship systems can give individuals access to various resources and territories, it does not generally bestow an individual with decision-making powers, which regulate resource use and access.

<sup>87</sup> People who are not from Marovo are not entitled to use Marovo fishing grounds for any purpose.

that approximately 65% of marine resources in this area are harvested by the Mbili Passage *butubutu*, 15% by other traditional rights users and 20% by outsiders. Mbili Passage bêche-de-mer fishers primarily harvest in neighbouring fishing grounds.

The Chea puava extends seaward to Kataghoghoto and Kemu Islands in the east on the barrier reef to Ebolo passage in the north-west and then returning south westerly to Kara stream on Vangunu Island. This area has several lagoonal characteristics, with shallow patch reefs with deep reef slopes on the windward side of these chains of islands. The neighbouring communities of Chubikopi and Sasaghena also have access to Chea's puava for the purpose of harvesting marine resources, but should seek permission first. Chea fishermen who wish to access the sheltered reefs at Lumalihe and Ligutu Passages in the Repi and Vahole area should also seek permission from appropriate *butubutu* at Chubikopi and Patutuvia (Hviding 1996). From the IWP socioeconomic surveys it was determined that approximately 85% of marine resources are harvested by the Chea *butubutu*, with another 10% by traditional rights users and 5% by outsiders.

## 5.2 "Traditional" management

"Traditionally", specific prohibitions concerning types of fish or certain fishing grounds were explicitly announced and enforced by reef-holding *butubutu*. These prohibitions were defined as *hope* (spiritually sanctioned taboos), and were of two main varieties, each protected by the powers of specific *poda* (ancestral spirits) (Hviding 1996).

One was a general *hope chinaba* (fishing taboo) covering all types of fishing in an area of reef marked by raised sticks, and would be imposed by a chief in preparation for a large feast (such as those connected with funerary rites), or simply as a response to localised over fishing. Hope *chinaba* involved a rotation among taboo and non-taboo reefs, and rotational closures of certain sites practiced today by some *butubutu* are a direct continuation of the ancient taboos. There were also prohibitions on the types of fish that could be caught, particularly certain food fish during spawning times. Other marine resources that were subject to restrictions of varying duration included sea turtles, crayfish, giant clams, and of course bêche-de-mer in later times.

The other form of ancient fishing prohibition was *hope valusa*, which was used to protect and regulate tuna fishing. They often lasted for one or two years, and for this reason were not commonly invoked. Hope *valusa* was not associated with concerns of over fishing, but rather with aspects of ceremonial cycles in fishing, agriculture and warfare.

In the early days of trading in the 1800s, many chiefs in Marovo Lagoon, applied restrictions on the taking of bêche-de-mer resources to ensure the continual supply of iron axes (Hviding 1996). These closures would have been instigated under *hope chinaba*.<sup>88</sup>

Traditional restrictions on the exploitation of the resources were based on human perception of stock abundance. Hviding and Baines (1994) state that the practical, behaviour-oriented and observation-based nature of Marovo people's knowledge of the marine environment, focusing as it does on the fluctuating and changing abundance of important food species, is relevant to fisheries management in the sense that it provides an admirable basis for the monitoring of fish stocks. Modern regulations modified from the traditional now include bans on dynamite fishing,<sup>89</sup> nylon gillnets, derris root, and spear guns. These apply mostly to outsiders and not to their own *butubutu* members. Restrictions are also sometimes placed on outsiders, which

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<sup>88</sup> The Colonial administration in the 1930s later endorsed the rights of people in the Marovo Lagoon, supporting the local people against the incursion of Asian bêche-de-mer vessels poaching in the eastern Marovo Lagoon (Hviding 1996).

<sup>89</sup> Because of the vast quantities of ammunition left behind after World War II, villagers cut open artillery and other shells to obtain powder to build explosive devices for stunning fish. Although this practice has waned in recent years, recent reliable information confirms that fishing with explosives still occurs in parts of the Marovo Lagoon and possibly elsewhere. Fishers using dynamite generally target dense schools of fish (mostly long-jawed mackerel, *Rastrelliger kanagurta*) and clumps of corals, with corals often suffering mortality within a radius of approximately 1–2 m from the blast (McManus 1997). Dynamite fishing tends to taper off when coral cover does not exceed more 20% and when fish concentrations fall below an order of magnitude of their original values.

restrict the taking of resources that are destined for sale, such as *bêche-de-mer*, trochus and corals for making jewellery (see Box 2).

Enforcement of these regulations or restrictions in the past was usually done by younger men, who were active on the reef and lagoon, in tune with environmental changes, and most likely to detect trespassers. Today, however, there is little respect for this management regime, particularly with increasing monetary needs, and it is usually the same young men that were formerly responsible for overseeing the safety of the *butubutu* that are now responsible for many of the infractions, and the consequent decline of certain species.

**Box 2: Reef closure at Mbili Passage**

As a young and energetic customary leader of the coastal, barrier-island-dwelling *butubutu* of Mbili explained to me in June 1987, “There is enough fish in our *toba* [barrier reef] here for everyone to eat, really. But when twenty men from some other side come here with their spearguns to fish for money, then that is not easy. Fish will become short. For, if you fish for money you do not stop when you have caught enough to feed your family and relatives. You go on and on, because you want more money. Fish will become short, and fish are all we saltwater people have. This is why I must strengthen my laws here”. This leader had just declared half of his group’s very extensive barrier reef (consisting of a double chain with numerous sheltered lagoons) largely off-limits for fishing by most mainland bush people, in the face of a new commercial fishing enterprise by the Seven-Day Adventist Church at Batuna, in the eastern lagoon. Nevertheless, he emphasised, he would continue to provide the bush people with “big help”, by still allowing them to do largely what they wanted in the remaining half of the Mbili *toba*. As he commented, “My old men and their old men straightened all this a long time before now at *horevura* [down-ward migration from the bush to the sea] time. They can fish in our *toba*, and we can go and take things like canoe trees in their forest. I can’t change that. We must help each other, because our old men said so. But some things we must keep for ourselves, so this is why I have closed this half of the *toba*”.

Excerpt taken from Hviding 1996: 289.

### 5.2.1 *Tabu Sites*

Totolave is the main sacred site at Mbili Passage, which holds objects such as fishing lines, shells, spear, an old gun and skulls. The site has lost some of its traditional importance, as it is now accessible to tourists for a small fee of SBD 15 per visitor. The passage at Mbili was also traditionally guarded by shark spirits (Hviding 1996). *Tabu* areas also exist at Chea but again, are no longer regarded with importance, due to the influence of the SDA Church.

## 5.3 Present management

A decade or so ago, the government of the Western Province indicated that the level of exploitation of some natural resources, particularly, *bêche-de-mer* and trochus, was of concern and instigated the development of the Western Province Environmental Management Ordinance.

Due to concerns regarding increased exploitation and lower abundance of *bêche-de-mer*, some United Church and CFC communities began in the early 1990s to enforce an increasing number of management measures on *bêche-de-mer* harvesting in their own areas. *Bêche-de-mer* was considered of no value in the majority of SDA communities, because of church doctrine, and therefore was thought not to warrant management. The Chea community was an exception to this, and in 1991, developed a Resources Policy Framework<sup>90</sup> (see Box 3) to control the collection of marine resources and to avoid over-exploitation (Chea Village

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<sup>90</sup> This was developed as part of the Marovo Lagoon Resource Management Project and was catalysed by the presence of Edvard Hviding, who resided at Chea for differing periods between 1986 and 1994 doing his doctoral work under the project.

Community 1991). The Chea community has never implemented the framework, however, and alienated individuals in the community continue to tend to overharvest marine resources (Chea Village Community 2003a).

**Box 3: Marine resource regulations constituted in Chea 1991**

- Persons must obtain permission of the Chief's committee before removing mangroves
- No sale of mangroves for firewood is permitted
- No dragging of nets or other equipment on the sea floor for purpose of collecting marine resources
- *Kuarao*<sup>91</sup> is to be controlled by the Chief's committee
- Commercial fishing in certain areas is restricted
- No bait fishing allowed
- Chief's committee will tabu certain areas so that the number of fish and shells can come up
- Use of nets are prohibited for commercial fishing
- No dynamite fishing allowed
- Control of harvest for shells for making ceremonial money (tabu sela and poata mala)
- Fishing of grouper is prohibited during the spawning season
- Restriction of activities in Karikana Passage
- Spear-fishing to be restricted
- Controls on collections of black and brown corals
- Controls on collection of trochus and bêche-de-mer to avoid over-exploitation and to allow adequate stocks
- No commercial shell collecting
- Fishing by bunarokoroko<sup>92</sup> only to be allowed with the method of kurao

Source: Chea Village Community 1991a.

The Chea community has recently called for a careful examination of the status of their resources, and how these can be used sustainably. This was partly brought about by the results of an internal village review carried out by the chief's representatives on 02/01/03. The findings of this assessment stated that (i) the Elders' Committee was not functioning,<sup>93</sup> (ii) the village committee did not know their functions, (iii) law and order was increasingly becoming a serious issue,<sup>94</sup> (iv) there was an overall inability to cope with development change and pressures, as well as misuse of community assets (Chea Village Community 2003b).

Specific calls for action include the development of a marine resources conservation and management plan, which would include effective monitoring, control and surveillance strategies (which the community believes the government is presently unable to provide). Chea's 5 year Development Plan 2003-2007 states the need to liaise with appropriate NGOs

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<sup>91</sup> *Kuarao* is a type of fishing involving the entire community, and entails setting a wide perimeter using coconut fronds to herd fish to the center of the closing circle.

<sup>92</sup> Derris root.

<sup>93</sup> Partly due to deaths and other matters working against the *butubutu*.

<sup>94</sup> Alcohol and occasional marijuana use is now practiced by some village youths.



and other organisations to draw up a proper resource development plan for the Chea Village Community; to improve the current Chea Village Community Resource Policy Statement from 1991; to identify areas within the *butubutu* sea boundary for conservation and management purposes; and finally to reduce the overharvesting of resources by applying both traditional and modern conservation techniques and methods (Chea Village Community 2003b). The Chea community developed a budget for these activities: SBD 14,000 was deemed necessary for development of the resources development plan and updating the community resources policy, and a further SBD 20,000 was to be used for the engagement of qualified personnel to undertake and lead these programs, and to organise workshops and training programs (Chea Village Community 2003b).

The Chea community was not surprisingly delighted when the request for expressions of interest (EOI) was announced by IWP. It should be noted here that the EOIs submitted by both Mbili Passage and Chea were developed by educated village elites living elsewhere.<sup>95</sup> In the case of Mbili Passage, this caused some confusion, as has the recent Seacology proposal, as it was submitted with little community consultation. It should also be noted that there are also strong elements of project dependency and the wish to obtain material benefits from IWP. In the case of Mbili Passage, the situation is further complicated as Mbili Passage is the resident village of the wife of IWP's National Coordinator. Expectations were also raised during the initial inception visits, in part because the community was aware of IWP's budget. Project dependency and expectations aside, there is support for action within the communities, particularly at Chea.

In previous work undertaken at the height of the LRFFT, Donnelly (2001) notes that half of the respondents in the Marovo Lagoon stated that it was important to adopt modern fishing management mechanisms. There seemed to be less support for customary management (due to erosion of respect for traditional authority), but customary access rights were regarded as important.

During the recent *bêche-de-mer* fisheries survey, *bêche-de-mer* fishers from Mbili Passage and Chea stated that the best way to manage the *bêche-de-mer* fishery would be through government legislation, as they could see no means by which they would manage themselves (especially as a majority of the money is spent on beer). In contrast, United Church fishers, who have *bêche-de-mer* as their main income source, stated that those communities using the resource should manage the *bêche-de-mer* fisheries, and the use of rotational closures was suggested (it is known that *hope chinaba* is still practiced from time to time). They also stated that buyers should strictly enforce *bêche-de-mer* size limits when purchasing from divers. Successful management of marine resources in Marovo Lagoon necessitates that United Church communities be incorporated into IWP's activities, particularly as they all utilise the same sea territories and reef systems.

#### 5.4 Marine Protected Areas

The Mbili community representatives have selected two sites for establishment of marine protected areas (MPAs).<sup>96</sup> Gorugoru reef and Tibare Island, which are separated by a 200 m wide channel, and are similar in terms of complexity and ocean influence (the reefs are relatively protected). This MPA encompasses well known cod and grouper spawning sites, and a black coral (*Tubastrea micrantha*) garden. The islands of Japwana and Kaurujeu are also

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<sup>95</sup> In the case of Mbili Passage, Allan Agassi, who lives in Honiara, was responsible: in Chea, it was the Chief's secretary, Wilson Liligeto, who made the submission.

<sup>96</sup> Other MPAs in the Marovo Lagoon include one at Biche, an SDA community, which developed a detailed resource management plan for their marine environment with assistance from WWF (Foale 2000a). Michi has also had WWF support and was developing management plans for *bêche-de-mer*. Orine has also designated an MPA of 48 km<sup>2</sup> (SPREP 1988; World Bank 2000). The term MPA is often viewed with suspicion by many communities who fear imposition of unreasonable constraints on their behaviour and threats to their livelihoods (Bleakley 2004). A more acceptable term, now used widespread in the literature is Locally Managed Marine Areas or LMMA.

under consideration as conservation areas by the Mbili Passage community. Japuana Island has a protective bay, which is a rich fishing ground as well as a safe anchorage site for yachts, though the windward side is exposed. The Mbili Passage community is under some pressure to have MPAs established due to their agreement for a new school building with Seacology (Totalave, the *tabu* island, has been designated for this purpose).

Under the previous Chea Resource Policy Framework, it was stated that there would be limited activities at Karikana Passage (Chea Village Community 1991). Currently, the Chea community representatives have selected a section of the Wainimotru Reef as an MPA. It is typical of the outer reefs in Marovo, with steep drop-offs, and surrounded by deep, clear waters.

Disputes have already surfaced over the proposed MPA establishment at Mbili Passage and Chea. At Mbili Passage, several communities (e.g. Ketoketo, Bunikalo, Sobiro, Tatabiri, Rakata, and Manabusu) have voiced concern should there be any restrictions imposed on reefs through MPA establishment. Most members of these neighbouring communities are considered to be of the same *butubutu* as those in Mbili Passage. Chubikopi and Sasaghena communities have raised similar issues over closure of reefs in the Chea area.

In September 2004, the proposed MPAs sites were surveyed by the IWP team (see Manioli 2004). Results from this survey suggest that the MPAs contain many commercially valuable marine resources, such as high value *bêche-de-mer*, trochus shell, giant clams, blacklip pearl oyster, shellfish (ke'e and kurila) and coral reef fish species. Relatively high live coral cover and fish abundance were observed within the proposed MPAs.

## 5.5 Government management

The main two legislative mechanisms for the management of the environment in the Solomon Islands are the *Fisheries Act 1998*, and the *Wildlife Protection Act 1998* (for a comprehensive review of the environment laws and issues in Solomon Islands, see IWP 2003). The *Fisheries Act 1998* (No. 6 of 1998) has been devised to ensure that fishery resources in the Solomon Islands are developed with proper conservation and management measures, so that those resources are used at their optimum sustainable yield, so as to achieve economic growth, human resource development, and employment creation, while also providing a sound ecological balance. Customary rights are also respected under this Act. The only previous management legislation for *bêche-de-mer* was the ban on fishing for sandfish in 1998, which was repealed in 2000. IWP is currently investigating the development of a *bêche-de-mer* management plan and this should be strongly pursued. The *Wildlife Protection and Management Act 1998* (No. 10 of 1998) was essentially established to bring the Solomon Islands into compliance with the Convention on the International Trade in Endangered Species (CITES).

Provincial governments also have a fundamental role in the management of marine resources in the Solomon Islands. The fisheries powers of provincial governments include providing open and closed seasons and the establishment of marine reserves, the prescribing of minimum sizes for all organisms caught, retained or collected and the prohibition of destructive fishing methods or equipment.

The Western Province Resource Management Order (RMO) is currently the only mechanism for management in the province. This is simply a legislative tool that enables a particular set of resource management rules to be drafted, gazetted, and be enforceable by law under the RMO.<sup>97</sup> Ultimately the usefulness of an RMO depends of course on the capacity of both the provincial government and the landowning group to enforce the rules once they are gazetted. In most cases this capacity is not likely to be great.

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<sup>97</sup> One currently exists for harvesting of megapode eggs on Simbo Island.

## 5.6 IWP Community Project Committees

Under IWP, communities must select members of the community to assist in project coordination and implementation activities. This is to ensure that the communities have maximum control and retain a sense of ownership of the Project.

The Mbili Passage IWP Community Project Committee has 17 such members. The Chea community has 13. The Chea committee members are also traditional leaders in their respective villages. At Mbili Passage, a new committee was established for the IWP, and it was agreed that the committee would serve a term of one year. After that period, membership would be reviewed. This has caused some friction among the Mbili Passage community, as all but one of the new members is related to (i.e. an inlaw) of the IWP National Coordinator. The new committee is consequently experiencing problems gaining respect, and will find it difficult to garner full community support. At Chea, the committee is the existing administration committee for the community.

Table 31: Community committee membership

Position	Mbili Passage 2004	Mbili Passage 2005	Chea
<b>Chairman</b>	Willie Posala	James Siloko	Nezol Ghele
<b>Vice Chairman</b>	Harrington Logara	<i>Lidon Sogha</i>	Risily Amos
<b>Secretary</b>	<i>Lidon Sogha</i>	Johnson Poghosa	Maurine Ghele
<b>Assistant Secretary</b>	Irvin George		Relna Ngatulu
<b>Treasurer</b>	Fox Arthur	James Siloko	Lester Tutuo
<b>Assistant Treasurer</b>			Serol Dioni
<b>Members</b>	Allan Agasi Sarah Hugo Enari Panda Luteni Watt Douglas Luteni John Lee Kolikeda	Nathenial Koli Chogakolo Luteni Moloku Lutea Clement Pana Tesma Lidon Milnaru Oswald Netolo Rose Logura	Alrick Jimuru Hemeti Joseph
<b>Village Contact</b>	Lidon Sogha		Nezol Ghele
<b>NTF Representatives</b>	Willie Posala Harrington Logara (Alternative)		Alrick Jimuru Wilson Liligeto (Alternative)
<b>PDT Representative</b>	Lidon Sogha Willie Posala (Alternative) Harrington Logara (Alternative)		Nezol Ghele Alrick Jimuru (Alternative)

Source: IWP Solomon Islands.

## 5.7 Previous projects in Marovo Lagoon

Starting in 1987, the Marovo Lagoon was considered for World Heritage listing by the United Nations Educational, Scientific and Cultural Organization (UNESCO), which conducted fact-finding missions in 1989–1990 (McKinnon 1990; see also LaFranchi and Greenpeace 1999; Hviding and Baines 1994; Bayliss-Smith 1993) and later supported the establishment of ecotourism ventures around village accommodation. There is a possibility that the World Heritage listing initiative maybe revived (as a second World Heritage site). An investigation team recently visited Marovo Lagoon, and a review meeting was held in Marovo in March 2006.

The UNESCO Local and Indigenous Knowledge Systems program has been operational for some time, looking at the role of indigenous knowledge and the use of tenure regimes in day-to-day decision making about fundamental aspects of resource use. In 2005 the project published an environmental encyclopedia of Marovo lagoon (Hviding 2005).

The Marovo Lagoon Resource Management Project was supported by the Commonwealth

Science Council, set up in 1982 after the Marovo Area Councils<sup>98</sup> raised concerns about the future of the lagoon and its inhabitants. Chea participated with this project and hosted Edvard Hviding while he undertook his doctoral studies.

In 1995, WWF's South Pacific Program initiated the Solomon Islands Community Resource Conservation and Development Project (CRCDP) to conserve and protect the natural environment and biodiversity of Solomon Islands by assisting customary resource owners to meet their development needs through ecologically, socially and economically sustainable use of their natural resources.<sup>99</sup> This was affiliated and aligned with the Marovo *Butubutu* Development Foundation (MBDF), the ineffective executive arm of the (equally ineffective) Marovo Council of Chiefs (Foale 2001). Part of the reason for the eventual failure of this project was that the MBDF was widely seen by villagers in the Marovo Lagoon as a WWF "puppet" and subsequently lacked credibility with either the government or Marovo resource owners; the CRCDP was often modified or manipulated by the participating villages.<sup>100</sup>

## 5.8 Current projects in Marovo Lagoon

The following organisations have programs that compliment that of IWP Solomon Islands in the Marovo Lagoon, and have shown some interest in possibly pursuing collaborative arrangements. A more extensive list of stakeholder is detailed in Appendix J.

The NGO Seacology provides funding for community infrastructure needs under agreements for a community to forgo harvesting rights and to establish protected areas. The Mbili Passage community has entered into such an agreement. In exchange for funds for the construction of a new school building at Mbili Passage, the community is to set up an MPA around Totalave Island. Bilikiki Cruises has agreed to monitor the reserves.

The South Pacific Applied Geoscience Commission (SOPAC) has funding from the European Union to conduct the Reducing Vulnerability of the Pacific States program. Under this program, SOPAC may conduct beach profiling, bathymetry surveys, and hydrodynamic modelling in Marovo Lagoon, and provide assistance to one student to assess the impacts of logging activities on the coral reefs and marine ecosystem.

The University of Adelaide, in association with IWP and in conjunction with the Solomon Islands Government, has begun initiating the Transboundary Environment Governance program. This program aims to analyse the barriers and opportunities to achieving common and cooperative approach to integrated coastal management.

The Environmental Concerns and Action Network-Solomon Islands and Oxfam have received funding for the Forestry Awareness Campaign Programme, which is designed to increase community awareness about the environmental impacts of logging. It will also involve public awareness and education on existing environment and natural resources legislation.

The University of Queensland and the Rural Development Trust, a Solomon Islands-registered NGO (with headquarters on Tengomo Island, in the central portion of the southeastern section of Marovo lagoon), have recently signed a memorandum of understanding, to provide an integrated approach to the environmental management of Marovo Lagoon that will support protection of the regions' high biodiversity and allow for sustainable use of the lagoon. Specific activities involve terrestrial and marine surveys, assessments of the water quality and assessments of community and traditional knowledge. IWP should pursue strong linkages with this program as it holds the best potential for ultimately achieving IWP objectives.

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<sup>98</sup> The Area Councils have been disbanded since 1998.

<sup>99</sup> Project proposals such as sewing, butterfly ranching and honey production were put forward. Little was achieved, and this led in part to community desires to acquire material benefits from projects before they disappear.

<sup>100</sup> For example, chiefs requested that more of the community resource conservation funds distributed by WWF be directly allocated to meetings organised around traditional hierarchical structures (and therefore maximising their benefits), rather than around the more egalitarian, participation by all approach favoured by WWF (Hviding and Baines 1994).

## 6 Conclusion

People in the Marovo Lagoon are no longer satisfied with a wholly subsistence lifestyle, and the exploitation of marine resources is now particularly important in terms of income and food security. Formerly, the value that people attached to their environment was dependent mainly on the extent to which that environment provided direct resources and services. With the increasing monetisation of the rural economy (brought about in part by SDA Church doctrines), and the growing consumer aspirations of the population at large, the nature of environmental values is changing, with the environment now valued insofar as it can provide financial rewards.

Risks arising from the exploitation of commercialised marine resources are both social and ecological in nature. As noted, most social conflict in the Marovo Lagoon is when *butubutu* leaders to whom resource rents are made fail to share these proceeds or to direct them to activities that benefit the *butubutu* as a whole.<sup>101</sup> Ecological risks arise from potential resource depletion<sup>102</sup> and habitat degradation.

In many cases people of Marovo Lagoon have not generally had to look seriously at the long-term implications of their economic behaviour.<sup>103</sup> Unless fishers have personally experienced the collapse of a fishery, they may still believe in the inherent capacity of an ecosystem to restore itself, regardless of the destabilising effect of increasing fishing effort. While this is generally the case, people of Mbili Passage and Chea have come to understand that changes in the status of marine resource stocks due to human use can occur very rapidly (as evidenced during the LRFFT period, and presently in association with concerns regarding the decline of sea cucumber stocks).

While customary management systems have much to offer with respect to the management of marine resources, they tend to come under increased pressure when commercial considerations become significant.<sup>104</sup> For this reason, effective management of the resources in question also requires that support be given to government legislation; education of village fishers is also important, as they may not fully understand the medium- and long-term impacts of certain fishing practices, such as the targeting of spawning aggregations. Access to such information facilitates informed decision-making and results in effective co-management of fisheries resources.

Given the social and cultural setting of Marovo Lagoon, enforcement of management measures is only feasible through the support (and empowerment) of local *butubutu*, who hold the resource rights (and hopefully have a vested interest in the sustainable management of their marine resources). Resource users at Mbili Passage and Chea will need to agree to (i) abide by communally-imposed measures (such as those already in place through the use of by-laws at Chea) to protect declining resources, (ii) report infringements of agreed management measures, and (iii) participate in activities designed to enhance resource productivity and longevity.<sup>105</sup> For this to happen, however, there is a need for chiefs to regain respect (lost as a result of

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<sup>101</sup> Traditional practices can also cause social inequality, through restriction on those who do not hold *nginira* rights of ownership.

<sup>102</sup> Depletion of stocks also produces uneven social results in the subsistence sector.

<sup>103</sup> Economic sustainability is the degree to which the community is able to sustainably meet their basic income needs. It is a factor that contributes toward an overall measurement of quality of human life for a particular village and influences the rate (sustainable or unsustainable) at which natural resources are harvested to meet basic income needs. Theoretically, a village achieves economic sustainability when harvest levels allow for a family's basic income needs (money for food, school fees, medicine, clothing and transport) to be met without degrading the natural environment and depleting the resource base for future generations.

<sup>104</sup> Marine resources have probably always existed in quantities that are surplus to the requirements of the local population in Marovo Lagoon, but this is changing, as a result of external export market demands that place added pressure on resources; consequently, fishers are often unaware of the vulnerability of the resources to overexploitation. Chapman (1991) states that one of the basic elements required for the sustainable development of fisheries resources is a perception within the community that the resources are limited.

<sup>105</sup> Hviding and Baines (1994) state that the practical, behaviour-oriented and observation-based nature of Marovo people's knowledge of the marine environment, focusing as it does on the fluctuating and changing abundance of important food species, could be used to involve community members in the monitoring of marine resource abundance.

personal greed and uninformed decision making), as communal obligations are administered and controlled by the village chiefs.

## 6.1 Next steps

The IWP focus for fisheries management in the eastern Marovo Lagoon has shifted to a more specific interest in the *bêche-de-mer* fishery. For this to happen there needs to be greater involvement with United Church communities who are also utilising the resource, particularly those adjacent to Chea. The Mbili Passage conducts most of their harvesting in the neighbouring puava.

Due to the limited time remaining for the IWP program to implement activities, it is suggested that fewer activities be conducted in Mbili Passage and that efforts be concentrated on Chea. Mbili Passage already has an arrangement with Seacology, which will result in establishment of an MPA at Totolave Island. Also, many of the issues creating community divisiveness at Mbili Passage cannot be resolved in the immediate future. Chea is consequently the better focus, albeit not without problems. The surrounding United Church communities should be involved, and efforts made to build on the Marine Resource Policy Framework that Chea developed in 1991 to manage the *bêche-de-mer* fishery.

## Recommendations

1. Extend IWP's work at Chea to encompass the neighbouring United Church communities, particularly at Chubikopi and Sasaghena.
2. Conduct surveys in CFC and United Church communities to determine what management measures (if any) have been put in place for the management of *bêche-de-mer*.
3. Update Chea's Resources Policy Framework and ensure participation and acceptance by neighbouring United Church communities (who use the same sea territories and reef systems).
4. Conduct awareness activities that include the interrelationships between sexual maturity (size-limits), reproduction (spawning) and good fisheries production.
5. Conduct awareness on the ecological role of *bêche-de-mer* in generating and maintaining living reefs.
6. Continue to strengthen community-based management and establishment of mpas.
7. Determine clear definition of the marine boundaries of fishing and management areas, which incorporate all resource users.
8. Develop a simple monitoring program to verify and qualify catch-per-unit-effort trends.
9. Conduct extension work on better processing and grading for *bêche-de-mer*.
10. Investigate a cooperative relationship with marine resource buyers who could deliver management and quality control messages.
11. Assess the feasibility of lifting the ban on blacklip pearl shell to potentially allow pulse harvesting (and thus diversifying income opportunities).
12. Implement the process for developing *bêche-de-mer* management plans at either the provincial or national level and pursue the appropriate legislative mechanisms.
13. Extend the collaboration with the University of Queensland's Conserving the Marine Biodiversity of Marovo Lagoon, Solomon Islands project, to look at habitat and *bêche-de-mer* distribution (this will help in determining appropriate reserve areas).

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Appendix A: Socioeconomic Survey Form (March-April 2004) (1<sup>st</sup> Survey)

<b>Application Information</b>				<b>Population</b>	
Household:		Person Contacts:		Number of People	
		Rank in Family:		No: of People at Home	
		Others		No: of People not at Home	
Location:				No: of People 60 years and up	
				No: Females	
Ownership:		Present	Yes / No	No: Males	
				No: Youths	
				No: Women	
<b>Background Information</b>					
<b>Houses</b>		<b>Toilet System</b>		<b>Solid Waste</b>	
Type of Perm. Houses		Any in door system?	Yes / No	<b>Type of Solid Waste Disposal?</b>	
Type of Semi Perm. Houses		Yes, Type of System	Latrine	<b>Domestic Waste</b>	Sea
Materials for House			Septic		Burnt
Sources of Materials			Open pit		Underground
Who build the house		No, Type of System used			Other
			Beach	<b>Other type of Waste</b>	Burnt
<b>Any House Plan or Community Waste Plan for waste?</b>			Mangroves		Underground
Yes / No			Streams		Sea
Comments:					

<b>Education Level</b>					
<b>Person</b>	<b>Relation to head of Household</b>	<b>Gender</b>	<b>Age / Age Group</b>	<b>Currently in School</b>	<b>Highest Education</b>
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
<b>Community's Activities</b>					
List of Activities that Household participate in?		Responsible Authority	Responsible Person	# of Days in Month	General Remarks

List of Previous Funded Community Projects?	Funding Organization	Responsible Govt. or NGO	Status	Remarks
<b>Income Generating Activities</b>				
List of sources of Income generating activities	Av. Income per weeks	Where was it sold?	Who buys the product?	Where did come from?
Salary / Wages				
Selling of garden produce?				
Selling of Cooked food				
Selling of plantation crop?				
Selling of fruits / nuts?				
Selling of fish / seafood?				
Selling of other marine product?				
Remittances from Wantok				
Stores and Hiring of equipments				
Craft and Carvings				
Retirement				
Royalties				
Ecotourism				
<b>Other Marine Species harvested for Income</b>	Beche-de-mer	Trochus	Reef Fishes	
Where did they sell it?				
Who buys it?				
At what prices?				
Who participates?				
% spent on transportation				

<b>Coastal Fisheries Related Problems and Activities</b>					
Coastal Fisheries Problem:		Brief Description of Scope of Problem			
List the main causes of problem?		Who are the main culprits of the Problem?		Previous community action to address the problem	
Was there any form of conservation or restriction imposed on certain resources?		Which species?		Why?	Who is responsible?
		When?			
	Yes / No	How often?			
List of Villages or Communities that can be Involved?		Are they present?	List of Tribes within Community Included?	Previous Disputes?	How was it settled?
		Yes / No			
		Yes / No			
		Yes / No			
		Yes / No			
		Yes / No			
<b>Coastal Fisheries Activities [Only completed this section if the Problem is depletion of marines resources]</b>					
<b>Activities</b>		<b>Men</b>	<b>Women</b>	<b>Youth</b>	<b>Remarks</b>
Number of times per day (Average)					
What time of the day they leave?					
Purpose of fishing?					
Average Catches in a day?					
Number of hours per outing (average)					
How far from the villages they have to travel?					
What specific species are harvested?					



<b>Expenditure</b>				
<b>Items</b>	<b>Never / Occasion/ Frequent</b>	<b>Amount ( In day)</b>	<b>Amount ( In week</b>	<b>Amount ( In month)</b>
Consumption				
Shops item (Rice etc..)				
Local Marketed goods				
Energy				
Radio				
Light				
Kerosene & Battery				
Health Care				
Medicine Cost				
Transportation				
Transportation				
Fuel				
Education				
School fee				
Contribution				
Recreation				
Alcohol / Smoke				
Tools / Equipment				
Diving & Carving				
Others				
<b>Alternative Livelihoods</b>				
Brief assessment of any potential Aquaculture Projects that can be developed within the Areas?				

<b>Accessibility</b>					
Centre		<b>Cost Information</b>		<b>Accommodation Available</b>	
Port		Travel [Air]		<b>Name</b>	<b>Cost</b>
Airport		Travel [Sea]			
Best possible transport to the site:		Fuels			
Type of Transport Available		Hiring Canoe			
		others			
<b>Other Additional Information</b>					
<b>Please write any additional information that your feel that would be helpful for us to know to assist your community.</b>					
<b>Closing Remarks</b>					



## Appendix C: Socioeconomic Survey Form (December 2004) (2<sup>nd</sup> Survey)

House number:

Answer the following questions carefully.

1. Number of people who live in this house: \_\_\_\_\_

2. How many are males: \_\_\_\_\_

3. How many are females: \_\_\_\_\_

4. How many of the males are within the following age group ranges:

Age group range	Number of males
1 - 9	
10 - 19	
20 - 29	
30 - 39	
40 - 49	
50 - 59	
60 - 69	
70 and above	

5. How many of the females are within the following age ranges?

Age group	Number of females
1 - 9	
10 - 19	
20 - 29	
30 - 39	
40 - 49	
50 - 59	
60 - 69	
70 and above	

6. For each person could you tell us the following information?

Person #	Gender	Age	Relationship to head of household	Highest level of education	Still at school
1	m/f				
2	m/f				
3	m/f				
4	m/f				
5	m/f				
6	m/f				
7	m/f				
8	m/f				
9	m/f				
10	m/f				
11	m/f				
12	m/f				
13	m/f				
14	m/f				
15	m/f				

7. Does anyone in this household have an income from the following?

Income source	Tick for yes	Rank (1-5)	Market outlet	Income or sales/wk
Salary/wages				
Selling garden produce				
Selling fruits				
Selling nuts				
Selling plantation crops				
Selling fish/sea food				
Selling other marine products (specify)				
Owning store				
Equipment/ canoe hire				
Getting remittance from wantoks				
Selling timber/logs				
Land rent/ royalties				
House building. Etc				
Repair work				
Crafts. eg carving and weaving				
Pension (retirement)				
Others (specify)				

8. Does your household regularly use cash for any of the following things.

Item	Tick for yes	Once a week	Once a month	Occasionally	Comments
Shop food (eg rice)					
Tobacco					
Alcohol					
Local market food					
Kerosene					
Tools/equipment					
Education					
Health care					
Transport					
Remittance					
Donations to church					
Others (specify)					

## Appendix D: Summary of consultant's Terms of Reference

In consultation with the Solomon Islands IWP National Coordinator, National Task Force, local community committees and SPREP IWP Project Coordination Unit (PCU), the consultant is required to design and coordinate a beche-de-mer fishery survey, and to finalise the production of the socio-economic baseline and participatory consultation for the IWP pilot project in Solomon Islands through the combination of the following methods:

1. Review of existing information about the respective communities including previous material and reports prepared by the Solomon Islands IWP team on participatory consultation, initial socio-economic household questionnaire, community meeting, and ecological baseline survey;
2. Semi-structured interview with key village representatives and knowledgeable locals; and
3. Observation of activities in the villages in relation to coastal fisheries.

The Consultant is engaged to undertake the following activities:

1. Conduct preparatory work for the finalisation of the socio-economic baseline and participatory consultation:
  - In consultation with the IWP National Coordinator and the PCU, review work completed to date in relation to the Solomon Islands IWP.
  - Compile any relevant existing socio-economic information on the communities to provide an initial profile of the communities;
  - Review and revise the current Solomon Islands IWP stakeholder analysis (local and national level stakeholders);
  - Develop a detailed work plan for a beche-de-mer fishery survey in consultation with the Solomon Islands IWP team; and
  - Produce a report on the participatory consultation. This report will form Part One of the contract.
2. Coordinate beche-de-mer fishery survey, data collection and analysis and finalise the production of the socio-economic baseline:
  - In the light of existing socio-economic information, the revised stakeholder analysis, and other relevant information, prepare a beche-de-mer fishery survey to support the proposed management of marine resources in the area. Where appropriate, the methodology being used under the European Union funded Secretariat of the Pacific Communities' PROCFISH reef fisheries assessment project should be considered and incorporated into the survey where appropriate;
  - Coordinate and undertake the beche-de-mer fishery survey, data analysis and the write up of results;
  - Identify any parameters for future monitoring in relation to the success of the Solomon Islands IWP; and
  - Produce a report on the socio-economic baseline, which incorporates the results of the beche-de-mer fishery survey. This report will form Part Two of the contract.

In addition the consultant is engaged to:

- In consultation with the Solomon Islands IWP and the PCU assist in communications activities as necessary to support the assessment (e.g. public relations activities in relation to survey);
- Liaise and coordinate with other partner agencies and stakeholders such as those organizations involved in ecological baseline assessment work to support the IWP.

## Appendix E: Beche-de-mer Fishery Survey (April 2005) (3<sup>rd</sup> Survey)

### Mbili Passage and Chea Communities, Marovo Lagoon

#### Beche-de-mer Survey

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**Target Group:** Fishers (Men and Women who are 15 years and older)

**Introduction:**

The International Waters Project Solomon Islands is implementing a community-based sustainable coastal fisheries management project in association with your community. This project is intended to support improved local management of important marine resources of commercial value, in particular beche-de-mer resources in Marovo Lagoon. This survey is part of the project and is designed to find out what your beche-de-mer fisheries are like and to seek community opinion on the management of your resources. The survey should take approximately 30-45 minutes for you to complete

The Objectives of this beche-der-mer survey are to:

- Determine average catch size and composition
- Determine local biological knowledge
- Determine harvesting trends
- Determine markets and income trends
- Determine management options

The survey Results will be analysed by the IWP survey team and presented back to your community for discussion and to assist you and your community in developing management actions. The survey results will also provide a baseline from which to measure changes in your beche-de-mer resources over the next few years.

For further information on the IWP project in your community, please feel free to contact:

- Kenneth Bulehite – National Coordinator
- Nellie Kere – Community Facilitator
- Patrick Mesia – Community Facilitator
- Julia Manioli – Marine Biologist (Student)

The IWP project office is located in the:

- Department of Fisheries and Marine Resources, PO Box 1424, Honiara
- Phone: 28769 / 28735; Fax: 28735

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Name: \_\_\_\_\_

HHNO

Gender: Female  Male  Age:

Village: \_\_\_\_\_

Date: \_\_\_\_\_ Surveyor's name: \_\_\_\_\_

---

**1. How many years have you been harvesting beche-de-mer?**

< 1 year  1 - 2 years  3 - 5 years  > 5 years

**2. Which species of beche-de-mer do you harvest? (Use with ID sheets)**

Rank the top five species in terms of income and amount harvested.

Common Name	Scientific Name	Tick (√) if harvested	Rank of Importance
Amberfish	<i>Thelenota anax</i>		
Blackfish	<i>Actinopyga miliaris</i>		
Black teatfish	<i>Holothuria nobilis</i>		
Brown curryfish	<i>Stichopus horrens</i>		
Brown sandfish	<i>Bohadschia vitiensis</i>		
Chalkfish	<i>Bohadschia similis</i>		
Curryfish	<i>Stichopus herrmanii</i>		
Deepwater redfish	<i>Actinopyga echinites</i>		
Elephant trunkfish	<i>Holothuria fuscopunctata</i>		
Greenfish	<i>Stichopus choloronotus</i>		
Hong Pai (House Pigfish)	? <i>Holothuria coluber</i> ?		
Lemonfish	<i>Holothuria rubralineata</i>		
Lollyfish	<i>Holothuria atra</i>		
Peanutfish	<i>Stichopus vastus</i>		
Pinkfish	<i>Holothuria edulis</i>		
Prickly redfish	<i>Thelenota ananas</i>		
Red Snakefish	<i>Holothuria flavomaculata</i>		
Ribblefish (Three-thorn side)	<i>Pearsonothuria graeffei</i>		
Sandfish	<i>Holothuria scabra</i>		
Snakefish	<i>Holothuria coluber</i>		
Stonefish	<i>Actinopyga lecanora</i>		
Surf redfish	<i>Actinopyga mauritiana</i>		
Tigerfish	<i>Bohadschia argus</i>		
White teatfish	<i>Holothuria fuscogilva</i>		
Other ( )			
Other ( )			
Other ( )			

**3. What months do you harvest beche-de-mer?**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

**4. How many times a week would you go out to harvest beche-de-mer?**

1  1-2  3-4  5-6  7

**5. Where do you harvest beche-de-mer? Use attached Map to show areas.**

**6 Do you harvest beche-de-mer from outside your own resource (clan) area?**

Yes  No



7. If you answered yes to Question 6, please explain where you go and by what rights of access that allows you to harvest there.

Place	Right of Access

8. Have you noticed a change in beche-de-mer numbers in any of these areas?

Yes  No

9. If you answered yes to Question 8 please provide reasons for this change. What reasons do you think are responsible for this change?

10. Are there any areas that you are not allowed to harvest beche-de-mer from?

11. If there are areas you cannot harvest in, what is the reason?

12. Do you harvest beche-de-mer at a particular phase of the tide?

Phase of Tide	Reason
Rising tide	
High tide	
Falling tide	
Low tide	
Any state of the tide	

13. Do you harvest beche-de-mer at a particular phase of the moon?

Phase of the moon	Reason
Full moon	
First quarter	
New moon	
Last quarter	
Any state of the moon	

**14. At what time of day do you normally harvest beche-de-mer?**

Time of Day	Reason
Morning	
Afternoon	
Night	
Anytime	

**15. How many hours on average each trip do you normally harvest beche-de-mer?**

<2     2-4     4-6     >6

**16. Do you harvest all sizes of beche-de-mer?**

Yes                   No

**17. If you do not harvest all sizes of beche-de-mer, why not?**

**18. Do you have any traditional/local knowledge (use local term here) about beche-de-mer?**

**19. When you harvest beche-de-mer, how many people are *usually* with you?**

Rank in order of the most frequent situation.

Number of People	Rank
0	
1-2	
3-5	
6-10	
>10	

**20. When you harvest beche-de-mer, whom do you go with?**

Rank in order of the most common situation.

People You Go With	Relationship	Rank

**21. What equipment do you use to harvest beche-de-mer?**

Record the number of each item that you own or borrow.

Equipment	Own	Borrow
Diving goggles		
Underwater torch		
Coleman lamp		
Kerosene lamp		
Spear		
Buckets/containers		
Boat/canoe		
Other (please specify _____ )		

**22. Do you process your own beche-de-mer?**

Yes  No

**23. If your answer to Question 22 is 'No', then why?**

**24. Did you ever receive training on processing?**

Yes  No

**25. If your answer to Question 24 was 'yes', then by whom and when?**

**26. If you sell processed beche-de-mer, where do you sell it?**

Rank in order of importance of amount sold to each buyer.

<i>Sold to</i>	<b>Rank</b>

**27. Who markets your processed beche-de-mer?**

You  Your spouse  Group/collective of fishers

others  (please specify \_\_\_\_\_ )

**28. If you sell unprocessed beche-de-mer, where do you sell it?**

Rank in order of importance of amount sold to each buyer.

Sold to	Rank

**29. Who markets your unprocessed beche-de-mer?**

You  Your spouse  Group/collective of fishers

others  (please specify \_\_\_\_\_)

**30. How much money did you make last month from the sale of beche-de-mer?**

0-100  501-1000  1001-2000  2001-3000  3001-4000   
4001-5000  >5000

**31. How much money did you make last year from the sale of beche-de-mer?**

0-100  501-1000  1001-2000  2001-3000  3001-4000   
4001-5000  >5000

**32. Do you believe there are ways you could earn more money from beche-de-mer?**

Yes  No

**33. How could you earn more money from beche-de-mer?**

**34. If you could no longer harvest beche-de-mer, would this be a problem for you?**

Yes  No

**35. If your answer to Question 34 was 'yes', please explain why this would be a problem?**

**36. Who (if anyone) do you think is responsible for managing beche-de-mer harvesting in the Morovo Lagoon?**

**37. Who (if anyone) do you think is responsible for managing and protecting beche-de-mer habitats in the Morovo Lagoon?**

**38. Are you aware of any rules (customary or legislative) associated with the harvesting of beche-de-mer?**

Yes  No

**39. If you answer to Question 39 was 'yes', please describe these rules that you are aware of.**

**40. What are your general feelings about the status of the beche-de-mer resources around the Marovo Lagoon?**

**41. Do you have any other comments you would like to make about the beche-de-mer fishery?**

**42. Do you have any comments about the IWP project?**

**THANK YOU**

## Appendix F: Development Indices-1999

Category	Solomon Islands	Western Province
Area km <sup>2</sup>	30,407	7,509
Population density/ km <sup>2</sup>	13	8
Number of households	65,014	9,992
Average household size	6.3	6.3
Total population	409,042	62,739
Males	211,381	197,661
Females	33,190	29,549
Total population under 25 years	234,501	35,187
Males under 25 years	121,368	18,451
Females under 25 years	113,133	16,736
Females under 25 years with children (ever born alive)	12,004	1,941
Females under 25 years with children (surviving)	11,896	1,919
Median age at last birth	29.8	29.8
Annual growth rate	2.8%	3.2%
Sex ratio (male per 100 female)	107	112
Infant mortality rate	66.0	65.5
Total population that die before 40 years	17.8%	17.7%
Life expectancy at birth	61.1	61.6
Total Fertility Rate	4.8	4.8
Family planning coverage	8%	11%
Ante-natal coverage	63%	80%
Post-natal coverage	35%	49%
Immunization (DPT 3)	67%	70%
Children under weight under 5 years	23%	32%
Engaged in any sort of economic activity	65.6%	67.8%
Total Population aged 14 and over, doing paid work	23.1%	35.1%
Males aged 14 and over, doing paid work	31%	45%
Females aged 14 and over, doing paid work	15%	24%
Total population aged 15 and over, self-reported literacy	76.6%	94.0%
Males aged 15 and over, self-reported literacy	84%	95%
Females aged 15 and over, self-reported literacy	69%	93%
Total population aged between 5-19 years, school attendance	56.3%	65.4%
Males aged between 5-19 years, school attendance	58%	65%
Females aged between 5-19 years, school attendance	54%	66%
Total population enrolled in primary school	76.5%	88.7%
Males enrolled in primary school	78%	89%
Females enrolled in primary school	75%	89%
Total population enrolled in secondary school	29.3%	27.3%
Males enrolled in secondary school	34%	28%
Females enrolled in secondary school	25%	26%
Total population enrolled in tertiary institution	4.1%	1.8%
Males enrolled in tertiary institution	5%	2%
Females enrolled in tertiary institution	3%	1%
Population displaced due to ethnic tension (1999)	35,309	1,140
Households without access to potable water	31.5%	19.0%
Disabled population	2.7%	2.8%

<b>Category</b>	<b>Solomon Islands</b>	<b>Western Province</b>
Population using mosquito nets	53%	54%
Households without access to health services	25.3%	26.9%
Population per doctor	9,513	15,685
Population per nurse	455	380
Households with working radio	41.2%	40.5%
Access to modern toilet facility	23.0%	28.2%
Households with electricity	15.7%	19.9%
Human Poverty Index (Rank)	-	2
Human Development Index (Rank)	-	2
Gender Empowerment Measure (Rank)	-	2
Gender-related Development Index (Rank)	-	2

Source: Solomon Islands Census 1999.

## Appendix G: Bêche-de-mer exports

Exports from the Solomon Islands: 1981-2003

Year	Weight (kg)	Value (SBD)	Reference
1981	7,300		Skewes 1990
1982	17,000		Holland 1994
1983	9,259	51,755	Sulu et al. 2000; Leqata 2004
1984	44,291	251,872	Sulu et al. 2000; Leqata 2004
1985	13,616	74,880	Sulu et al. 2000; Leqata 2004
1986	134,184	733,793	Sulu et al. 2000; Leqata 2004
1987	146,376	939,533	Sulu et al. 2000; Leqata 2004
1988	146,958	1,469,117	Sulu et al. 2000; Leqata 2004
1989	87,095	721,236	Sulu et al. 2000; Leqata 2004
1990	118,86	1,880,957	Sulu et al. 2000; Leqata 2004
1991	622,385	7,631,952	Sulu et al. 2000; Leqata 2004
1992	715,414	10,227,486	Sulu et al. 2000; Leqata 2004
1993	316,388	3,161,069	Sulu et al. 2000; Leqata 2004
1994	284,630	2,577,131	Sulu et al. 2000; Leqata 2004
1995	219,339	1,732,575	Sulu et al. 2000; Leqata 2004
1996	113,090	1,260,332	Sulu et al. 2000; Leqata 2004
1997	202,860	2,478,781	Sulu et al. 2000; Leqata 2004
1998	253,489	4,275,727	Sulu et al. 2000; Leqata 2004
1999	375,744	1,937,384	Sulu et al. 2000; Leqata 2004
2000	160,846	3,637,777	Sulu et al. 2000; Leqata 2004
2001	96,150	2,025,544	Sulu et al. 2000; Leqata 2004
2002	374,628	4,797,349	Solomon Islands Customs
2003	173,633	2,021,816	Solomon Islands Customs
2004	408,703	2,264,736	Solomon Islands Customs



## Appendix H: Bêche-de-mer purchase prices

April 2005

Species	Honiara April 2005	Gizo April 2005*	Mbili Passage April 2005	Rukutu April 2005	Chubikopi (Uvilau) April 2005
Amberfish	45	35	35	35	35
Blackfish	200	170	170	150	150
Black teatfish (l)	130	125	40	85	85
Black teatfish (sm)	50	63			
Brown curryfish	200			185	185
Brown sandfish	75	45	68	70	70
Brown sandfish 4 (l)	50	35	40	25	25
Brown sandfish 4 (sm)					
Chalkfish	30	30	35		
Curryfish (l)	200	138	170	185	185
Curryfish (sm)			90		
Elephant trunkfish	30	30	30	25	25
Greenfish (l)	230	185	180		
Greenfish (sm)			100		
Hong Pai/House pigfish	30	26	25	22	22
Lemonfish		25		22	22
Lollyfish (l)	30	28	20	15	15
Lollyfish (sm)	20	18			
Peanutfish (l)	200	175	170	185	185
Peanutfish (sm)	100	100	90		
Prickly redfish (l)	200	183		185	185
Prickly redfish (sm)					
Red lollyfish/Pinkfish	30	28	28	20	20
Red snakefish	50	33	35	35	35
Ribblefish/TST	20	21	15	15	15
Sandfish (l)		163		150	150
Sandfish (sm)		83			
Snakefish	45	34	30	30	30
Stonefish (l)	200	175	170	185	185
Stonefish (sm)	100	100			
Surf redfish (l)	200	153	170	150	150
Surf redfish (sm)	100	85			
Tigerfish	75	77	68	70	70
White teatfish (A)	220	223	220	210	210
White teatfish (B)	190	175	180	160	160
White teatfish (C)	160	140	150	130	130
White teatfish (D)	50	45		50	50

\*Courtesy of Chris Ramofafia

## Appendix I: Bêche-de-mer abundance

Year	Location	Depth	Latitude	Longitude	Number	Reference
2004	Veru Point	Shallow	08° 26.174	157°16.191	4	Ramohia 2004
2004	Landoro Passage	Shallow	08° 26.174	157°16.191		Ramohia 2004
2004	Landoro Passage	Deep	08° 26.174	157°16.191	2	Ramohia 2004
2005	Sambulo	Deep	08° 27.897	158° 01.742	3	Manioli 2005
2005	Patusulu	Deep	08° 28.043	158° 01.044	8	Manioli 2005
2004	Lumehile Passage	Shallow	08° 28.234	158°03.610	1	Ramohia 2004
2004	Lumehile Passage	Deep	08° 28.234	158°03.610	8	Ramohia 2004
2005	Vaenimoturu	Shallow	08° 28.522	158° 03.321	1	Manioli 2005
2005	Matimbako	Deep	08° 28.531	158° 03.495		Manioli 2005
2005	Nusarua	Deep	08° 30.766	158° 03.599	5	Manioli 2005
2005	Rebareba	Shallow	08° 35.119	158° 09.340		Manioli 2005
2005	Rebareba	Shallow	08° 35.169	158° 09.235	3	Manioli 2005
1999	Nganguso Island	Shallow	08° 36.902	157° 49.384		Moseby and Read 1999
1999	Manjaulu Island	Shallow	08° 37.255	157° 49.448	2	Moseby and Read 1999
1999		Shallow	08° 37.321	157° 50.796	7	Moseby and Read 1999
1999		Shallow	08° 38.293	157° 50.896	23	Moseby and Read 1999
1999	Merusu Island	Shallow	08° 38.501	157° 52.066	2	Moseby and Read 1999
1999	Pore Pore Island	Shallow	08° 38.564	157° 52.511	8	Moseby and Read 1999
1999		Shallow	08° 38.653	157° 50.719		Moseby and Read 1999
1999	Tivakae Island	Shallow	08° 38.787	157° 51.958	6	Moseby and Read 1999
1999	Tivakae Island	Shallow	08° 38.815	157° 52.098	6	Moseby and Read 1999
1999	Karungarao Island	Shallow	08° 38.826	158°08.530		Moseby and Read 1999
1999	Vori Vori Island	Shallow	08° 38.843	157° 52.699		Moseby and Read 1999
1999	Maharosa Point	Shallow	08° 38.907	157° 48.437		Moseby and Read 1999
2004	Toatelave Island	Shallow	08° 39.010	158°11.848	13	Ramohia 2004
2004	Toatelave Island	Deep	08° 39.010	158°11.848	1	Ramohia 2004
1999		Shallow	08° 39.084	157° 52.535	13	Moseby and Read 1999
1999		Shallow	08° 39.489	157°50.678	3	Moseby and Read 1999
1999	Rinjenje Island	Shallow	08° 39.641	157° 50.955		Moseby and Read 1999
2005	Turupu	Deep	08° 40.220	158° 11.112		Manioli 2005
2005	Turupu	Shallow	08° 40.225	158° 11.082		Manioli 2005
2004	Mbili Passage	Shallow	08° 40.381	158°11.538		Ramohia 2004
2004	Mbili Passage	Deep	08° 40.381	158°11.538	3	Ramohia 2004
2005	Serakogomo	Shallow	08° 40.448	158° 11.339	4	Manioli 2005
2005	Ropu	Deep	08° 40.448	158° 11.339	6	Manioli 2005
2005	Serakogomo	Shallow	08° 40.453	158° 11.331	4	Manioli 2005
1999	Runja Island	Shallow	08° 40.530	157° 48.585		Moseby and Read 1999
1999	Karuhahe Island	Shallow	08° 40.627	157° 50.568		Moseby and Read 1999
1999	Island Nth of Tchoava	Shallow	08° 40.641	158° 07.624	1	Moseby and Read 1999
2005	Ropu	Shallow	08° 40.652	158° 11.733	8	Manioli 2005
1999	Tachoava Island	Shallow	08° 40.679	158° 07.837		Moseby and Read 1999
1999	Kuacha Island	Shallow	08° 41.297	157° 48.977		Moseby and Read 1999
1999	Tengomo Island	Shallow	08° 41.779	158° 08.481	1	Moseby and Read 1999
1999	Mbahoro Island	Shallow	08° 42.232	157° 49.137		Moseby and Read 1999
1999		Shallow	08° 42.389	158° 05.617		Moseby and Read 1999
1999		Shallow	08° 42.430	158° 054		Moseby and Read 1999
1999	Pangu Pangu Island	Shallow	08° 42.439	158° 10.611		Moseby and Read 1999

<b>Year</b>	<b>Location</b>	<b>Depth</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Number</b>	<b>Reference</b>
1999	Sera Iriri Island	Shallow	08° 42.540	158° 11.459		Moseby and Read 1999
1999		Shallow	08° 42.548	158° 05.823	3	Moseby and Read 1999
1999		Shallow	08° 42.615	158° 05.237	4	Moseby and Read 1999
1999	Chaila Island	Shallow	08° 42.726	158° 07.370	7	Moseby and Read 1999
1999		Shallow	08° 42.772	158° 05.528	1	Moseby and Read 1999
1999	Karu Nokonoko	Shallow	08° 42.775	158° 04.859	1	Moseby and Read 1999
1999	Hotoanivena Island	Shallow	08° 43.705	158° 06.972	2	Moseby and Read 1999
1999	Sinevolo Island	Shallow	08° 43.765	158° 10.101		Moseby and Read 1999
1999	Hotoanivena Island	Shallow	08° 43.990	158° 05.819	5	Moseby and Read 1999
1999	Small island Nth of Taepulu	Shallow	08° 44.343	158° 08.613		Moseby and Read 1999
1999	Ulukoro Island	Shallow	08° 45.074	158° 03.313		Moseby and Read 1999

## Appendix J: Other stakeholders

Organisation	Contact	Position	Activity
AusAID Reforestation Project		Team Leader	Forestry and Reforestation Management
AusAID Rehabilitation Programme		Programme Manager	Rural development
Bilikiki Tours			
Biodiversity Network	Lawrence Makili	Campaigner	Conservation Issues
Conservation International	Nethanial Dewheya	Programme Manager	Environment Conservationist
Christian Fellowship Church (and associated bodies)			
Curriculum Development Unit		Chief Education Officer	Environment Education and Sciences
Department Fisheries and Marine Resources	Paul Maenu'u	Minister	Marine and Fisheries Management
Department Fisheries and Marine Resources	Eddie Oreihaka,	Director of Fisheries	Marine and Fisheries Management and Regulation
Department Fisheries and Marine Resources	Peter Ramohia	Deputy Director, Research and Resource Management Section	Marine and Fisheries Research and Management
Department Fisheries and Marine Resources	Tione Bugotu	Permanent Secretary	Marine and Fisheries Management
Department Fisheries and Marine Resources	Gideon Tiroba	Deputy Director, Aquaculture Research and Resource Management Section,	Marine and Fisheries Research and Management
Department of Forest, Environment and Conservation	Joe Horokou	Environment Pollution Control Officer	Environment Protection, EIA and Conservation
Department of Forest, Environment and Conservation	Steve Likaveke	Permanent Secretary	Environment and Conservation Policies
Department of Forest, Environment and Conservation	Gideon Bouro	Commissioner of Forests	Forestry Resources Management
Department of Forest, Environment and Conservation	Moses Biliki	Director of Environment and Conservation	SPREP & GEF Focal Point, Environment and Conservation Issues
Development Services Exchange	Edgar Pekoe	General Secretary	Umbrella for NGO
ECANSI	Dr Morgan Warier	Director	Conservation Issues
Forum Fisheries Agency		Director	Fisheries Management
FSPI (SI)	Silverado Wale	National Coordinator	Marine Protection and Conservation

<b>Organisation</b>	<b>Contact</b>	<b>Position</b>	<b>Activity</b>
Japan International Cooperation Agency	James Tobias	Administrative Assistant	Donor Agency
Live and Learn - Solomon Islands	Nicholas Kikini	Project Manager	Environment Education
Micro EU Project		Project Manager	Community Projects
Ministry of Mines & Energy	Don Tolia	Permanent Secretary	Policies on Water Resources, Geology and Mines
Ministry of Mines & Energy		Director of Geology	Continental shelf and Geology and Underground water
Ministry of Mines & Energy	Isaac Lekealalu	Deputy Director of Water Resources	Water Resources Management & Hydrology
Ministry of Mines & Energy	Ellison Habu	Director of Mines	Minerals and Mining
Ministry of Mines & Energy	Charlie Bepapa	Director of Water Resources	Water Resources Management & Hydrology
Ministry of Agriculture and Livestock	Edward Kingmele	Permanent Secretary	Agriculture Development and Projects
Ministry of Culture, Tourism and Aviation	Henry Isa	Chief Cultural Officer	Traditional and Community Participation
Ministry of Education and Human Resources	Derick Sikua	Permanent Secretary	Education Policies and Curriculum
Ministry of Finance and Economic	Shadrach Fanega	Permanent Secretary	Government Financial arrangement
Ministry of Foreign Affairs	John Wasi	Pacific Desk Officers	Foreign and International
Ministry of Health and Medical Services	Dr Jackson Leafasia	Permanent Secretary	Health and Medical Services
Ministry of Home and Ecclesial Affairs	Ruth Liloqula	Permanent Secretary	Government Policies
Ministry of Lands and Housing	Silverio	Commissioner of Lands	Lands Policies
Ministry of Lands and Housing	Donald Kudu	Permanent Secretary	Lands Policies
Ministry of National Planning and Development	Jane Waitara	Permanent Secretary	Development and Planning
Ministry of National Planning and Development	Daniel Buto	Under Secretary	Development and Planning
Ministry of Provincial Government and Rural Development	John Tuhaika	Permanent Secretary	Rural Development and local government
Ministry of Provincial Government and Rural Development	Joseph Rausi	Director for Rural Development	Rural Development and local government
Ministry of Transport, Works and Communication	John Ta'aru	Permanent Secretary	Infrastructure Development
Ministry of Transport, Works and Communication	Moses Virivolomo	Under Secretary	Infrastructure Development

<b>Organisation</b>	<b>Contact</b>	<b>Position</b>	<b>Activity</b>
Ministry of Youth, Women and Sport	Ethel Sigamanu	Director	Women' s issues
Ministry of Youth, Women and Sport	Janet Tuhaika	Women's Project Officer	Women' s issues
Mother's Union		Sister	Women's Issues
Organisation	Contact	Position	Activity
National Council of Women	Ruth Maetala	Director	Women's Issues
National Museum	Lawerence Fuanota	Director	Anthropology and archives
People First Network	Randall Biliki	Project Officer	Networking and Community Participation
Prime Minister's Office	Towell Kaua	Secretary to Prime Minister	Adivsor to the government
Rural Development Volunteers Association	Alan Agasi	Chairman	Rural Development
Rural Development Volunteers Association	Rence Sore,	Chief Training Officer	Rural Development
Rural Training Center Association		Coordinator	Education
Rural Water Supply and Sanitation Project	Robinson Fugui	Director of Health Environment	Rural Water supply and Sanitation
Rural Water Supply and Sanitation Project	Bobby Patterson	Project Manager	Rural Water supply and Sanitation
School of Marine and Fisheries	William Aruhane	Fisheries Lecturer, School of Marine and Fisheries Studies	Education on Fisheries
School of Natural Resources	Alexander Makini	Head of School, School of Natural Resources	Education on Natural Resources
Seacology	Samani L D Kali'ua	Coordinator	Infrastructure Development and Conservation
Seven Day Adventist Church (and associated bodies)			
SICA Council of Women		Director	Women's Issues
Solomon Islands Broadcasting Corporation	Johnson Honimae	General Manager	Media
Solomon Islands Broadcasting Corporation	Julian Maka'a	Environment Programme Director	Media
Solomon Islands Christian Association	Charles Kelly	Chairman	Social, Religion and community
Solomon Islands Development Trust	Abraham Baeanisia	Director	NGO and Community Participation
Solomon Islands Development Trust	Dr. John Roughan	Technical Advisor	NGO and Community Participation
Solomon Islands Forest Industrial Association		Manager	Forestry
Solomon Islands Meteorological Services	Chanel Iroi	Director of Meteorological Services	Meteorology and Climate Changes and

<b>Organisation</b>	<b>Contact</b>	<b>Position</b>	<b>Activity</b>
Solomon Islands Tourism Bureau	Morris Otto	General Manager	Variation Eco - Tourism and Tourism
Solomon Islands Village Electrification council	Edmund Huniehu	Chairman	Community Participation
Solomon Islands Water Authority	John Waki	Acting General Manager	Water Supply
Solomon Islands Women Information Network	Afu Billy	Consultant	Women's Issues
Solomon Taiyo LTD	Milton Sibisopere	General Manager	Fisheries and Bait fish
The Nature Conservancy Uepi Resort	Willie Atu	Programme Manager	Regional NGO
United Church (and associated bodies)			
United Nation Development Program	Jan McDonald	Environment Officer	Donor Agency
University of the South Pacific	Dr. Glynn Gaol	Director	Education and Research
University of the South Pacific	Reuben Sulu	Center Lecturer	Education and Research
Voices Blong Mere	Josephine Teakeni	Media Officer	Women's Radio Program
Wetland International - Oceania	Aaron Jenkin		Regional NGO
World Fish Center	Cletus Peters	Director	NGO - Marine Project
World Heritage Project	Ben Davi	Project Coordinator	Conservation and Protection
World Vision International - Solomon Islands		Programme Manager	Christian International NGO
World Wide Fund for Nature	Kido Dalipada	Country Programme Manager	Marine Protection and Conservation