Socio-economic survey of small-scale fisheries in Morobe Province, Papua New Guinea

PNG NATIONAL FISHERIES AUTHORITY
COASTAL FISHERIES
Management and Development Project
ASIAN DEVELOPMENT BANK

NATIONAL FISHERIES AUTHORITY

May 2007

GPA

Tautai

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National Library of Papua New Guinea Cataloguing-in-Publication:

National Fisheries Authority (Papua New Guinea).
Socioeconomic survey of small-scale fisheries in Morobe Province, Papua New Guinea. National Fisheries Authority and Coastal Fisheries Management and Development Project, 2007.

73 p. ; cm.

ISBN 9980-86-099-5

1. Fisheries – Papua New Guinea – Morobe Province. 2. Fisheries – Economic aspects - Papua New Guinea – Morobe Province. I. Title. II. Coastal Fisheries Management and Development Project (Papua New Guinea).

338.372099571 -- dc22

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This report was funded by
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Contents

Acronyms & Terms

ADB	Asian Development Bank
CBM	community-based management
CFMDP	Coastal Fisheries Management and Development Project
EU	European Union
FAD	fish aggregation device
GIS	geographic information system
GPA	Gillett, Preston & Associates
GPS	global positioning system (using Garmin Gecko)
LLG	local level government
MBP	Milne Bay Province
MOR	Morobe Province
NFA	National Fisheries Authority
NGO	non-governmental organisation
NIP	New Ireland Province
PNG	Papua New Guinea
SD	standard deviation
SE	standard error
UPNG	University of Papua New Guinea
VDC	Village Development Committee
WDC	Ward Development Committee
WFG	Women's Fellowship Group

'Eye grease' informal market near main wharf, Lae

Introduction

Background

The purpose of this report is to present the findings of socio-economic surveys undertaken in Morobe Province during July and August 2005 as part of NFA's Coastal Fisheries Management and Development Project (CFMDP). This report is part of a series focused on fish catches, market sales, buyers and socio-economic surveys. These surveys were designed to characterise small-scale fisheries and to monitor project outcomes in the provinces of New Ireland (NIP), Milne Bay (MBP) and Morobe (MOR) in Papua New Guinea.

Characterisation of small-scale fisheries and its role in these three provinces forms a part of the CFMDP, which is implemented by the National Fisheries Authority (NFA) with loan funding provided from the Asian Development Bank (ADB) (1925 PNG-SF). The overall aim of the CFMDP is to contribute to the reduction of poverty in rural areas through increasing, or preventing a further decline in the incomes of coastal communities. This is being done by promoting improved management of resources and by creating sustainable earning and employment opportunities for coastal communities, including mechanisms that improve awareness and access to information on fisheries, and through the construction of wharves, jetties and other social infrastructure.

This part of the project comprises surveys undertaken by enumerators employed by the CFMDP, and the collation of existing historical data being collected by the Provincial Fisheries Office and by buyers under the conditions of their fishing and processing licences.

The data collected and/or collated includes:

1. Surveys of marine products landed by small-scale fishers, usually using canoes or small powered "dinghys" or "banana boats" (open outboard-powered fibreglass dories);
2. Surveys of deepwater and pelagic fishes landed by small-scale fishers and people involved in the European Union (EU - Rural Coastal Fisheries Development Project) scheme for purchasing longer-range vessels (the so-called 'ducklings');
3. Surveys of marine products sold at local markets and their relative importance in relation to other items sold, including direct surveys of marine products purchased by buyers;
4. Existing buyer receipts retained by the Provincial Fisheries Office;
5. Purchasing data collected by buyers and NFA;
6. Household surveys examining socio-economic conditions and contribution of small-scale fisheries undertaken in all three focal provinces; and
7. Focus group and key informant surveys undertaken in conjunction with the household surveys.

These surveys and data collections were undertaken to provide basic information on the relative importance of fisheries to the livelihoods of people in Milne Bay Province. They were also designed to provide information on the types and quantities of marine organisms collected/caught in the province with a view to assessing the status of the resources and to identify threats and opportunities for the future.

Aims of CFMDP Socio-economic surveys

These surveys were designed to access information from individuals and groups through interviews and meetings conducted with randomly selected people who could inform us of their lifestyles, livelihoods and opinions on the issues that affect them. The purpose of the surveys was to:

- Establish existing baseline socio-economic conditions in selected parts of Morobe Province, particularly as they may relate to benefits derived from small-scale fisheries;
- Monitor direct and indirect benefits / effects of the CFMDP at the village and household level in Morobe Province; and
- Collect information relevant to designing an appropriate community-based management strategy for individual villages, and villages in the province in general.

Project management was provided by Gillett, Preston & Associates Inc. and Tautai Ltd.

Approach and Methods

Design of the study

Twenty wards selected within four local level governments (LLGs) in the coastal parts of Morobe Province (Fig. 1) were visited by teams of trained enumerators between 16 July and 1 September 2005. The surveys were focused at the ward level because of the great dispersion of people into small numbers of households in many villages throughout the province. This is a similar approach to that used by the PNG National Census. The number of wards surveyed was distributed evenly among the selected LLGs, so that a five were surveyed in each (Fig. 2). For each ward, enumerators spread their sampling among the villages and isolated houses located within the ward boundary, collecting information on the position of each sample location.

Within each ward, surveys of three groups of people were conducted:

- Households (30 per ward, total of 600 interviews).
- Focus groups: NGOs, youth/fishermen's/ women's groups (5 per ward, total of 100 interviews).
- Key informants: LLG representatives, community leader, others (5 per ward, total of 100 interviews).

This design was expected to yield 800 interviews across all wards and LLGs. These three groups of people were separately approached in an effort to obtain detailed information at the same time as an overview of the special interests of identifiable groups of people.

Several options for the sampling framework were considered prior to the study to ensure that the design could meet the needs of the project. Most considerations referred to optimizing the household level surveys in an effort to ensure the aims of the survey could be adequately examined. These included a consideration of: i) distributing sampling effort among LLGs and wards; ii) repeated measures vs random sampling; iii) the number of households to be sampled for an optimal design; and iv) the sampling period.

Distribution of sampling effort

There are two main approaches that could have been used for distributing sampling effort in household surveys. The first, using proportional sampling, places more effort in areas with the highest populations and can be used to optimise for a good overall picture of socio-economic conditions. Sampling in this case focuses more on population centres, and is often used for population studies. The second approach uses equal sampling effort in all wards, is geographically based, and is often used for detecting change through time.

We used the equal sampling effort strategy, in which sampling effort was equally distributed among wards (same number of households per ward, regardless of number of villages or population size). This method is best suited for detecting changes through time and ensures that people in remote/low density areas are represented, in addition to those living in population centres. Because the CFMDP has a focus on poverty alleviation, we considered it important that the conditions being experienced by people in remote areas should be adequately represented.

Repeated measures vs random sampling

Sampling of households through time can be accomplished either by using a "repeated measures" or a "random sampling" design, each having different properties in terms of sampling outcomes. Repeated measures sampling designs require that the specific households randomly selected during an initial first survey are sampled again in subsequent surveys. Such designs can be associated with better precision in the results obtained for some kinds of surveys. There were however, several disadvantages to using this sampling approach for our purposes: i) total exposure to households over the entire survey (now and at a later date) would have been limited to the same 600 households, reducing generalisation (in random sampling up to 1200 households could be sampled during 2 surveys); ii) people may react to the survey and give answers they would not have given otherwise with less exposure, depending on their

➔ Figure 1: Morobe Province showing approximate locations of the four LLGs included in this survey. Also shown is the distribution of population in the LLGs and census units used during the national census. Red dots indicate higher population densities than grey dots.

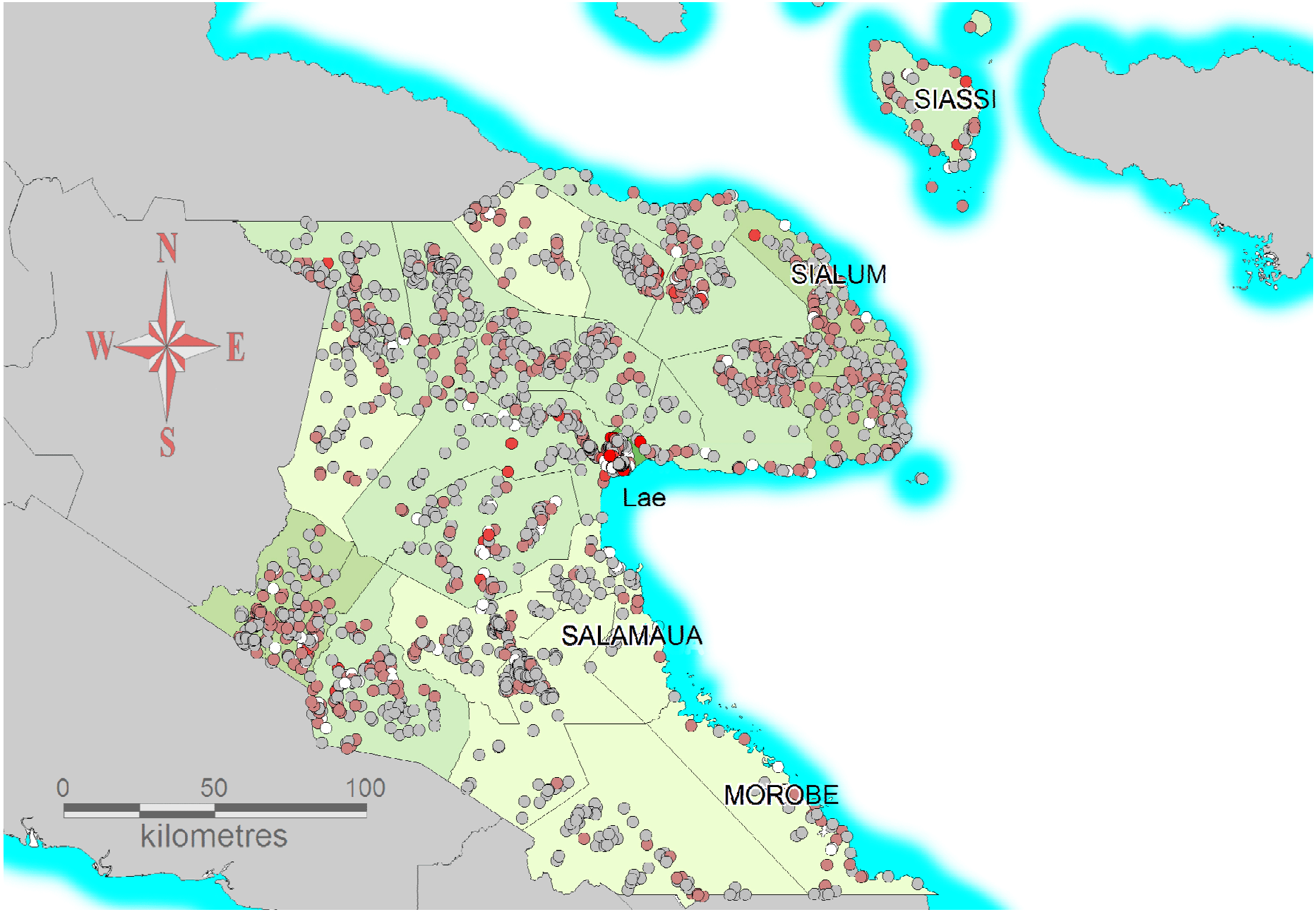

SIASSI
SIALUM
Lae
SALAMAUA
MOROBE
N
W
E
S
0
50
100
kilometres

Figure 2: Distribution of sampling effort for the socio-economic surveys in Morobe Province. Values in the table indicate the actual number of questionnaires completed at each site and for each type of survey.

LLG	WARD	Household	Focus Group	Key Informant
SIASSI	Mabey	30	5	5
	Marile	30	5	5
	Giam	30	5	5
	Aronae-Mandok	30	5	5
	Malai-Tuam	30	5	5
SIALUM	Gitua	30	5	5
	Sialum	30	5	5
	Nunzen	30	5	5
	Kanome	30	5	5
	Walingai	30	5	5
SALAMAUA	Lutu Busama	30	5	5
	Buakap	30	5	5
	Keila-Laugui	30	5	5
	Buansing	30	5	5
	Lababia-Salus	30	5	5
MOROBE	Kui	30	5	5
	Paiawa-Maiama	30	5	5
	Bosadi-Mou	30	5	5
	Ana	30	5	5
	Wuwu	30	5	5
		600	100	100

attitude. We have minimised this (but not eliminated it, as there would still be considerable communication within communities) by randomly sampling another subset of 600 houses at a later date; and iii) the households surveyed during the first sample may not all be available by the final survey, so some samples may be lost.

Under a random sampling design, households are selected independently at each survey. There may be overlap in the houses selected, but usually this is minimal and arises only by chance. This method measures change more generally among households in wards, but does not track the specific outcome for any one household. The benefits are more generalised outcomes, and minimisation of biases generated if people included in the survey react to the enumerators or the survey itself.

Choice of wards, number of households and sampling period

The LLGs included in the design are on the eastern coastal areas of Morobe Province (see Fig. 3). The LLGs chosen were Siassi, an island group in the north of the province, Sialum, Salamaua and Morobe. The more remote coastal LLG of Wasu was not included for two reasons: 1) it was too remotely located to interact regularly with the markets and facilities in Lae, the provincial capital, other than through occasional visits; and 2) with increasing distance from Lae, road networks disappear and travelling times for boats increase to unworkable levels. Furthermore, support (medical, emergency, mechanical) for the field teams would have been difficult or non-existent.

Within each of the four selected LLGs, wards were chosen haphazardly from those present to ensure good geographical spread: 20 wards in Siassi, 19 in Sialum, 17 in Salamaua, and 21 in Morobe. The selected wards are listed in Figure 2, and their locations shown in Figure 3.

The number of households interviewed in each ward (30) was designed to ensure good coverage of the ward without over-sampling the number of available households. Only households within one kilometre of the coast were surveyed. In six areas, wards were too small and contained too few households for separate sampling. To work around this problem, we coupled neighbouring wards into a single unit for the study (e.g. Aronae/Mandok and Bosadi/Mou). The total percentage of households interviewed per ward or ward group averaged 18%, and varied between 13% and 28% of those available. Because most of the survey data collected by interviews in households and groups was non-numerical, we were unable to apply standard statistical optimisation techniques to determine the best number of sample units for good precision.

It is envisaged that the socio-economic surveys described in this report might be repeated at the conclusion of the project, in 2007. For this survey, results have been analysed to provide a snap-shot of socio-economic conditions as they relate to coastal fisheries now. After a second survey, with a focus on indicators of change, further analysis would be targeted on identifying possible outcomes of this project.

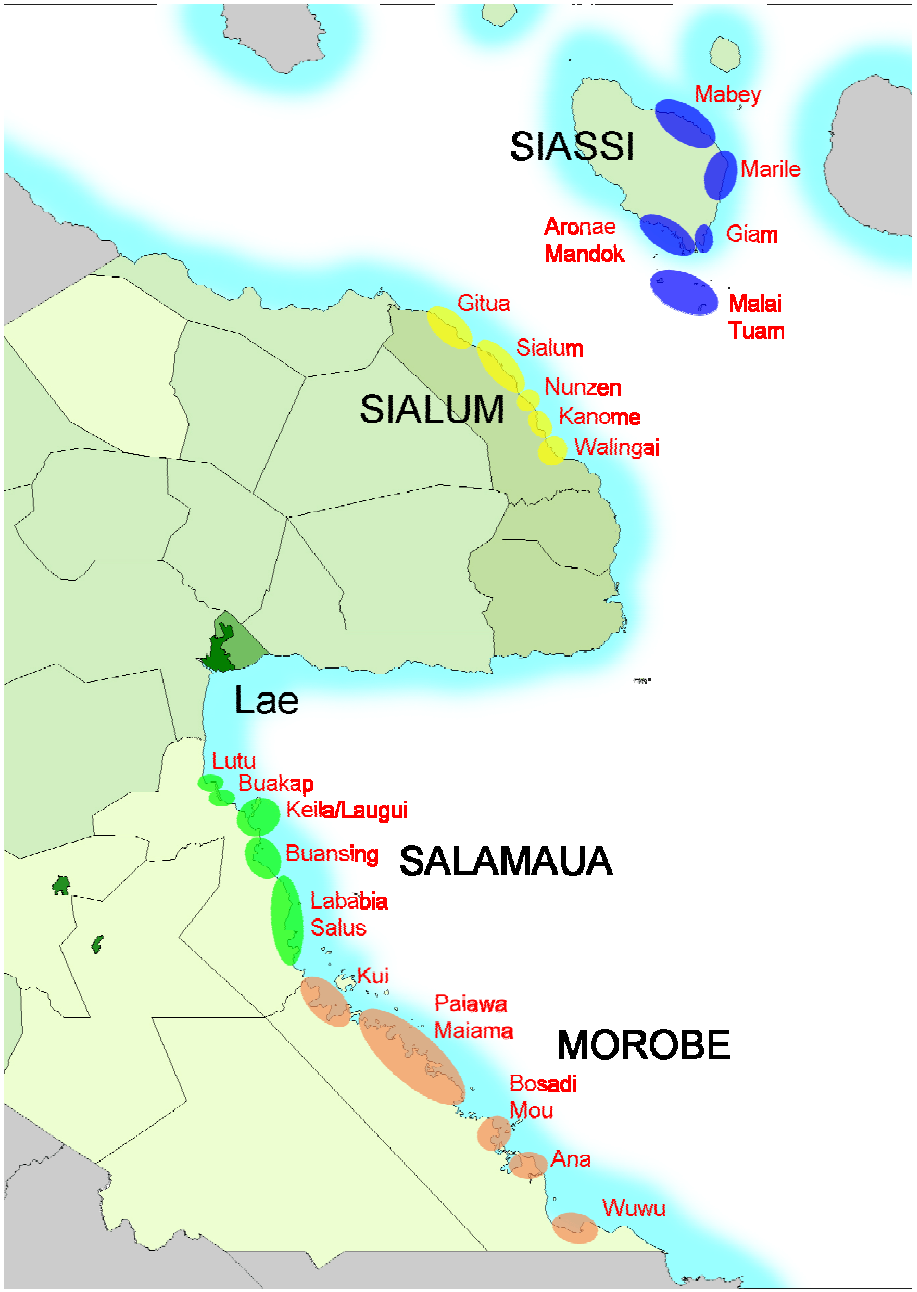
SAMPLING METHODS

Questionnaires

The collection of socio-economic information was done using guided interviews. With the assistance of an expert from the University of Papua New Guinea and an external reviewer we developed three separate detailed questionnaires that would be used by enumerators to gather information (see Table 1).

Each survey was accompanied by introductory text to be used by enumerators to explain to people the purpose of the project and the interview to be conducted. At the end of each survey participants were also invited to ask questions or make comments in connection with the project, natural resources in general and their concerns. Although surveys were conducted at the scale of wards, many of the questions focused on conditions found in individual villages, the more important social unit for most people.

Survey forms were produced in English, with some translations to local language where necessary. The questions were conveyed in Pigin or local dialect at the time of each interview by the enumerators. The main topics covered by the surveys were focused on establishing a rapport with the interviewee(s), obtaining general information on social conditions, services, and resources available and being used, income levels and sources, perceptions on how resource levels might be changing, and traditional / existing forms of management (see Table 2 for overview of questionnaires used).



➔ Figure 3: The four LLGs surveyed, showing location and approximate locations of wards. This map was modified from the PNG Census GIS 2000.

▼ Table 1: Overview of survey questionnaires developed, their target individuals or groups, and the number of questions posed.

Survey	Target(s)	Questions
Household survey	Head of household + others present	62
Key informant	Individual with standing in and/or knowledge of the community	42
Focus groups	Identifiable and/or registered groups of youth, women or fishermen	37

Enumerators

All interviews of households, individuals and groups were carried out by locally hired and trained enumerators. We trained 12 people who were already familiar with local conditions, customs and dialects during a short course held in Lae (6-12 July 2005). The people selected for the course included some who had previously worked in fisheries-related areas, or for government departments or NGOs. Participants were shown the survey design and the questionnaires to be used, and were invited to improve on them based on their own experience working and living in villages. Through a combination of lectures, role-playing and mock-interviews, the group worked through all of the questionnaires and refined them while becoming familiar with the approaches and etiquette to be used during the survey. An emphasis was placed on ensuring that all of the enumerators understood all of the questions and would ask them in the same way to reduce variance among them.

Successful participants were then signed onto as enumerators to a seven-week field schedule to carrying out interviews in all LLGs and wards included in the survey (see Annex 1). Four concurrent teams of three people were deployed every week during the survey to visit all sites. A team leader was selected for each team to ensure data were completely and properly collected and returned to us for incorporation into our database.

Indicators of change for comparison over time

In order to detect change in socio-economic conditions and the role of fisheries over the life of the CFMDP, we posed a series of *a priori* questions (hypotheses) against which data and responses collected at the first survey could be compared with those collected later. These were designed in an effort to isolate as much as possible the effects of this project against other events occurring over the same time frame. We acknowledge however, that because we cannot establish control communities that would not hear of the project or react to it, there is likely to be confounding of results. That is, even in

▼ Table 2: Details of the topics covered in each of the 3 questionnaires.

Topic	Questions on:	Number
Household survey		
General information on the household	Persons living there, religion, village affiliations, occupations, education, land ownership, transportation used, health	19
Fishing	Consumption, fishing activities, changes over time, subsistence and market activities, seasonal fishing patterns, fishing effort and equipment, handling, income from fishing	13
Income (all sources)	Income, loans, contributions by household members, marketing options, market conditions	7
Fisheries management	Changes in catch over time, perceived reasons for any changes, changes in the environment, fisheries rules, role of women	16
Community	Participation, perceived ability to influence decision-making, information needs.	7
Key informant survey		
General	Information on the key informant, general features of the village and population	11
Fishing	Village involvement, fuel prices, distances to fishing grounds and markets	3
Income	Main sources for village, outside employment, changes in natural resources, general community concerns	4
Fisheries management	Issues, past community approaches to addressing them, effects of using these approaches, existing mechanisms of community communication and decision-making, conflicts, traditional management practices, tenure,	14
Village life	Education, organisations, basic services, problems and conflicts	7
Gender	Role of women and expected impacts if increased	3
Focus group survey		
Group type	Registration, affiliations, officers, activities	7
Differences among groups in village	Opportunities, participation, income, roles, restrictions	5
Resources & income	Supply and marketing of marine products	8
Management of resources	Needs, tenure, control of resources	5
Community & services	Education, medical, social issues	6
Trends & the future	Roles of women and youth, under- and over-utilised resources, environmental change	6

communities not included in our community-based management (CBM) processes, word-of-mouth transfers of information are expected to occur. There are also likely to be widespread impacts of our NGO contacts with communities through radio and other media over the life of this project.

In addition to the CFMDP's positive influences on communities, we acknowledge that there could also be negative influences. Therefore, to provide an assessment of the project, which is as unbiased as possible, we have included hypotheses of both types to be assessed after a second survey as shown in the boxes to the right.

Data storage and analysis

All data collected during the survey by the enumerators were entered by trained data entry staff into a purpose-built Microsoft Access database. These data included numeric values (such as amounts of income in kina) in addition to text replies to questions aimed at peoples' opinions on the issues that concerned them. They also included numerical data on votes given by individuals with differing opinions during group consultations.

All data were exported into separate Excel 'flat files' for analysis. These were Excel spreadsheets that contained the resulting data for a particular question (the dependent variables), together with all of the header information (independent variables) on which an analysis would depend (e.g. LLG, ward, date, etc.). Numerical data were usually analysed directly, but text information was read by the analyst, interpreted and re-coded into separate concepts so that frequencies of certain types of ideas could be examined. In this way, non-numeric text information were converted to numerics on responses. All data were then summarised using pivot tables in Excel, either as frequencies or averages across the survey, or by breaking down responses by LLG and Ward. All of the flat files and reprocessed data are held by the project and can be made available to interested parties.

Overall patterns of similarities and differences among LLGs and wards were assessed using a multivariate cluster analysis of selected questions (the numeric ones) in the household survey data. This technique was applied using questions 7-8, 11-13, 15, 18, 20, 23, 26, 28, 30, and 32-36. This and other standard statistical analyses were done using Statsoft Statistica Version 7. All graphs presented in this report were drawn either using Excel, Statistica or Grapher.

Indicators of positive change

1. Income from fishing increases
2. Income from other activities (marketing vegetables, buai (betel nut), crafts) increases as the local economy is stimulated through increased fishing incomes
3. The market for fisheries increases so that more people can participate and derive their income from fishing/collecting
4. People are more aware of resource issues and how to address them
5. People are more aware of sustainable development issues and the need to optimise livelihoods in a way that ensures the future
6. People are enabled to protect and manage their own resources
7. Management plans are established in villages
8. There is some way to assess whether management is leading to improvements/benefits that people can see
9. There is increased access to education and medical facilities through better incomes
10. Community activities and benefits increase
11. Increased income goes to women who use it to improve quality of life for the family
12. Other opportunities for income generation are made possible through project initiatives such as training, better management, etc.

Indicators of negative change

1. More income leads to more problems with alcohol and buai
2. Increased women's participation leads to family problems if traditional roles are disrupted
3. Resource depletion
4. Increased damage to ecosystems that support fisheries
5. The project increases prospects for people already participating in fisheries, but does not increase opportunities for poor families (i.e. benefits not equally distributed and do not target poverty)
6. The fisheries market becomes saturated and those already participating can no longer derive sufficient income from fisheries
7. There is a drain of people from villages through increased centralised employment opportunities
8. The fisheries legislation confuses stakeholders in determining who has the right to control resources
9. Alternative income generation opportunities result in a negative impact on reefs (e.g. anchors, tourists)
10. FADS (fish aggregation devices) cause safety problems due to fishers going further offshore.

Results

The results given in this section concern overall patterns observed and are summarised under topic headings incorporating information from the three types of interviews. The results of individual questions under each of the household, focus group and key informant surveys are given in the sections that follow. Not all questions were analysed, largely because this report is intended as a general overview. In some cases, data were incomplete, or there was evidence that the question was misunderstood. In some cases, questions were better answered by households, and the responses given by focus groups or key informants added little to the results.

In many cases, the total number of responses given in a question is less than the number of interviews done because data were missing, incomprehensible or did not answer the question (the number of valid responses "*n*" is given for each). This generally was a problem in only a few percent of cases, so is not considered significant to the overall result on a question-by-question basis.

For reasons of privacy, the identity of all persons interviewed during this survey has been withheld. All responses described below are the opinion of those interviewed and may not accurately reflect a given situation. We considered people's *perceptions* the most important results of the survey and a shift in these an important outcome of the project. For example, although we know that fisheries regulations for sea cucumbers exist, a lack of knowledge of them by interviewees indicates that there is scope for improving public awareness.

Overall results across all LLGs and wards

Overall, the surveyed population is characterised by moderate numbers of people living in households (<6 on average), with a gender ratio that is significantly unequal and biased towards males (Table 3). The population is young, with 52% of people aged from 0-20 years, and only 3% of the population over 60. Education levels are generally low, with 79% of the population attaining education levels to Grade 6 or lower. Very few of the people present in the survey area (0.2%) attained college, technical or university levels of education. Most people own their land, many by customary mechanisms, but only 8% with a formal title. The average cost of schooling a child in the area is K 189 per year and the average number of cases of malaria in households is 12.2 per year, with most household members having around two cases per year (average 2.1).

The average household income is K 5,052/year, while average household costs are K 2,160/year. Some households have loans from financial institutions and other sources, averaging K 3,367 among the households that have them. This includes assistance from relatives (wantoks) to cover costs such as schooling. People in the areas of Morobe Province that we surveyed derive their incomes from a wide range of activities, including fishing, garden cropping, and selling buai (betelnut) and mustard. Cash income from these livelihoods is low, ranging between K 28 and K 200 per month per household.

Fishing is an important livelihood in the area, contributing an average of about K 200/month in to each household. Seafood is heavily used for consumption and for selling, with moderate amounts given to wantoks and small amounts for community purposes (Table 3).

➔ Table 3: Summary of indicative overall results of the surveys of households, focus groups and key informants.

Characteristics of households		
HH7	Number of people in household	5.83
HH8	Number of males	3.1
HH8	Number of females	2.7
HH8	Gender balance	53% Male : 47% Female
HH8	Percent of the population in different age groups	Aged 0-10: 27%; 11-20: 25%; 21-30: 18%; 31-40: 14%; 41-50: 9%; >60: 3%
HH11	Education as cumulative percentages for different levels	Elementary=24%; Grade 6=79%; Grade 10=96%; Grade 12=97%
HH11	Education college, technical & university	0.2%
HH12	Land ownership	90%
HH12	Who owns the land?	Individuals 10%; Families 41%; Clans 49%
HH12	Title held for land	8%
HH13	Cost of public transport to usual places / trip	K 80
HH15	Cost of schooling / child / yr (K)	K 189
HH17	Cases of malaria in household / year	2.1 / person; 12.2 / HH
HH18	Cost malaria treatment / case (adults) (K)	K 1.43-11.23
HH18	Malaria treatment	10% Doctor; 80% Aid post or clinic; 8% traditional
Characteristics of groups		
FG1,2	Number of each type of group interviewed	Fishers 33; Women 26; Youth 29
FG1,2	Registration	Registered 47%; Unregistered 53%
FG6	Activities undertaken (ranked most important)	Church activities; Increase standard of living; Community
Fishing and collecting		
FG12	Groups of people sometimes restricted from fishing	Men with pregnant wife; Pregnant women; Women; Menstruating women
HH20	Meals of seafood / week	5
HH22	Changes in fishing grounds	Have to go further; fish declining; overfishing
HH22	Reasons for changes in fishing grounds	To increase catch; seasons; increase catch per effort
HH23	Uses of seafoods (ranked)	Household 39%; Selling 39%; Wantoks 16%; Community 6%
HH26	Fishing & collecting trips / month	7.5
HH28	Seafoods caught / trip	17.5 kg; 19 pieces (animals)
HH30	Costs / fishing trip (K)	K 50
HH31	Processing of seafoods for sale	Yes 94%
HH31	Reasons for processing of seafoods	Preservation 93%; Increase price 15
HH32	Income / fishing trip (K)	K 106
FG13	Income from fishing could be increased by	Transport; Ice; Better markets
Income and costs		
FG8	Income opportunities in the village	Fishing; Garden produce, Buai / mustard
FG9	Most common sources of income	Fishing; Garden produce, Buai / mustard
HH33	Monthly Income in household (all sources) (K)	K 421
HH34	Loans (K)	K 3,367
HH35	Fishing income / month (K)	K 200
HH35	Farming income / month (K)	K 211
HH35	Buai income / month (K)	K 73
HH35	Selling income / month (K)	K 28
HH35	Employment income / month (K)	K 232
HH36	Household costs / month (K)	K 180

Community		
HH58	People's anticipation in the community	Very high 31%; High 27%; Average 31%; Low 9%; Very low 3%
HH59	Influence in community decision-making	Very high 21; High 22%; Average 31%; Low 17%; Very low 9%
HH60	Decision-makers	Councillor 47%; Community 45%; Leaders 34%; Magistrate 29%
FG30	Social problems	Drugs (marijuana); Alcohol; Theft; Clan clashes
KI18	General communities concerns as raised in meetings	Education; Drugs; Community developmentLand disputes
KI37	Problems arising because of alcohol and drugs	Community disturbance; Drunkeness; Fighting
KI38	Clan conflicts	Yes 51%; No 40%
KI38	Reasons for clan conflicts	Land disputes, Gardens; Theft
Women in fishing		
FG32	Women should become more involved in fishing	Yes 45%; No 45%
FG32	Women should be more involved because:	Income; Better catches
FG32	Women should not become more involved in fishing because:	Neglect gardening and housework; Against tradition
Fisheries management		
FG17	Concerns about marine resources	Poison rope (derris); Limemaking; Declining sea cucumbers
FG18	Marine resources are abundant	Agree 85%; Disagree 7%
HH42	Reasons catches of seafoods might decline in future	Population growth; Overfishing; Destructive fishing
HH42	Reasons catches of seafoods will improve or stay good in future	Plenty of resources; Use wisely
HH43	Factors affecting catches (drivers)	Population growth; Overfishing; Uncontrolled fishing
HH43	Factors affecting catches (activities)	Poison rope (derris); Dynamite; Small mesh nets
HH43	Factors affecting catches (environment)	Pollution; weather, tides and currents
HH45	Solving problems with fishing	Community discussions; Rules; Leaders; Education
HH45	Who should solve fishing problems?	Community; Leaders; NFA
HH46	Role of individuals and households in addressing problems with fishing	Awareness; Compliance with rules; Community discussions
HH47	Changes in the environment	Poison rope used; Strong swells; Fishes declining
HH48	Reef tenure?	Yes 72%; No 24%
HH48	Type of control	Exclusion of outsiders; Traditional; Bans and tambus
HH51	Fishing rules are effective because:	People respect rules; Aware of the future; Community is involved
HH51	Fishing rules are ineffective because:	People stubborn; Ignore rules; No enforcement
HH52	Who / how are rules implemented?	Leaders 58%; Community 20%; Village court 10%
HH53	Knowledge of changing resources	Very poor 5%; Poor 8%; Not sure 29%; Good 30%; Very good 28%
FG20	Other income opportunities from the marine environment	Ecotourism; SCUBA diving; Tourism; Salt
FG21	Management is needed	Agree 70%; Disagree 17%
FG25	Outcomes expected of management	Resources rich; Cathes increase; Higher income

There is some evidence that catches in some areas may be declining, particularly fin fishes and sea cucumbers. People believe that income from fishing could be increased through better transport, access to ice and access to or better markets.

The main concerns raised about the state of marine resources were the use of *Derris* roots (poison rope) in fishing, collecting of corals for lime making and declines in sea cucumbers. For interviewees, the outlook for the future of marine resources is not good. Many people believe that resources will decline and environmental problems increase.

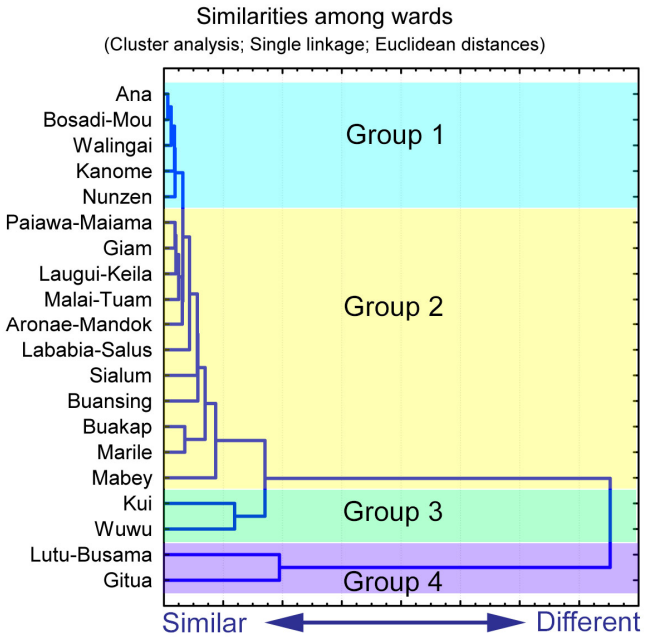
People see themselves as quite involved in community activities, and with better than average power to influence community decision-making. The decision-makers in the communities are mostly the Ward Councillor, the community itself, community leaders and the magistrate. There is a range of issues and social problems, including those associated with drug use, alcohol, theft and clan clashes. Land issues were often mentioned as the cause of clan problems. Communities are generally concerned with education, drug use, mechanisms for promoting development. and dealing with disputes over land or sea areas and resources. Fisheries is not always a major agenda item in community discussions (although for some communities it is) largely because of a lack of markets to make it worthwhile.

➔ Figure 4: Results of a cluster analysis of wards based on numerical values obtained during the household survey. Wards have been grouped according to 47 variables (from 23 questions) to illustrate degree of similarity. In this graph, wards most similar to each other are linked by shorter connections on the "similarity" axis. Wards linked by long lines are less similar than those linked by short lines. For example, Ana and Bosadi-Mou are similar, while Lutu-Busama and Gitua are more dissimilar in terms of the variables included.

General information on LLGs and wards

The wards surveyed tended to form several groups in terms of overall similarity in their characteristics (Fig. 4). That is, when a range of values relating to population, age distribution, levels of education attained, land ownership, uses of seafoods, and income and expenditure were simultaneously compared, certain wards tended to be more to similar than others. The natural groupings that emerged did not in general relate to the LLG to which a ward belonged. For example, Group 1 wards were derived from Morobe and Sialum LLGs, while Group 2 included wards from all four LLGs surveyed.

Group 1. This group was formed by five wards that were very similar to one another. They were: Ana and Bosadi-Mou from Morobe LLG, and Kanome, Nunzen



and Walingai from Sialum LLG. These wards had the most very young children (under 10 years of age) and a peak in the number of people aged between 30 and 40. This group has the most certificate and vocational training and the most people who went to school up to Grade 10. Group 1 communities also have the least university level education. These wards have the lowest levels of malaria cases, low medical costs and eat the fewest seafood meals per week (Fig. 5). They do the least fishing of the wards and derive the least income from fishing. With the lowest average household incomes per month, they also support the least loans and have the lowest cost of living.

Group 2. This group is formed by 11 wards that are derived from all of the LLGs. The group is not as distinctive as others, with some wards being more similar to others. That is, Paiawa-Maiama and Giam are quite similar, but more loosely related to Mabey. These wards tended to have many people living in their households, a heavy bias towards younger age groups (<40 years) and have the fewest old people. Rates of malaria are high and the costs of medical treatment the highest among the groups (Fig. 5). They do not tend to have formal titles for their land and tend to travel more than most. Costs of schooling each child were highest in this group of wards. Group 2 communities tend to use seafood for sale and have good average catches. Household income is highest for this group, and the income comes from employment and buai sales, with little coming from fishing. Costs of living are highest for wards in Group 2.

Group 3. This small group includes Kui and Wuwu wards of Morobe LLG. They are less similar to one another than any of the wards in Groups 1 and 2, but as a group they are very distinct from all of the other groups (Fig. 4). Group 3 communities have the fewest people in each household, the least number of males, and the lowest number of the younger age groups than all other groups (Fig. 5). Education to Grade 12, college and diploma level is low, but some people have a technical and university level education. They tend to own their land and often have a formal title for it. Rates of malaria are highest in this group, averaging 12.1 cases per household per year. People in this group eat the most seafood meals per week, have high catches and receive good incomes from fishing. Monthly household income is high and is mostly derivesd from paid employment and market selling. They have the second-highest cost of living of all groups.

Group 4. This grouping of wards is formed by Lutu-Busama and Gitua from Salamaua and Sialum LLGs. These two wards are distinctive and are in a group that is extremely dissimilar from all of the other groups and wards (Fig. 4). The two wards are themselves also more dissimilar that any of the others. Communities in this group have the highest number of people living in each household. They have the fewest children under 10 years of age, but a large part of the population is between 10 and 30 years of age. Many people are educated to Grades 11-12 and there are people in the population with a technical and university level of education. Malaria rates are high, with about 12 cases per household per year and medical costs are moderate. Like Group 2, Group 4 people are mobile and tend to make trips, but do not often use public transport. Seafood is used in the household, for sale, for the community as a whole, and for wantoks. They do not make many fishing trips per month, but earn good income when they do, even though fishing costs are high. They have the highest amount of loan money owing and have the lowest income per household. Most household income comes from fishing, and to a lesser extent from farming. The cost of living in these communities is moderate.

Characteristics	Group 1	Group 2	Group 3	Group 4
People per HH	5.70	6.01	5.08	6.02
Males	3.06	3.12	2.50	3.02
Females	2.60	2.82	2.50	2.90
Age 10	1.7	1.6	1.2	1.3
Age 20	1.3	1.4	1.2	1.5
Age 30	0.9	1.1	0.8	1.0
Age 40	0.8	0.8	0.7	0.6
Age 50	0.5	0.5	0.5	0.6
Age 60	0.2	0.2	0.4	0.4
Age 70	0.1	0.1	0.1	0.1
Age 70+	0.0	0.0	0.1	0.1
Elementary	1.3	1.4	1.4	1.3
Grade 3	1.2	1.1	1.2	1.3
Grade 4	1.2	1.1	1.3	1.2
Grade 5	1.2	1.1	1.0	1.1
Grade 6	1.7	2.0	1.6	2.2
Grade 7	1.3	1.0	0.5	1.0
Grade 8	1.4	1.3	1.0	1.3
Grade 9	0.9	0.9	1.0	1.0
Grade 10	1.3	1.3	1.2	1.2
Grade 11	0.0	0.3	0.5	0.5
Grade 12	0.2	0.4	0.0	0.5
Mission School	0.2	0.8	0.5	1.0
Vocational	1.0	0.7	0.0	0.0
College	0.4	0.7	0.5	0.5
Certificate	0.6	0.4	0.0	0.5
Diploma	0.0	0.1	0.0	0.0
Technical	0.2	0.5	0.5	0.5

Characteristics	Group 1	Group 2	Group 3	Group 4
University	0.2	0.2	0.5	0.5
Malaria / yr	8.6	11.3	12.1	12.0
Land owned	0.9	0.9	0.9	0.9
Held by	2.3	2.4	2.4	2.3
Have title	2.6	2.5	2.8	2.9
Trips / month	2.0	3.0	2.3	3.0
PMV trips / month	1.3	0.4	0.5	0.7
Boat trips / month	1.7	1.7	1.5	1.5
School costs / child	120.4	239.6	69.2	177.4
Adult treatment costs	1.4	2.3	1.8	2.1
Fish meals / week	4.2	5.3	6.2	5.0
Seafoods for HH	3.2	3.2	3.1	3.2
Seafoods for Community	0.6	0.5	0.6	0.7
Seafoods for sale	3.0	3.2	2.8	3.1
Seafoods for wantoks	1.4	1.3	1.3	1.7
Fishing trips / month	6.4	7.8	8.1	6.5
Average catch kg	12.5	15.0	20.3	14.3
Average catch count	9.4	25.8	21.3	15.2
Costs of fishing	11.2	56.5	64.3	60.1
Income / fishing trip	31.0	104.8	179.6	232.7
Income to HH	170.0	573.6	380.1	174.8
Loans	58.5	209.0	3075	11773
Fishing income / month	48.9	178.9	238.7	619.1
Farming income / month	95.1	106.7	10.0	225.0
Buai income / month	22.2	69.9	45.5	33.2
Market income / month	9.1	15.5	47.9	11.5
Employment income / month	12.3	179.2	150.0	0.0
HH costs / month	99.7	234.8	184.6	167.4

↑ Figure 5: Summary of main characteristics of groupings of wards. In this and following tables increasing intensity of colour indicates higher values.

SURVEY WEAKNESSES

- Teams did not clarify answers well. Although considerable emphasis was placed on pursuing clarifications during enumerator training and during debriefing sessions throughout the survey, enumerators were generally reluctant to ask interviewees, "What do you mean by that?" Despite repeated attempts to improve rigor in the sampling we were unable to solve this problem.

- Some of the interviewers did not fill in questions completely so that a "no" or "not applicable" or "don't know" answer could not be distinguished from them simply not completing the form properly. It was stressed repeatedly during training and debriefing sessions that all parts of the questionnaire had to be filled in, even if the answers were negative. Despite this, there were many questionnaires with blank sections that could not be included in the analyses.

- Some questions were not answered at all, and it appears they were simply forgotten or were 'too hard'.

- In some cases, enumerators recorded answers that were irrelevant to the question asked. For example, in the focus groups surveys (FGQ10), roles of community members in areas of life *other* than fisheries were recorded.

- Inappropriate shortcuts in recording data invalidated some information. The use of "as above" or unexplained (and later forgotten) acronyms in a database context is not interpretable.

- Questions requiring units of measurement were often reported without their units. Rather than requiring enumerators to convert gallons to litres, hours per week to hours per month, in the field, we allowed all quantities to be reported as given as long as the units used by the person interviewed were also recorded at that time. This approach was not successful. Enumerators often failed to record the units associated with a measurement, rendering some results unusable (e.g. HHQ9).

- Where examples of the kinds of answers being sought were provided on the questionnaires to assist and remind the enumerators, it was clear these were often read out to respondents. Answers were often almost entirely limited to the few options given as examples (e.g. HHQ9). This occurred despite repeated training, briefings and error checking. Short of going into the field with the teams, it appeared to be impossible to prevent enumerators from reading out options, thereby "leading" the answers.

- Key Informants were not good sources of numerical information about their villages. They seemed able to summarise attitudes and issues discussed at meetings, but could not report on how large their village was, how many people lived in it, or what the annual growth rate of the population was.

- It was not possible to complete the surveys for the required number of focus groups. There simply do not seem to be sufficient numbers of focus groups in the areas we surveyed — an interesting result on its own.

Summary of Findings

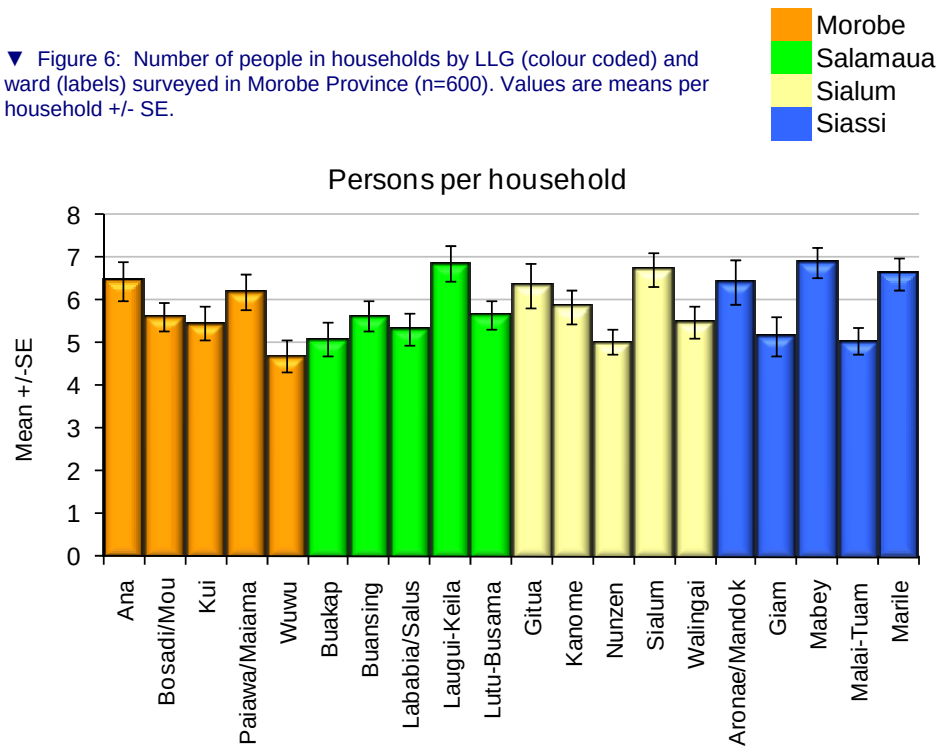
Household Survey

HH-Q7 Number of people in households

How many people live in this household at present? Is this the usual number of people who live here? If not, who are the others and are they leaving/ coming back?

The mean number of people in living in households across the survey was 5.8 +/- 2.2 SD (standard deviation). This value was calculated across 600 households surveyed. The greatest number of people living in households was 14 people, recorded in Laugui-Keila ward (Salamaua LLG) and Aronae-Mandok ward (Siassi LLG). The minimum number of people living in households was 1 person, observed in four wards. Overall, there was little variation in average numbers among LLGs but sthere was some variance among wards (Fig. 6). The greatest average numbers of people living in households were recorded in Mabey, Laugui-Keila and Sialum (6.7-6.9).

▼ Figure 6: Number of people in households by LLG (colour coded) and ward (labels) surveyed in Morobe Province (n=600). Values are means per household +/- SE.

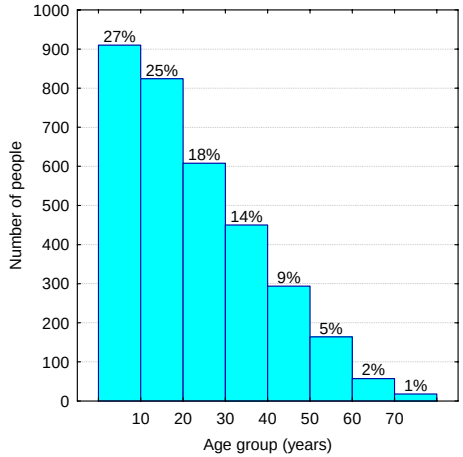


HH-Q8 Age & Gender

What is the age and gender of all the people living in this household?

Age information was collected for 3,325 people, although 3,491 people were reached during this survey. Many people did not know their age, or the spokesperson answering the survey did not know the ages of everyone living in the household.

The surveyed population in Morobe Province is very young and appears to be growing rapidly. More than one-half of the population is 20 years old or younger, with only 7% of the population over 50 years of age. The oldest person was 88 years old and living in the Lutu-Busama area of Salamaua LLG. There were only 6 people aged 80 years or older, which represents less than 0.2% of the population (Fig. 7).

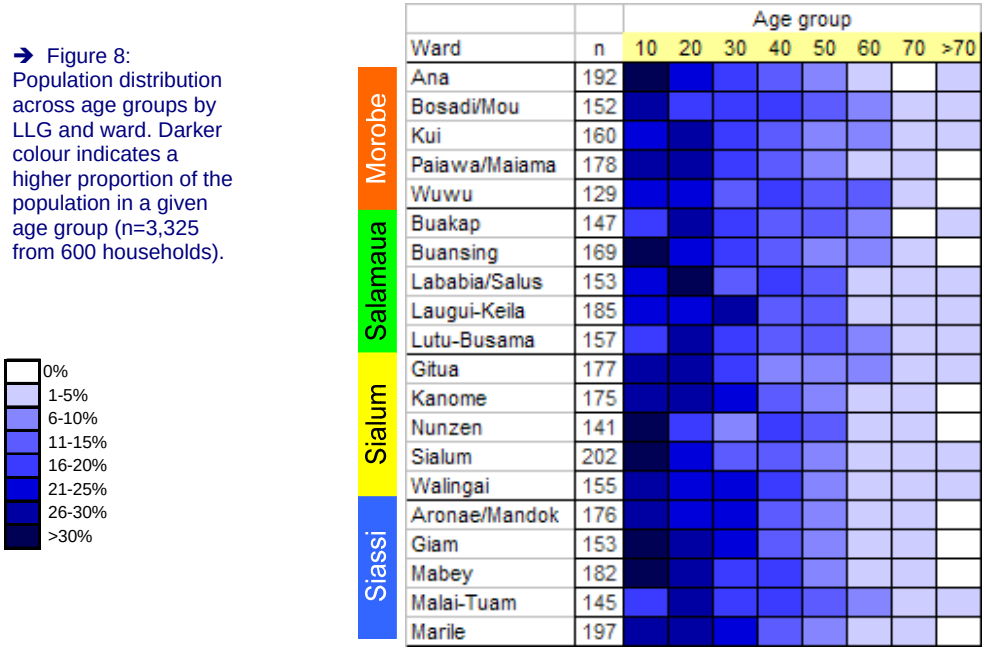


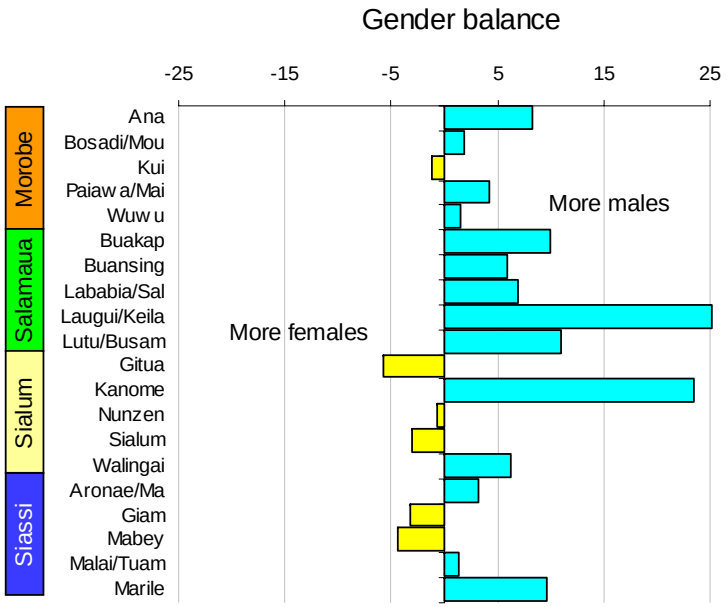
▲ Figure 7: Age distribution of population across all LLGs and wards. Data are percent of the total sampled population in each age group (n=3,325 from 600 households). Age categories show the upper limit of the age in each group (i.e. "20" means people from 11 to 20 years old).

All LLGs had wards with rapidly expanding populations, but Salamaua tended to have fewer very young people, and more people in the 30-40 year-old age groups than other LLGs. The wards with the greatest number of very young people were Ana, Buansing, Nunzen Sialum, Giam and Mabey (Fig. 8). The lowest average age was found at Giam at just under 19 years, and the highest at 26 years of age. The lowest maximum age of 61 years was recorded at Nunzen.

Overall, the gender balance over the study area was heavily biased towards more males than females (53:47%), a pattern seen in most wards and especially those in Salamaua LLG (Fig. 9).

➔ Figure 8: Population distribution across age groups by LLG and ward. Darker colour indicates a higher proportion of the population in a given age group (n=3,325 from 600 households).



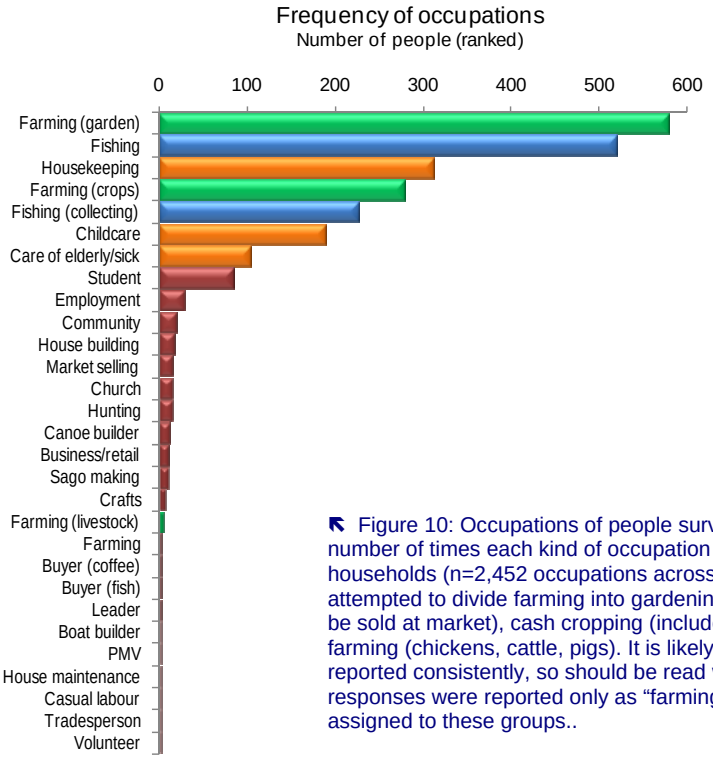


➔ Figure 9: Gender balance by LLG and ward. Values are percent difference in the proportion of males to: females in the population, with a positive value on the graph indicating more males than females (n=3,466 from 600 households).

HH-Q9-Q11 Occupations & Education

What are your occupations? What part of your time is spent on each activity? What is your highest level of education? What are the main occupations and levels of education for all other members of the household? (Include school children).

There were on average 4.2 occupations reported per person interviewed in each household. The lowest number of occupations reported by the person interviewed was one, and the greatest number of occupations reported by a single person was 9. Of the categories reported by respondents, the most common occupation was gardening (578 people), largely for vegetables to be sold in the markets. Fishing was the second most common category, and was reported by 519 people (24% of the population) (Fig. 10). Fishing was the

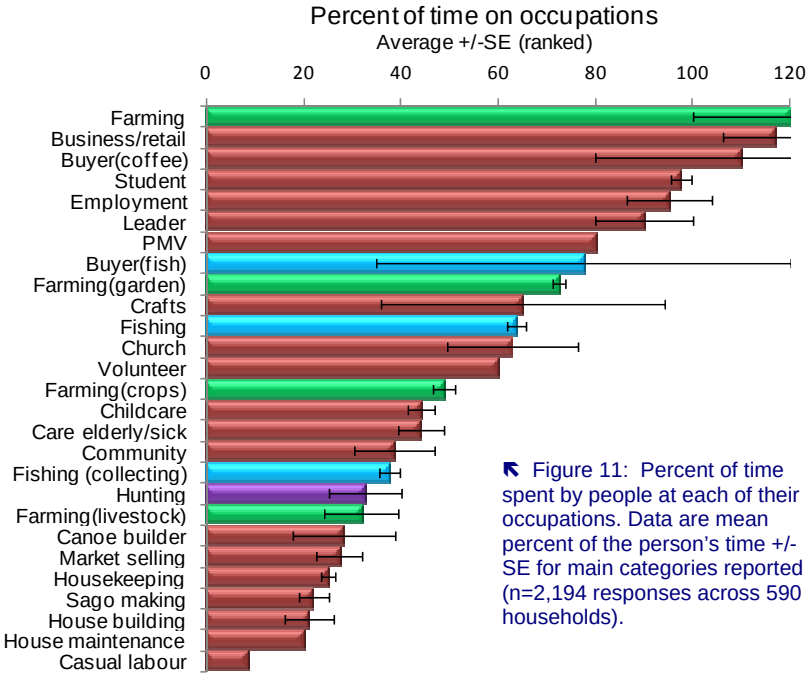


↖ Figure 10: Occupations of people surveyed. Values are number of times each kind of occupation was reported across all households (n=2,452 occupations across 590 households). We attempted to divide farming into gardening (mostly vegetables to be sold at market), cash cropping (includes vanilla) and livestock farming (chickens, cattle, pigs). It is likely that these were not reported consistently, so should be read with caution. A few responses were reported only as "farming" and could not be assigned to these groups..

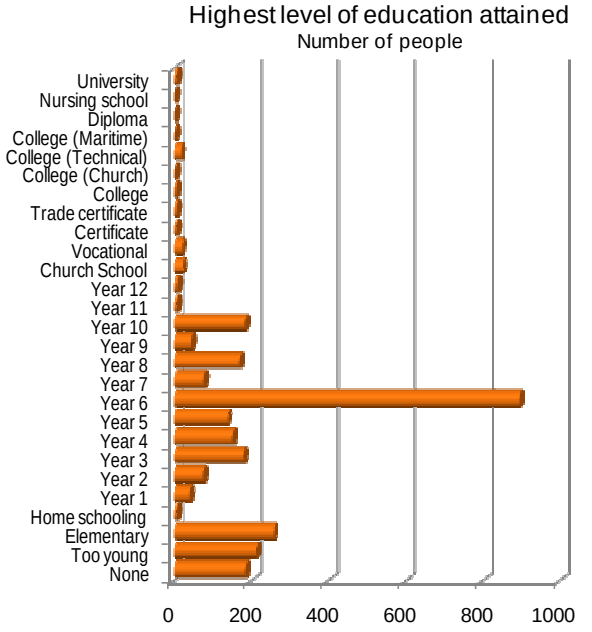
second most common occupation, with about 21% of people being involved. Housekeeping accounted for another 13% of occupations, and cash cropping and collecting of marine products together contributed to 20% of all occupations. Paid employment accounted for about 1% of all the occupations reported by those interviewed.

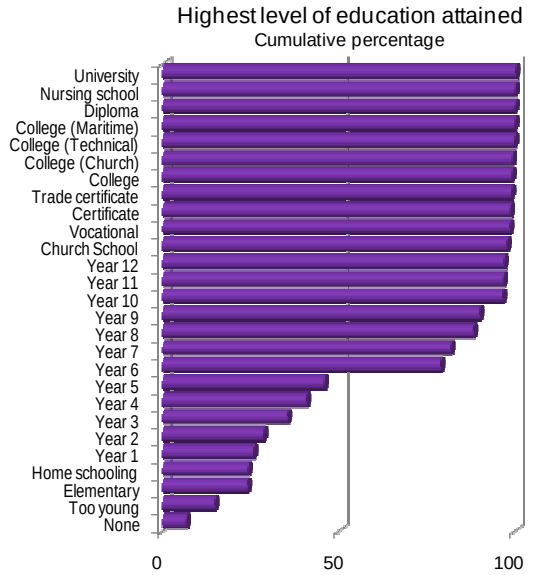
Farming was the occupation that people spent the most time at (this category was simply reported as generalised farming and did not specify what was being farmed), accounting for 120% of a 40-hour work week. Small businesses were next (116%), followed by coffee buying (110%) (Fig. 11). Students, people engaged in paid employment, and community leaders all say these occupations take between 90% and 97% of a 40-hour work week. People involved in fish buying spend about 78% of their time in this occupation, while fishers spend 64% of their time fishing, and collectors of marine products about 38% of their time harvesting. Some forms of farming took relatively little of peoples' time, with livestock farming taking about the same amount of time as hunting for wild meat and collecting seafood. The least time-consuming occupations were in casual labour, house building and maintenance, sago making and housekeeping.

Education levels are limited to Year 10 or lower for 96% of the population, with 79% overall educated only to Year 6 level. Years 6 and 10 are major stopping points for most people, with only about 2% of the population having attained vocational, college or technical education, and 0.2% to university level. These results are, in part, related to the youth of the population and many of the people interviewed should go on to increase their education levels.



↖ Figure 11: Percent of time spent by people at each of their occupations. Data are mean percent of the person's time +/- SE for main categories reported (n=2,194 responses across 590 households).





↗→ Figure 12: Snapshots of maximum level of education attained at the time of the survey by all members of the household in total numbers and cumulative percent. It is important to remember when viewing these results that at least some of those with low levels of attained education are still young and could not have yet attained higher levels (see age structure in question 8). Even in the adult population, education may be ongoing. These data are therefore a "snapshot" of education now found in the community, with the potential for increase in most of the age groups (n=2,714 responses).

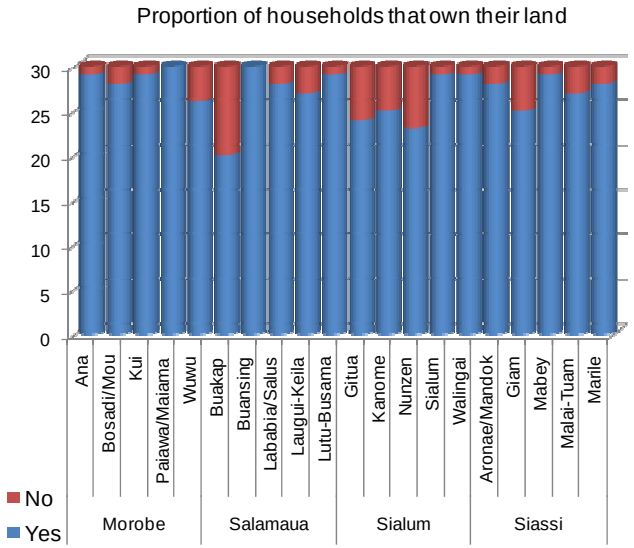
HH-Q12 Land ownership

Do you or anyone in the household own land? Is the land held by the: Clan/Family/ Individual? Is there a Title? If not, please describe how the land is held.

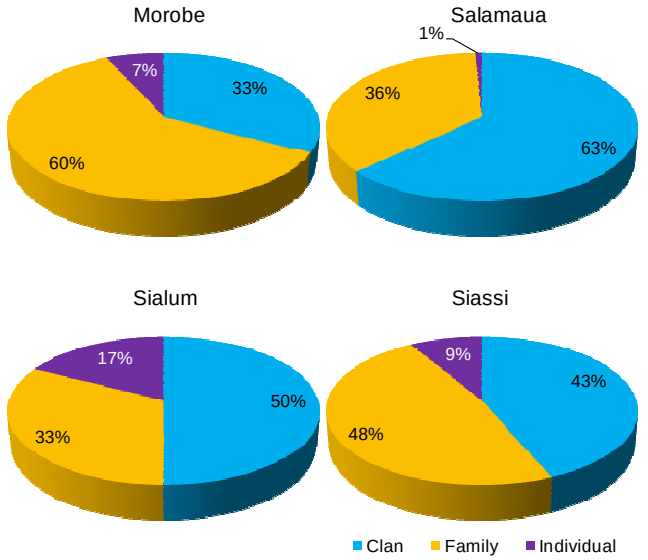
Overall, more than 90% of the people interviewed during the survey said that they had some kind of ownership of the land they occupied. About 47% of all households reported that the land they occupied was owned by the clan, and about 45% reported ownership by the family. Only 8% of all people interviewed said that their land was individually owned. Overall, 10% of people owned their land individually, 41% at the family level and 49% through the clan (Fig. 13).

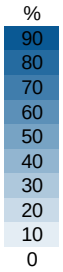
The greatest percentage of clan ownership was found in Buansing, Nunzen and Wuwu wards (Fig. 14). Family ownership was most commonly reported in Morobe LLG, while clan ownership was more common in Salamaua and Sialum LLGs. The highest levels of individual ownership were reported in Sialum (33%), followed by Siassi LLGs. Most households reported that they acquired their land through traditional mechanisms (52%) and/or inheritance from relatives (40%). Very few people had leased or purchased their land or obtained it through government schemes (Table 4).

LLG	Ward	Clan	Family	Individual
Morobe	Ana	27	63	10
	Bosadi/Mou	20	63	17
	Kui	10	83	7
	Paiawa/Maiama	27	73	0
	Wuwu	82	18	0
Salamaua	Buakap	57	38	5
	Buansing	93	7	0
	Lababia/Salus	70	30	0
	Laugui-Keila	57	43	0
	Lutu-Busama	34	66	0
Sialum	Gitua	48	37	15
	Kanome	60	24	16
	Nunzen	87	13	0
	Sialum	23	43	33
	Walingai	41	41	19
Siassi	Aronae/Mandok	10	76	14
	Giam	54	46	0
	Mabey	59	31	10
	Malai-Tuam	39	50	11
	Marile	57	36	7



➔ Figure 13: Land ownership in LLGs and wards. The bar graph shows the number of households that consider they "own" their land and the individual pie charts show the breakdown of ownership level in each LLG (n=557).





↑ Figure 14: Level of land ownership by ward (n=557). Shading indicates the percentage of land held by each group (clan, family or individual).

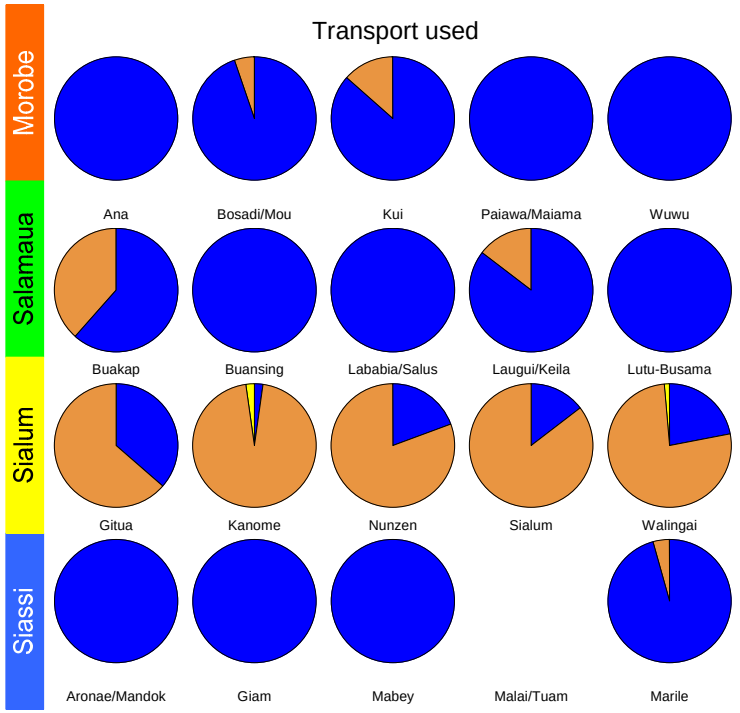
🡻 Table 4: Summary of main methods of land acquisition by current owners (n=227 responses).

How land acquired	#	%
Traditionally	119	52
By inheritance	91	40
From the clan	9	4
Lease	3	1
Purchase	2	0.9
Church allocation	1	0.4
Government resettlement	1	0.4
Government lease	1	0.4
Total	227	100

HH-Q13 Public transport

Do people in this household use public and hired transport? Usual Destination for Car (hired, taxi)/Bus, PMV/Boat (hired, ferry); Frequency (total trips per month per household); Cost (K).

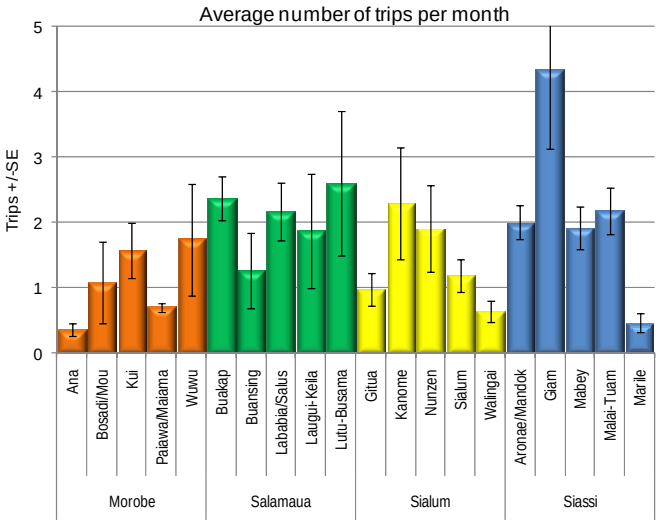
Most people in the area surveyed relied on two main forms of transport, boat and bus/PMV (public motor vehicle), with very few people having access to a car or other forms of transport. Boat use was high at 72% overall, and PMVs accounted for around 28% of all forms of transport used. No other forms were reported in this question, including trucks and air travel, despite reports in question 14 that trucks are owned by some of those interviewed. Transport used depended on LLG. People living in Sialum were most reliant on PMVs and used them 53% of the time. In all other LLGs, boats were most commonly used. Nine wards reported that only boats were used. Cars were reported from only two wards in Sialum LLG (Fig. 15).

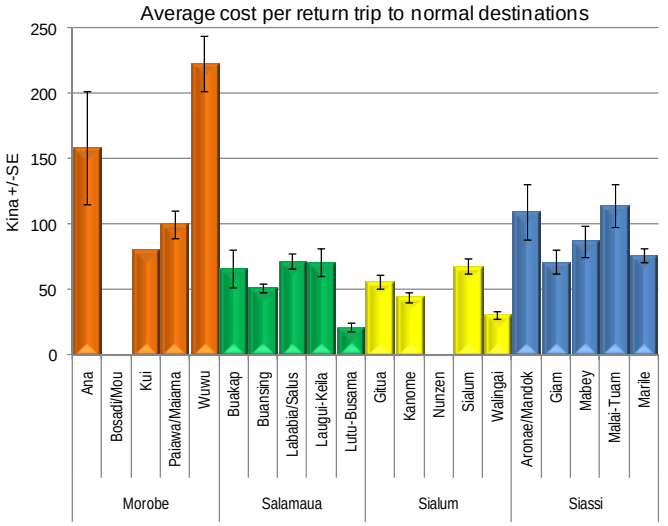


➔ Figure 15: Relative use of different forms of transport broken down by LLG and ward (n=674 responses).

The number of trips made per month per household averaged 1.6 across the survey (+/-3.1 trips SD). People living in Salamaua LLG were the most mobile, averaging two trips per month per household, while those in Morobe only took an average of one trip per month (Fig. 16). At the level of wards, people living in Giam (Siassi ward) reported an average of four trips per month.

Costs of public transport averaged K80 per trip across the survey, but were much higher than this in Morobe LLG where average cost was around K 150 per trip. The lowest costs were reported by people in Lutu-Busama and Walingai. These figures are not comparable on a per kilometre basis, but represent the real costs people must pay for the trips they usually need or choose to make from their homes.





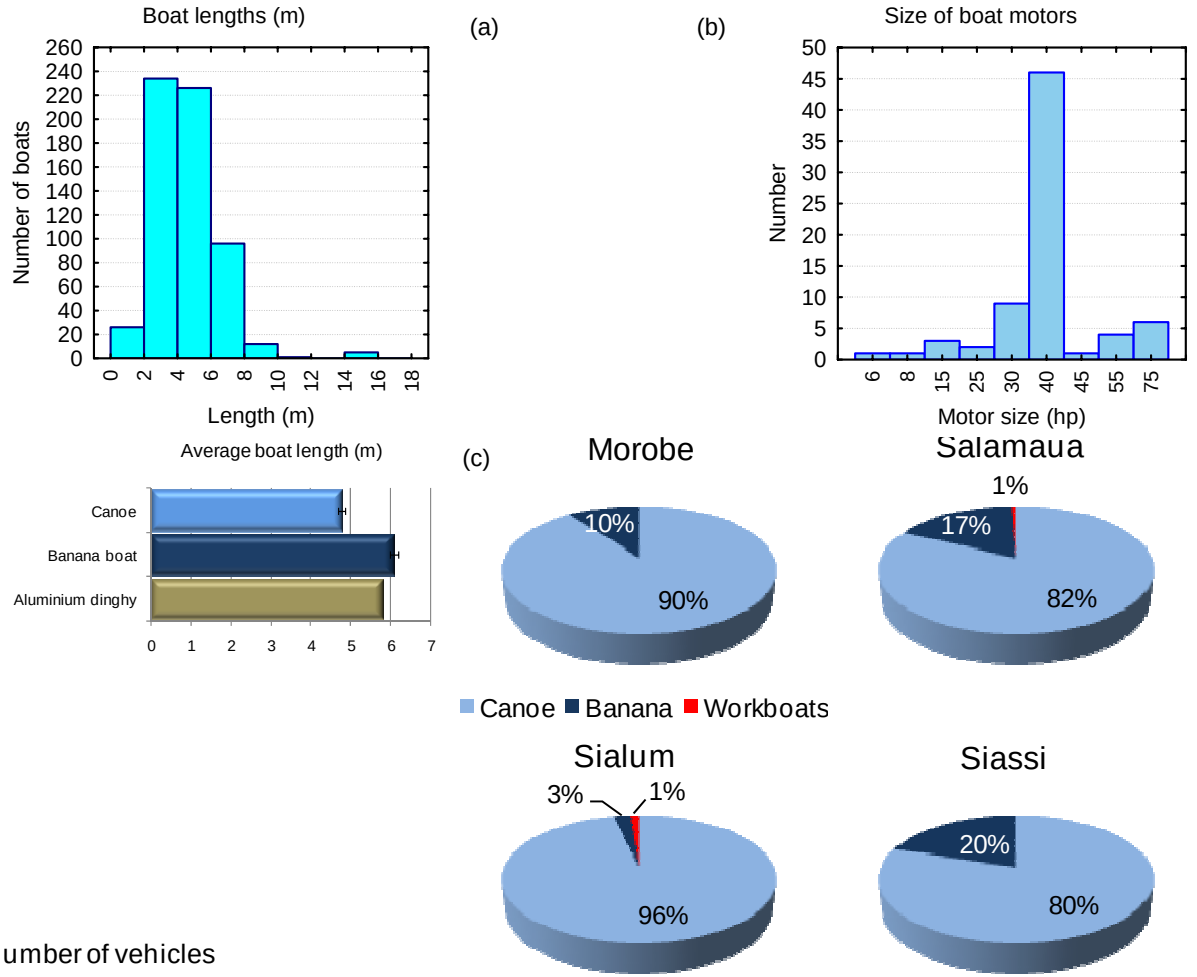
↔ Figure 16: Trips per month and cost per return trip using all forms of transport by LLG and ward. Data are means +/SE for all forms of transport used by households (n=723 for number and 675 for costs).

HH-Q14 Vehicles & Boats

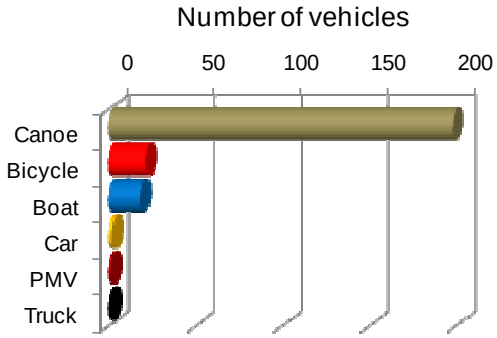
How many cars, boats, bicycles, canoes or other forms of transport are owned by this household? By whom? What is the size of the boat and motor and the type of fuel used by the boat?

The total number of vehicles reported by the people interviewed was about 642 across the survey, comprising around 25 land vehicles and 617 boats. The most commonly owned vehicles were canoes (owned by 84% of households), followed by banana boats and bicycles (Table 5). The average number of vehicles per household was 1.1 across the study area. The maximum number of vehicles in one household was seven (all canoes). Only two cars, one PMV and one truck were reported. The small number of PMVs is surprising given the heavy reliance on public transport provided by them seen in earlier questions.

Around 87% of all boats owned did not have a motor, including 13% of banana boats. Most boats were reported as under four metres in length, and some (work boats) reached up to 15 metres. Among those with motors, the most common size was 40 hp (Fig. 17), and ranged between 6 hp and 75 hp. Most motors (97%) used "zoom" (petrol + 2-stroke oil) as fuel, the remainder using diesel.



Type	No. vehicles	% Vehicles	No. HH	% HH
Canoe	528	82	137	84
Boat	89	14	18	11
Bicycle	21	3	19	12
Car	2	0.3	2	1.2
PMV	1	0.2	1	0.6
Truck	1	0.2	1	0.6
Totals	642	100	163	100



← Table 5: Details of vehicles owned by households in all LLGs and wards. Data are totals of vehicles owned and recorded in the survey, with % of households (HH) reporting ownership of each type of vehicle (n=245 vehicles).

↖↑ Figure 17: Types and lengths of boats and the size of motors in use in Morobe LLGs and overall (n=617 boats). (a) shows average boat length and frequency of lengths, (b) frequency of motor sizes and (c) relative number of each type of boat in the LLGs.

HH-Q15 Costs of schooling

How much does it cost to send all the children in the household to school each year? (include cost of fees, books, uniforms, transport, fundraising etc). Are you able to meet this cost? If not, what do you do?

The average household cost of schooling per year in all wards was around K348 (+/- 559 SD). The average cost of schooling per child per year was K189 (+/- 377), with the highest costs per household and per child being reported in Marile in Siassi LLG (Fig. 18). The lowest cost of schooling a child was recorded in Wuwu (K63 per year). The most expensive LLG for per child yearly costs was Siassi at K306, which was about three times the per child costs reported for Sialum (K97/child/year).

Overall 52% of households reported that they were able to meet the costs of schooling, while 48% reported that they either could not meet the costs or found it very difficult. In order to meet costs, around 28 types of income generating activities were quoted, with the most important being fishing and market selling (Table 6).

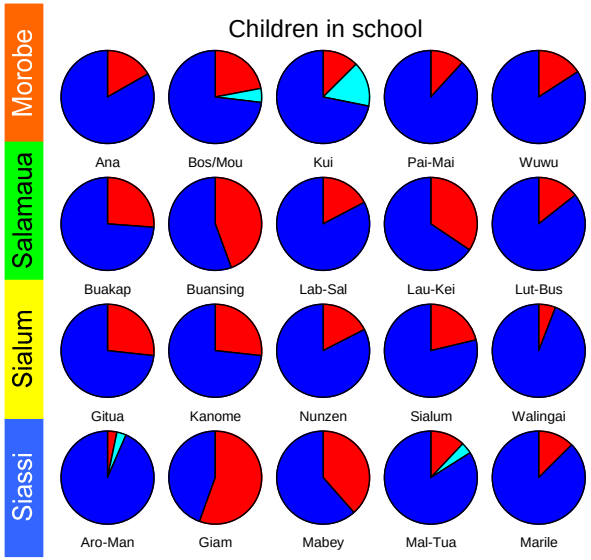
About 77% of school-aged children were reported as attending school, with 21% not attending for a wide range of reasons and included high fees and associated costs of schooling, reported in 13% of all households. Interestingly, in 22 households people reported that children did not attend school simply because they refused, with others saying it was because children were "dropouts", lazy, delinquent and in one case because a child was too shy.

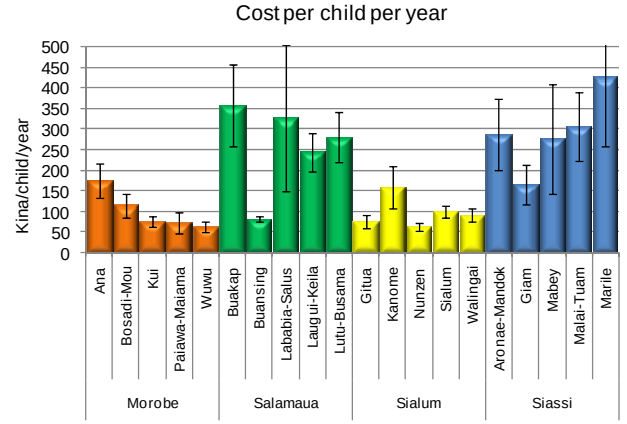
The greatest percentage of school-aged children attending school was reported in Sialum LLG (80%) and at the ward level in Walingai (Fig. 19). Giam (Siassi LLG) had the lowest percentage of school-aged children attending school.

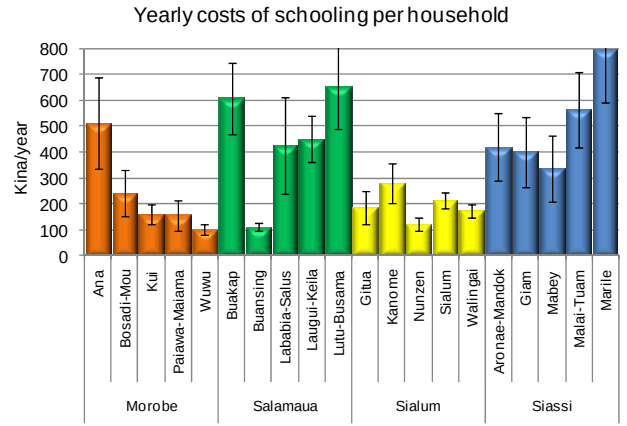
	HH	% Responses
Fishing	140	28
Market	97	20
Garden	59	12
Buai / tobacco	40	8
Sago	30	6
Wantoks	21	4
Cash crop	20	4
Collecting	19	4
Partial payment	16	3
Lime	8	2
Cooked food	8	2
Retailing	6	1.2
Employment	6	1.2
	494	100

Values	HH	% Responses	% HH	Children	% Children
Fees / cost	79	51	13	96	52
Children refuse	22	14	4	25	14
Dropout	15	10	3	18	10
No elementary	13	8	2	13	7
Transport / distance	5	3	1	10	5
Volcano / Tsunami	2	1.3	0.3	2	1.1
Supporting family	2	1.3	0.3	2	1.1
Parent prevents	2	1.3	0.3	2	1.1
No suitable clothing	2	1.3	0.3	2	1.1
Lazy	2	1.3	0.3	2	1.1
Disabled	2	1.3	0.3	2	1.1
Delinquent	2	1.3	0.3	2	1.1
Weather	1	0.6	0.2	3	1.6
Theft	1	0.6	0.2	1	0.5
Sickness	1	0.6	0.2	1	0.5
School incomplete	1	0.6	0.2	1	0.5
No teachers	1	0.6	0.2	1	0.5
Afraid / shy	1	0.6	0.2	2	1.1
Total	154	100	26	185	100

← Table 6: Reasons given for why children did not attend school, and income activities used to generate fees.







↑ Figure 18: Cost of schooling per household and per child for each LLG and ward. Data are average costs (K) +/-SE for households that send children to school (i.e. excludes zero values reported by people who do not have children at school; n=410 and 412, respectively).

Yes
Sometimes
No

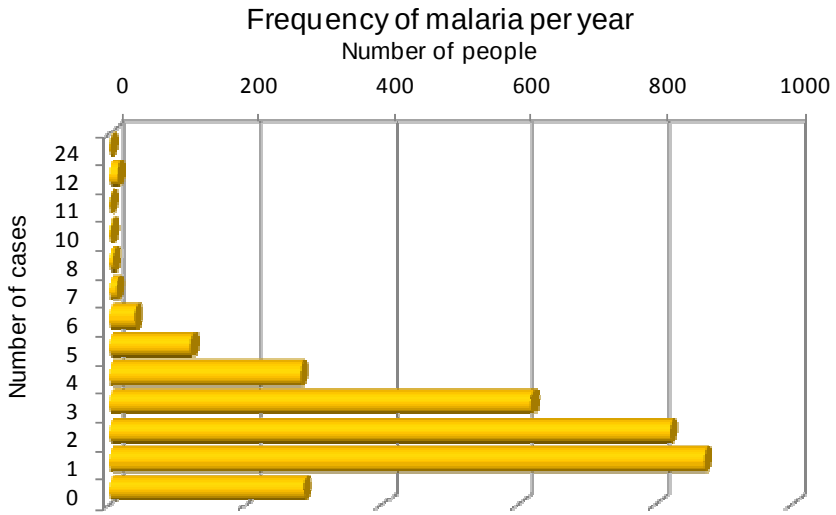
← Figure 19: Proportion of children in school by ward and by LLG (n=599 school-aged children across 455 households). Note: these pie graphs exclude households that did not have schooling children.

HH-Q17-Q18 Malaria

On average, how many times per year does each of household member get Malaria?

Of over 3,000 people for whom the frequency of malaria cases per year was reported, 8% reported not having malaria. About 25% of the people we reached through interviewing household heads had one case of malaria per year, and 24% experienced two cases per year (Fig. 20). Twenty-one people reported having malaria more than seven times a year, with one person reporting 24 cases.

Cases of malaria were most common in Salamaua LLG where the average number of cases per year was 2.4. This contrasts with Sialum where the average number of cases per year was 1.7. The wards with the greatest number of cases per year were Wuwu (average of >3 cases/yr), Lababia-Salus and Lutu-Busama. The fewest cases were reported in Kanome ward where the average was 0.98 cases/yr (see also Fig. 20, Table 7).



↑ Figure 20: Number of malaria cases experienced by members of households per year across the survey. Values are number of people in each frequency category (n=3,063 people).

Most people interviewed (80%) said that they and their family received treatment for malaria through their local aid post and 10% from a doctor, probably also at the aid post (Table 8). About 8% of people use traditional treatments derived from pawpaw, noni and other herbs and/or consulted a traditional healer. Self medication was reported by about 1% of people who bought medicines directly.

The vast majority of people (84%) thought that the treatments they used (all included) were effective, while 3% reported that treatments were ineffective, and around 12% said that treatment effectiveness was conditional. The main reasons given for ineffectiveness of treatments were that the medicine was out of date, or that they were not available when needed (Table 8).

The cost of treating a case of malaria varied according to the services accessed and where. Having a medical card associated with a yearly cost of about K5 per person kept costs for treatment down to less than K2 per case of malaria (Table 8).

Cases malaria / year		n	0	1	2	3	4	5	6	7	7+
Morobe	Ana	175	20	23	25	14	9.1	6.3			
	Bosadi/Mou	125		35	26	26	6.4	3.2			
	Kui	140	6.4	44	19	16	4.3	4.3	5		
	Paiawa/Maiama	162	22	23	22	13	14	3.1		3.7	
	Wuwu	134		13	28	25	16	11	6		
Salamaua	Buakap	132		31	26	22	14	5.3			
	Buansing	148		24	41	15	11	7.4			
	Lababia/Salus	118	4.2	14	12	43	20	5.9			
	Laugui-Keila	165	9.7	34	25	18	6.7	6.1			
	Lutu-Busama	144		24	23	22	17	6.3	4.9		
Sialum	Gitua	191	9.9	41	26	15	6.3				
	Kanome	160	32	44	19	5					
	Nunzen	128	10	27	31	20	10				
	Sialum	164	6.7	41	30	10	4.3				6.1
	Walingai	146	7.5	41	27	19	4.8				
Siassi	Aronae/Mandok	180	12	25	24	24	4.4	8.3			
	Giam	131	3.8	17	32	31	15				
	Mabey	198	20	41	16	18	3.5				
	Malai-Tuam	140		10	21	39	25	5			
	Marile	177	4	8.5	51	32		3.4			

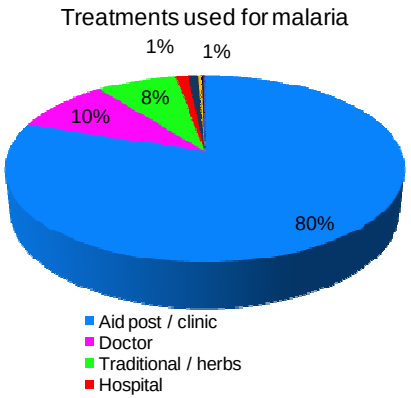
%
60
50
40
30
20
10
0

↑ Table 7: Cases of malaria per year expressed as a percentage of the population interviewed in each ward and LLG having the disease between 0 and more than 7 times per year. Values are percent of people in each frequency category (n=3,058 people).

↗ Table 8a: Treatments for malaria and their effectiveness.

↓ Table 8b: Average cost (kina) for treatment of a case of malaria in all LLGs and wards (n=582 households).

Cost of treatment	Average (K)	+/-SD	n
Adults	1.86	2.19	529
Children	1.43	1.70	505
Students / school	0.00	0.00	12
Yearly Adult Card	4.88	4.59	29
Yearly Child Card	4.62	5.13	25
Yearly Family Card	5.78	8.51	49
Admission hospital / clinic	11.23	5.38	11
Private treatment	9.33	12.70	3

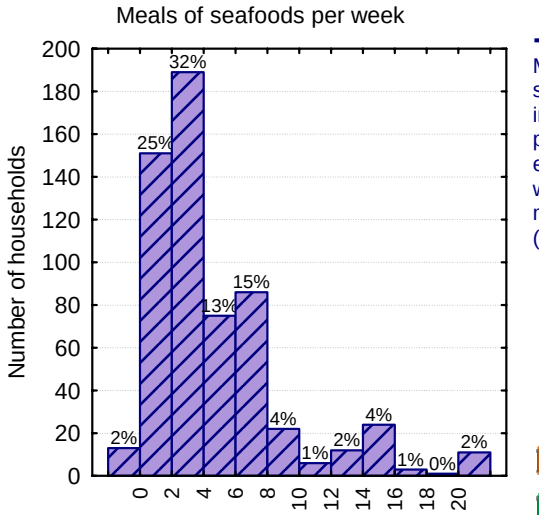


	Reasons	% Reasons	% HH
Treatment is effective because:			
Cured / quickly	206	36	35
Medicine is effective	83	14	14
Complete the required dose	39	7	7
Medical facilities are close by	29	5	5
Good / fresh supply of medicines	23	4	4
Health workers are available	23	4	4
Herbs are used	20	3	3
If we get treatment	15	3	3
Injections are effective	12	2	2
The corrrect medicine is used	9	2	2
Herbs are used to assist drugs	8	1	1
No side-effects	3	1	1
Medicines are better than herbs	3	1	1
Herbs are better than medicines	2	0.3	0.3
Treatment is not effective because:			
Medicines are out of date	26	5	4
No medicines	18	3	3
Ineffective medicines	13	2	2
Long cure time	8	1	1
Ineffective treatment	8	1	1
Doctors / treatment unavailable	4	1	1
Medicines damaged	2	0.3	0.3
Health workers unfocused	2	0.3	0.3
Not enough medicines	2	0.3	0.3
Aid Post needs improving	1	0.2	0.2
Case is too severe	1	0.2	0.2
Nurses not trained	1	0.2	0.2
Expensive	1	0.2	0.2
Wrong medicines used	1	0.2	0.2
Other comments:			
Have to use herbs	6	1	1
Depends on body / blood condition	3	1	1
Cured by faith	2	0.3	0.3
Don't know	1	0.2	0.2
Responses	575	100	
Households	582		100

HH-Q20 Meals of seafood

How many meals of locally caught seafood are normally eaten in this household each week? (think about the last 2-3 months)

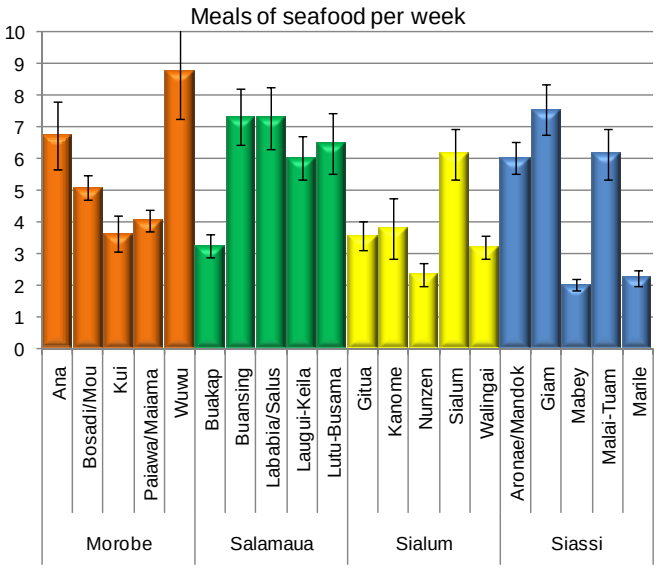
The average number of seafood meals eaten in households per week across all LLGs and wards was 5, and varied between 0 and 30. Most households (57%) ate between one and four meals of locally caught seafood per week. About 14% (85 households) reported having more than seven seafood meals per week (i.e. averaging at least one per day), while 7% reported eating an average of at least two meals containing locally caught seafood per day (Fig. 21).



↑ Figure 21: Frequency of seafood meals per week per household across the survey (n=593).

People living in Salamaua LLG tended to eat more seafood meals than in other LLGs (about 6 per week on average). The LLG with the fewest seafood meals per week was Sialum with an average of 3.8. The wards in which the most seafood was eaten were Wuwu, Giam, Buansing and Lababia-Salus. The lowest consumption was reported in Mabey, which is surprising given its offshore and remote location compared with other wards (Fig. 22).

Thirteen households reported not eating any seafood meals. All of these came from Kanome and Nunzen in Sialum LLG.



➔ Figure 22: Meals of seafood eaten in households per week in each LLG and ward. Data are means +/SE (n=593).

HH-Q22 Changes in fishing and collecting activities

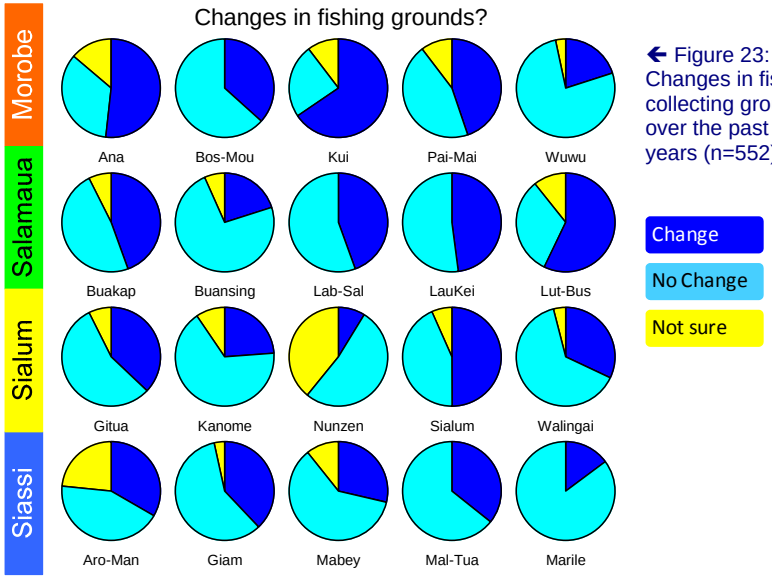
Has there been any change in the locations used for fishing over the past 5-10 years? Describe the change and reasons why locations are changing.

Overall, 37% of people interviewed said that they had changed the locations of their fishing grounds over the past 5-10 years, while 55% said they had not changed their fishing grounds. The greatest percentage of people reporting changing fishing grounds were those from Morobe LLG (44%), and the least from Siassi (30%). In terms of wards, the greatest changes in fishing grounds were recorded from Kui, and Ana wards in Morobe and Lutu-Busama Ward in Salamaua (Fig. 23).

People mentioned 47 different kinds of negative changes in the fishing grounds around their area and the causes for these changes over the past 5-10 years (Table 9). Changes and causes are combined here because they were often mixed in the responses, showing how people actually think of them. The most common responses were that people had to go further or elsewhere to fish because fish were declining and there was overfishing. About 7% of people said that the fish had moved away. Human population increases, changes in oceanography, enlarging reefs, weather/climate changes, and damage to reefs were commonly reported in this context.

In contrast, only 12 people reported positive changes to fishing grounds. The most common responses were that fishes have increased and that growing reefs were attracting more fishes (Table 9).

The main reasons given for why people deliberately change their fishing grounds were to increase their catch and to respond to natural seasonal changes or movements of fishes (Table 10).



← Figure 23: Changes in fishing/ collecting grounds over the past 5-10 years (n=552).

Reasons people changed where they fish		
To increase catch	20	6
Response to natural seasons	6	2
Increase the catch per unit of effort	4	1
To find bigger fish	4	1
To rest fish / reserve for breeding	4	1
Because conservation is encouraged	2	1
For leisure	2	1
To follow moving fish	1	0.3
To target catch	1	0.3
To prevent fish getting used to us	1	0.3
For better biting by fish	1	0.3
For feast	1	0.3
Avoid bad weather	1	0.3
Subtotal	48	14
Totals	944	334

↗ Table 10: Reasons given for why people moved to different fishing grounds (n=48 for this table). There were 944 responses from 334 households overall).

Negative causes & changes		
Have to go further / elsewhere	81	24
Fish declining	81	24
Overfishing	57	17
Fish have moved away	25	7
Population increase	24	7
The catch is lower	17	5
Sealevel rise / current / tide changes	17	5
New / growing reefs reduce fish	16	5
Weather rough / changed / Global warming	14	4
Reefs damaged / disturbed	13	4
Poison rope used	9	3
Reefs are dying	9	3
Nets used	8	2
Pollution	6	2
Sea cucumbers declining	5	1
Increases in fishing	5	1
New technology (gears)	4	1
Fish not biting / used to bait	4	1
More fishing time needed	2	1
Poor resource management	2	1
Increases in earning activities	2	1
Sorcery	2	1
Seaweed overgrowth	2	1
Floating logs make fishing difficult	2	1
Breeding areas damaged	2	1
Logging impacts	2	1
Runoff clouds / affects reefs / ruins breeding	2	1
Fish food has moved	2	1
Small fishes are caught	2	1
Shallowing of habitats / sand on reefs	2	1
Dynamite used	1	0.3
Changes in sea temperature	1	0.3
Lack of reserve areas	1	0.3
Trochus declining	1	0.3
Spearguns used	1	0.3
Small hooks used	1	0.3
Mangroves damaged	1	0.3
Ignore traditional rules	1	0.3
Night fishing	1	0.3
Fish are smarter	1	0.3
Anchor damage	1	0.3
large boats block migrations	1	0.3
Lime harvesting	1	0.3
Abnormal tuna migration	1	0.3
Too many sharks	1	0.3
Mangroves growing into habitat	1	0.3
Current carries fish away	1	0.3
Subtotal	436	131
Positive causes & changes		
Fish have increased	5	1
Growing reefs bring more fish	4	1
New species of fish found	2	1
Use banana boats to increase catch	1	0.3
Subtotal	12	4

➔ Table 9: Causes and types of changes reported in fishing grounds in all LLGs and wards (n=448).

Target species / groups	No.	%HH
Fishes	1510	
Reef fishes	424	75.6
Deepwater snappers	221	39.4
Snappers	190	33.9
Tunas	161	28.7
Offshore pelagic fishes	128	22.8
Trevallies	87	15.5
Mackerels	56	10.0
Other deepwater fishes	39	7.0
Sharks	35	6.2
Coral trouts	22	3.9
Mullets	21	3.7
Barracudas	18	3.2
Groupers	18	3.2
Rabbitfishes	14	2.5
Longtoms	10	1.8
Drummers	9	1.6
Emperors	9	1.6
Stingrays	7	1.2
Scads	7	1.2
Rainbow runners	6	1.1
Freshwater fishes	5	0.9
Eels	3	0.5
Garfishes	3	0.5
Lagoon fishes	3	0.5
Mangrove fishes	3	0.5
Milkfishes	3	0.5
Parrotfishes	3	0.5
Coastline fishes	2	0.4
Other fishes	2	0.4
Inshore pelagic fishes	1	0.2
Crustaceans	148	
Lobsters	106	18.9
Crabs	38	6.8
Prawns	4	0.7
Molluscs	321	
Shells	148	26.4
Trochus	105	18.7
Octopuses	34	6.1
Clams	26	4.6
Kina shells	6	1.1
Squids	2	0.4
Sea cucumbers	188	33.5
Corals for lime	1	0.2
Seaweeds	5	0.9
Turtles	37	
Turtles	36	6.4
Turtle eggs	1	0.2
Dugongs	2	0.4
Responses	2,215	
Households	561	

HH-Q23 Important seafood for subsistence & sale

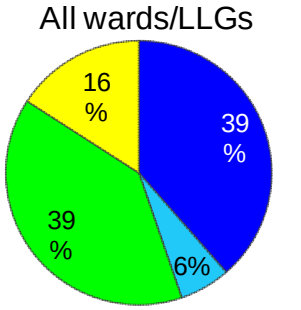
Rank the most important fish species for subsistence/sale. Are they the same? (Rank with 1 being most important, use 0 if not important).

The most important seafood for subsistence or sale are fin fishes followed by molluscs, with a smaller focus on sea cucumbers and crustaceans. There are also smaller numbers of people who reportedly target corals (for lime), seaweeds, turtles (including their eggs) and dugongs (Table 11). For fin fishes, the most important targets were reef fishes (76% of households), deepwater snappers (39%) and reef snappers (34%). The most important molluscs targeted were trochus and other shells used for food and crafts. When reported in terms of fishing activities, hand collecting was the most commonly reported activity (67% of households). Fishing by handline and "reef fishing" (probably also by handline) and trolling were the most important fin fish targeting activities recorded. No households reported using dynamite or rotenone (poison rope), despite the concern that these two raise in several of the questions about the health of resources (e.g. HHQ22, Q43 and others).

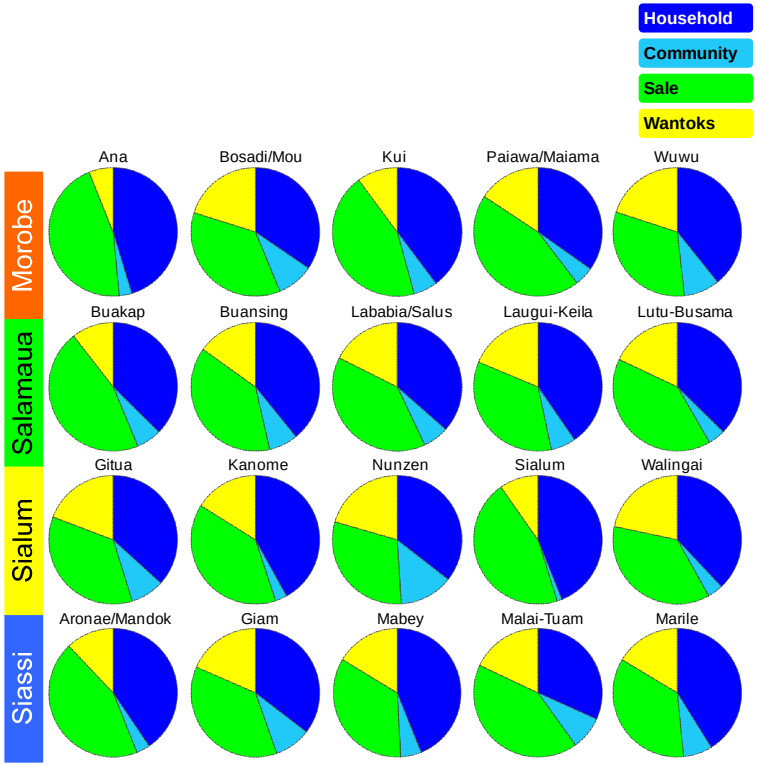
Seafood caught/collected by household members were equally used within the household and for selling to generate income (39% each). About 78% of all seafood was therefore used for direct benefit to the household. Only 6% was used in community activities (Fig. 24). This pattern was remarkably consistent among the wards and LLGs surveyed.

↔ Table 11: The fishing/collecting activities of households. People usually reported their fishing activities either in terms of target species, or fishing activity. We did not require people to reorganise how they normally think of their activities, but allowed them to report them according to the way they normally considered them. Some people appeared to target particular species or groups of organisms, while others took whatever species were captured using a particular fishing method. Values are frequencies that a species or activity was used by the household interviewed. In some cases, people reported species and activities together, so values in the table do not sum to the total number of responses (n=561 households for species, and 241 for activities).

Fishing methods	No.	%HH
Collecting	161	67
Handline	105	44
Reef fishing (handline?)	79	33
Trolling	63	26
Bottom fishing	49	20
Spearfishing	47	20
Diving	35	15
Netting	22	9
Deepwater handline	11	5
Beach fishing & casting	6	2
Vertical longline	4	2
Trapping	3	1
Hand reel	2	0.8
Cast trolling	1	0.4
Responses	592	
Households	241	



↑↓ Figure 24: Uses of seafood caught/collected by households across the survey (see pie chart above), and by LLG and ward (see individual pie charts below; n=1,659 responses).



Target species	J	F	M	A	M	J	J	A	S	O	N	D
Barracudas	8	8	9	8	8	9	8	8	8	8	9	9
Deepwater fishes	10	10	10	10	8	3	3	3	9	10	11	10
Drummers	11	11	11	11	11	5	5	5	5	7	9	11
Deepwater snappers	10	10	9	9	8	5	4	6	9	10	10	10
Eels	13	13	13	0	0	0	0	0	7	13	20	20
Emperors	8	8	9	9	9	9	8	8	8	8	8	8
Fishes	10	9	11	9	9	4	3	3	11	10	10	11
Freshwater fishes	17	17	0	0	0	0	0	0	17	17	17	17
Garfishes	8	8	8	8	8	8	8	8	8	8	8	8
Groupers	8	8	8	8	8	8	8	8	8	8	8	8
Longtoms	0	0	0	0	0	50	50	0	0	0	0	0
Mackerel scads	8	8	8	8	8	8	8	8	8	8	8	8
Mackerels	8	7	8	8	7	8	8	9	8	9	9	9
Mangrove fishes	8	8	8	8	8	8	8	8	8	8	8	8
Milkfishes	8	8	8	8	8	8	12	12	8	8	8	8
Mullets	8	8	9	8	8	8	8	8	8	8	9	9
Parrotfishes	8	8	8	8	8	8	8	8	8	8	8	8
Pelagic	10	10	10	10	10	5	4	5	8	9	9	9
Rabbitfishes	8	8	8	8	8	8	8	8	8	8	8	8
Rainbow runners	7	7	10	10	7	7	7	7	7	10	10	10
Reef fishes	10	10	9	9	8	6	5	6	9	10	10	10
Scads	8	8	8	8	8	8	8	8	8	8	8	8
Sharks	10	10	10	10	9	8	5	4	6	9	10	10
Snappers	10	10	9	9	9	6	5	7	8	8	9	9
Stingrays	8	8	8	8	8	8	8	8	8	8	8	8
Trevallies	8	8	8	8	8	8	8	8	8	8	8	8
Trouts	9	9	9	9	9	7	7	8	8	8	9	9
Tunas	8	8	8	8	7	6	6	8	9	11	10	10
Crabs	13	13	11	8	8	3	3	3	8	9	11	11
Lobsters	11	11	10	9	8	4	3	5	9	10	11	11
Mudcrabs	8	8	8	8	8	8	8	8	8	8	8	8
Prawns	8	8	8	8	8	8	8	8	8	8	8	8
Clams	7	7	7	7	11	11	11	7	7	7	7	7
Kina shells	8	8	8	8	8	8	8	8	8	8	8	8
Mangrove shells	8	8	8	8	8	8	8	8	8	8	8	8
Octopus	10	12	12	8	6	3	3	3	9	12	12	13
Shells	9	9	9	8	8	6	6	7	8	9	9	10
Trochus	10	10	9	9	9	6	6	6	8	9	9	9
Sea cucumbers	10	10	9	10	9	5	5	6	9	9	9	9
Seaweeds	17	17	0	0	0	0	0	0	17	17	17	17
Turtles	11	11	11	9	9	4	2	7	9	9	9	9

Activity	J	F	M	A	M	J	J	A	S	O	N	D
Beach fishing	8	8	8	8	8	8	8	8	8	8	8	8
Bottom fishing	9	9	8	7	7	7	7	8	9	9	9	9
Casting	20	20	0	0	0	0	0	0	0	20	20	20
Collecting	9	9	9	9	9	7	7	7	8	9	9	9
Deepwater fishing	9	9	9	9	9	8	7	7	8	8	9	9
Diving	11	10	9	8	8	4	4	5	8	11	11	11
Handlining	10	10	9	8	8	6	5	6	7	10	10	11
Longlining	10	10	10	10	10	10	6	3	3	10	10	10
Netting	10	10	8	7	7	6	6	7	8	9	11	11
Spearfishing	12	11	10	9	7	4	4	5	7	11	11	11
Traditional netting	0	0	0	0	0	0	0	0	0	0	50	50
Trolling	11	10	8	8	8	6	5	4	7	11	11	12
Vertical longlining	14	14	14	14	0	0	0	0	0	14	14	14

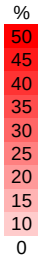
HH-Q24 Timing of fishing/collecting activities

Is there a season during the year for each fishing activity? How long? Which months/moon phases for which species?

Seasonal patterns in fishing and collecting activities were found for certain target species and for some fishing activities. Patterns were found for particular species in all groups reported. Overall, fishing and collecting tended to diminish in the middle of a year and increased towards the beginning and end of the year (Fig. 25). For the moon phases examined, fishing tended to be most intense during a new moon (Fig. 26).

Among the targeted species there were some that were targeted to approximately the same extent most of the time. For example, tunas, clams, kina shells and mangrove snails tended to be fished at all times of the year and all phases of the moon. In contrast, deepwater snappers, drummer fish, lobsters, and octopus were fished more towards mid-year. The target species most affected by moon phase in terms of fishing effort included milkfishes, mullets and prawns.

Interestingly, people did not report a lessening of fishing effort for sea cucumbers during the national closed season between 1 October and 15 January each year. Instead, they reported that fishing for these animals tended to be less during mid-year.



← Figure 25: Distribution of fishing/ collecting activities over the months of the year. Intensity of shading indicates focus on particular months (n=559 households).

Activity	New	1st	2nd	3rd	Full
Beach fishing	24	18	18	24	18
Bottom fishing/handline	39	11	10	23	18
Collecting	21	20	18	20	21
Deepwater fishing	32	11	11	29	16
Diving	23	17	21	18	20
Deepwater handline	43	14	14	14	14
Handline	29	15	18	16	22
Handreel	50	0	50	0	0
Longline	25	25	0	25	25
Netting	29	14	19	15	24
Spearfishing	26	15	19	14	25
Trapping	38	0	19	6	38
Trolling	28	19	14	15	23
Vertical longlining	31	19	25	13	13

Target species	New	1st	2nd	3rd	Full
Barracudas	35	10	10	18	27
Deepwater fishes	34	20	15	12	19
Drummers	25	21	17	17	21
Deepwater snappers	30	18	14	19	19
Eels	43	14	14	14	14
Emperors	22	20	19	19	20
Fishes	63	15	4	4	13
Freshwater	20	20	20	20	20
Garfish	33	17	17	17	17
Groupers	25	18	18	21	19
Longtoms	22	22	15	15	26
Mackerels	26	18	15	19	22
Mackerel scads	33	17	17	17	17
Mangrove fishes	20	20	20	20	20
Milkfishes	50	50	0	0	0
Mullets	54	15	7	10	15
Parrotfishes	20	20	20	20	20
Pelagic	28	21	16	16	19
Rabbitfishes	38	13	13	13	25
Rainbow runners	23	19	19	15	23
Reef fishes	26	19	19	17	20
Scads	42	8	17	8	25
Sharks	22	21	13	21	22
Snappers	28	18	13	18	23
Stingrays	24	20	20	20	16
Trevallies	29	16	15	20	20
Trouts	24	20	17	17	22
Tunas	27	19	13	18	24
Crabs	31	21	16	13	19
Lobsters	24	21	18	19	20
Mudcrabs	29	29	14	14	14
Prawns	57	43	0	0	0
Prawns (Freshwater)	20	20	20	20	20
Clams	22	18	18	20	22
Kina shells	20	20	20	20	20
Octopuses	21	16	25	18	21
Shells	21	19	19	19	21
Squids	20	20	20	20	20
Trochus	20	20	20	20	20
Sea cucumbers	21	20	19	20	21
Seaweeds	20	20	20	20	20
Turtles	25	17	19	17	23

↑ Figure 26: Distribution of fishing/collecting activities over the waxing phases of the moon (n=558 households). Intensity of shading indicates percentage of focus on phases of the moon, with no colour (white) indicating no activity. Phases are new moon, first quarter, half moon, third quarter and full moon.

HH-Q26-Q27 Fishing effort

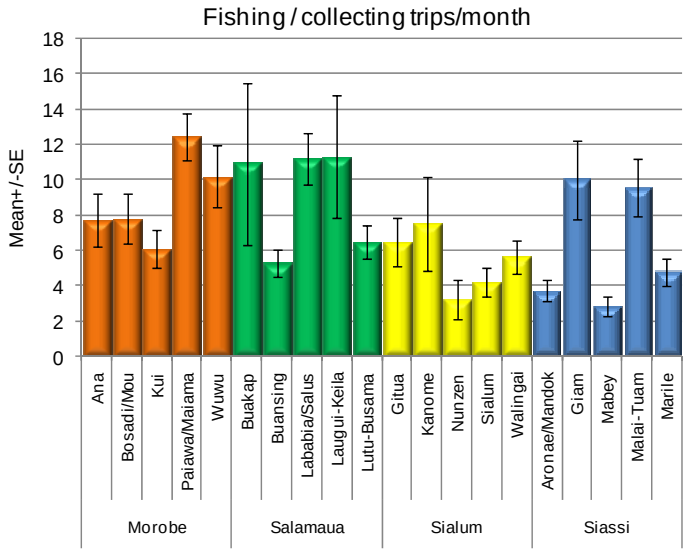
How many fishing trips on boats per month? How long (hours) does an average fishing trip last? When during the day or night do you usually fish?

The average number of fishing trips in boats made per month across the survey was 7.5 per household (+/- 7.6 trips SD). The number of trips made varied by LLG, with the greatest average number of fishing trips made in Morobe LLG (9.3/ month), and the least in Sialum (5.5). There was also a large amount of variation among wards. People living in the Paiawa-Maiama area of Morobe LLG made the most fishing trips by boat each month, averaging about 12.4 trips/month. Frequent fishing trips were also reported in Lababia-Salus, Buakap and Wuwu in Morobe and Salamaua LLGs.

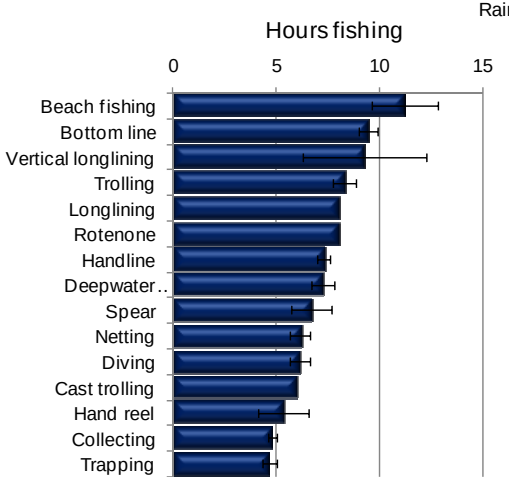
The smallest number of fishing trips per month were reported from Mabey (2.9 trips/month) and Marile (4.8) in Siassi LLG. This is surprising as Siassi LLG is the most maritime of those surveyed (Fig. 27).

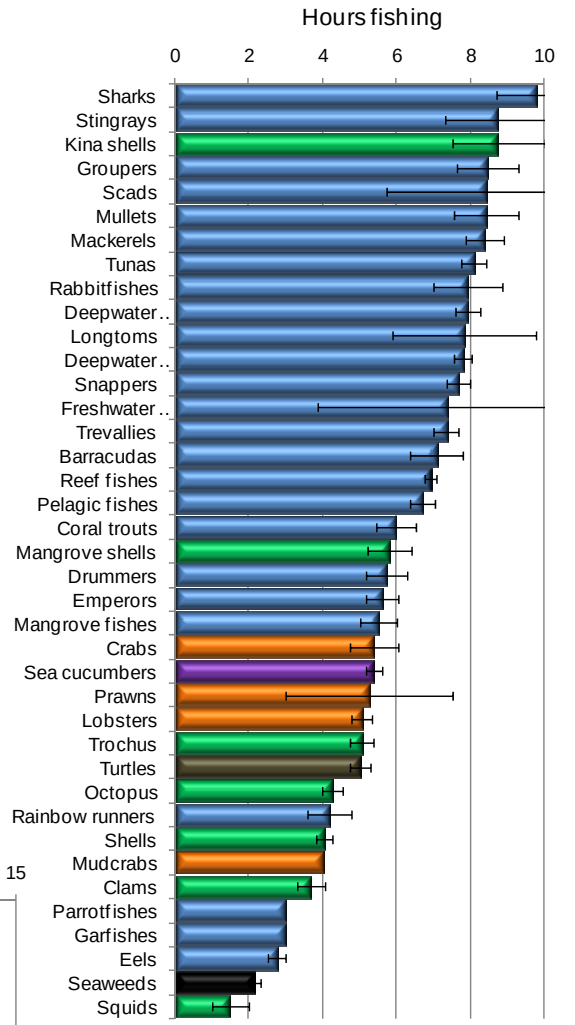
The overall average amount of time spent on fishing or collecting trips for the survey was around 6.9 hours, with the most time spent by people in Morobe LLG (8.4 hours per fishing trip). In Siassi, also the LLG with the least number of trips per month, the average time spent on each trip was lowest at just 5.3 hours per fishing or collecting trip.

The target species that took the most fishing time were sharks, stingrays and kina shells (Fig. 28). This may reflect a long time taken to get to fishing grounds and/or time actually spent in catching or collecting the target animals. The target species that took the least time to capture or collect included squids and seaweeds. Overall, fin fish tended to take the longest to capture of the species reported, with most molluscs and all crustaceans and other groups taking between one-half and two-thirds of the time needed for catching fin fish.



← Figure 27: Number of fishing trips on boats per month by LLG and ward. Data are mean number of trips +/-SE of estimated number of fishing trips undertaken in households each month (n=400 households).





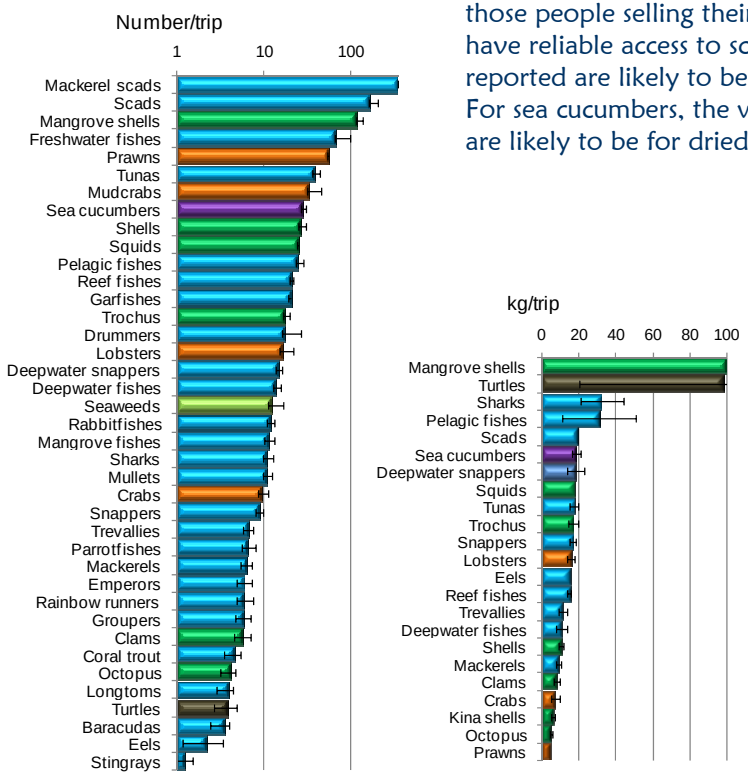
←↑ Figure 28: Time taken for each fishing or collecting trip. Values are averages +/-SE per trip reported separately for target species and fishing activities (n=2,128 responses).

HH-Q28 Catches

What is the average catch per trip in numbers of fishes, cucumbers, shells, clams, seaweed, crabs, lobsters and other things you collect from the sea?

The average number of animals people said they caught or collected per fishing trip was about 19 overall, and the average weight around 17.5 kg. The larger catches by number (up to 300 per fishing trip) tended to be for small inshore pelagic fishes (scads) and mangrove shells (>100/trip). Seafood such as stingrays, eels, barracudas and turtles were usually caught in small numbers of 1-4 animals per trip. The greatest catches by weight were for mangrove shells, turtles, sharks and pelagic fishes (ranging between 30 kg and 100 kg per fishing trip (Fig. 29).

These data should be interpreted with caution, as very few people have access to facilities for weighing their catches. Only those people selling their catches to buyers have reliable access to scales, so the weights reported are likely to be rough estimates. For sea cucumbers, the weights shown here are likely to be for dried animals.



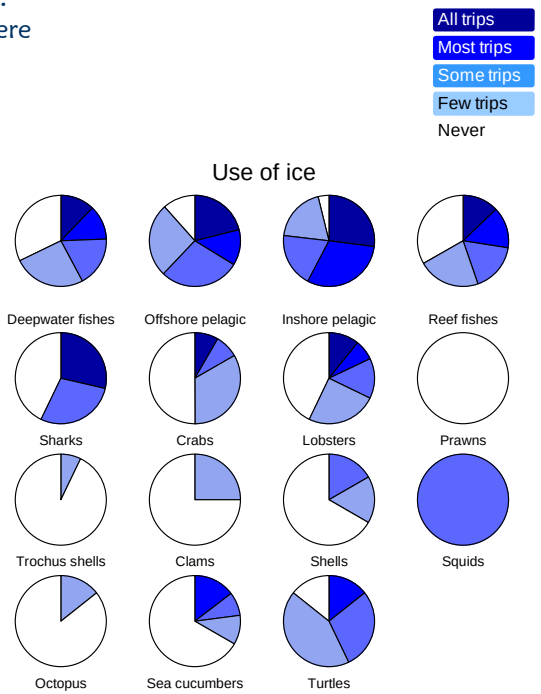
← Figure 29: Catches per fishing/ collecting trip in numbers of animals and kg of weight caught. Data are means +/- SE.

HH-Q29 Use of ice

Is the catch chilled on ice? Which ones? How much of the time?

Just over half of the people (55%) said that they did not use ice during fishing trips, regardless of the target species being caught. About 9% of people said that they used ice on all fishing trips and 9% on most trips. A total of 28% said they used ice on some or few trips. Ice was most commonly used for pelagic and deepwater fishes, lobsters and reef fishes (Fig. 30). Prawns were the only group for which ice was not used at all.

Ice usage varied with LLG and ward. Ice was used the most in Morobe LLG where 22% of people said that they used it in all fishing trips. In Salamaua, 9% of people said they used ice on all trips, while in Sialum and Siassi between 0.4% and 1.3% used ice for all trips. None of the people in Wuwu, Gitua, Kanome, Nunzen, Sialum, Mabey or Marile appear to use ice for fishing (Fig. 31).



← Figure 30: Use of ice in fishing and collecting, by species or group (n=913 responses).

LLG	Ward	All	Most	Some	Few	Never
Morobe	Ana	2				89
	Bosadi/Mou	7		2	38	54
	Kui	39	2	23	17	12
	Paiawa/Maiama	25	12	15	28	2
	Wuwu					1
Salamaua	Buakap	2	19	33	17	29
	Buansing	13			9	78
	Lababia/Salus	13	2	31	6	3
	Laugui-Keila	3	8	3	22	64
	Lutu-Busama	10	18	47	6	19
Sialum	Gitua					1
	Kanome					1
	Nunzen					1
	Sialum					1
	Walingai	4	2	2	4	88
Siassi	Aronae/Mandok	1	14	3	23	58
	Giam			6	6	88
	Mabey					1
	Malai-Tuam		55	6		40
	Marile					1

↑ Figure 31: Use of ice in fishing by LLG and ward (n=267).

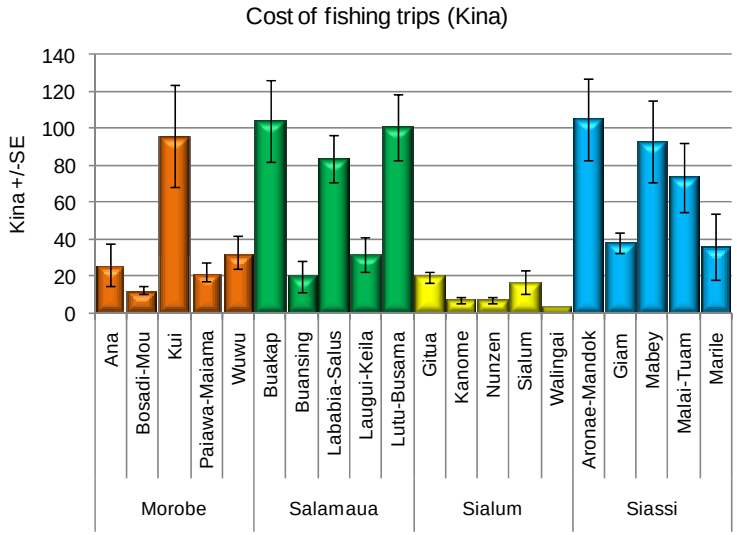
HH-Q30 FISHING COSTS

WHAT IS THE ESTIMATED COST PER FISHING TRIP OF FUEL, BAIT, ICE, FISHING GEAR, CREW, FOOD, ETC?

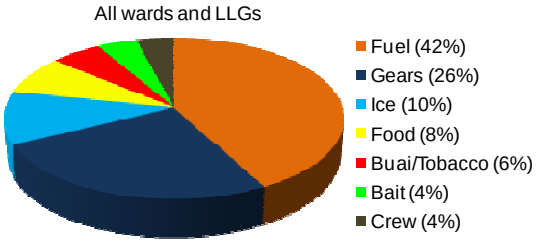
The average cost of a fishing trip in the survey area was around K50 and ranged up to K575 for a single fishing trip. The highest average costs of fishing trips were recorded in Siassi and Salamaua LLGs, where the average cost was between K66 and K69 per trip. The cheapest LLG for fishing was Sialum where the average cost per trip was as low as K 11. Fishing costs were highest in Aronae-Mandok and Buakap wards at an average of more than K100 per fishing trip (Fig. 32).

The most important components of cost overall as reported by people interviewed were for fuel (42%) and fishing gear (26%). Interestingly, crew was a minor cost component in all wards and LLGs.

The greatest fuel costs were found in wards from all LLGs surveyed. The highest fuel components were found in Ana, Kui, Marile and Buansing wards, where the cost per trip was over K100. The greatest gear costs were reported at Lababia-Salus and Giam at K38-41 per trip (Fig. 33).



↑ Figure 32: Cost per fishing trip by LLG and ward (n=452 households). Values are mean costs (kina) +/-SE.



↑→ Figure 33: Breakdown of costs of fishing trips for all LLGs and wards (n=375).

LLG	Ward	Fuel	Gears	Ice	Food	Buai / tobacco	Bait	Crew
Morobe	Ana	155	13	0	3	7	0	20
	Bosadi-Mou		17			2		
	Kui	113	33	26	20	9	2	6
	Paiawa-Maiama	5	13	2	0		2	0
	Wuwu		27	25		1	65	
Salamaua	Buakap	71	28	16	14	9	0	19
	Buansing	100	13	27	8	2		
	Lababia-Salus	16	41	8	10	1	7	6
	Laugui-Keila	7	18	1	1	2	0	0
	Lutu-Busama	64	29	14	38	4	9	20
Sialum	Gitua	0	11	0	0	3	0	0
	Kanome	0	6	0	0	2	0	0
	Nunzen	0	6	0	0	2	0	0
	Sialum	75	6		4	5	20	
	Walingai		4			2		
Siassi	Aronae-Mandok	88	16	19	1	4	1	0
	Giam		38		100	5	20	
	Mabey	46	19	0	1	1	4	0
	Malai-Tuam	32	33	57	18	11	11	9
	Marile	109	13		15	6	1	55

K
150
100
80
60
40
20
1

HH-Q31 Seafood processing

Do you process your catch for sale? How? Which seafoods? Why?

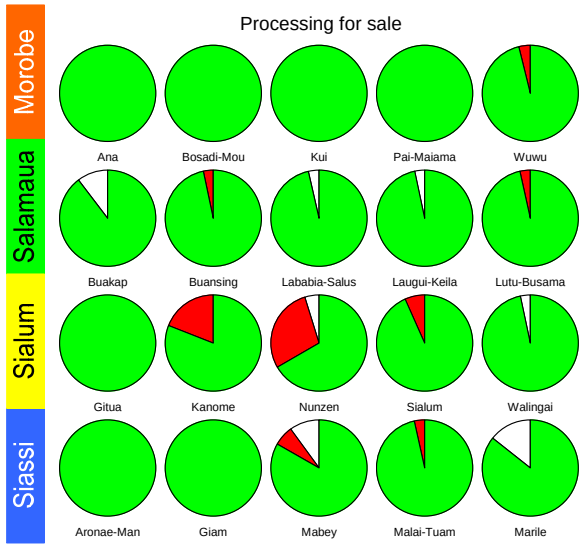
The vast majority (94%) of people reported that they process their seafood for sale. Only 3% of the people interviewed said that they did not process their seafood before offering them for sale, and a further 2% said that they did not sell their catch (Fig. 34). Processing of the catch before sale was common in all wards and LLGs. The wards with the largest number of people not processing their catch were Nunzen and Kanome in Sialum LLG.

The types of processing depended on the seafood caught or collected (Fig. 35). Much of the seafood was smoked, but some was processed in other ways. All prawns and kina shells were boiled prior to sale, and squids were universally put on ice before being sold. For most fin fishes, crabs, lobsters and molluscs, smoking was accompanied by other processing methods including gutting and gilling. In most cases "drying" referred to drying over a fire and was associated with smoking.

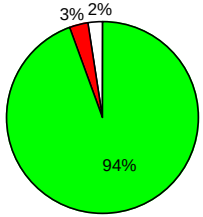
People reported their reasons for processing the catch before sale in three main related categories: 1) to maintain quality and make handling easier; 2) to improve their interaction with markets, and 3) to respond to customer demand (Table 12). Of the 491 households that responded to this question, 93% said that their primary reason for processing was to "preserve" the product. There was an awareness that fish could spoil through autolysis (enzymatic breakdown arising from internal organs) and through bacterial decay. This lead people to gut and gill as well as smoke and dry their products. Most people therefore processed to increase the "shelf life" of seafood and often to ensure it lasted long enough to sell. In some cases people said that they processed to allow them time to access better-paying, more remote markets, or in one case so they could time their entry for a better price.

Reason	No.	%HH
Quality and handling		
Preserve	455	93
Prevent enzyme breakdown	71	14
Reduce size for handling	38	8
Maintain quality	10	2
Clean	7	1
Dry	1	0.2
Increase freshness	1	0.2
Freeze	1	0.2
Maintain cool temperature	1	0.2
Meat easier to extract	1	0.2
Safe from pests (ants, rats, dogs)	1	0.2
Shells easier to break	1	0.2
Storage	1	0.2
Markets		
Increase the price	73	15
Extend time for sale	60	12
Easier / faster sales	9	2
Allow time for transport	2	0.4
Better / more remote markets	1	0.2
Increase the number of sales	1	0.2
Better prices when supply is low	1	0.2
Appeal to customers		
Increase appeal for sale	57	12
Increase appeal for eating	6	1
Cook	3	1
So people will buy them	2	0.4
People prefer smoked fish	1	0.2
Responses	805	
Households	491	

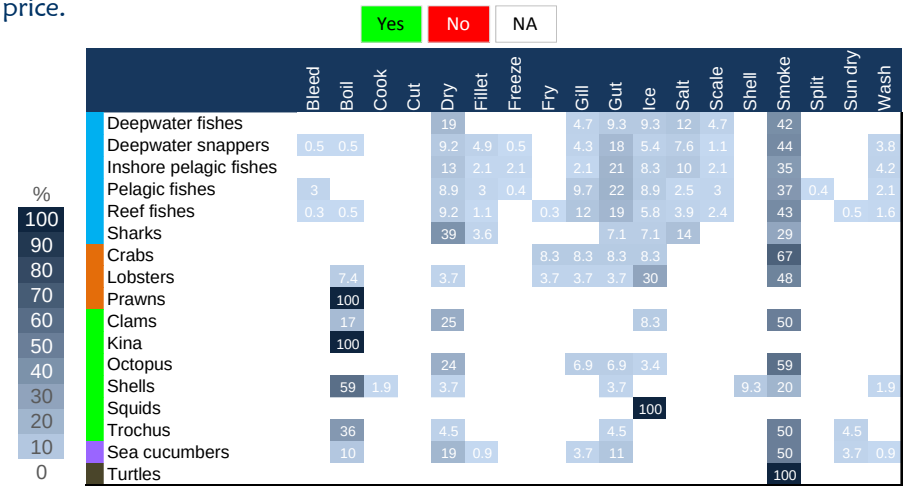
← Table 12: Catch processing by response and household (n=805 responses over 491 households).



↗ Figure 34: Breakdown of proportion of people processing their catch before selling by LLG and ward. NA means that the catch was not sold, so any processing was irrelevant to this question (n=595 households).



→ Figure 35: Catch processing for sale for major groups of organisms caught or collected (n=1,198 responses). Data are percent of households applying each processing type for a species (that is, percentages add across a row).



HH-Q32 Income from fishing

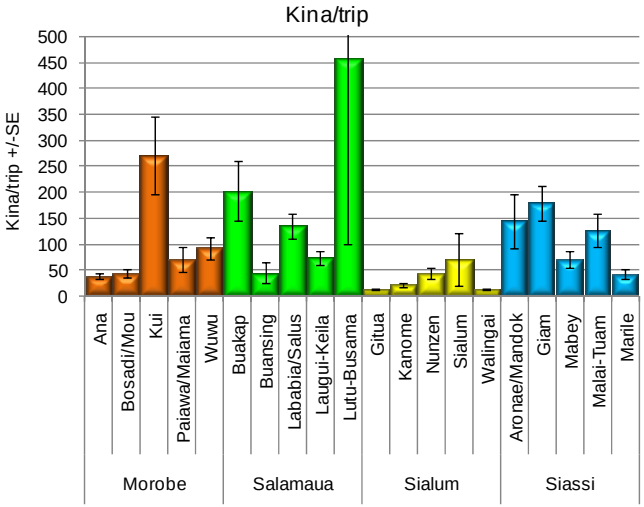
What is the estimated average income per fishing trip? How many people share this income inside and outside the household?

The overall average income from fishing for each household across all LLGs and wards was around K106 per fishing or collecting trip. The best incomes derived from fishing and collecting trips were found in Salamaua LLG at an average of K181 per trip. People in Sialum derived the least income of the LLGs at around K32 per fishing or collecting trip.

At the ward level the highest incomes were found at Lutu-Busama where an average of K454 per trip was recorded. This figure is, however, inflated by a single value showing a per trip income of K10,000 in one household. If that value is ignored, the average per trip income from fishing drops to K100/trip in Lutu-Busama, and Salamaua LLG as a whole drops to second position behind Siassi (at K 109/trip for Salamaua LLG and K 118/ trip for Siassi).

The wards with the lowest income per fishing or collecting trip were Gitua and Walingai, both from Sialum LLG. These had an average income from fishing trips of around K12 (Fig. 36).

The income derived from fishing trips is often shared among people from other households, so can not be taken as a household income in its raw form. On average, the income reported here from each fishing trip is shared with 1.4 people outside the household (+/- 6 SD).



← Figure 36: Income derived per fishing or collecting trip in each LLG and ward (n=564). Values are averages (after costs) as (kina) +/-SE.

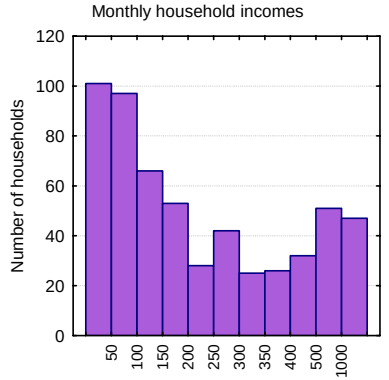
HH-Q33 Income from all sources

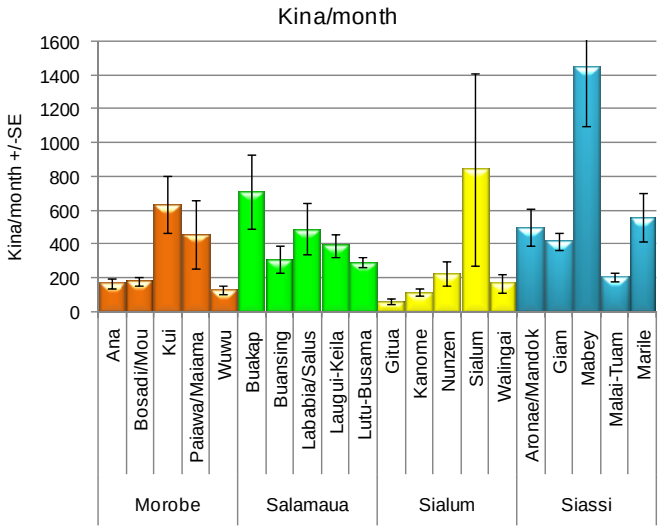
What is the estimated total monthly income from all sources to this household?

The average monthly income for households from all sources across the survey was K421 (+/-1,029 SD). Household incomes varied significantly among LLGs and wards.

The highest monthly per household incomes were recorded in Siassi LLG at around K634 (Fig. 37). This figure is over twice that recorded at Sialum LLG, where an average monthly household income of K294 was recorded.

The highest average household income at the ward level was recorded at Mabey in Siassi LLG at K1,449 per month. This value was almost 25 times higher than the average income recorded for households in Gitua ward, Sialum LLG. In Gitua, the average monthly household income was K59, or 14% of the overall survey average. The highest household monthly income recorded was over K17,000 and the minimum K2. A total of 49 households across the survey reported incomes of K1,000/month or more.





↑ Figure 37: Monthly income to households from all sources by LLG and ward (n=568). Values are given as frequencies and averages +/-SE.

HH-Q34 Loans

Do you or anyone in this household have any loans (include Bank or Wantok)? How much? Where are loans from? What are they used for?

A total of K225,595 was reported on loan to households surveyed during this study. The total number of loans reported was 68, spread out over 54 households. Overall, 12% of households had some kind of loan (Fig. 38).

The average loan amount owed per household was K3,367, with significant variations in the amount owed by each. The largest average loan sizes were reported in Salamaua LLG at an average of K5,805 per household (24 loans). This contrasts greatly with the average loan amount in Siassi LLG at K500 per household (4 loans). The wards with the greatest amount of loans were Lutu-Busama (>K8,000 per loan, 17 loans) and Gitua (about K7,900 per loan and 7 loans). Eight wards reported having no loans (Fig. 38).

Most households with loans (80%) had just one at the time they were surveyed. About 15% of households had two loans and a smaller number (6%) had three loans. No households reported having more than three loans.

Source	No.	% of loans
Wantoks	29	43
Bank	12	18
Friends	9	13
Morobe Savings & Loans	5	7
Employers	4	6
Lae Microbank	3	4
CCI	2	3
Agriculture Bank	1	1
Bank (EU loan)	1	1
Fish projects	1	1
Rural Development Bank	1	1
Total	68	100

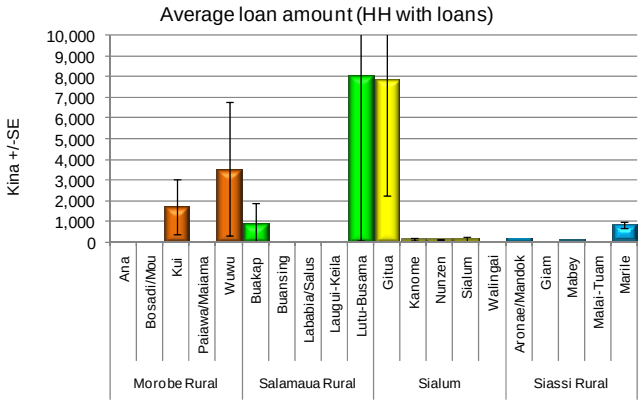
Most of the loans were from wantoks (family) and friends (Table 13). About 32% of the loans were from banks located in the Lae area. Four of the loans were arranged with employers and two were through cocoa cooperatives (CCI).

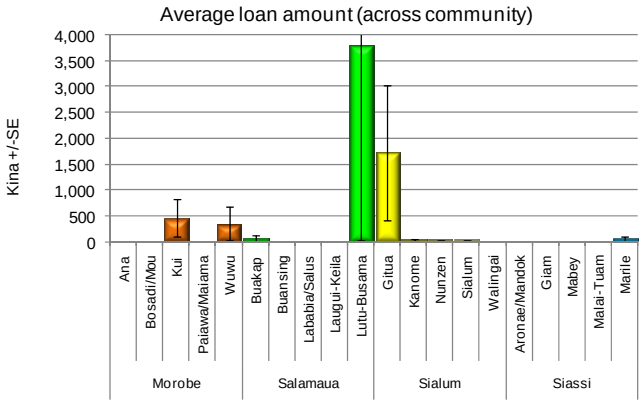
The most important reasons for taking loans included paying for school fees (16% of loans) and buying fishing gear. About 18% of the loans reported were for personal needs or to meet customary requirements (Table 14).

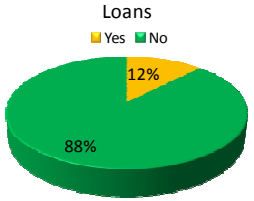
Use of loan	No.	% of loans
School fees	11	16
Buy fishing gears	8	12
Personal needs	8	12
Ceremonies / bride price	4	6
Develop farming (rice, cattle)	4	6
Household needs	4	6
Medical needs	4	6
Transport / fares	4	6
Build house	3	4
Buy fuel	3	4
Develop / stock trade store	3	4
Buy fishing boat	2	3
Buy food	2	3
Business development	1	1
Buy cocoa dryer	1	1
Buy outboard motor	1	1
Buyer of wet cocoa beans	1	1
Develop fishing	1	1
Repair motor	1	1
Settle another loan	1	1
Total	67	100

↑ Table 13: Source of loans held by households in all wards and LLGs (n=33 loans across 29 households).

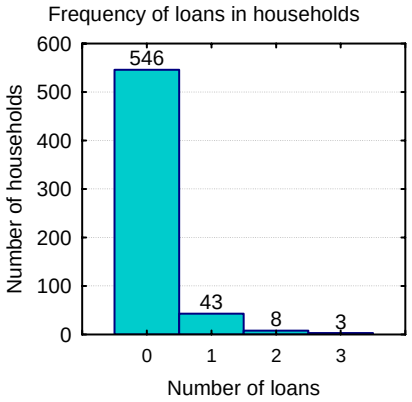
↗ Table 14: Uses for loans across all wards and LLGs.







←↑→ Figure 38: Presence, frequency and average size of loans in households by ward and LLG. In the bar graphs at left, data are given for just those households with loans and as averages across communities (n=68 loans).



HH-Q35 Contributions from different income sources

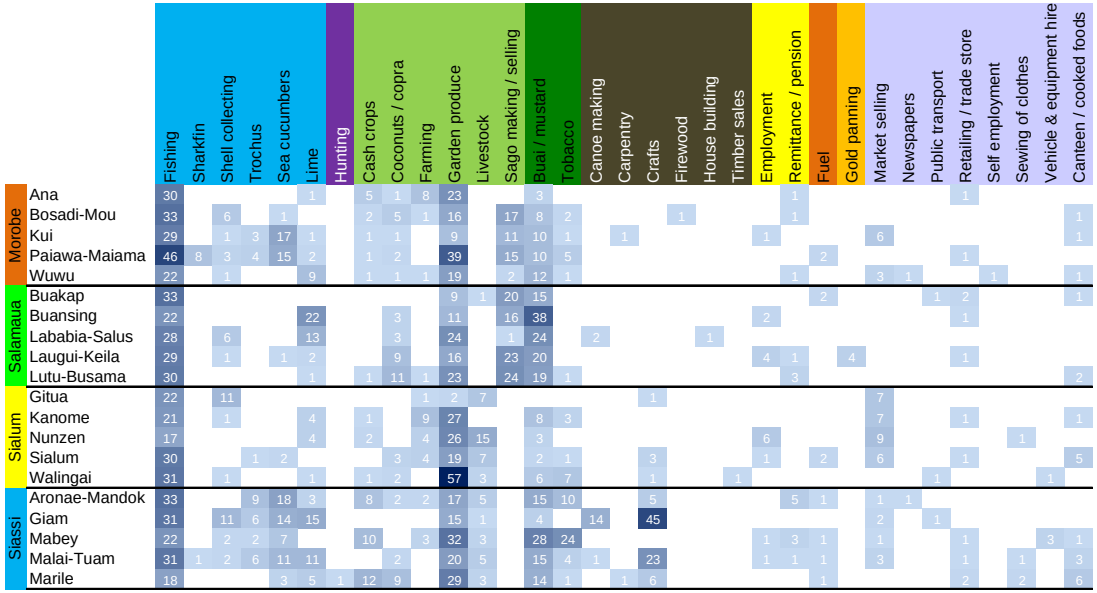
How much income comes each month from each of the activities carried out by all members of the household?

Income to the household comes from a wide range of sources, including fishing and hunting, primary production, selling of goods at markets, employment, services and businesses. More than 30 broad classes of income generating activities were identified during the survey (Fig. 39).

Sources of income	No.	% responses
Fishing	558	26
Lime	94	4
Sea cucumbers	89	4
Shell collecting	46	2
Trochus	31	1
Sharkfin	9	0.4
Hunting	1	0.0
Garden produce	433	20
Sago making/selling	129	6
Coconuts/copra	54	3
Livestock	50	2
Cash crops	45	2
Farming	34	2
Buai/mustard	254	12
Tobacco	60	3
Crafts	84	4
Canoe making	17	1
Carpentry	2	0.1
Firewood	1	0.0
House building	1	0.0
Timber sales	1	0.0
Employment	16	1
Remittance/pension	16	1
Fuel	10	0.5
Gold panning	4	0.2
Market selling	45	2
Canteen/cooked foods	22	1
Retailing/trade store	12	1
Sewing of clothes	4	0.2
Vehicle/equipment hire	4	0.2
Public transport	3	0.1
Newspapers	2	0.1
Self employment	1	0.0
Responses	2132	100
Households	599	

The four activities that contributed the largest amount to monthly household incomes were raising and selling livestock, retailing, re-selling fuels (kerosene and "zoom"), and carpentry (Fig. 40). The top ranked activity, raising livestock, was reported to generate an average of K725 per month, while carpentry generated around K525 per month. Although these were the activities that

← Table 15: Sources of income across all wards and LLGs (n=2,166 sources of income and 599 households).

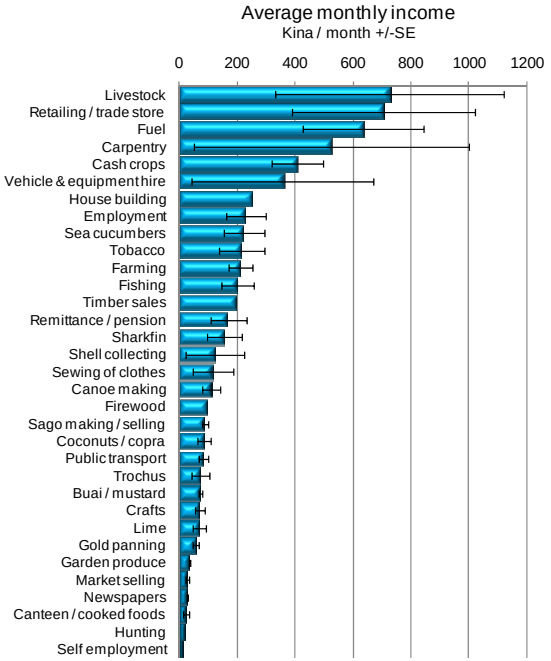


↗ Figure 39: Frequency of involvement in sources of income to households by LLG and ward. Title colours match the groupings shown in Table 15.

↘ Figure 40: Sources of income in rank order of average kina contributions to total household income across the survey (n=2,159 sources).

generated the most monthly income, they were not the most commonly used as income sources (Table 15). Of the 2,166 responses, only 3% were involved in these four activities.

The most commonly used income generating activities were fishing, growing and selling garden produce (including fruit, vegetables, nuts and root crops), and selling betelnut (buai) and mustard. The average monthly contribution to household income from fishing was around K200. Garden produce on average contributed K35/month and selling betelnut and mustard around K73/month.



HH-Q36 Costs of living

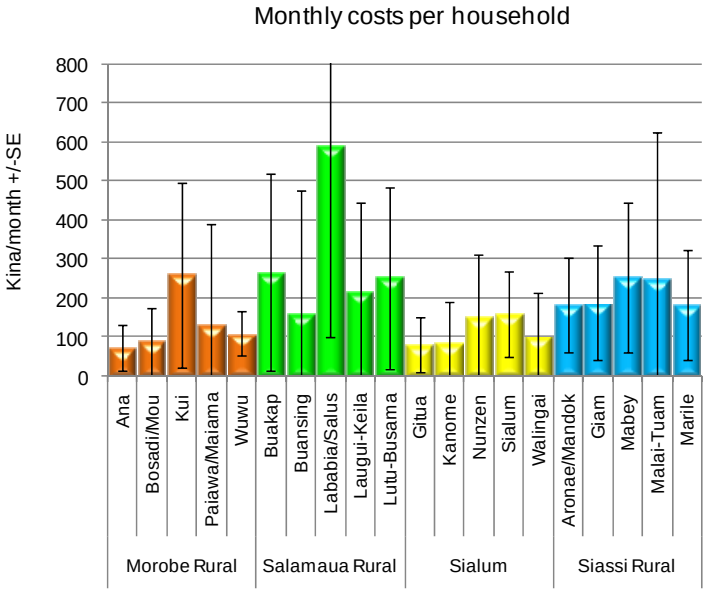
How much money do you estimate is spent on the following items per month? Please add other items not listed here.

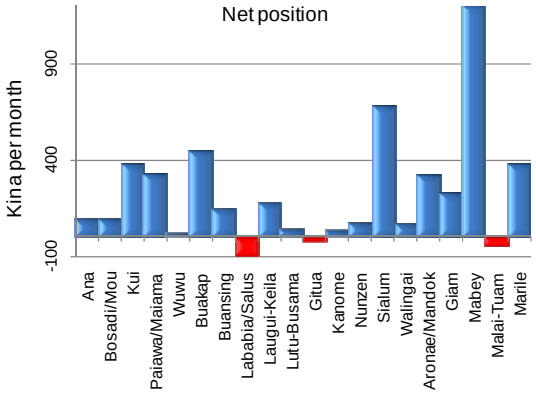
The average monthly cost of running a household in the survey area was K180 (+/- 222 SD). This is about 43% of the average monthly household income reported in HH-Q33, suggesting an average surplus income of around K240 per month.

Households in Salamaua and Siassi LLGs tended to have the highest costs (averaging K210-263/ month), while those in Sialum averaged lower costs (around K114 / month). In terms of wards, people in Lababia-Salus reported the highest per household costs per month at an average of K588. Their average income was K491/month, leading to an average short-fall of around K97 per month per household. The second most costly ward was Buakap, which reported less than half these monthly costs at K266 per month. The least expensive ward was Gitua at reported costs of just K83 per household per month. Gitua also has the lowest average monthly income and reports a shortfall of around K24 per household per month (Fig. 41).

Fuel was the greatest expense for households across the survey area (Fig. 42), which, depending on the household, could account for as much as 52% of overall costs. The average monthly cost of fuel depended on whether it was used for driving land vehicles, for fishing, or for transport. Used in fishing, fuel costs averaged K181 per household per month. Food was the second greatest expense, costing around K53 per month.

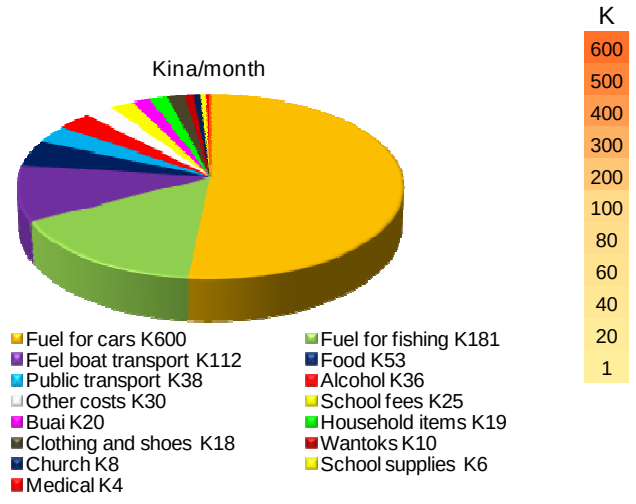
LLG	Ward	Fuel for cars	Fuel for fishing	Fuel boat transport	Food	Public transport	Alcohol	Other	School fees	Buai	Household items	Clothing and shoes	Wantoks	Church	School supplies	Medical
Morobe	Ana		155		14	28	8	17	28	3	10	14	1	3		2
	Bosadi/Mou		1	24	30	40			17	14	9	6	3	4	2	3
	Kui		259	183	81	38	3	92	13	9	24	15	8	9	1	3
	Paiawa/Maiama		140		40	24	42	10	18	7	35	25	5	4	2	4
	Wuwu			19	47	30	43		4	6	8	12	7	4	4	4
Salamaua	Buakap		333		86	63	55	8	51	8	26	15	38	10	14	2
	Buansing	600		600	43	13	44		9	12	18	10	10	6	3	6
	Lababia/Salus		767		272	69	90		57	17	53	60	7	19	2	21
	Laugui-Keila		300		52	63	53		36	17	22	14	23	7	3	3
	Lutu-Busama		172	57	68	30	24	24	35	12	27	31	10	17	26	11
Sialum	Gitua				33	19	17	9	14	27	7	7	9	4	2	5
	Kanome				23	24	200		19	13	8	12	3	2	3	1
	Nunzen				39	45	50	4	13	22	16	21	8	14	5	4
	Sialum		220	1	39	35	4		18	36	17	10	4	5	5	4
	Walingai				38	15			10	23	20	5	5	4	1	2
Siassi	Aronae/Mandok		43	6	49	25	8		30	33	13	9	8	7	4	3
	Giam			229	57	26		40	27	23	32	23	11	14		3
	Mabey		103	197	59	93	13	31	16	29	25	49	20	6	2	0
	Malai-Tuam		308	240	44	38			34	25	21	18	9	12	17	7
	Marile		75		64	24	5		64	22	15	13	4	9	10	5





↔↑ Figure 41: Average aggregated costs per household per month and net position (average income minus average costs) across all LLGs and wards (n=536).

↑↓ Figure 42: Breakdown of monthly household costs for each ward and over all LLGs and wards (n=3,861 cost items).



HH-Q39 Disposal of seafood not sold

Do you ever have fish left over that you cannot sell? Very often/Often/Sometimes/Rarely/Never. What do you do with them?

A large percentage of people (38%) who sell their seafood reported that protein is in such demand that they never have seafood leftover from sales. As one person put it, "people rush for and buy every fish that goes into the market".

About 47% of people said that seafood was only sometimes or rarely left over. In contrast to this, around 9% of the people interviewed said that seafood was very often left over from their attempts to sell them.

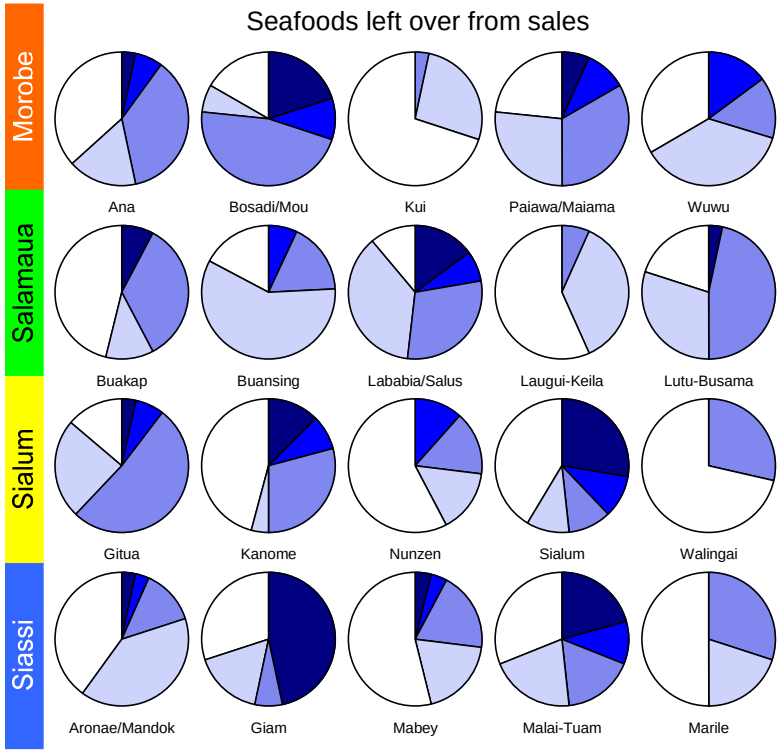
The greatest difficulty in selling seafood at market was recorded in Siassi LLG, where 16% of people said that they very often could not sell all their items (Fig. 43). People in Sialum reported the greatest ability to sell off their seafood, with 46% of people reporting that they never had seafood left over after trying to sell them.

The ward with the greatest difficulty in disposing of all seafood at sale was Giam, where 47% of people said they very often had leftovers. In Sialum, Malai-Tuam and Bosadi-Mou wards between 20% and 28% of people interviewed said that they very often had seafood leftover from sales. Most people in Walingai, Kui and Laugui-Keila wards (67-71%) reported that they never had seafood left over from sales. In Kui ward, this was accompanied by about 27% of people who rarely could not sell all of their catch, and 3% who had leftovers only sometimes.

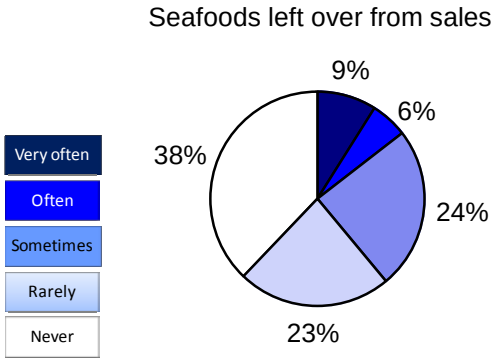
Most seafood offered for sale but not sold was eaten within the household (56%), or given them to wantoks (30%) (Table 16). Around 4% of seafood was used for bartering for other goods (e.g. garden produce, buai and tobacco), usually with inland villages. A few households said that they tried to sell the seafood at a later date. Some of this seafood was smoked if it had initially been offered fresh. These seafood items were sold at the village market, offered on the street in Lae, or in one case, offered to a local buyer.

Uses	No.	%HH
Household	257	56
Wantoks	137	30
Sell at village market	16	3
Friends	12	3
Barter	8	2
Community	6	1
Neigbours	6	1
Livestock / domestic	5	1
Barter for garden foods	4	1
Barter for buai/tobacco	3	1
Street sales	3	1
Give to non-fishers	2	0.4
Sell at discount	2	0.4
Sell to buyer	1	0.2
Sell to wantoks	1	0.2
Throw away	1	0.2
Responses	464	
Households	459	100

← Table 16: Fate, in rank order, of seafood left over from selling (n=459 households).



↑↓ Figure 43: Seafood left over from sales, across the survey and by LLG and ward (n=532).



HH-Q40-Q42 Past, present and future catches

Q40 How would you describe the catches of any marine resources made by members of this household over the past year? Very bad/Bad/OK/Good/Very Good. Explain. Q41 How would you describe the catches five years ago? Explain. Q42 What do you think catches will be like five years from now? Explain.

People's perceptions of how fishing was in the past, is now, and will be in the future shows a belief that things will get worse in the future. Figure 44 shows plots of people's opinions on whether fishing was "very good" through to "very bad" in their opinion for these three time frames. We used an intuitive colour coding of responses with green = things are good and red = things are bad (see legend for details). This shows a significant shift from dark green towards red from past and present to future. The number of people believing that catches were "very good" declined from 41% in the "five years ago" time frame, through 31% over the past year and further, to 16% into the future. At the same time, there was a large increase in the number of people who thought catches were "very bad", from 1% in the past up to 7% in the future. The "bad" category increased much more, from 5% in the past to 22% in the future. The number of uncertain people ("Don't know") increased by a similar amount, growing from 6% in the past to 18% in the future.

This pattern was generally consistent throughout the survey area, in all LLGS and wards. People in Kui, Sialum and Lababia-Salus wards were the most concerned about the future of marine resources. People in Nunzen were the most optimistic about the future of fishing in their area.

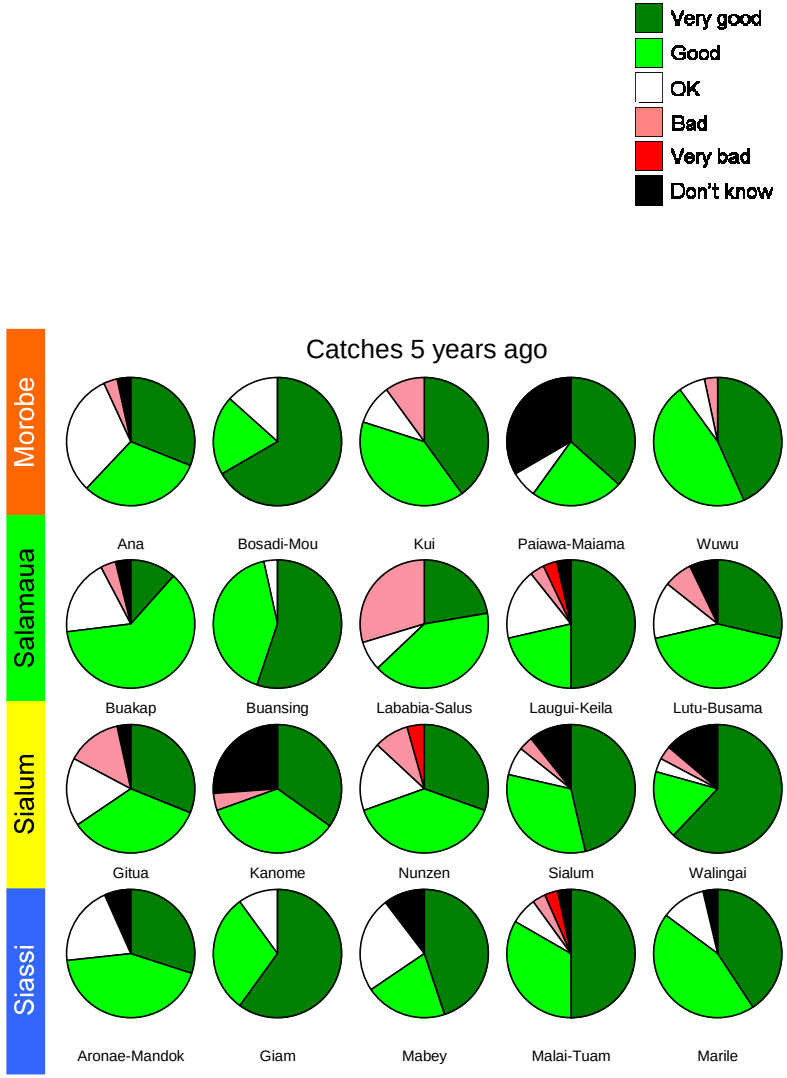
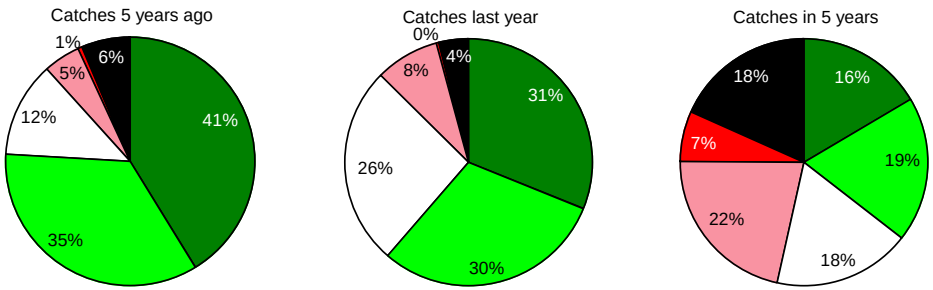
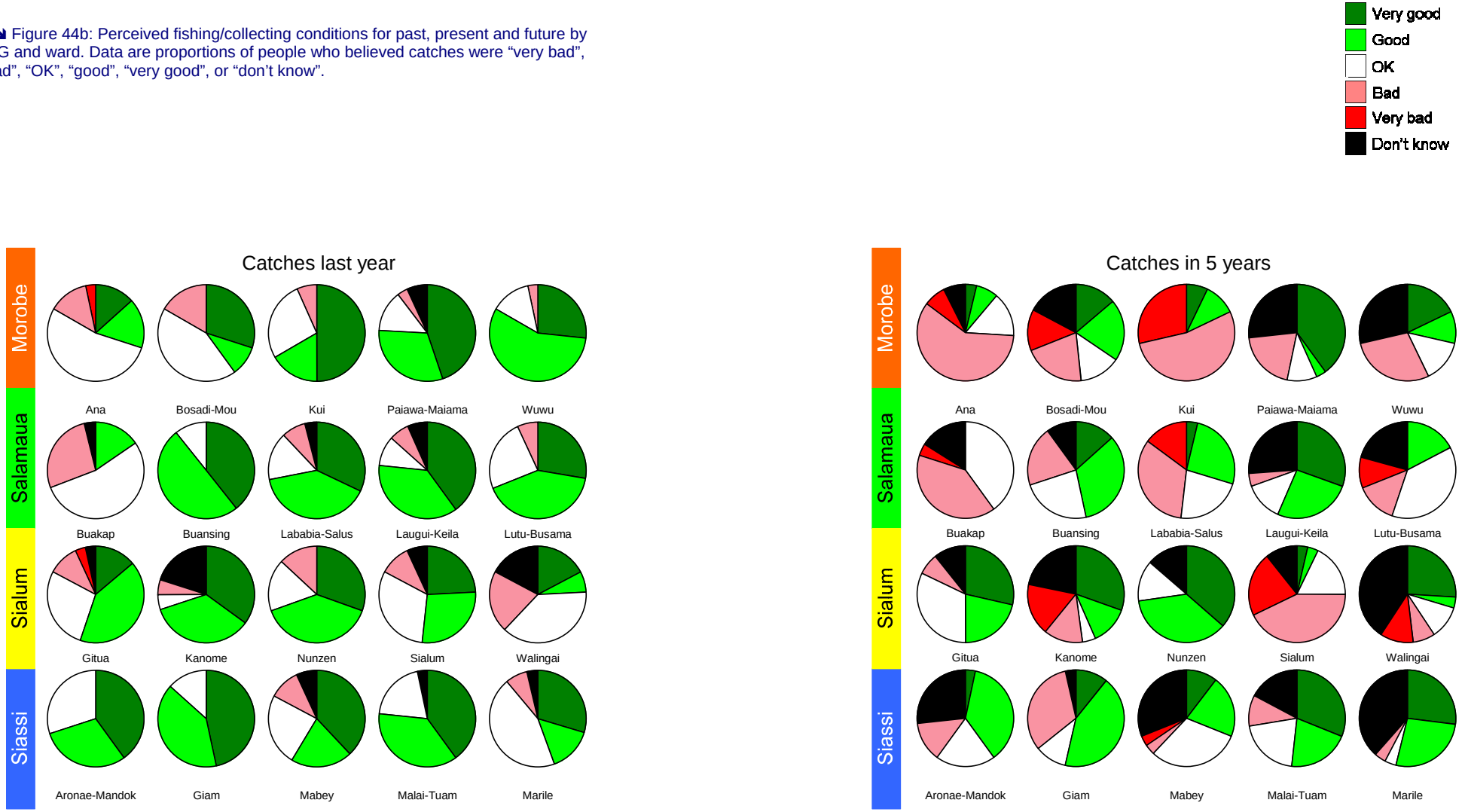


Figure 44a: Perceived fishing/collecting conditions for past, present and future combined across all LLGs and wards. Data are proportions of people who believed catches were "very bad", "bad", "OK", "good", "very good", or who "don't know".



↙↘ Figure 44b: Perceived fishing/collecting conditions for past, present and future by LLG and ward. Data are proportions of people who believed catches were “very bad”, “bad”, “OK”, “good”, “very good”, or “don’t know”.



Reasons catches will decline	No.	%HH
Effort-related		
Interest in fishing increases	10	5
Transport problems	6	3
Encouragement is needed for market	4	2
More gears are needed	1	0.5
Ice is needed	1	0.5
Income from fishing improves	1	0.5
Need to use very good bait	1	0.5
Current fishing effects		
Overfishing	34	16
Nets / destroy young fish	14	7
Modern technology	12	6
Fishing for money	4	2
Illegal techniques	1	0.5
Lime production	1	0.5
Longlines	1	0.5
More fishing knowledge	1	0.5
Resources are sensitive to overuse	1	0.5
Use destructive to get fish quickly	1	0.5
Young fish are being killed	1	0.5
Management		
Destructive methods	28	13
Fishing increases	28	13
Too many fishers	9	4
Companies take fish	8	4
No management	5	2
Buyers come frequently	2	1
Foreigners take fish	2	1
Outsiders	2	1
Area for fishing limited	1	0.5
Consumption rates increase	1	0.5
Damage to breeding	1	0.5
Lazy and use destructive methods	1	0.5
Light fishing	1	0.5
Environmental / natural		
Human population increase	76	36
Resources move / scared away	15	7
Pollution	14	7
Fish learn / smart	12	6
Weather unfavourable for fishing	8	4
Logging	6	3
Sea-level rise / tide / currents	5	2
Reef growth froms seawalls / shallowing	5	2
Mining	3	1
Bait / fish food has/will decline	3	1
Environmental damage / disturbance	3	1
Boats create noise	2	1
Noise in environment	1	0.5
Effects expected		
Resources already poor / declining	28	13
Will have to go further to fish	7	3
Resources, especially nearby will finish	6	3
People will have to work harder to catch	2	1
Reasons	380	
Households	212	

Reasons given for why catches of marine products will decline or increase in the future fell into five main categories related to:

- Fishing effort
- Effects of fishing
- Existing limits to effort
- Management
- Environmental/natural effects.

People gave about 20% more reasons for why catches would decline in the future than they did for why they might remain steady or increase (Table 17).

About 8% of all responses were concerned with how fishing effort might affect future catches, sometimes regardless of the condition of the underlying resources. In contrast, the majority of people focused on mechanisms that might affect the resources themselves.

People who focused on the future of catches through fishing effort reported that catches would decline in the future because of continuing or worsening problems with transport, poor markets, and a lack of gear and ice facilities. More indirectly, this caused concern because an increase in interest in fishing was expected to lead to additional pressure on resources, leading to their decline.

An increase in catches related to effort was seen as resulting from finding new resources to exploit, improving fishing gear, technology and training, and an improvement in overall weather patterns.

In terms of the condition of the resources themselves, people reported a range of poor and good fishing practices that if used would eventually lead to declining or improved catches in the future. The most important reasons leading to a decline were overfishing, use of nets and modern fishing methods. Resources are expected to remain in good condition because fishing effort is limited by few people fishing and poor weather conditions. Interestingly, the conditions that make deriving an income from fishing difficult, such as a lack of markets, poor equipment and high costs, were also seen as mechanisms that protect resources.

Management of fishing and resources was the subject of 23% of all responses. This included a range

Reasons catches will remain steady or improve	No.	%HH
Effort-related increases		
New species / grounds / stocks will be found	11	5
New techniques introduced	9	4
Improving gears will lead to better catches	5	2
Weather improves	3	1
Good markets will increase interest	2	1
Can spread effort to increase catch	1	0.5
Catch depends on comittment to fishing	1	0.5
Good fishers will get good catches	1	0.5
Training	1	0.5
Existing limits to effort		
Few people fish	14	6
Frequent bad weather prevents overfishing	4	2
Lack of markets	4	2
Catches limited to subsistence only	3	1
Gear is inefficient	2	1
Don't have boats	1	0.5
High fuel prices	1	0.5
No fishing companies	1	0.5
Only catch a few	1	0.5
Management-related		
Use wisely / conserve	25	12
Management	15	7
Don't use destructive methods (rotenone, small nets)	9	4
Seasonal (weather) fishing allows recovery / breeding	5	2
Community-based management (CBM)	3	1
Regulations followed	3	1
Resources are underused	3	1
NFA / Govt takes control of resources	2	1
Community enforcement	1	0.5
Exclude outsiders	1	0.5
Good methods now (non-destructive)	1	0.5
Limit number of fishers	1	0.5
Grounds rested so catch should be good	1	0.5
Undersized resources not caught	1	0.5
Use lines and not nets	1	0.5
Use traditional methods	1	0.5
Natural reasons		
Plenty of fish / resources	77	35
Resources will multiply / breed	29	13
There are good catches now	18	8
Reefs are growing	10	5
Marine environment is untouched	7	3
It is hard to finish-off resources	6	3
The resources will stay in our reefs	4	2
Environment will stay the same	3	1
There are many islands	3	1
There are many reefs	3	1
No reason for it to change	3	1
No threats / worries	2	1
Sea area / water is rich / good	2	1
Resources won't run out	2	1
God made them, they will always be there	1	0.5
Increase in sea cucumbers is leading to return of fish	1	0.5
The changes are natural	1	0.5
Reef acts as bank for fish	1	0.5
Reasons	311	
Households	217	

↖↗ Table 17: Reasons given for why seafood catches would decline (left) or improve (right) in the future (n=691 reasons given).

of mechanisms relating to self-regulation and management through institutions.

People felt that destructive fishing methods and increases in fishing, including too many fishers, were some of the most important reasons that catches could decline in the future. About 12% of households concerned about declines were concerned that companies, foreigners and outsiders (other villages) would lead to declines.

To prevent declines in seafood catches, respondents advocated using resources wisely, not using destructive methods such as nets and rotenone (*Derris* root), and following regulations.

A range of environmental factors were quoted for leading to the future declines of resources. The most important one, quoted by 36% of households, was an increase in the human population. About 7% of people said that resources would simply move or be scared away. A range of other environmental factors such as pollution, logging, changes in tides and currents, and mining were also raised.

HH-Q43 Factors affecting catches

What do you think can affect the numbers of fishes, sea cucumbers, shells, clams, seaweed, crabs, lobsters and corals in the sea? Rank the threats to fisheries in order of importance.

The factors thought by people to affect the abundance of sea food in their areas fell into three broad categories: 1) broad drivers that affect how much pressure there is on fishing, 2) specific fishing/collecting practices or activities, and 3) environmental conditions. Of these, the factor considered the most important in the survey area was specific fishing/collecting activities (Table 18).

The most significant fishing activities thought to affect catches were the use of poison rope (rotenone or *Derris* root) and dynamite, mentioned by 56% and 40% of households respectively. The ranked score for poison rope was 1.4 times greater than that for dynamite, and four times greater than the most important environmental factor. The use of nets, particularly those with small mesh sizes, was ranked third of the fishing activities. In addition to killing juvenile fishes, people were concerned that the nets caught unintended bycatch (especially in commercial fishing), and in the village, nets were causing damage to reefs. A range of other fishing activities were identified as factors affecting catches, including coral harvesting for lime production, diving, light fishing, and outsider fishing.

In terms of environmental impacts on catches, people generally saw pollution as the most significant factor. The most important form of pollution was from oil and fuel spills, urban and industrial pollution (including sewage, plastics and detergents), and chemical pollution. People frequently singled out pollution from logging or logging ships.

The main drivers thought to be operating behind the scenes to cause these many effects was increasing human population, leading to overfishing or uncontrolled fishing.

➔ Table 18: Factors thought to affect seafood catches (n=600 households). Values are weighted scores for each factor identified, calculated by summing the ranked scores using values: Rank 1 (most important)=7, Rank 2=6, Rank 3=5, rank 4=4, Rank 5=3, Rank 6=2; Rank 7=1.

Factors affecting catches	Score	No.	%HH
Drivers			
Population growth	133	21	4
Overfishing	65	10	2
Uncontrolled fishing	6	1	0.2
Fishing activities			
Poison rope	2087	334	56
Dynamite	1462	240	40
Nets / small size / damage reef	291	53	9
Coral harvesting for lime	124	22	4
Undersized harvesting, nets & hooks	98	20	3
Diving / spearing / Light fishing	70	13	2
Commercial fishing	66	12	2
Sea cucumber harvesting	39	6	1
SCUBA diving	21	5	1
Modern fishing	20	3	1
Outsider fishing	19	3	1
Seafood processing wastes (guts)	11	2	0.3
Harvesting sea cucumber	10	2	0.3
Different baits	5	1	0.2
Environmental			
Fuel and oil spills / pollution	507	90	15
Urban & industrial pollution	445	82	14
Chemical pollution	379	67	11
Weather / tides / current changes	186	31	5
Damage to reefs / fish habitat	154	29	5
Logging	143	24	4
Mining	93	17	3
Pollution from ships	73	12	2
River floods / siltation	66	11	2
Erosion/silting	49	10	2
Earthquakes & landslides	36	7	1
Damage to mangroves	23	4	1
Noise pollution	20	3	1
Natural disasters (e.g. tsunami)	17	3	1
Natural mortality and predation	13	2	0.3
Anchor damage	11	2	0.3
Volcanos	10	2	0.3
Crown-of-thorns	7	1	0.2
Too many boats disturbing our fishing	7	1	0.2
Crocodiles prey on fishes	6	1	0.2
Fish diseases	6	1	0.2
Fruits from certain trees can affect reefs	6	1	0.2
Logging ships	6	1	0.2
Using reef for building materials	6	1	0.2
Blocking lagoon entrance	5	1	0.2
Sorcery	17	3	1
Nothing		85	14
Don't know		51	9
Responses	6842	1322	
Households		600	100

HH-Q45 Solving problems with fishing

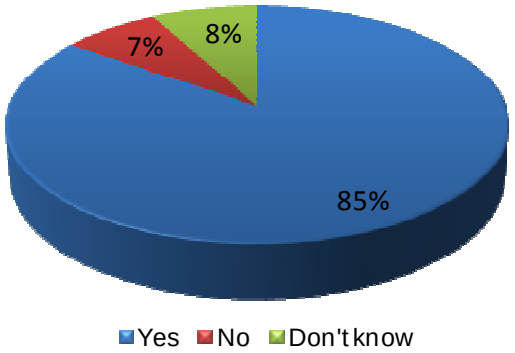
Are there any problems with fishing/collecting (fishes, sea cucumbers, shells, clams, seaweed, crabs, lobsters, corals any others) around this village? What problems? If there are any problems with fishing, what do you think should be done to improve things? What should be done? Who should do it?

The majority of people interviewed (85%) thought that there were problems with fishing or collecting in their areas (Fig. 45). Most of the problems raised related to overfishing and the use of destructive fishing methods. There was also concern over declining resources, particularly sea cucumbers, and the long-term impacts of increasing population, the effects of pollution, logging and outsider fishing (including foreigners, commercial fishing and people coming from other villages) (see also Q43).

A large number of suggested actions for addressing the problems were proposed and are summarised in Table 19a. These included general actions not directed at any particular implementing party or agency, community actions and specific approaches to authorities for assistance with the problems. Approaches for improving the resources and environment on which they depend were also suggested. Overall, there was a diversity of opinions, with none being suggested by more than one-fourth of the households.

About 23% of people interviewed suggested that community meetings and discussions were needed to consider the issues. About 8% of people suggested the assistance of community leaders, elders, of local government representatives. Only 4% of people suggested seeking advice from Provincial Fisheries and 0.5% from NFA.

The most important actions suggested were to create laws and rules to control fishing (17% of households) and a non-specific need to "address and solve" the problems (16%). About 10% of responses were concerned with mechanisms for "preserving" the resources and breeding areas. Eight percent of people interviewed thought that some fisheries should be closed, some quoting a period of around two years. A further 2% suggested setting up conservation areas as a way of protecting resources. Other suggestions for preserving resources included addressing pollution issues and establishing fish aggregation devices (FADs), and aquaculture as ways of reducing pressure.



← Figure 45: Opinions on whether there are any problems with fishing/collecting in respondent's areas (n=522 households).

General	No.	%HH
Laws and rules	70	17
Address & solve problems	67	16
Education / awareness / training	31	7
Legal action	15	4
Punishment / fines	7	2
Mediation with offenders	7	2
Control practices	4	1
Enforcement	2	0.5
Tougher penalties	2	0.5
Avoid bad fishing weather	1	0.2
Declare season for damaging methods	1	0.2
Make tough decisions	1	0.2
Prevent foreigners fishing in village areas	1	0.2
Violence against offenders	1	0.2
Community / local government approaches		
Community discussions	97	23
Leaders / elders / councillors solve	35	8
Citizen action / self responsibility	11	3
Inform community	11	3
Community law & enforcement	10	2
Community action	7	2
Inform leaders	7	2
Establish tambus	5	1
Use traditional fishing methods	3	1
Create committee to address	1	0.2
Community descision	1	0.2
Court	1	0.2
Enforce traditional rules	1	0.2
Leaders seek external assistance	1	0.2
Traditional calling fish back	1	0.2
Other		
Nothing can be done	4	1
Problem can't be fixed (e.g. weather)	4	1
I can't do anything	1	0.2

Conservation approaches	No.	%HH
Fisheries closures	32	8
Create conservation areas	7	2
Pollution practices improved	4	1
Regulations for ships	4	1
Make conservation a priority	3	1
Closure till recovery	2	0.5
Preserve breeding areas	1	0.2
Monitor breeding / recovery	1	0.2
Monitor fishing	1	0.2
Aquaculture	1	0.2
Establish FADs to preserve	1	0.2
Instruct companies not to pollute	1	0.2
Limits or bans		
Ban poison rope (derris)	28	7
Ban small nets	9	2
Ban destructive fishing	6	1
Ban dynamite	6	1
Ban nets around reefs	2	0.5
Ban sea cucumber fishing	1	0.2
Limit nets	1	0.2
Limit use of resources	1	0.2
Use handlines only	1	0.2
Fisheries / Government		
Advice/help from Fisheries	18	4
Advice/help from Government	12	3
Report offences to Fisheries	12	3
Advice/help from NFA	2	0.5
Report offences to Govt authorities	2	0.5
Report offences to NFA	2	0.5
Checks by Fisheries Officers	1	0.2
Advice/help from Dept Environment	1	0.2
Fishers should report to Fisheries	1	0.2
Control commercial fishing	1	0.2
Responses	571	
Households	416	

➔ Table 19a: Proposed actions for addressing fisheries problems (n=416 households).

When asked who should fix the problems with fisheries, about 45% of people suggested that the communities themselves should fix their problems, often in association with other parties (Table 19b). About 31% of households suggested that community leaders should be involved in solving the problems. NFA was suggested by 13% of people and "the government" by another 12%. Provincial Fisheries was mentioned in only 7% of households.

↙ Table 19b: Who should solve fisheries-related problems? (n=511 households).

Who should solve?	No.	%HH
Community	230	45
Community Leaders	160	31
NFA	65	13
Government	59	12
Provincial Fisheries	36	7
Ward Dev Committee (WDC)	26	5
Fishers	22	4
Magistrate	20	4
LLG Members	13	3
Provincial Government	10	2
Authorities	9	2
Village Planning Committee (VPC)	7	1
Individuals	6	1
Church elders / groups	5	1
Resource owners	4	1
Those directly involved/disputing	4	1
NGOs	3	1
Law-makers	3	1
Village Court	2	0.4
God (through prayer)	2	0.4
Family / clan	2	0.4
Ward Members	1	0.2
Police	1	0.2
Local authorities	1	0.2
Fishing experts	1	0.2
Companies	1	0.2
Don't know	16	3
Responses	709	
Households	511	

← Table 20: Role of household members in addressing fisheries problems.

Is there a role?	No.	%HH
Yes, there is	402	75
Don't know	81	15
No role	39	7
No power	12	2
Govt should do it	2	0.4
Not my problem	1	0.2
Leader should	1	0.2
Not interested	1	0.2
Households	539	100

HH-Q46 Role in addressing problems with fishing

What role can you and members of your household play to address any fishing problems?

Most people (75%) believed that they had a direct role to play in addressing fisheries problems. Only very small numbers said that they were not interested, that it was not their problem, or thought that leaders or authorities should do it all (Table 20). A significant number of people (12) felt that they had no power to do anything to address problems with fishing. Some of these said so because the problem was the weather and therefore unchangeable, and others because the use of poison rope and other practices were so entrenched that they would be impossible to stop. About 7% of people felt they had no role, and 15% did not know if they could play a role in addressing fisheries problems.

People cited a wide range of things they felt they could do to assist (Table 21). The most common was in the area of public awareness and education, reported by 23% of people. In a few cases, respondents were teachers and said they could help by teaching school children. The second most commonly cited role people could play was in the area of self responsibility, where they would simply observe all rules and stop destructive practices. In one case, this assertion was followed by the caveat that laws would be followed only if they were actually enforced.

↓ Table 21: Role that household members could play to assist with dealing with fisheries problems (n=482 suggested roles, 398 households).

Role people could play	No.	%HH
Awareness / Education	91	23
Follow rules / stop destructive practices	79	20
Discuss / raise with the community	52	13
Cooperate / assist leaders / community	49	12
Contribute ideas / discussion	36	9
Report violations to leaders / NFA / Fisheries	33	8
Discuss with the family	29	7
Support others / contribute efforts	20	5
Advise / encourage better methods	12	3
Enforce / assist rules	11	3
Discuss / assist authorities	7	2
Discuss with leaders	7	2
Lead by example / look after our reefs	7	2
Talk directly to offenders	7	2
Advise how to solve problems	3	1
Observe tambus	3	1
Advise against bad practices	2	1
Ask leaders to raise issues with authorities	2	1
Ban use / close my areas	2	1
Organise village groups	2	1
Provide information on problems	2	1
Request assistance NFA / Fisheries	2	1
Surveillance of rule-breakers	2	1
Advice on traditional methods	1	0.3
Ask leaders to talk to community	1	0.3
Ban family members from fishing	1	0.3
Consult with coastal people who know	1	0.3
Convince authorities to make laws	1	0.3
Support Fisheries	1	0.3
Create & enforce rules	1	0.3
Destroy poison rope crop	1	0.3
Discuss / assist Fisheries	1	0.3
Discuss Church groups	1	0.3
Encourage management	1	0.3
Get family involved in managing resources	1	0.3
Formulate & implement rules	1	0.3
Get angry with offenders	1	0.3
Help clean up environment	1	0.3
Negotiate with company to stop damage	1	0.3
Share in decision-making	1	0.3
Stop outsiders	1	0.3
Stop people using nets on my reef	1	0.3
Sue logging company	1	0.3
Use FADs	1	0.3
Responses	482	
Households	398	

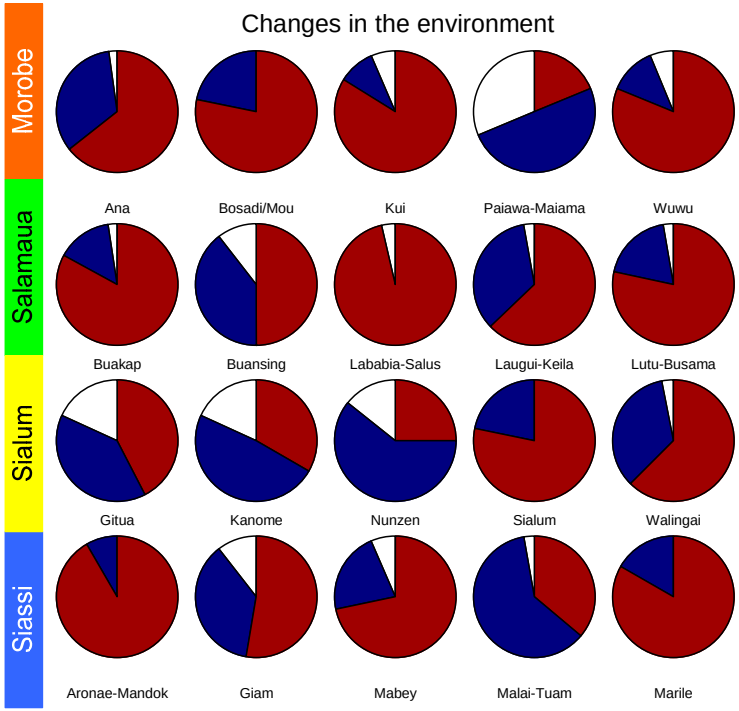
HH-Q47 Changes in the environment

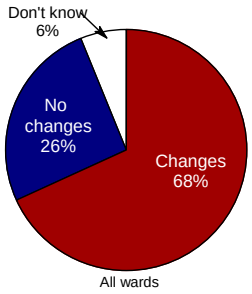
Have you noticed any changes in the marine environment around your village in the last five years? What changes? Rank their importance. How great is the change? Have these conditions improved or declined?

About one-fourth of all people interviewed said that they had not noticed any environmental changes in their area. Some (6%) reported that they did not know or were not aware because they did not get involved in fishing or other marine activities (Fig. 46). The majority of people (68%) reported noticeable changes in their marine environment over the past five years, with 61% of people saying the changes were "very big". Only 13% of people reported changes that they thought were minor.

The greatest number of changes were observed in Salamaua and Siassi LLGs (70-79% of people interviewed) and the least changes reported in Sialum LLG, with 51% of people reporting changes, and 39% reporting no changes. The wards reporting the least environmental changes were Malai-Tuam, Nunzen and Paiawa-Maiama. Paiawa-Maiama was also the area in which the most people expressed uncertainty about whether there had been changes.

Most of the important observations reported were considered negative by respondents, with few people reporting welcome changes to the environment. The most significant in terms of weighted score (see Table 22 for explanation) were the use of poison rope, strong swells and higher tides (often connected with erosion of beaches and loss of habitat), and declining stocks, especially fin fishes. An interesting result includes the reporting of coral reefs as being damaged or dying by some people (score of 389) and an almost equal importance placed on reefs increasing or growing (301). In cases where reefs are growing they are seen as shallowing areas, obstructing boats and exposing "fish houses" so that fishes move away.





← Figure 46: Observations on changes in the environment over the past fie years over all wards and by LLG and ward (n=845 responses, 574 households).

Change	Score	No.	%HH
Beach accretion / blocked lagoon	40	4	1
Beach right in front of village smells	10	1	0.2
Commercial overfishing / equipment	70	7	1
Cutting / loss mangroves / shoreline trees	130	15	3
Dugong gone	10	4	1
Erosion coast / beach	420	62	11
Fish habitat / breeding damaged	15	2	0.3
Fishes declining / smaller / moved	460	71	12
Fishes frightened	1	1	0.2
Fishes increasing / new species	17	4	1
Human population growth	270	28	5
Islands forming	10	2	0.3
Lobsters declining	25	5	1
Mangroves declining	5	1	0.2
Mangroves increasing	15	2	0.3
More fishing effort / less catch	15	2	0.3
Noise pollution	1	1	0.2
Poison rope (derris) / dynamite being used	544	62	11
Pollution / runoff / oil spills / detergents	175	27	5
Random movement of seabed rocks	5	1	0.2
Reef damage for construction	10	1	0.2
Reef damage for lime	281	32	5
Reef diving	5	1	0.2
Reefs changing colour	25	4	1
Reefs damaged / dying	389	61	10
Reefs increasing / growing	301	41	7
River flooding / turbidity / sedimentation	48	16	3
Sea cucumbers declining / smaller	108	16	3
Sea cucumbers increasing	5	1	0.2
Sea temperature change	5	1	0.2
Seagrass declining / moving	15	2	0.3
Seagrass increasing / new species	1	1	0.2
Seaweeds dying	17	4	1
Sedimentation / shallowing / reef smothering	20	3	1
Shells declining	2	5	1
Strong / changing currents	86	12	2
Strong swells / high tides / sealevel rise	541	77	13
Strong winds / damage	101	12	2
Trochus declining	1	1	0.2
Weather changes	81	10	2
Responses		603	
Households		587	

↑ Table 22: Summary of responses on environmental changes seen by respondents in their areas. Data are number and % of households reporting a change (some households reported more than 1 response). A measure of perceived importance is given for each response as a total value calculated by summing scores for each change as follows: minor=1; some=5; and very big changes=10.

HH-Q48 Reef tenure

Do people in this village have tenure over the reef areas? What kind of control? If so, who owns the reef, community, clans, individuals, other?

Most people interviewed (72%) said that they had some kind of control over reefs and resources in the area in which they lived. About one-fourth of people reported that there was no tenure in their area, while 3% said that they were not sure (Fig. 47). A small number of people (2) said that tenure was held in the past but was no longer effective.

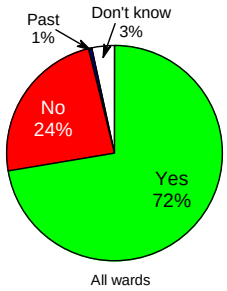
In several wards, 100% of those interviewed said that they had control over their reefs. This included Kui and Wuwu in Morobe LLG, Lababia-Salus in Salamaua and Marile in Siassi. The reverse situation was reported in Bosadi-Mou and Gitua wards in Morobe and Silaum, respectively. In those areas, people universally reported that they had no control over their reefs.

A total of 88% of the people interviewed commented on how the reef tenure was "held" in their area. The most common resource "owner" was the community at large, with some people reporting that "the community" included the entire ward (Table 23). About 21% of those interviewed said that nobody owns the reefs, with some saying that reefs belonged to everyone.

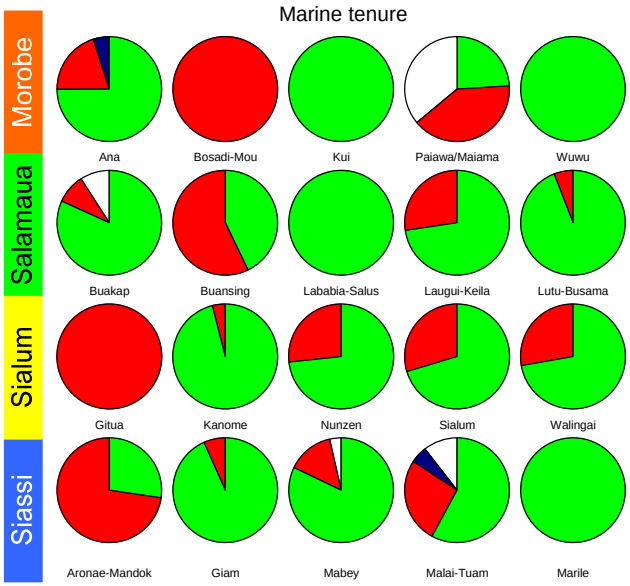
The main forms that ownership or control took was in excluding outsiders, usually from other villages. This was followed in importance by people reporting that the ownership was "traditional" and involved tambus. In some areas, ownership took the form of bans, usually on destructive practices such as the use of poison rope (*Derris* root) and dynamite. Note that dynamite at least in some cases refers to "traditional dynamite", which is another name for poison rope. In some cases, people made the point of mentioning "bombs" or "modern dynamite".

When asked about how successful or effective the control was, none of the respondents reported that it was effective. Comment was limited to 10% of households saying that there was no control, and 25% saying that there was open access to their reefs.

Most of the perceived tenure was over reefs, with people also identifying marine areas adjacent to the lands they own, or the sea in general.



↔ Figure 47: Marine tenure overall and by LLG and ward (n=383 responses).



→ Table 23: Summary of characteristics of marine tenure reported. Note that "dynamite" in this table may in many cases mean *Derris* root.

Who has tenure / control?	No.	%HH
Community	317	53
Nobody	124	21
Clan	67	11
Individuals	8	1
Ward	6	1
Open access	3	1
Family	2	0
Responses	527	88
Types		
Outsiders excluded	90	15
Traditional	52	9
Fishing rights	30	5
Tambu	30	5
Dynamite banned	25	4
Poison rope banned	23	4
Lime cutting from reefs	21	4
Verbal control	15	3
Boundaries	7	1
Can't fish in others' areas	5	1
Observe laws	4	1
Diving banned	3	1
Foreigners excluded	3	1
BDM restricted	2	0.3
Conservation policy	2	0.3
Ensure responsible use	2	0.3
Fishing restricted	2	0.3
Reef breaking banned	2	0.3
Restrict use of resources	2	0.3
Village announcements	2	0.3
Access to resource restricted	1	0.2
Collecting banned	1	0.2
Complete closure	1	0.2
Decide who can fish	1	0.2
Night fishing banned	1	0.2
Rest area for conservation	1	0.2
Rubbish / littering banned	1	0.2
Share in fishing agreement	1	0.2
Steel bars to crack reef banned	1	0.2
Washing restricted	1	0.2
Responses	333	56
Level of control		
None	62	10
Open access	25	4
Fishing in others' areas	1	0.2
Responses	88	15
Control of what?		
Reefs	70	12
Adjacent to owned land	9	2
Sea	9	2
Bays	2	0.3
Front village	2	0.3
Breeding grounds for fish	1	0.2
Islands	1	0.2
Points	1	0.2
Responses	101	
Households	600	

HH-Q49 Access to resources

Has ownership access changed over the years?

Ownership and access to resources has not changed significantly over the years for most people (85%). Only 7% of people responding to this question said that they thought the arrangements had changed recently compared with past generations (Fig. 48). Interestingly, some people said that they did not know, often because their father, grandfather or other relative had not told them the history.

Changes were recorded in seven of the 20 wards and in three of the four LLGs. The ward that recorded the most changes to the way people accessed marine resources was Nunzen, where about one-fourth of the people reported changes.

The types of changes reported are shown in Table 24. Most changes were mentioned only by a few people. The most commonly reported was a change from clan ownership in the past, to community ownership now (8 households). Changes between community, clan and individual in both directions were noted. In one case, clan ownership has shifted at least in part to "sub -clans".

Other changes reported were increasing problems of enforcement and poaching, and the need to be more vigilant because the value of resources has now been realised and people have a strong need to make money.

Several interesting reasons were given for changes in access arrangements. In several cases, community ownership was handed over to individuals in connection with a mining deal. In several cases, ownership was transferred because the previous owners (communities or clans) did not look after resources properly.

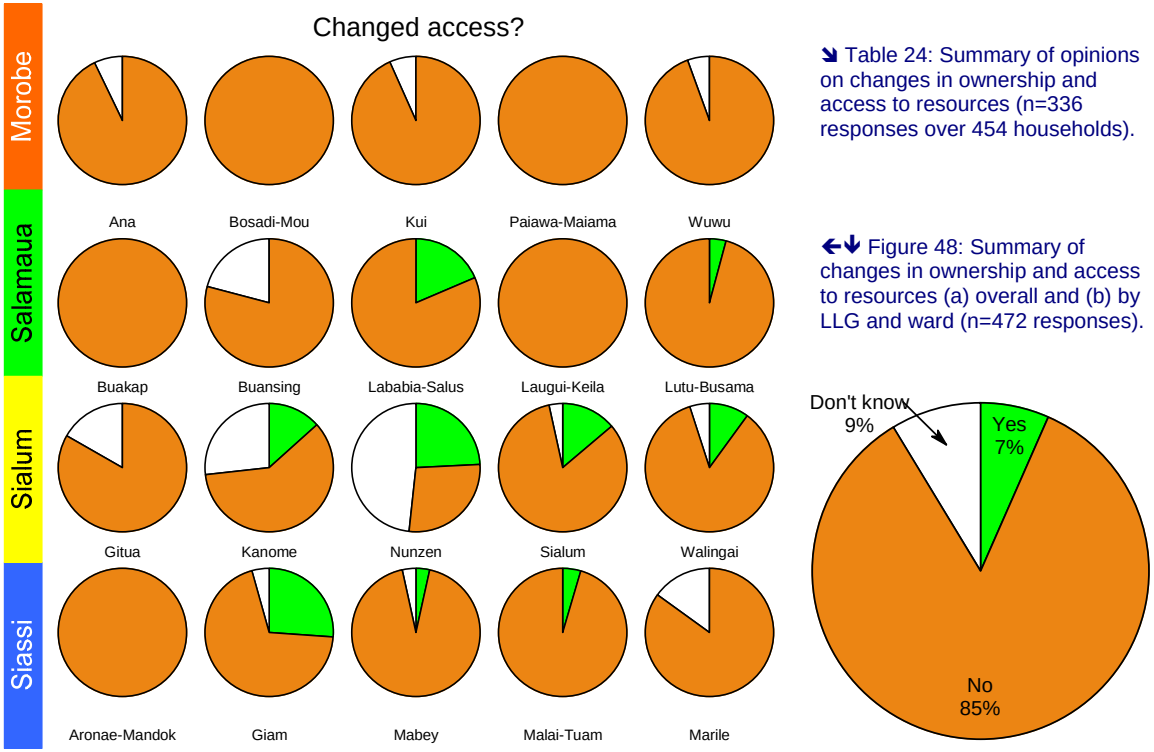


Figure 48: Summary of changes in ownership and access to resources (a) overall and (b) by LLG and ward (n=472 responses).

Table 24: Summary of opinions on changes in ownership and access to resources (n=336 responses over 454 households).

Types of changes	No.	%HH
Can't enforce ownership	1	0.2
Clan now shares with sub-clan	2	0.4
Clans in past now relatives of Clan leader	1	0.2
Clans in past, now community	8	2
Clans past, now individuals	1	0.2
Clans used to own the reefs	1	0.2
Community in past, now clan	2	0.4
Community now owns	1	0.2
Community owned, Councillor is head / has say	2	0.4
Community past, now individuals	3	1
Community past, now individuals and clans	1	0.2
Don't know	13	3
Don't know, not told by relatives	6	1
Have to be strict now because of the need to earn money	1	0.2
Have to chase outsiders away	1	0.2
Individual past, now community	1	0.2
Lot trying to get ownership, importance is now realised	1	0.2
Nearby village tries to claim our area	1	0.2
No change, things are the same as the past	287	63
Settlers are coming and causing disputes	1	0.2
Used to be open access	1	0.2
Responses	336	
Households	454	

HH-Q50 Fishing rules

Are you aware of any Government (National, Provincial and LLG), NGO or Community rules on fishing in this village or the surrounding area? What are these?

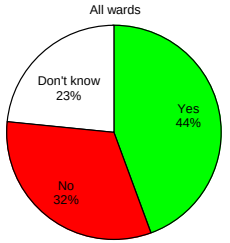
Overall, about 44% of the people interviewed said that they were aware of certain rules concerning fishing in their area and, more generally. About 32% of people said they did not know of any rules, and 23% were not sure, or did not know if there were rules. People in Giam (Siassi LLG) and Kanome wards (Sialum) were the most aware of fisheries rules. More than one-half of the people in four wards (Bosadi-Mou, Paiawa-Maiama, Nunzen and Mabey) said that there were no fishing rules, government or otherwise in their area (Fig. 49).

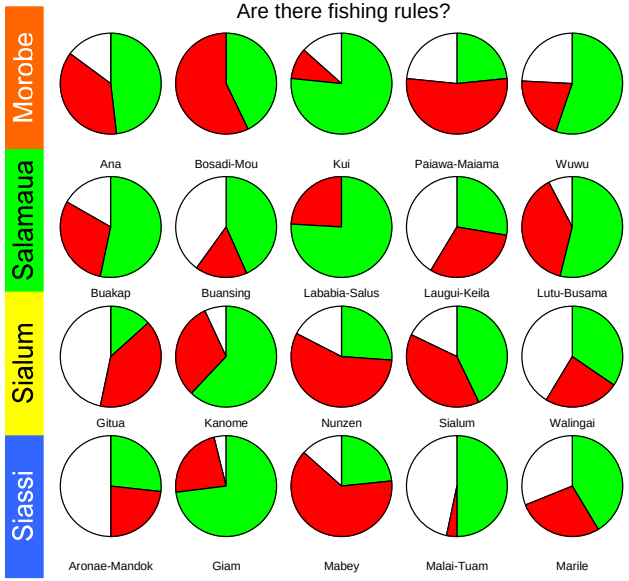
The main originators of fishing rules were the community, NGOs and LLGs. The National Fisheries Authority ranked quite low in the list of rule-makers for fisheries (Fig. 50).

A wide range of fisheries rules were reported during the survey. These included general rules on where, when and who can fish, and specific rules focused on women and customs, target species, gear used and general environmental health affecting resources. The most commonly cited rules centred on destructive fishing methods (e.g. use of poison rope and dynamite), protecting endangered species, restricting access of outsiders, and protecting undersized resources. The restrictions for turtles, dugongs and dolphins was generally connected with NGOs. For others, protecting certain species had little to do with direct benefits from resources. As two respondents put it: "do not hurt dugongs because they look like human beings; do not fish dolphins because they are lifesavers".

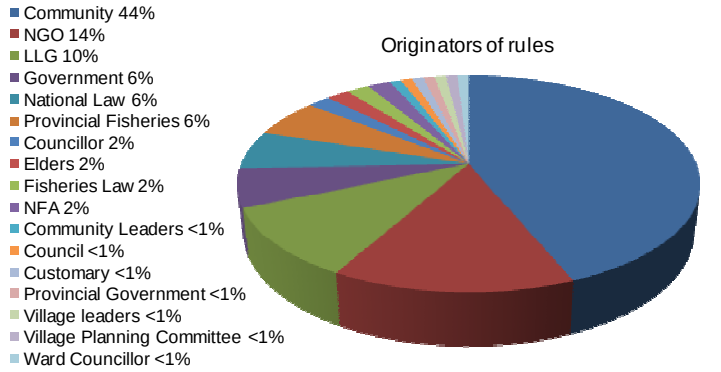
➔ Table 25: Fisheries rules known and reported by those interviewed during the household survey (n=272 households).

➔ Figure 49: Proportion of people saying that they were aware of fisheries rules applicable in their area (n=568 households).





➔ Figure 50: Authorities responsible for making, implementing or enforcing fishing rules (n=105 responses).



General	No.	%HH
Closed seasons	1	0.4
Preserve coastal vegetation	1	0.4
Commercial /foreign vessels restricted/licensed	13	5
Conservation area	4	1
No overfishing	1	0.4
Fishing rules	1	0.4
Fish habitat preserved	2	1
Look after reef / resources	20	7
Disturbance of reef, scare fish / resources	1	0.4
Boundaries for fishing areas	4	1
Don't fish in others' areas	7	3
Outsider fishing restricted	20	7
Inlanders can't fish	1	0.4
No fishing in other people's areas	1	0.4
Tambu	8	3
Temporary closure	1	0.4
Undersize	20	7
Proper fish processing before selling	1	0.4
Women and traditions		
Husbands of pregnant women banned fishing	1	0.4
No fishing when a death	1	0.4
No sex before fishing	1	0.4
Pregnant women banned fishing	1	0.4
Women outsiders not in men's fishing areas	1	0.4
Species		
Sea cucumbers ban	2	1
Sea cucumber harvesting rules	2	1
Seasonal sea cucumber closure	3	1
Sea cucumber size limits	4	1
Coral harvesting	1	0.4
Lime cutting	12	4
Dolphin hunting	11	4
Dugong hunting	26	10
Leatherback turtle hunting	31	11
Turtle hunting	6	2
Turtle egg collecting	8	3
Mangrove cutting ban	2	1
Release small fish	1	0.4
Gears		
Destructive fishing	46	17
Dynamite	63	23
Poison rope	56	21
Electric fishing?	1	0.4
Night fishing / diving	8	3
Diving	4	1
Small hooks	1	0.4
Spear / gun for certain species	1	0.4
Netting	2	1
Net mesh size restrictions	1	0.4
Netting near village	1	0.4
Nets on the reef	1	0.4
Drift nets	5	2
Poisonous net?	1	0.4
Environmental		
Detergents in the sea	1	0.4
Disposal of chemicals at sea	1	0.4
Spilling oil	1	0.4
Rubbish in the sea	3	1
Reef breaking	10	4
Companies polluting	1	0.4
Responses	429	
Households	272	

HH-Q51 Effectiveness of rules

Do you think these rules are effective? Why/Why not?

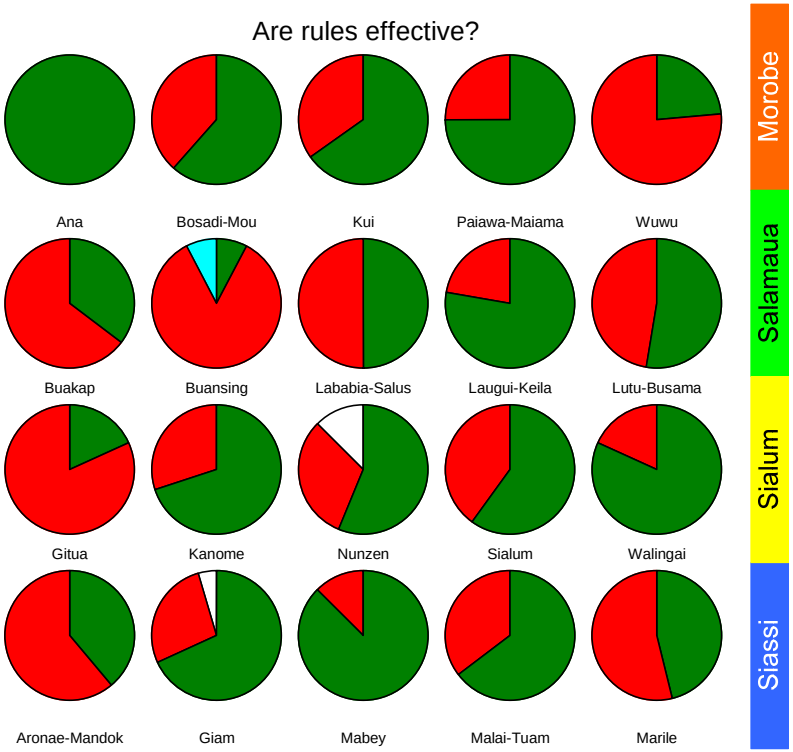
Around 58% of people said that fisheries rules in their area were effective (about 30% of respondents did not answer this question because they said there were no rules). A smaller proportion (42%) said the rules were not effective, but very few said that they did not know (Fig. 51). The ward in which the rules appear to be most effective was Ana, where 100% of people said that they thought the rules on fishing were being observed. High levels of compliance were also reported at Mabey, Walingai, Laugui-Keila, Paiawa-Maiama and Giam wards, with at least one from each LLG.

People cited evidence for why they thought rules were or were not effective. Evidence that rules were not effective in some areas included the continued use of harmful fishing methods, continued presence of "outsiders" fishing in village areas, and loss of resources ("no longer available"). Where people reported that rules were effective, the main evidence given was that harmful methods and outsiders were lessened or gone, and direct observation.

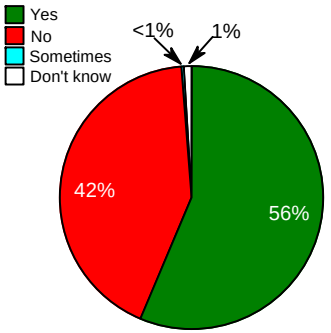
The main reasons given for the ineffectiveness of rules included "stubbornness", "ignorance", just plain ignoring the rules, and a lack of enforcement. Bad practices were used because there was a need to meet basic needs and destructive methods are seen as easier than other methods. People also cited a lack of general understanding of the mechanisms for why some practices might be bad (Table 26).

On the positive side, people do tend to respect rules and there is some awareness of the importance of marine resources.

Rules ineffective because:	No.	%HH
People are stubborn / ignorant	19	7
People ignore the rules	14	5
Not enforced	12	4
Break rules if not seen	9	3
Can do as they please on own land/territory	7	3
Need to meet basic needs	7	3
For commercial gain	5	2
Needs reinforcement	4	1
Unclear explainations / awareness	3	1
Easier methods for fishing	3	1
Lack of resources for enforcement	2	1
Ward Development Committee ineffective	2	1
Government not effective or supportive	2	1
No information on safe practices	1	0.4
Evidence		
Still using harmful methods (nets, torches, poison)	36	13
Outsiders / foreigners still accessing fishing areas	14	5
Resources / species no longer available in the area	1	0.4
Rules effective because:		
People respect / follow rules	61	23
Awareness of consequences / concern for future	40	15
Whole community is involved	19	7
Follow rules to avoid penalties / fines	14	5
People afraid of the law	8	3
People believe its effective	8	3
Traditional tambu / superstitious beliefs (curses)	4	1
Individual or community enforcement	4	1
Conscious of their reputations in the community	4	1
Enforced by the Government	4	1
Species endangered and have human characteristics	4	1
People have good attitudes	3	1
Good awareness done	2	0.7
Because companies and outsiders follow rules	1	0.4
Community afraid of police / fisheries	1	0.4
Enforced through buyers: no compliance, no sale	1	0.4
Boundaries not monitored	1	0.4
Boundaries not registered	1	0.4
Evidence		
Harmful fishing methods / tools no longer used	34	13
Decrease in use of harmful methods / tools	4	1
Don't see outsiders on reefs	2	0.7
Through experience / seeing it	2	0.7
People are fishing less	1	0.4
Responses	364	
Households	268	



↑→ Figure 51: Effectiveness of fishing / collecting rules (a) overall and (b) by LLG and ward (n=307 households, 439 including those who said there were no rules).



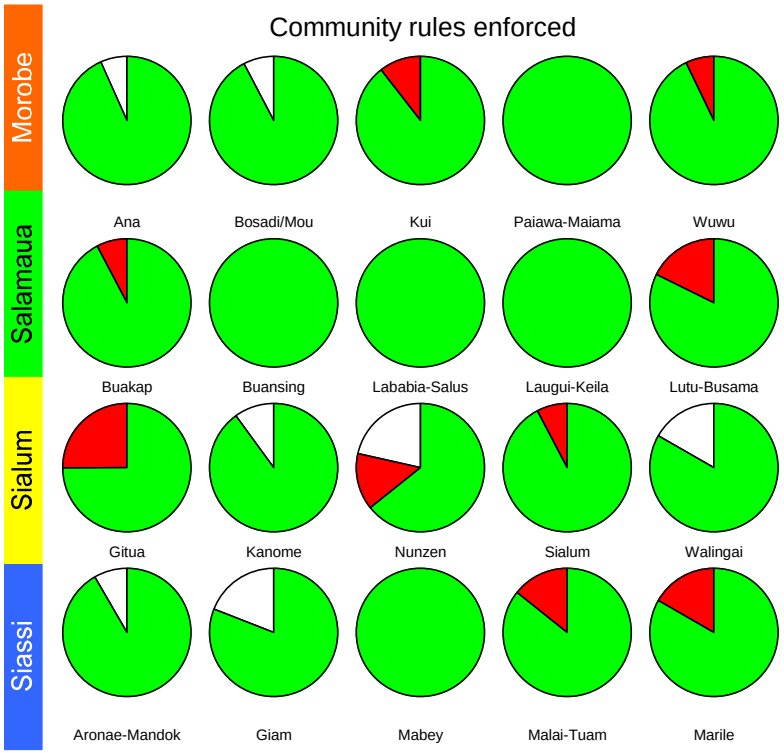
← Table 26: Reasons given for effectiveness/ineffectiveness of fishing rules (n=268 households).

↑↓ Figure 52: Are community fishing rules enforced? (n=261).

HH-Q52 Community fishing rules and enforcement

If there are community level fishing rules, how are they enforced in this village?

A total of 89% of people responding to this question said that there were community rules and that an attempt was made to enforce them. Only 6% said that rules had been made, but that they were not enforced in their area (Fig. 52). A lack of enforcement was reported in nine of the 20 wards 20 surveyed, and was reported in all LLGs. In five wards, 100% of those interviewed said that community fishing rules were present and enforced.



Community fishing rules were most often enforced by the community leaders, as reported by 58% of households (Table 27). About 20% of people said that the community-at-large played a role: "Community members keep an eye out for each other. Offenders are brought before the community during gatherings and disciplined". A range of other authorities were also reported as being involved in enforcing community fishing rules, including church leaders, fishers groups and LLGs.

The types of enforcement most often used were raising awareness (often in community meetings) and through fines and other penalties imposed by leaders and the village court. In some cases, community leaders could apply "special punishment" if the offender could not pay the K10 fine owing for an offence. Little indication was given on the kinds of enforcement that might come into play through traditional channels. There was some emphasis on self discipline, with people expected to observe markers and comply voluntarily in the interests of the community. "Power is with every villager from here if outsiders are seen around this area they are forcefully removed and put to court".

Enforced by:	No.	%HH
Community Leaders	140	58
The community	47	20
Village Court / Traditional	23	10
Church Leaders	20	8
Ward Development Committee	14	6
Fishing groups / fishers	9	4
Community Police	5	2
Turtle / Monitoring Committee	6	3
In collaboration with NFA	3	1
LLGs	3	1
Clans	2	1
Appointed individuals	2	1
Youth Groups	2	1
Resource owners	1	0.4
Enforcement type:		
Awareness / community meetings	69	29
Fines / penalties	14	6
Special punishment by leader	5	2
Tambus / traditional rules	7	3
Public notices	3	1
Verbal enforcement	3	1
Markers/flags over reef boundaries	2	1
Self / community discipline	2	1
Responses	382	
Households	240	

↑ Table 27: Mechanisms for enforcing community rules (n=240 households).

HH-Q53 Knowledge of changes in resources

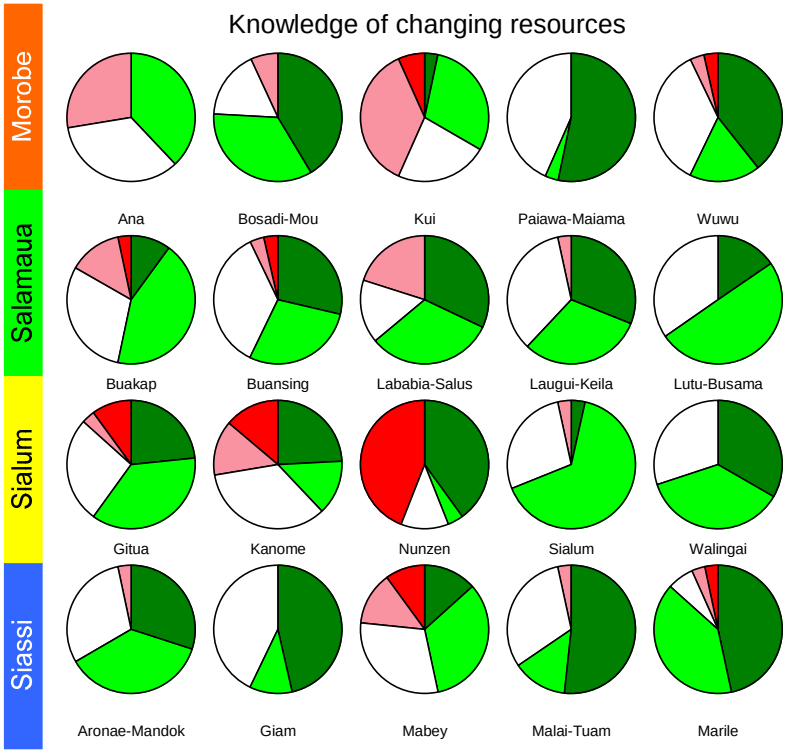
Do you think you have a good idea of the condition of the marine resources in this area? How would you rank your knowledge of whether resources are increasing, decreasing or staying the same? Very poor/Poor/Not sure/Good/Very good.

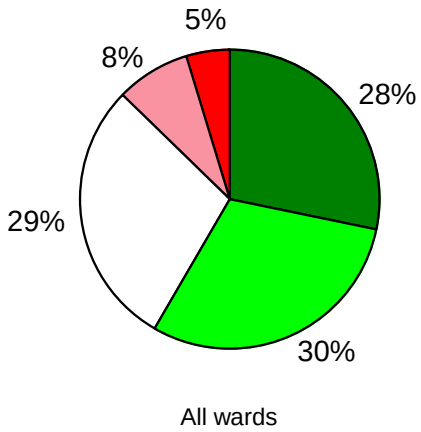
Overall, 58% of people said that they felt they had a good or very good idea of how their resources might be changing over time. Only 8% of those interviewed said that they had a poor knowledge of the state of their resources, with 5% rating themselves as having very poor knowledge (Fig. 53). About one-third of people were unsure about their ability to assess the state of their resources.

People's opinions on their ability to assess the condition of their resources showed some differences among LLGs and wards.

Generally, more people in Sialum LLG said that they had very poor knowledge of changes in their resources (13%) compared with other LLGs where the values were between 1% and 3%.

There were also particular wards in which people felt less able to assess their resources than in others. Nunzen, Kanome and Kui all had a large proportion of people who felt they had very poor knowledge of changes in their resources. This is in contrast to wards such as Paiawa-Maiama and Malai-Tuam, where people were very confident of their knowledge.





←↑ Figure 53: Knowledge of whether resources are changing over all sites and by LLG and ward (n=574).

HH-Q58 Participation in the community

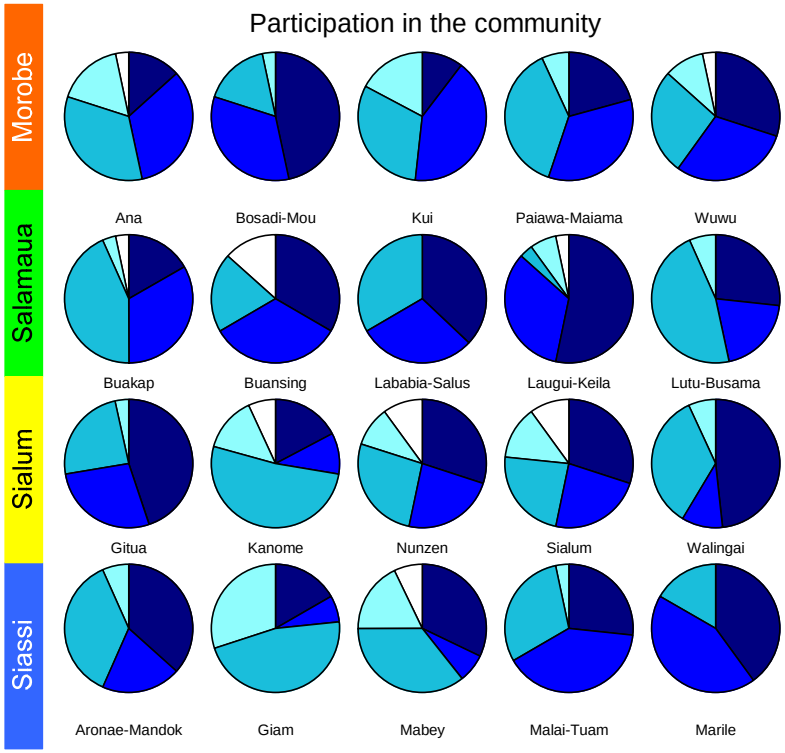
How would you rate your level of participation in community and church activities in this village? (do not include going to church, school or employment). Very low/Low/Average/High/Very high. How many hours per month would you and members of the household spend on community activities?

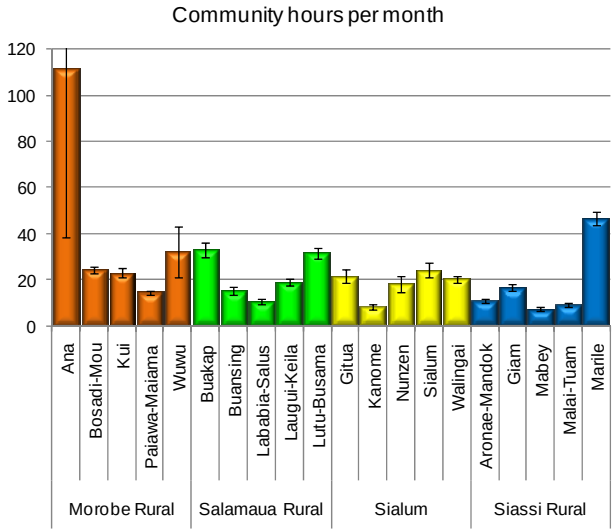
The majority of people interviewed (58%) felt that they had very high or high participation in community activities (Fig. 54). Another one-third of people reported average participation, with only 12% reporting that their participation was low or very low.

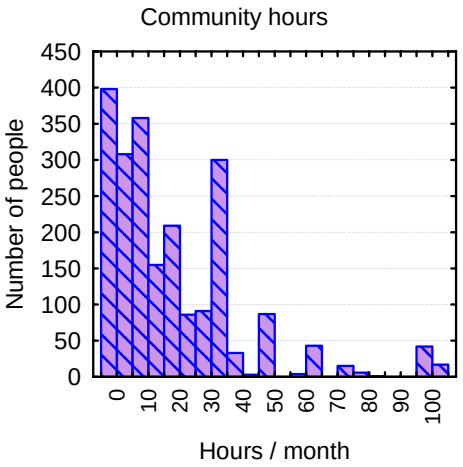
The wards with the greatest perceptions of participation included Laugui-Keila, Boasdi-Mou and Marile (Fig. 54).

The reported actual hours spent per month in community service was highest in Morobe LLG at an average of 40 hours/person/month, and lowest in Siassi at 16 hours. The number of hours spent in community activities by ward was greatest in Ana at over 111 hours per month on average (Fig. 55).

About 18% of all people spent no time each month on community activities, but many of these were children. The overall average time spent by individuals was 24 hours per month.

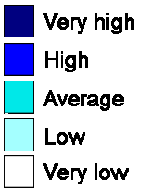


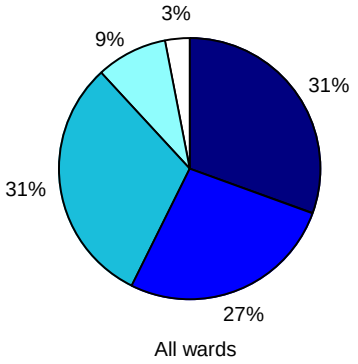




↑→ Figure 54: Perceived level of participation in community activities overall and by LLG and ward (n=590).

← Figure 55: Average (+/-SE) and frequency of hours per month spent in community activities by all members of households (n=2,156 people).





HH-Q59 Influencing community decisions

How would you rate your ability to influence community decision-making in this village? Very low/Low/Average/High/Very high. Explain.

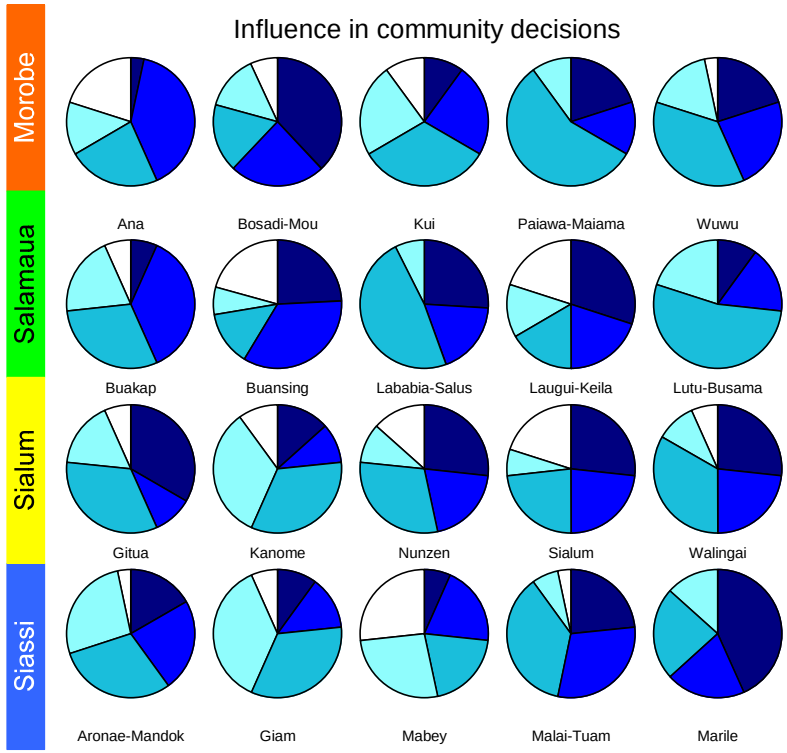
People rated themselves quite highly in terms of their ability to influence community decisions, with 43% across the survey saying they had "very high" or "high" levels of influence (Fig. 56). About 31% of people rated themselves with an "average" ability to influence decisions. Some people (17%) felt they had a lower than average ability and opportunity to influence decision-making in their communities, and about 9% said their influence was "very low".

The wards in which the most people felt they could influence community decision-making included Marile, Buansing, Bosadi-Mou and Malai-Tuam. The number of people who felt they had a "very high" rating for influencing community decision-making was very low in Ana, Buakap and Mabey. The greatest number of people who reported "very low" levels of influence in community decision-making were reported in Mabey.

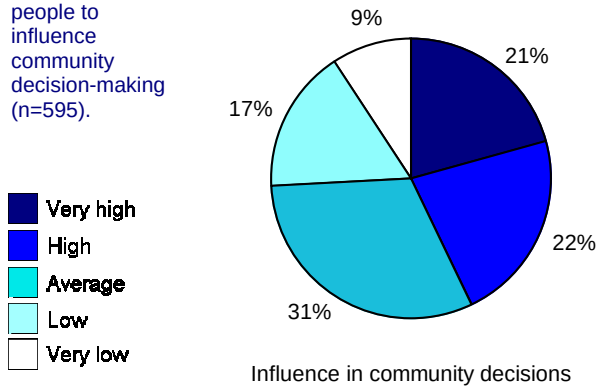
Many people (36%) saw themselves as non-influential and as "ordinary villagers" or those that "others will not listen to". The main people able to influence decisions were church and community leaders and elders. Influence in making decisions within the community was also connected with holding positions in organisations, including youth, women's church, culture and fishers groups. Some people reported that their influence in community decision-making was low because they were shy or afraid to speak in public (5%). Young, very old people, and women also said that they would not be listened to because they had no status.

Influence	No.	%HH
Low influence, follow decisions	205	36
Contributing community member	138	24
Church leaders	41	7
Community leaders	38	7
Elders	34	6
Group member	25	4
Committee member	15	3
Advisor / spokesman	10	2
High status	9	2
Magistrate	9	2
Youth leader	9	2
Councillor	8	1
Whole community	7	1
Educated	6	1
Retired official	6	1
Women's group leader	6	1
Chairman	4	1
Law & order committee	4	1
School board	4	1
Elected government	3	1
Treasurer	3	1
Vice chair of village	2	0.3
Village chairman	2	0.3
School vice / chairman	2	0.3
Aid post orderly	1	0.2
Board member	1	0.2
Cocoa buyer	1	0.2
Coffee buyer	1	0.2
Men	1	0.2
Teacher	1	0.2
Village court clerk	1	0.2
Responses	597	
Households	572	

← Table 28: The decision-makers in the community (n=572).



↑↓ Figure 56: Self-rating on the ability of people to influence community decision-making (n=595).



HH-Q60 Decision-making

How are decisions made in the village and who are the main people involved in this process? Do you think that all people in the community have a "fair say" in decisions affecting the village? (women, youth, old people, others?). If not, what groups of people are having less say?

The most important decision-makers reported during the survey were the ward councillor, reported in 47% of households and the communities themselves (45%). The village magistrate, church leaders and both village and church elders were mentioned by between 20% and 29% of households (Table 29). The category "leaders" probably included all of these. Most respondents reported combinations of these decision-makers working simultaneously following two routes: 1) in which the community discusses an issue that leaders implement; or 2) in which the leaders bring an issue to community meetings for a vote or endorsement.

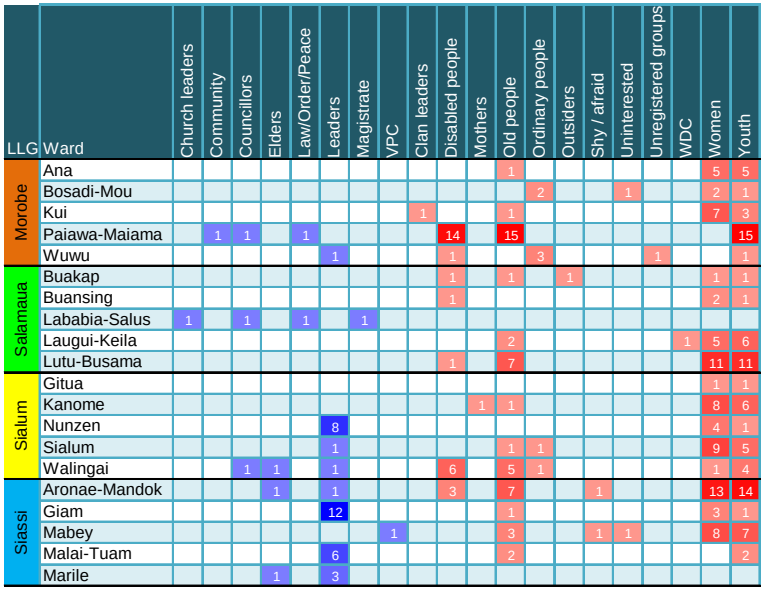
Decision-making	No.	%HH
Councillor	275	47
Community	267	45
Leaders	198	34
Magistrate	172	29
Church leaders	131	22
Elders	121	20
Chairman / President	100	17
Committees	56	9
VPC Village Planning Committee	41	7
Group leaders	26	4
Law & Order / Peace Officer / Police	16	3
Clan leaders	7	1
Planning committee	4	1
WDC Ward Development Committee	4	1
Government officers	2	0.3
Village clerk	2	0.3
Chief of village	1	0.2
Customary exchange of pigs	1	0.2
Educated people	1	0.2
Health Committee	1	0.2
Incorporated land group leaders	1	0.2
LLG representatives	1	0.2
Planners brought to village	1	0.2
Problem Solving Committee	1	0.2
Vocal people	1	0.2
By voting	63	11
By consensus	53	9
Responses	1547	
Households	591	

← Table 29: The main decision-makers and people with more and less say in community decision-making. Note percentages do not sum to 100 because more than one decision-maker was often reported by each respondent.

Around 78% of households responding to this question said that there were people or groups who did not have a "fair say" in community proceedings (Fig. 57). Youth, women, very old and disabled people were often excluded from the decision-making process (see also Q59). No concrete explanations were offered for why old people and youth tended to be excluded. In the case of women, they were often "forbidden to speak" because women are "inferior to men" and they "let men speak on their behalf" because "women should not overtake their husbands".

In some cases individuals were seen as having "democratic rights, but leaders have confidential decisions to be made". At least in some cases, the confidential decisions related to marriage problems.

People with MORE say	No.	%HH
Leaders	33	20
Councillor	3	2
Elders	3	2
Law & Order / Peace Officer / Police	2	1
Church leader	1	0.6
Community	1	0.6
Magistrate	1	0.6
VPC Village Planning Committee	1	0.6
Responses	45	
Households	37	22
People with LESS say		
Youth	85	51
Women	80	48
Old people	51	31
Disabled	27	16
Ordinary people	5	3
Shy / afraid	3	2
Decline to participate	2	1
Clan leaders	1	0.6
Mothers	1	0.6
Outsiders	1	0.6
Unregistered groups	1	0.6
WDC Ward Development Committee	1	0.6
Responses	258	
Households	131	78
Total households	167	100



LLG	Ward	Church leaders	Community	Councillors	Elders	Law/Order/Peace	Leaders	Magistrate	VPC	Clan leaders	Disabled people	Mothers	Old people	Ordinary people	Outsiders	Shy / afraid	Uninterested	Unregistered groups	WDC	Women	Youth
Morobe	Ana												1							5	5
	Bosadi-Mou													2			1			2	1
	Kui									1			1							7	3
	Paiawa-Maiama		1	1		1					14		15								15
	Wuwu						1				1			3				1			1
Salamaua	Buakap										1		1		1					1	1
	Buansing										1									2	1
	Lababia-Salus	1		1		1		1													
	Laugui-Keila												2					1	5	6	
	Lutu-Busama										1		7							11	11
Siaum	Gitua																			1	1
	Kanome											1	1							8	6
	Nunzen						8													4	1
	Sialum						1						1	1						9	5
	Walingai			1	1		1				6		5	1						1	4
Siassi	Aronae-Mandok				1		1				3		7			1				13	14
	Giam						12						1							3	1
	Mabey								1				3			1	1			8	7
	Malai-Tuam						6						2								2
	Marile				1		3														

↓↗ Figure 57: People or groups with more or less influence in decision-making by LLG and ward (n=305 responses). VPC=Village Planning Committee, WDC = Ward Development Committee.

Analysis of Survey Questions

Focus Group Survey

FG-Q1-Q2 Group details

Is this a formal/registered group? Yes/ No. If the group is registered, please describe where and if/how it is officially classified or recognized. Is this group affiliated with any other organisations? Which one(s)?

A total of 33 fishers, 26 women's and 29 youth groups were consulted during the survey. In addition to these, some church, planning, culture and theatre groups were contacted (Table 30). Organised groups of fishers were the easiest to find, particularly in Siassi and Salamaua LLGs.

Table 30: Focus groups interviewed during the survey showing distribution among LLGs and wards (n=100).

LLG	Ward	Fishers	Women	Youth	Other
Morobe	Ana	1	3	1	
	Bosadi-Mou	1	1	1	2
	Kui	3	1	1	
	Paiawa-Maiama		1	4	
	Wuwu	1	2	2	
	Total	6	8	9	2
Salamaua	Buakap	3	2		
	Buansing	1		2	2
	Lababia-Salus	2	1	2	
	Laugui-Keila	2		2	1
	Lutu-Busama	2	2	1	
	Total	10	5	7	3
Sialum	Gitua	4		1	
	Kanome	1	2	2	
	Nunzen		2	3	
	Sialum		2	1	2
	Walingai		1	3	1
	Total	5	7	10	3
Siassi Rural	Aronae-Mandok	5			
	Giam	3	1		1
	Mabey		2	1	2
	Malai-Tuam	3	1	1	
	Marile	1	2	1	1
	Total	12	6	3	4
All LLGs and wards		33	26	29	12

Less than one-half (47%) of the groups interviewed were registered with some authority, with the remaining groups formed without formal recognition (Fig. 58). Many of the groups were affiliated with churches (e.g. Lutheran or Roman Catholic), and a range of government and non-governmental organisations. This included the Morobe Fisheries Authority, the Morobe Fishermen's Association, the European Union, Provincial Government, and women's and youth organisations.

FG-Q3-Q4, Q7 Group structure and history

What officers does this group have? How are positions selected? How long has this group existed? How many members? Males/ Females. Is there a membership fee?

The groups we contacted had 4,146 members, 63% of which were women. The distribution of male and female members varied with group type. There was a similar gender ratio for fishers and youth groups which had 30-32% female members. This contrasted greatly with the women's groups that were 99% comprised of female members (Fig. 59). Most groups had a hierarchical structure, with a leader and office holders often selected through election, and in some cases by appointment.

Women's groups tended to be the longest established (averaging 19 years). Youth groups were on average 12 years old, but fishers groups were on average the most recent, averaging 5.5 years since establishment (Fig. 60). The longest established women's group was 60 years old, and the longest established fishers group was 25 years old.

Women's groups tended to be larger than youth and fisher groups, with an average of 81 members compared with 44 for youth and 36 for fishers. The largest group, with 200 members, was, however, a fishers group. Many groups charged an annual membership fee, although not all. The highest fees were payable to fisher groups.

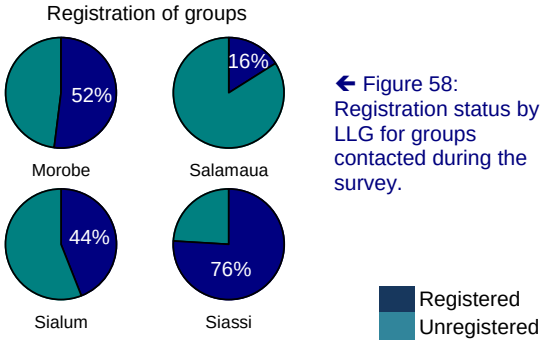


Figure 58: Registration status by LLG for groups contacted during the survey.

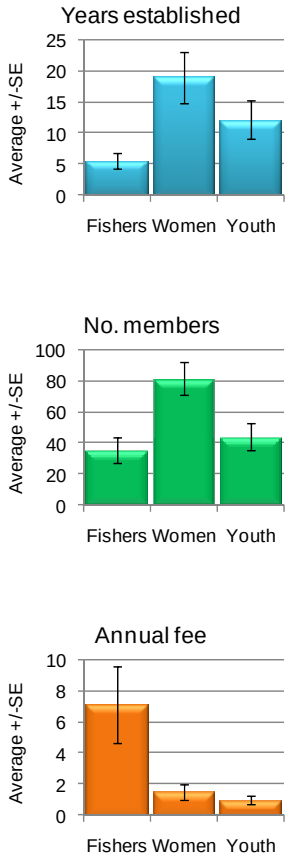


Figure 59: Gender of group members interviewed during this study.

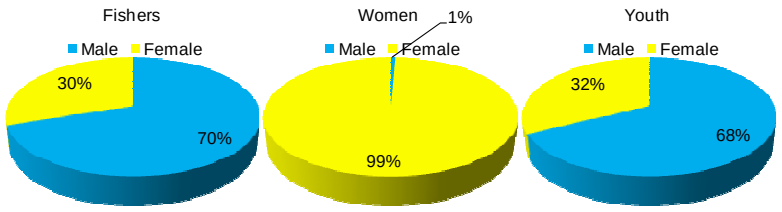


Figure 60: Membership, years of operation, and annual fee charged in community groups contacted during the survey.

FG-Q6 Group Objectives

What are the group's main objectives? Why/how was it formed?

The focus groups we visited in Morobe Province were found to be involved in a wide range of activities designed to improve the well-being and enrich the lives of the communities they serve. The overall objectives of each type of group tended to be different. Fishers groups were most involved in increasing income from fisheries and promoting fishing activities. There appears to be many recently-formed fishing groups because people believe that "under the European Union terms and through the Morobe Fisheries Authority, any commercial fish company will only buy fish from locals if they have a registered fishing group affiliated to the Mutu Fishing Association of Siassi". It appears that these conditions also apply to loans.

Women's groups were often involved in church activities, assisting disadvantaged people and fundraising. Youth groups, although also involved in church activities, tended to focus on gathering youth to promote their well-being and give them activities that will direct them away from bad behaviour, crime and drugs (Table 31).

Group objectives	Fishers	Women	Youth	Other	Total
Address women's issues		3			3
Assist / support community leaders			2		2
Assist disabled people		2			2
Assist mothers		4			4
Assist orphans		1			1
Assist the aged		5	1		6
Assist those sick / hospitalised		2			2
Assist with social functions		2			2
Bring goods and services to community	1		1		2
Church activities	1	13	10	3	27
Community work / contributions	5	5	5	1	16
Conflict resolution				1	1
Create employment	2	1			3
Eligibility for loans	2				2
Eligibility for selling fish	1				1
Family assistance for grief / sorrow		2			2
Fishing activities	7				7
Fundraising	1	4	3		8
Gather / organise people		3	7		10
Hardship relief		1			1
Help those in need		4	2		6
House-building and gardening			1		1
Income / increased standard of living	19	3	1	1	24
Increase involvement in fishing	1				1
Learn cooking / handicrafts		1			1
Maintain Christian values	1	2	5		8
Occupy people to prevent crime / drugs			10	1	11
Outreach programmes			4		4
Participation in women's conferences		1			1
Peace and well-being of community			5	2	7
Promote self-reliance in youth			1		1
Promote spiritual lives of women		2			2
Promote sustainable fishing	1				1
Promote womens activities		3			3
Promote youth participation	1		1		2
Protect marine resources	1				1
Recreational / sporting activities			6		6
Retain cultural heritage			3	1	4

← Table 31: Objectives of focus groups interviewed during the survey (n=188 responses, 86 groups). Data are total number of times an activity was mentioned across all groups.

FG-Q8 Income opportunities

What are the income opportunities for people in this village? Are there any groups of people who cannot participate or are not allowed to? If so, why?

All group types agreed on the most important income opportunities available in their areas. The main opportunities they reported involved fishing and growing garden produce, betelnut (buai) and mustard for sale at local markets (Table 32). Sago making and sea cucumbers were also considered important, and were most often mentioned by fishers groups. A few unusual opportunities were reported. These included exhibitions (it is not clear of what), hosting meetings, research and tourism. One group said that there were no opportunities for income generation.

When asked whether there were any disadvantaged groups within the community in terms of opportunities for employment, the focus groups identified a range of people and situations, including disabled people, "drug addicted youth", lazy youth, very old people, pregnant women, disobedient people, Jehovah's Witnesses and "religious backgroups". One group said that women were not allowed to participate in their group because of customary tambus. Another said that they did not want other clans to participate because "vital services may not reach them if other clans are involved".

A large number of groups specifically made the point that "everybody has the same [equal] right" to participate.

Opportunities	Fishers	Women	Youth	Other	Total
Baked / cooked foods		5	1	2	8
Basket exchange	1	1		1	3
Buai / mustard	14	13	21	6	54
Canoe making	3		1	1	5
Cash crops: cocoa, coffee, vanilla	3	4	5	2	14
Casual work / labour		1	2		3
Clams	1				1
Coconut / copra / coconut oil	6	7	6	8	27
Crabs		1			1
Crafts / bilums / carvings	9	7	2	3	21
Crocodile meat & skin	1				1
Exhibitions / hosting meetings			2		2
Farming		1	3		4
Farming cattle	4	3	2	2	11
Farming pigs	1	6	1	3	11
Farming poultry		1			1
Farming rice	1	4	1		6
Firewood	1	1			2
Fishing	32	19	20	11	83
Fundraising			1		1
Garden / paddock maintenance		3			3
Garden produce	11	29	33	10	83
Hunting		1			1
Kerosene sales	1	3	1		5
Kina shells			1	1	2
Lime making / selling	5	4	5	3	17
Lobsters	1				1
Logging		1			1
Marketing	2	2	3		7
None	1				1
Octopus			1		1
Prawns		1			1
Research in marine and forestry			1		1
Sago making / selling	13	4	7	5	29
Sea cucumbers	9	4	5	2	20
Seafoods	1		1		2
Sewing clothes		2			2
Shark fin	1		1		2
Shellfish	4	2	2	1	9
Tobacco / cigarettes		6	4	3	13
Tourism			1		1
Trade stores	2	2	3		7
Trochus	3	3	3		9
Wild nuts			1		1

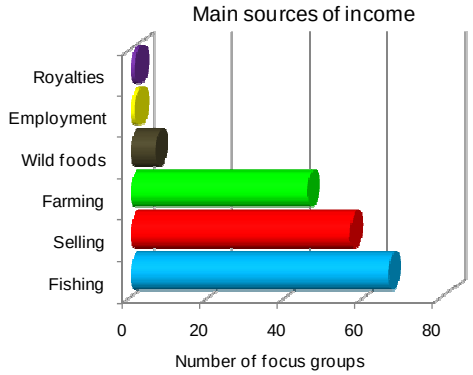
↑ Table 32: Details of perceived income opportunities divided into focus group type (n=478 responses, 100 groups).

FG-Q9 Most common sources of income

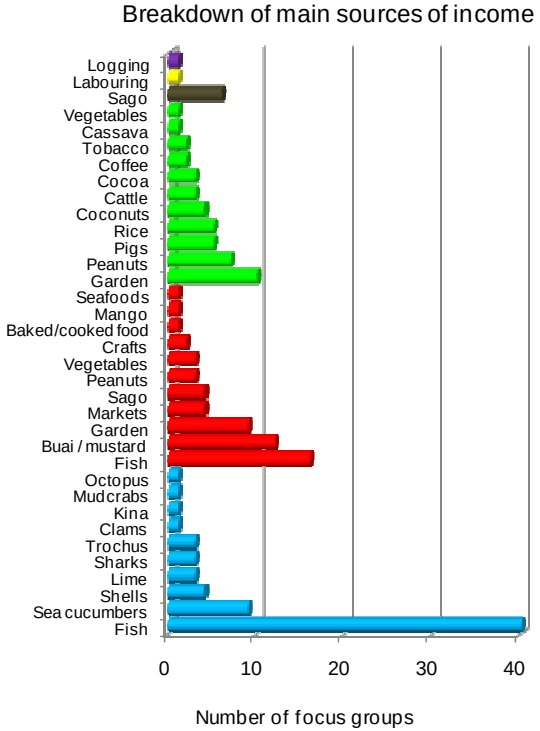
What is the most common source of income in this village?

Where the previous question focused on the potential sources of income for people in their area, this question was concerned with actual activities currently being used to generate income. Focus groups reported that the most important income sources in their villages focused on fishing and garden produce, with lower numbers reporting buai/ mustard, sago-making and sea cucumbers as important (Table 33). Most other categories of income-earning were much lower than these and appeared to contribute less to over-all income in each place.

When reporting on income activities, people often reported each product either in terms of procuring it (e.g. farming, fishing, collecting etc), or in terms of selling it at markets or to buyers. In Figure 61, fishing, selling and farming are shown as the three most important activities, with collecting wild foods, employment and collecting royalties as much less common. When broken down to show the actual sources of income generation under each activity (Fig. 62), fin fishes were the single most important source of income (under fishing and selling).



↑ Figure 61: The most important income categories reported for their area by focus groups (n=175).



↗ Figure 62: Breakdown of the actual income sources considered to be the most important in their area by focus groups. Colours match categories in Fig. 61 (n=173).

Source	Fishers	Women	Youth	Other	Total
Buai / mustard	2	5	12	3	22
Clams		1			1
Cocoa		2		1	3
Coconut / copra	1		1	2	4
Coffee			2		2
Cooked food				1	1
Crafts / mats / carvings	1	1	1		3
Farming		1	1		2
Farming cattle		2	1		3
Farming pigs		3	2		5
Farming rice	1	2	2		5
Fishing	22	11	18	7	58
Garden produce	2	11	17	3	33
Kina shells			1		1
Labouring		1			1
Lime	2	1			3
Logging royalties		1			1
Market selling	2	1	2		5
Mudcrabs		1			1
Octopus			1		1
Sago making / selling	5	3	1	1	10
Sea cucumbers	6		3		9
Seasonal crops		1	1		2
Shark fins	1	1	1		3
Shells	1	1	1	1	4
Tobacco		1		1	2
Trochus	1	1		1	3

↔ Table 33: Summary of the most important sources of income as described by focus groups, by group type and by LLG and ward.

Increasing intensity in redness indicates a higher frequency of this activity being identified by focus groups in that ward (n=100 groups).

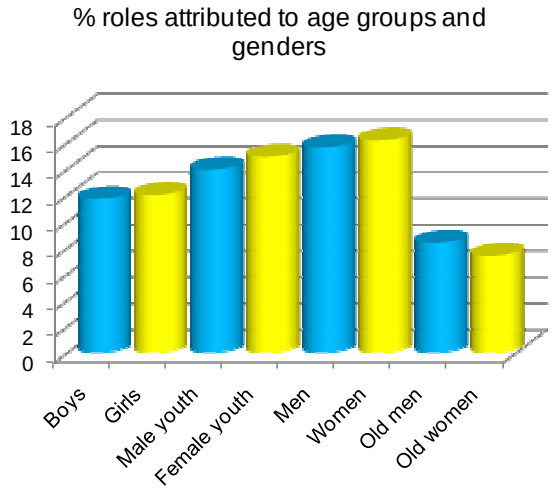
LLG	Ward	Buai / mustard	Clams	Cocoa	Coconut / copra	Coffee	Cooked food	Crafts / carvings	Farming	Farming cattle	Farming pigs	Farming rice	Fishing	Garden produce	Kina shells	Labouring	Lime	Logging royalties	Market selling	Mudcrabs	Octopus	Sago	Sea cucumbers	Seasonal crops	Shark fins	Shells	Tobacco	Trochus
Morobe	Ana	2										4	5	2						1								
	Bosadi-Mou											1	5	1								1						
	Kui												4			1							1					
	Paiawa-Maiama	2											5	1									1					
	Wuwu	1											4	1	1			1								1		
Salamaua	Buakap	2									1		2	1								4						
	Buansing	3											2				1					2						
	Lababia-Salus	1											3	1			1											1
	Laugui-Keila	1				1							3	2								1						
	Lutu-Busama	1		1									4						1			2						
Sialum	Gitua	1											3	1					1				1		1		1	
	Kanome	1							2	1			7						1					2				
	Nunzen				2			2		2			2															
	Sialum		1	1					1	1			5	1			1				1				1	1		
	Walingai	1											1	9														
Siassi	Aronae-Mandok												4						1									
	Giam												4										3			1		1
	Mabey	5		1										2													2	
	Malai-Tuam							3					3	1					1				3		2			
	Marile	1		2	2								1	1														
All LLGs and wards		22	1	3	4	2	1	3	2	3	5	5	58	33	1	1	3	1	5	1	1	10	9	2	3	4	2	3

FG-Q10 Roles in fishing & collecting

What are the roles of men, women, children, youth and old people in fishing and collecting?

According to the focus groups consulted, males and females, and people of different age groups play different roles in the work load associated with procuring, processing, selling and using marine resources.

Both genders are involved throughout their lives, but responsibilities increase through childhood and early adulthood, reaching a peak in people aged between 31 years and 60 years and diminishing in older age groups (Fig. 63).



↑ Figure 63: The roles of different community members in utilising marine resources (n=1,926 roles reported). Data are percentages contributed by each to the total effort of utilising resources. Boys and girls <16 years; youth 17-30 years, men & women 31-60 years; and old men & women 60+ years of age.

Children and youth contribute significantly, taking around 12% of the work load each. This increases to 14% for male youth and 15% for female youth. Old men take about 8% of the roles and old women about 7%. There is a large degree of equality among genders in terms of overall involvement.

A breakdown of tasks (Fig. 64) shows that the most significant tasks for old people are fishing (mostly old men) and as advisors (both genders). They also play a significant role in processing. Except for the difference in fishing involvement, old men and women do not differ much in their roles.

For the younger age groups, roles are much more gender-specific. Boys and men tend to be the main fishers and transporters, although they do contribute significantly as collectors and processors. Girls and women are more involved in selling, collecting and processing, although they also contribute to fishing and other parts of the seafood supply chain.

Roles	Boys	Girls	Male youth	Female youth	Men	Women	Old men	Old women	All
Advisors							36	25	61
Assist processing							1	3	4
Assist younger men							2		2
Assist younger women								2	2
Bait finders	2	2			1	1			6
Barter exchangers			1		1				2
Buyers	5		9	3	19	5	4	3	48
Canoe / paddle makers	3	1	3		5		7		19
Child carers		2		3		3	1	2	11
Collect clams						1		1	2
Collect prawns						1			1
Collect sea cucumbers	1	3		3		3			10
Collect shells	2	6	1	8		10		3	30
Collectors	41	63	30	60	29	66	11	18	318
Consumers	1						1	1	3
Cooks		2		2		1		1	6
Divers	12	3	11	1	8	1			36
Dynamiters	1		1		1				3
Fish smokers		1		3	1	3	3	4	15
Fish trappers							2		2
Fishers	81	36	102	48	108	47	42	17	481
Harvestors						1			1
Lime makers							1	1	2
Net fishers	6	5	8	4	8	4	1		36
Net menders	2		1		3		8	1	15
No role								1	1
Octopus fishers	1					1		1	3
Processors	32	49	38	67	38	72	33	41	370
Sea cucumber processors		1	1	2		1	1	1	7
Sellers	14	51	19	71	27	77	5	15	279
Spearfishers	3		3		5		1		12
Traditional net makers								1	1
Transporters	18	6	40	12	47	13	1		137

↑ Figure 64: Breakdown by gender and age group of roles of community members in utilising marine resources (n=1926 roles). Data are frequencies that particular roles were attributed to males, females, and age groups across all LLGs and wards, and as attributed by all focus groups. The frequency with which a role appears for any group of people is taken here as an indicator of importance.

FG-Q12 People restricted in fishing/collecting

Are there any groups of peolpe restricted by any customary tambus in fishing and collecting activities?

According to 64% of the focus groups surveyed, many communities impose restrictions on the fishing activities of particular members according to gender, age and specific circumstances (Table 34). The most important restrictions on fishing or collecting activities are focused on men with pregnant wives (reported by 29% of all groups) and pregnant women (21% of groups). In addition to these restrictions, there were reports of other types of restrictions on fishing activities, including those that ban women in general, ban women who are menstruating, and restrict fishing after a death in the village. Very old people and young children are also restricted, although it is not clear whether they are forbidden from participating or are just unable to do so.

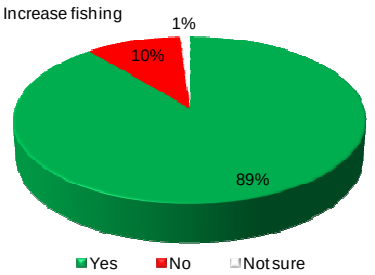
The restrictions on pregnant women and their husbands appear to be largely related to the bad luck this would bring to the fishing effort. In some cases people said that certain fishes move or are scared away when pregnant women were fishing. In others, it was said that the fish (tuna) would "get the bait only", or that fish would not "appear at their normal seasonal times".

Restricted people	No.	% Groups
After death in village (3 days)	3	3
Boys and male youths can't fish for clams	1	1
Firstborns until ceremony	2	2
Husbands who troll if wife speaks to them	1	1
In the past	2	2
Men can't collect mangrove shells	1	1
Men who are newly-wed	1	1
Men with child <1yr can't dive	1	1
Men with pregnant wife	25	29
Men with wives in menstruation	2	2
None	31	36
Outsiders: inlanders / other wards / provinces	4	5
People under a curse	1	1
Sex the night before fishing	3	3
Very old people	1	1
Women	7	8
Women during netting	1	1
Women forbidden to touch fishing gear	2	2
Women in menstruation	5	6
Women may not dive	1	1
Women may not fish from beach	1	1
Women may not net	1	1
Women may not use canoe	1	1
Women may not use men's gears	1	1
Women not allowed near fishing	1	1
Women not allowed to deepsea fish	1	1
Women on 2nd pregnancies	1	1
Women who are pregnant	18	21
Women with child <1yr can't dive	1	1
Young children	1	1
Responses	122	
Groups	86	

← Table 34: Summary of fishing restrictions imposed on groups of people living in the survey area as reported by focus groups.

FG-Q13 Increasing income from fishing

Do you think that income from fishing could be increased in this village? If so, why has this not happened already? How could it be increased?



↑ Figure 65: Can income from fishing be increased? (n=100)

The majority of groups (89%) thought that income from fishing activities could be increased in their communities and had many ideas on what was holding them back and what could be done about it (Fig. 65). The greatest impediment to increasing incomes from fishing was a lack of markets. Some groups said that their own local markets were flooded and that the prices there were too low compared with more remote markets, usually in Lae. The lack of transport and ice were related issues and considered the most important areas for improvement (Table 35). As one group put it: "people are not serious to do large-scale fishing for income because there [are] hardships in fish transportation to good markets in Lae".

Impediments	No.
Markets lacking / not good	42
Transport lacking / poor / problem	25
No ice / ice machine	21
No / regular buyers	14
No / old / inappropriate gears	12
People not fishers / interested	10
Prices from buyers low	10
Cost of fuel high	6
Cost of transport high	6
No advice / support / training	5
Weather poor / unpredictable	5
No finance	4
No facilities	3
Catches for our consumption	2
Cost of gears high	2
Cost of ice high	2
Income depends on catch	2
No commercial activity	2
No management of resources	2
No support from Government	2
We are farmers / gardeners	2
Bad roads	1
Costs for banana boat not viable	1
Costs increasing	1
Fishermen cheating	1
Income is used for other things	1
Isolation	1
Lack of manpower	1
Market flooded locally	1
Market too far	1
No control / monitoring	1
No landing areas	1
No need for cash	1
No support from companies	1

Needed improvements	No.
Transport	29
Ice	26
Better markets	25
Buyers	14
Gears	14
Training on skills / methods	12
Increase fishing / involvement	11
Increased prices	11
Markets	9
Affordable costs	5
Government support	5
Form / register groups	4
Ice machine	4
Freezer / chiller	2
Jetty / landings	2
Standard pricing	2
Better financial management	1
Boats	1
Commercialisation	1
Extension services	1
Facilities	1
Fuel prices lowered	1
Funding	1
Ice box	1
Maintain quality	1
More efficient boats	1
New preservation methods	1
NFA support	1
Reduce farming	1
Roads	1
Sell more	1
Subsidise fishing	1
Sustainable fishing methods	1
Don't know	1

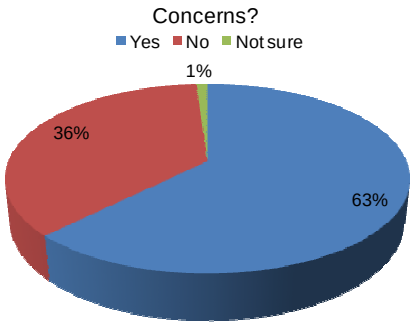
←→ Table 35: Summary of the perceive impediments and improvements needed to increase income from fishing (n=98).

FG-Q17 Concerns for natural resources

Are there any concerns about natural marine resources in this village? Describe them.

Many groups (63%) were concerned about the state of their resources and factors that might affect them (Fig. 66). A large proportion (36%) said that there were no concerns "so far" or that "our resources are plenty".

For those that were concerned, the most common issue raised was the use of poison rope (one-third of all groups), with coral harvesting for lime making the second largest issue. Concerns about poison rope (and sometimes pollution) were often centred around the destruction of fish habitats and/or chasing fish away or killing small fishes. There was some concern over commercial or outsider fishing, which is seen as high-tech and taking everything, or "all the tuna". There is also concern that poison rope, light fishing, rough seas and human bathing "scare fish away".



← Figure 66: Concern for the state of marine resources expressed by focus groups (n=96).

Concerns	No.	%FG
Poison rope	19	33
Lime making / coral harvest	9	16
Sea cucumbers declined	7	12
Dynamite	5	9
Fish declined	5	9
Pollution	5	9
Declining resources	4	7
Small mesh nets	4	7
Undersize fishing	4	7
Weather rough	4	7
Light fishing scares fish	3	5
Shells declined	3	5
Commercial fishing catches everything	2	3
Commercial fishing reduces tuna	2	3
Declining catches	2	3
Fuel / oil spills	2	3
Modern / high-tech fishing	2	3
Rubbish	2	3
Sea-level rising	2	3
Baitfish declined	1	2
Bathing scares fish	1	2
Diving restrictions	1	2
High tides	1	2
Live fish trade	1	2
Logging	1	2
Mangrove deforestation	1	2
Mining	1	2
Nets in use	1	2
Nets at mouth of lagoon	1	2
Nets overused	1	2
Population growth	1	2
Reef growth / surfacing	1	2
Reefs dying	1	2
Sandbanks forming	1	2
Shoreline tree loss	1	2
Small hooks	1	2
Spearfishing	1	2
Told to stop leatherback fishing	1	2
Tuna no longer nearby	1	2
Wrecks	1	2
Responses	107	
Focus groups	58	

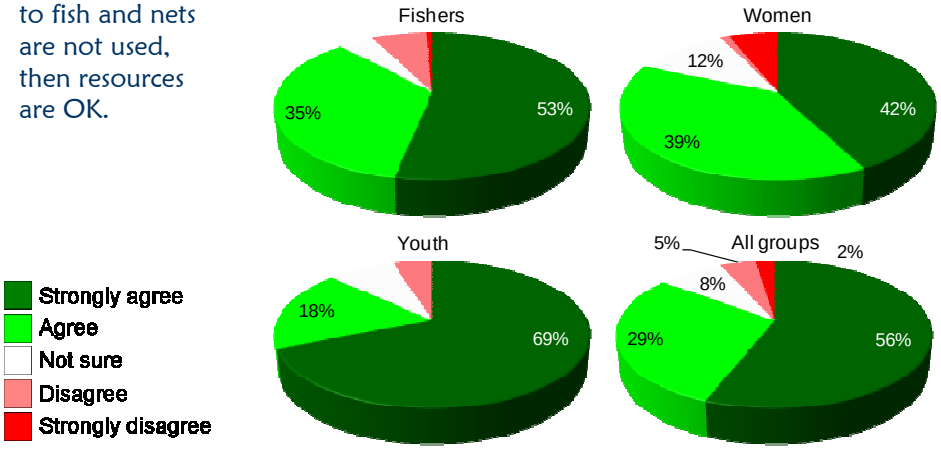
↑ Table 36: Summary of concerns about natural resources (n=58).

FG-Q18 Seafood Abundance

There are plenty of seafoods to catch in and around this village. (Ask for show of hands and count the number of people with each opinion). Strongly agree/Agree/Not sure/Disagree/Strongly disagree. Explain.

Overall, 56% of all voters (across all focus groups) strongly agreed that that marine resources were plentiful in their area, with a further 29% agreeing with the statement. About 7% of people either disagreed or strongly disagreed with the statement (Fig. 67). Level of agreement appeared to be related to group type. People voting in women's groups tended to agree with the statement less than fishers. The people that agreed the most that resources are abundant were youth, with 69% strongly agreeing. There was less difference among groups in the relative proportions of people who disagreed.

The reasons given for people's opinions tended to be based on the visibility or ease with which seafood could be caught. "Seafood is in surplus—underused". Many people agree with this because "fishermen always come with fish on each trip". People also base their assessments on fishing behaviour. That is, if not many people fish ("90% of the population is busy doing gardening"), or they don't do it for commercial reasons, the resources are not wasted, no outsiders come to fish and nets are not used, then resources are OK.



↑ Figure 67: Level of agreement (by vote) with the statement that seafood is plentiful by focus group type and overall (n=1,340 votes).

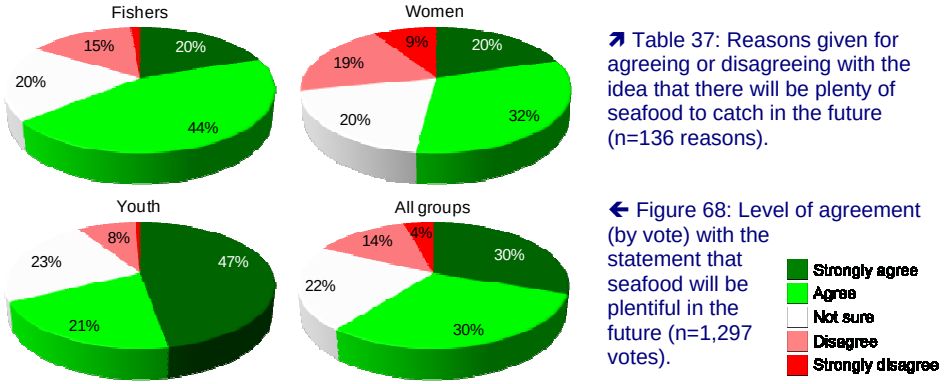
FG-Q19 Future abundance of seafoods

THERE WILL BE PLENTY OF SEAFOOD TO CATCH IN AND AROUND THIS VILLAGE IN THE FUTURE. (ASK FOR SHOW OF HANDS AND COUNT THE NUMBER OF PEOPLE WITH EACH OPINION). STRONGLY AGREE/AGREE/NOT SURE/DISAGREE/ STRONGLY DISAGREE. EXPLAIN.

About 60% of people in focus groups agreed or strongly agreed that there would be plenty of marine resources in the future (Fig. 68). Overall, 18% of people who voted on this question were concerned that there would be a shortage in the future and about one-fifth were not sure and said they "could not see into the future". The most optimistic group were youth of whom 47% strongly agreed that there would be plenty of seafood in the future. Women, as in Q18, were the most pessimistic, with 28% believing that the future abundance of seafood would be less than they are now (Fig. 68).

The most common reasons given for expecting resources to decline were human population increases (16% of groups) and overfishing (6%). The use of poison rope (*Derris* root) and pollution were also considered important. Some of the more specific concerns were that better technology would "wipe out all the resources" and that people would be "hungry for money".

People who expected resources to be plentiful in the future said that there were many resources and many untouched resources (20%). Many people said it was their belief that there would be plenty in the future, with others saying that fishing pressure was low and that the resources would reproduce naturally (Table 37).



← Figure 68: Level of agreement (by vote) with the statement that seafood will be plentiful in the future (n=1,297 votes).

Seafoods in the future	No.	%FG
Expect less		
Population increase	15	16
Overfishing	6	6
Poison roots / dynamite	5	5
Pollution	4	4
Declining over the years	3	3
Logging	3	3
Modern fishing methods	3	3
Foreigners	2	2
More fishers	2	2
Nets	2	2
Believe it	1	1
Better technology	1	1
Breeding disturbed	1	1
Conservation needed	1	1
Fishing uncontrolled	1	1
Hungry for money	1	1
Mining	1	1
Nets overused	1	1
Noise from barges	1	1
Outsider fishing	1	1
Projects increase fishing	1	1
Unnecessary fishing	1	1
Expect plenty		
Lots of / untouched resources	19	20
Believe it	6	6
Not many / much fishing	6	6
Resources reproduce naturally	4	4
God's blessing / creation	3	3
Can't be exhausted	2	2
Fishing is controlled / managed	2	2
No commercial activity	2	2
No harmful methods	2	2
Resources used wisely	2	2
Area large / lots of reefs	1	1
Bad weather limits fishing	1	1
Changing methods	1	1
Children educated	1	1
Conservation of resources	1	1
Current issues addressed	1	1
Good breeding areas	1	1
Management	1	1
Mostly gardeners	1	1
Natural state	1	1
Nets not overused	1	1
New fish species found	1	1
No disturbance	1	1
Not used up	1	1
Not using modern technology	1	1
Reefs growing	1	1
Small population	1	1
Not sure	10	
Responses	132	
Groups	93	

↗ Table 37: Reasons given for agreeing or disagreeing with the idea that there will be plenty of seafood to catch in the future (n=136 reasons).

FG-Q20 Income opportunities from marine environment

APART FROM FISHING & COLLECTING, ARE THERE ANY OTHER ACTIVITIES OR INCOME OPPORTUNITIES OFFERED BY THE MARINE ENVIRONMENT (E.G. DIVING, ECOTOURISM)

Focus groups were able to identify a limited number of new income opportunities from the marine environment. Most groups (41%) could think of no new activities, with 8% saying they did not know if there were any (Table 38). The main opportunities identified were related to tourism. This included ecotourism, scuba and wreck diving, surfing and in one case "ecotourism to explore archaeological [sites] in the peninsula". Two groups said that there were no opportunities because there were no incentives. Several said that there was no expertise with which to develop opportunities.

Other opportunities	No.
Ecotourism	13
SCUBA Diving	13
Tourism	9
Salt production.	8
Leatherback turtle conservation	3
Wharfage fees	3
Mariculture	2
Wreck diving	2
Archaeological tourism	1
Conservation	1
Corals	1
Eel farming	1
Income earned from NGOs	1
Mariculture for tourism	1
Mineral exploration	1
Research	1
Royalties from outsider fishing	1
Shells	1
Surfing	1
Turtle breeding	1
None	41
No incentives	2
Don't know	8
Responses	116
Groups	91

→ Table 38: Income opportunities from the marine environment identified by focus groups (n=91).

FG-Q21 Is management needed?

Management of natural marine resources is needed. (Ask for show of hands and count the number of people with each opinion). Strongly agree/Agree/Not sure/Disagree/ Strongly disagree. How should they be managed?

More than half of the people polled during focus group meetings said that management of marine resources was needed (52%), with 9% strongly opposing the idea (Fig. 69). Women's groups were the least in agreement with the need for management, with 17% strongly disagreeing with the need for it. Youth were the most in agreement with the need for management of marine resources, with 80% either agreeing or strongly agreeing.

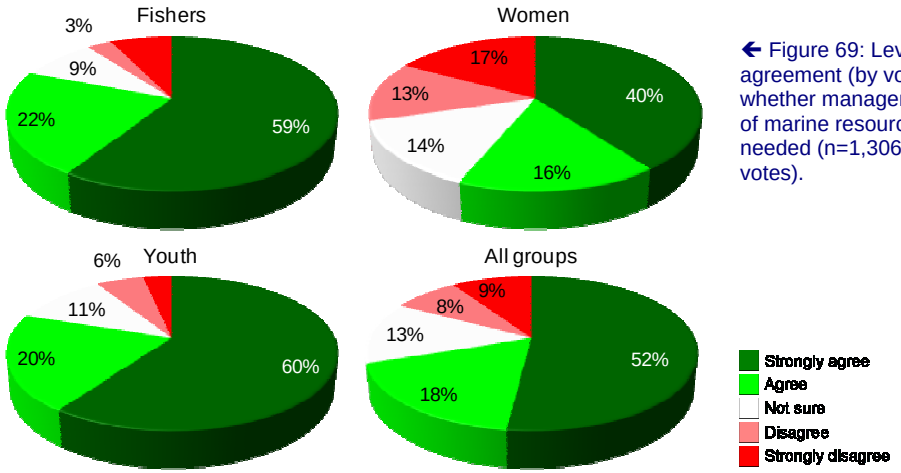
The most commonly suggested management action was education and/ or training on how to manage resources and on the issues affecting resources (Table 39). This was accompanied by the suggestion that there should be assistance provided by Fisheries, un-named experts, and the government.

About 16% of groups thought that management should be undertaken by the communities themselves, again with the assistance of Fisheries or the government. One group suggested that individuals should be given responsibility to enforce and manage resources. A fisher's group, looking into the future, suggested that "management is needed not because our resources are depleted, but to conserve our resources because of population growth and resource use".

A second tier of suggestions concerned the establishment of regulations (13% of groups) and specific controls that would be needed to manage resources. A ban on poison rope was at the top of the list, with bans also on small-mesh nets, coral harvesting for lime, and foreigners fishing in the area along with a range of other actions.

Some women's groups gave an insight into why they were not always in support of management. As one group put it they "strongly believe in nature as it is". Another group said that "we do not need management of our marine resources, we must fish more". One women's group summed up what may be an underlying position on their relationship to marine resources: "we do not need to manage our marine resources yet because we still have not fully used them". Another group said "we don't mismanage our natural resources".

One of the concerns raised by a fishers group was that they were not sure that management programs would really help.



← Figure 69: Level of agreement (by vote) on whether management of marine resources is needed (n=1,306 votes).

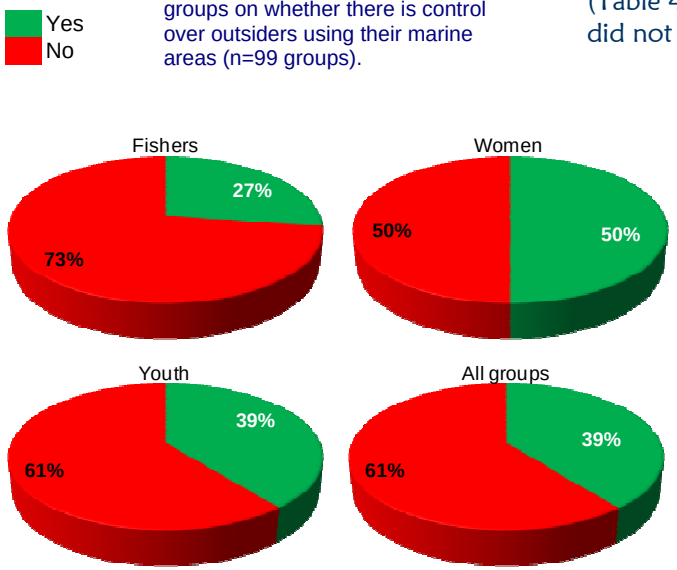
Mechanisms	No.	%FG
Assistance / advice from Experts / Fisheries / Government	22	24
Abide by Government laws	1	1
Ban coral harvesting for lime	3	3
Ban foreign fishing in area	2	2
Ban nets around reefs	2	2
Ban poison rope / dynamite	11	12
Ban rubbish dumping	2	2
Ban small-mesh nets	2	2
Ban turtle fishing	1	1
Catch restrictions	3	3
Closure periods	1	1
Community management / responsibility	14	16
Conservation areas	1	1
Conservation of rare species (dugong, dolphin)	1	1
Control sizes	1	1
Education / awareness / training	26	29
Enforcement by Fisheries	1	1
Establish rules / laws	12	13
Exclude outsiders	3	3
Fish less	1	1
Fish only in own area	1	1
Form management group	1	1
Individual enforcement / management	1	1
Introduce reef tenure	1	1
Leaders forum	1	1
Leave nature as it is	1	1
Look after resources / use wisely	5	6
Monitor fishing	1	1
Only catch what is needed	1	1
Organisation / experts to manage	5	6
Penalties for violators	1	1
Protect beaches from erosion	1	1
Protect mangroves / shoreline trees	2	2
Protect spawning	1	1
Size restrictions	5	6
Stop pollution	2	2
No need	9	10
Don't know	4	4
Not sure it will help	1	1
Responses	140	
Focus groups	90	

→ Table 39: Suggested mechanisms, banned practices and limits for the management of marine resources as suggested by focus groups (n=90).

FG-Q22 Control over marine areas

Do people in this village have any control over any marine areas or species (tenure, tambus or others)? Yes/No.

A large proportion of focus groups (61%) reported that they had little or no control over marine areas (Fig. 70). There were significant differences of opinion among group types for this question. Women were generally more optimistic, with a 50:50 opinion on whether there was any control over areas and resources. In contrast, almost 75% of fisher groups said that there was no control over resources.



↓ Figure 70: Voting results by focus groups on whether there is control over outsiders using their marine areas (n=99 groups).

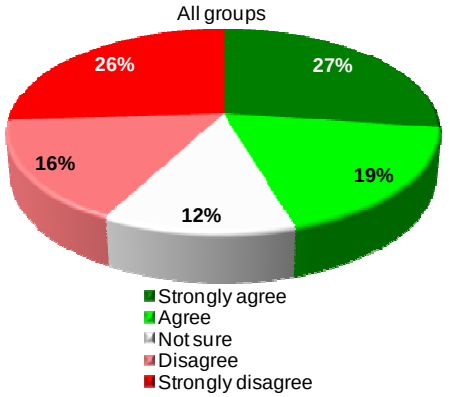
FG-Q23 Control over resources

People in this village have VERY GOOD CONTROL over outsiders using their marine resources. (Ask for show of hands and count the number of people with each opinion). Strongly agree/Agree/Not sure/Disagree/Strongly disagree. Explain.

Overall, 42% of people in focus groups disagreed or strongly disagreed that they had very good control over outsiders using their marine resources (Fig. 71). About 46% of people said they had good or very good control over their resources, with around 12% saying they were not sure. A number of focus groups explained that control was not needed in their area because resources were open to all, or because they are not that interested in fishing (Table 40). One group said there are not many involved in fishing activities, so they created "an advantage" (deal?) with outsiders using their marine resources.

The people that said they had good control said that they were able to stop outsiders from fishing in their areas, also in some cases successfully imposing fines for infringements. About 8% of groups said that their control was good because outsiders generally stuck to their own areas (Table 40), and this argument was also used by people who said they did not need control.

Those who said they had little or no control were in the majority and were most concerned about people from other villages, commercial companies or Lae residents coming into their areas to fish. One group said "people are not tough enough to enforce the laws or rules". Another group said we "don't know how to handle it and most times others come and fish in our areas at night time while we are sleeping".



↑ Figure 71: Results of voting on the degree of control they have over resources by focus groups (n=1,480 votes).

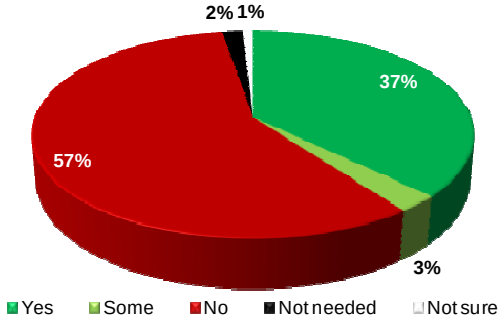
Good control	No	%FG
Outsiders are excluded	10	11
Outsiders don't come	7	8
People seek permission to fish	6	7
People stay in their own areas	5	6
Outsiders excluded	4	4
NGOs manage them	2	2
Outsiders fined	1	1
Companies excluded	1	1
Outsiders excluded	1	1
Little / no control		
Outsiders take resources / no control	35	39
Companies take resources / no control	8	9
Open access	2	2
People not able to enforce rules	1	1
Not originally from this area	1	1
Need help from Fisheries authorities	1	1
No tambus / tenure	1	1
No laws to stop outsiders	1	1
Foreigners fish in the area	1	1
Not needed		
Open access	5	6
Outsiders don't come	2	2
Don't need to control	1	1
Not an issue	1	1
Don't fish much	1	1
Sometimes		
Some people break rules	2	2
Responses	100	
Groups	89	

➔ Table 40: Summary of the types and extent of control that resource owners have over outsiders (n=89 groups). CBO=community-based organisation; VDT=Village Development Trust (both are NGOs).

FG-Q24 Management of resources

Are marine resources managed around this village now? How? Is this system of management working? Please describe.

Most focus groups (57%) said that resources in their area were not currently being managed, compared with 40% who said that there is at least some degree of management (Fig. 72). Some groups said that management was not needed because there were plenty of resources.



↑ Figure 72: Are marine resources managed? (n=113)

The types of management in place ranged from customary tambus, through verbal reinforcement, NGO arrangements for the protection of turtles and their eggs, and rules established by leaders. There was also some confusion over what management might entail. One group said that resources were "not managed at all: there were just laws and rules in place to protect the resources". Cases were cited of situations in which management was and was not working (Table 41).

Management used	No.
Boundaries / tambu areas	2
By Councillor	1
By leaders setting rules	1
By NGO rules	1
Community conservation policy	1
Community rules	1
Conservation areas	2
Customary boundaries	1
Laws	1
Leatherback conservation	1
Look after resources	1
No destructive fishing	3
No high-tech fishing	2
No hunting mother turtles	1
No nets	2
No netting near village	1
No netting on reefs	1
No outsiders	3
No poison rope / dynamite	11
Sea cucumbers not harvested	4
Turtle monitoring	1
Verbal / awareness	2
Total	44

↔ Table 41: Management in use and an assessment of its effectiveness.

Is management working?	No.
Management is not working	8
Nobody knows how	1
People are ignorant	1
People fish in restricted areas	1
Poison rope still in use	1
Still secretly use poison rope	2
Still use destructive methods	1
Use of small-mesh nets increasing	1
Management is working	29
Close monitoring of turtles and eggs	1
Dynamite not being used	3
Ecotourism increased	1
Everyone agreed to it	1
Implemented by community leaders	1
Implemented by Fisheries and NGO	1
Managed by committees	1
New species found	2
Outsiders kept out	4
People obey / cooperate	5
Plenty of resources	1
Reefs growing	2
Resources increasing	1
Sea cucumbers increasing	1
Tambus observed	1
Use of nets declined	1
Use of poison rope declined	1
Violators reported and shamed	1
Some aspects are working	1
Few respect tambus	1
Total	38

FG-Q25 Expectations of management

If marine resources were managed (or managed better), what would you expect would happen to the fishing and collecting in this village?

Of the focus groups that thought that management might be needed, all thought that management would bring benefits to themselves and the community (Table 42). That is, no negative impacts were expected. A large proportion of groups said that they expected their resources to improve or become richer (41%) and that catches would increase (24%). Around 23% of groups said that incomes from fishing would increase. Some groups suggested that fishing would increase, referring to the level of involvement in fishing as a livelihood. Some groups focused more on not needing to travel as far to make their catches and a reduction in the costs of fishing.

Some groups reiterated that "management is not quite needed" saying that their resources were still in good condition. One group of fishers took a broader view suggesting that "we need markets and management together and not management alone". This group said that the expectation of management on its own would be "nothing".

→ Table 42: People's expectations of what would happen if resources were managed (n=96 groups).

Expectations of management	No.
Benefits for many years	1
Bigger / fish close by	3
Catches increase	24
Fish breed more	1
Fishing increases	9
Fishing trips economical / costs reduce	2
Higher income	23
Improved standard of living	1
Increase in sales / markets	1
Increased skills and knowledge	1
More for consumption	2
More income opportunities	1
New species will be found	2
Productivity high	3
Recovery of resources	1
Reefs grow	1
Resources rich / improve	41
Resources used sustainably	5
Resources will last for generations	1
Shorter fishing time	1
Surplus resources / for sale	2
Won't run out	2
Don't know	6
Nothing	1
Responses	128
Groups	96

FG-Q26 Education

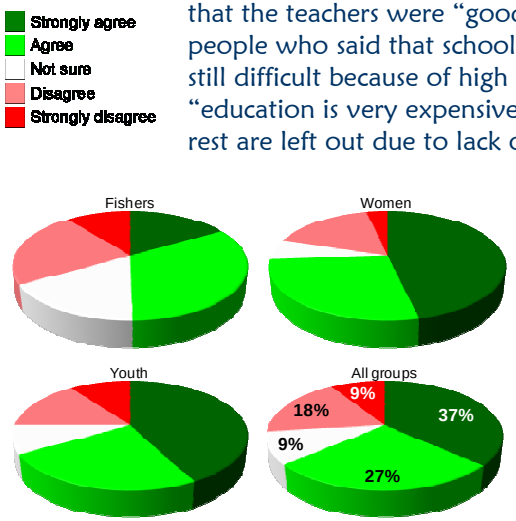
Children in this village can easily get an education. Strongly agree/Agree/Not sure/Disagree/Strongly disagree. Explain.

Most people (64%) thought that gaining access to education was easy in their area, with most people tending to "strongly agree" with this statement. About 27% of all voters thought that getting access to education was difficult (Fig. 73). The level of agreement with the statement that getting an education was easy differed significantly among focus groups. More women and youth voters tended to think that access to education was easy (64-67% agreeing) than fishers (50%). Although more fishers tended to disagree that education was easy to access (33%), the biggest difference between them and other group types was in their neutrality—twice as many fishers were unsure about education in their area.

Access to education	No.
Easy access	
Schools are nearby	71
Good qualified teachers	5
Facilities are good	1
Marine resources help with fees	1
Difficult access	
Fees	33
Far away	10
Teachers unreliable	8
Rough weather prevents paddling	4
Bad weather	3
Parents lazy / not supportive	3
No elementary school	1
Landslides / floods prevent access	1
Children have to board	1
Children have to paddle	1
Money for clothing	1
Shortage of teachers	1
Run out of teaching materials	1
Children have to stay with relatives	1
Responses	147
Groups	98

↑ Table 43: Reasons given by focus groups on why they thought it either easy or difficult to access education in their area.

Many groups said that schools were located nearby and a few said that the teachers were "good" and/or qualified. However, many people who said that schools were available also said that access was still difficult because of high fees (Table 43). One group said that "education is very expensive, only a few are able to get it, while the rest are left out due to lack of [money to pay] school fees". There were also problems with teachers who were seen as unreliable: "teachers cannot cope with village life, they leave" and "when the teachers go to get their pays they do not come back for many weeks".



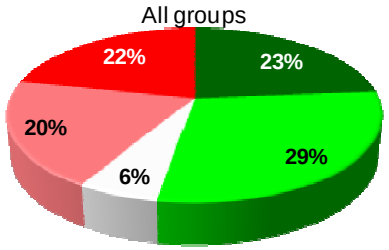
← Figure 73: Opinions of people (by vote) in focus groups of how easy it is to get an education (n=122 votes).

FG-Q27 Health

People in this village can EASILY get medical treatment. Strongly agree/Agree/Not sure/Disagree/Strongly disagree. Explain.

Just over half of the people polled in focus groups (52%) were of the opinion that access to medical services was easy in their area (Fig. 74). About 20% disagreed and 22% strongly disagreed. More members of women's groups (56%) tended to agree that access to medical services was easy than did fishers (48%), with 45% of fishers disagreeing compared with 38% of women.

The most common explanation for why access was considered easy, was the presence of an aid post or health centre in the village or nearby. Some groups said that they thought charges were reasonable and staff and medicines available. More often, the statement that services were nearby was tempered with a lack of or inconsistent supplies of medicines and/or staff that were unavailable and problems with high fees (Table 44). In one response: "we have an aid post ... but it has not had supplies or an orderly since 2003 ... the nearest health centre is around 7 hrs walking and 2 hrs by banana boat". Others said that although basic services were provided, blood tests, x-rays and pap smears were not.



↑ Figure 74: Opinions of people (by vote) in focus groups on the question of easy access to medical treatment (n=1,303).

Access to medical treatment	No.
Easy	
Nearby	51
Charges reasonable	7
Staff good / available	5
Medicines available	2
Transport	1
Enough medicine	1
Nurses come monthly	1
Difficult	
Far away	27
No / not enough medicine / supplies	21
No staff	10
Fees are high	10
Staff inconsistent / unavailable	5
Transport	5
Funding for medicine lacking	4
Have to travel by canoe	3
Problem for serious illness	2
No specialist services	2
Local aid post without staff	1
Staff terminated for poor performance	1
Weather problem	1
Only treat minor illness	1
Service insufficient for population	1
No clinic visits	1
Responses	163
Groups	99

→ Table 44: Reasons given for why people believe that access to medical treatment in their area is easy or not.

FG-Q30 Social problems

Are there any social problems in this village? What are they? How could they be addressed?

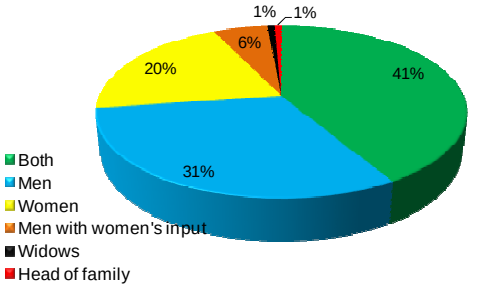
Most focus groups reported social problems in their communities that they felt needed to be addressed. Some groups said that social problems were only minor or rare (8%) and of little significance, while 24% said that they did not have any problems in their communities (Table 45). The most commonly cited problems concerned drugs (mostly marijuana or "spak brus"), alcohol (also home brew) and theft (including of crops). Clan clashes and land disputes, often mentioned as related issues, were reported by 21% and 17% of groups, respectively. Violence was reported in relation to alcohol and domestic disputes.

A wide range of solutions were suggested. Most groups said that these problems could be solved by the village court and magistrate and/or through community meetings. It was suggested that [someone] could "create income opportunities for people in [the] village so they can forget about other illegal activities [such] as rascals." One group said "I think it is normal for any society to have small social problems".

Problems	No.
Adultery	3
Alcohol	26
Buai (betelnut)	5
Clan clashes	21
Crime	2
Domestic violence	16
Drugs / Marijuana	35
Home made beer	2
Land disputes	17
Marital problems	2
Population increase	1
Rape	2
Rascals	4
Sea boundaries	1
Stealing	22
Stealing crops	6
Swearing	1
Tobbacco	1
Unmarried mothers	4
Violence / fighting / abuse	10
Welfare cases	1
No problems	24
Minor / rare problems	8
Responses	218
Groups	98

Solutions	No.	%FG
Awareness	6	8
Ban alcohol	1	1
Chairman	3	4
Christian discipline	2	3
Church leaders	2	3
Clan leaders	2	3
Community meetings	17	22
Compensation / higher	2	3
Councillor	8	11
Counselling by church / leaders	5	7
Create income opportunities	2	3
District court	1	1
Elders	6	8
Enforcement	3	4
Hard work	2	3
High bail	1	1
Lands Mediation Office	1	1
Leaders meet / enforce / laws	11	14
Our responsibility	1	1
Police / Law & Order enforce laws	9	12
Prison	2	3
Provincial / Government action / laws	3	4
Report drug use	1	1
Shame offenders	1	1
Social workers to report cases	1	1
Strengthen youth groups	1	1
Tough / strict laws	4	5
Tough penalties	6	8
Traditional feast	2	3
Village court / magistrate	22	29
Village Planning Committee	1	1
Within the family	2	3
Youth activities ecouraged	1	1
Not sure	2	3
Its normal to have some	1	1
Responses	135	
Groups	76	

↑→ Table 45: Social problems and their solutions reported by focus groups.



← Figure 75: Breakdown of control of money for different purposes in households (n=30).

FG-Q31 Control of money

Who controls money in the household? Who decides how much is spent on food, alcohol, education and medical?

According to 41% of the groups consulted, men and women jointly control household money, while according to 31% of groups men are solely in control. About 20% of groups said women are in control (Fig. 75).

Many groups responded to this question by separating what they considered "control" from who regulates what money is spent on. Control appeared to mean being in possession of the money. Men were generally responsible for all aspects of the household budget (24% of groups) or otherwise had "control" (possession of it). Where men had control, women were often included in deciding on what money should be spent. About 10% of groups said that women that were in control in their area, and that both men and women decided on how money was actually spent. If separated by different types of expenditure, women tended to be in charge of food and men in charge of spending on alcohol. More commonly both men and women shared the responsibilities 30% (Table 46).

↓ Table 46: Breakdown of who controls the money in households.

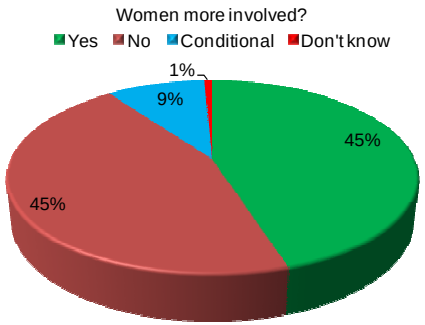
Who	No.
Both	
All	30
Big issues	2
Clothing	1
Depends on family	1
Depends on who has money	1
Education	3
Food	1
Medical	3
Most things	1
Regulate spending / budget	15
Men	
Alcohol	2
All	24
Approve spending	1
Control	14
Control own money	1
Most things	1
Regulate spending / budget	1
Women	
All	5
Control	10
Control own money	2
Food	5
Occasional control	1
Regulate spending / budget	5
Men with women's input	8
Widows	1
Head of family	1
Responses	140
Groups	99

FG-Q32 Women in fishing/collecting

Do you think women should become more involved in fishing and collecting? Why or why not?

The responses to this question fell into two distinct categories. In one, people took the meaning of the question as it was intended and gave their opinions of whether women *should* become more involved. Other groups responding answered the question of whether women *could* be more involved in fishing and collecting. Equal numbers of groups said that women should or should not become more involved in fishing and collecting (Fig. 76), with a further 9% saying they should under certain circumstances. The main reason given for more involvement was to increase household income. The main reasons given for not increasing involvement were concerned with neglect of women's current roles (in the household and gardening and that it would be against traditions (Table 47).

Figure 76: Responses by focus groups to the question of whether women should become more involved in fishing and collecting (n=140 responses).



Reasons for more involvement	No	%FG
Becoming increasingly involved	4	5
Can support family	1	1
Collecting	1	1
Contributes labour	1	1
Coral harvesting	1	1
Help men	1	1
Help men collect bait	1	1
Important for unmarried women	4	5
Income increased	19	22
Increase catches	4	5
Involvement is important here	1	1
Marketing	3	3
New cooking methods	1	1
New presevation methods	1	1
No market, waste of time	1	1
Preserve traditions	1	1
Processing	3	3
Require training	2	2
Shell collecting	1	1
support family	2	2
Women good at it	2	2
Reasons for not becoming more involved		
Gardening neglected	11	13
Housekeeping neglected	11	13
Against traditions	9	10
Care of family / children	7	8
Enough work already	4	5
No market, waste of time	4	5
Cooking	3	3
Domestic violence increase	3	3
Nothing for them to do	2	2
Don't know how to use canoe	1	1
Fishing traditionally for men	1	1
No interested in fishing	1	1
Afraid of rough weather	1	1
Overfishing will result	1	1
Prefer gardening	1	1
Prefer housework	1	1
Women not strong enough	1	1
Conditional		
If market available	5	6
If housekeeping neglected	2	2
If fish processing is improved	1	1
If there is a buyer	1	1
Must be physically fit	1	1
If washing neglected	1	1
Responses	128	
Groups	86	

Table 47: Reasons given for why women should or should not become more involved in fishing and collecting.

FG-Q36 Changes in the environment

Have you noticed any changes in the marine environment over the last 5-10 years? What changes?

Most focus groups (82%) reported that they had seen significant changes in their marine environment (Fig. 77). The most commonly reported changes included coastal erosion, beaches and seawalls, rising tidal levels (usually connected with erosion and stronger swells), and the growth of reefs (Table 48). People noted declines in several resources, expressing the changes in terms of lower catches, fewer animals, the disappearance of species nearby and that fishes and sea cucumbers had "moved out to sea". Several groups reported fish kills: "dead fish float on the sea surface ... we don't know what causes their death... in the past there was nothing like that happening".

Figure 77: Changes in the environment reported by focus groups (n=185 responses).

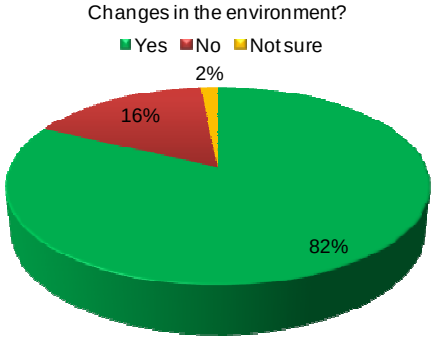


Table 48: Changes in the environment reported by focus groups.

Changes	No.	%FG
Accretion (new land building)	3	5
Beach gone	1	2
Changes in tuna migrations	1	2
Colour of reefs changed	1	2
Conservation area increased fishes	1	2
Corals dying	1	2
Erosion	24	36
Fish catches declining	1	2
Fish kills	2	3
Fish small	1	2
Fish species disappearing	1	2
Fishes declining	5	8
Fishes increasing	2	3
Fishing grounds no longer used	1	2
Further to fish / collect	9	14
Lagoon shallowing	1	2
Large fishes coming closer	1	2
Logging killing reefs	2	3
Logging pollution	1	2
Logging wharf changed tides	1	2
Loss of species	1	2
Mangrove loss	1	2
Mangroves spreading	2	3
Marine life dying	1	2
Migrations of fish changed	2	3
New species appearing	2	3
Oil spills	1	2
Overfishing	2	3
Pollution	1	2
Reefs growing	15	23
Reefs dying	5	8
Resources moved away / deeper	3	5
River flooding at mouth	2	3
Rubbish floating in	1	2
Sandbanks increasing	2	3
Schooling fishes declining	1	2
Sea cucumbers declining	6	9
Sea cucumbers: fewer high value	1	2
Sea cucumbers smaller	1	2
Sea-level rising / higher tides	16	24
Seaweeds dying	4	6
Sedimentation / suffocating reefs	5	8
Shoreline trees lost	2	3
Stronger currents	2	3
Stronger waves / swells	8	12
Tidal patterns changed	1	2
Weather changes	3	5
Responses	151	
Groups	66	

Analysis of Survey Questions

Key Informant Survey

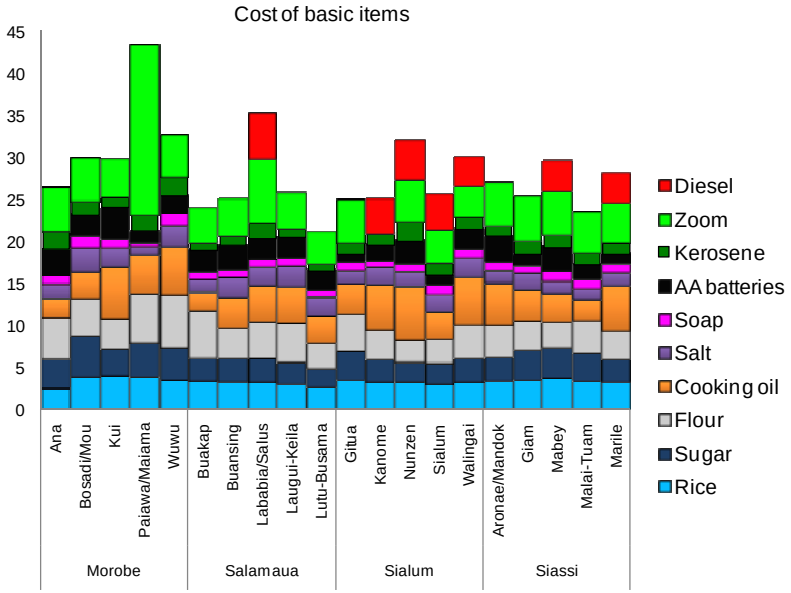
KI-Q1 Cost of items

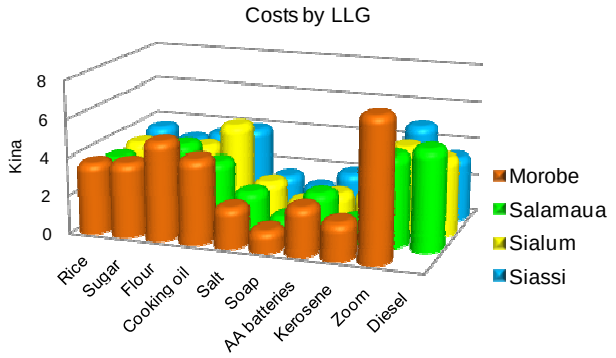
How much do the following items cost at one shop in this village: Rice (1 kg); Sugar (500 g); Flour (1 kg); Soap (cake); Cooking oil (1 litre); Salt (500 g); AA Batteries (2 pack); Kerosene (375 ml); Zoom (Gallon=5 litres); Diesel (Gallon=5 litres).

The cost of common household goods varied significantly among LLGs and wards. Of the 10 items we asked about, zoom (outboard fuel + oil mix) was the most variable with a standard deviation of 72% of the mean (Table 49). The other highly variable goods were AA batteries, cooking oil and salt. Rice was the least variable item, varying by only 12% across all the wards surveyed. Overall costs were highest in Morobe LLG and lowest in Siassi (Figs. 78 and 79). The most expensive ward was Paiawa-Maiama where a "basket" of goods (one unit of each item) would cost more than K43. The cheapest costs were in Lutu-Busama, but for that ward, no diesel costs were included.

🡻 Table 49: Summary of overall average cost (Kina) of common consumer goods across the survey. (SD=Standard deviation, n=30-100 depending on goods).

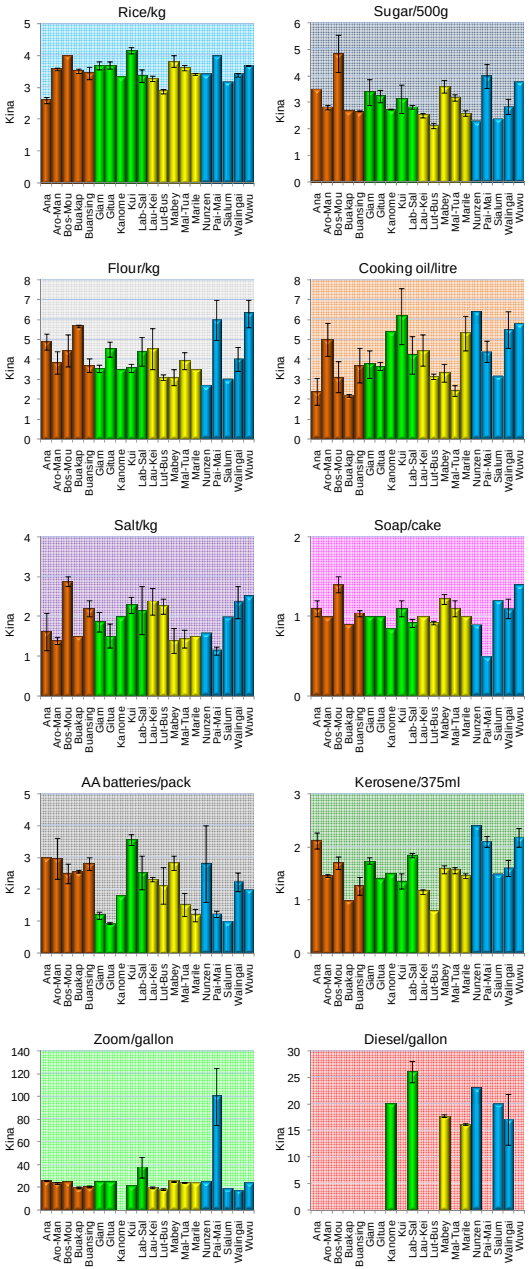
Values	Units	Cost (K)	+/-SD	n
Rice	kg	3.51	0.41	100
Sugar	500 g	3.07	0.84	100
Flour	kg	4.13	1.42	97
Cooking oil	litre	4.18	1.83	98
Salt	kg	1.89	0.68	99
Soap	cake	1.03	0.22	100
AA batteries	2 pack	2.13	0.92	88
Kerosene	375 ml	1.59	0.43	100
Zoom	gallon (5 litres)	27.41	19.64	86
Diesel	gallon (5 litres)	19.57	4.24	30





🡸🡹 Figure 78: Comparison of accumulated cost of items for each ward and by LLG. One unit of each item has been added to each bar as a proxy indicator of overall costs and how these might vary from place to place (n=100). Note values for zoom and diesel are value per litre.

🡺 Figure 79: Cost of common consumer goods in five stores selected in each ward. Kina values are given as means +/-SE of samples taken with each key informant survey (note values are not from the key informants themselves).



KI-Q7 Population growth

What is the population growth rate? % per year (or) Is the number of people Increasing/Decreasing/Steady? Why?

Most key informants said that the populations of all of the wards surveyed were increasing (Table 50). Only 5 of the 97 key informants responding to this question said that the populations in their wards were steady (neither increasing nor decreasing) and none of them suggested that populations were declining.

The most commonly given reasons of why populations were increasing included high birth rates (often associated with earlier or more marriages) and an increase in the number of unmarried mothers (teenage pregnancies and unwanted pregnancies) (Table 51). In some cases, key informants suggested that the underlying causes included better access to health care, a young population with many people at reproductive age and immigration from other villages, including through marriage. As one key informant put it: we have a "younger population with better health".

Those key informants who said populations were remaining steady in their areas stated that this was because family planning is used, because their populations are generally low, and because the costs of living are too high: "Financial crisis has deterred people from having plenty and extra children".

LLG	Ward	↑	→	↓
Morobe	Ana	◆		
	Bosadi-Mou	◆	◆	
	Kui	◆	◆	
	Paiawa-Maiama	◆		
	Wuwu	◆		
Salamaua	Buakap	◆		
	Buansing	◆		
	Lababia-Salus	◆	◆	
	Laugui-Keila	◆		
	Lutu-Busama	◆		
Sialum	Gitua	◆		
	Kanome	◆		
	Nunzen	◆		
	Sialum	◆		
	Walingai	◆		
Siassi	Aronae-Mandok	◆		
	Giam	◆		
	Mabey	◆	◆	
	Malai-Tuam	◆		
	Marile	◆		

← Table 50: Summary of population trends by LLG and ward. Information given is the opinion of key informants. For each ward ↑=population is increasing; →=population is steady; and ↓=population is decreasing (n=97).

Why population is increasing	No	%KI
Death rate < birth rate	1	1
Fewer babies die	1	1
Good health facilities	6	6
Good hygeine	1	1
High birth rate	23	25
Immigration	2	2
Immigration from inland	4	4
Immigration through marriage	1	1
Increase in / many early marriages	22	24
Lack of birth control awareness	1	1
Low death rate	1	1
Many female children who will reproduce	1	1
Many marriages	17	18
Many people of reproductive age	5	5
Many young women giving birth	2	2
More people want babies	3	3
Need more children to claim land	1	1
No family planning	3	3
People return to the village from towns	3	3
Unmarried mothers / unplanned pregnancies	12	13
Unplanned marriages	1	1
Younger population	3	3
Why population is remaining steady		
Birth rate = death rate	1	1
Family planning is used	1	1
Few people live here	2	2
Few relatives	1	1
High birth rate	1	1
High costs limit number of children	1	1
Low death rate	1	1
Not many marriages	2	2
Responses	124	
Key informants	93	

→ Table 51: Summary of reasons given for reported population trends.

KI-Q9 Illness

What are the main sicknesses in the village?

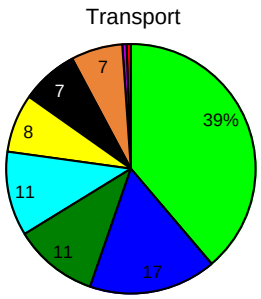
Malaria was the most often reported and by far the highest ranked in terms of important illnesses reported by key informants (Table 52). Fourteen different types of diseases were identified, and included minor ailments such as headaches and colds. Several serious diseases were also reported, including malaria, tuberculosis, typhoid, pneumonia, asthma and polio.

Diseases	Importance	No.
Malaria	381	96
Cold / flu / fever	44	18
Tuberculosis	36	12
Cough	23	9
Typhoid	16	6
Pneumonia	14	5
Diarrhoea	10	4
Asthma	8	4
Skin disease	5	2
Body aches	5	2
Cerebral malaria	4	1
Headaches	3	1
Pain	2	1
Polio	2	1
Total / responses	553	162
Key informants		100

↑ Table 52: Illnesses reported by key informants. The value of "importance'" was calculated by using the ranked importance scores by key informants as follows: most important=score 4; intermediate values of 3 or 2 and least important=score 1. Ranked scores were then summed across the survey.

KI-Q11 Schooling

Where do children in the village go to school? How do they get there? Give Name(s) of school(s)/Location(s) (Village)/Usual transport; for: Pre-school (<5 yrs); Elementary (5-6 years); Primary (Grades 1-6); Secondary (Grades 7-10); Secondary Grades 11 -12; Vocational.



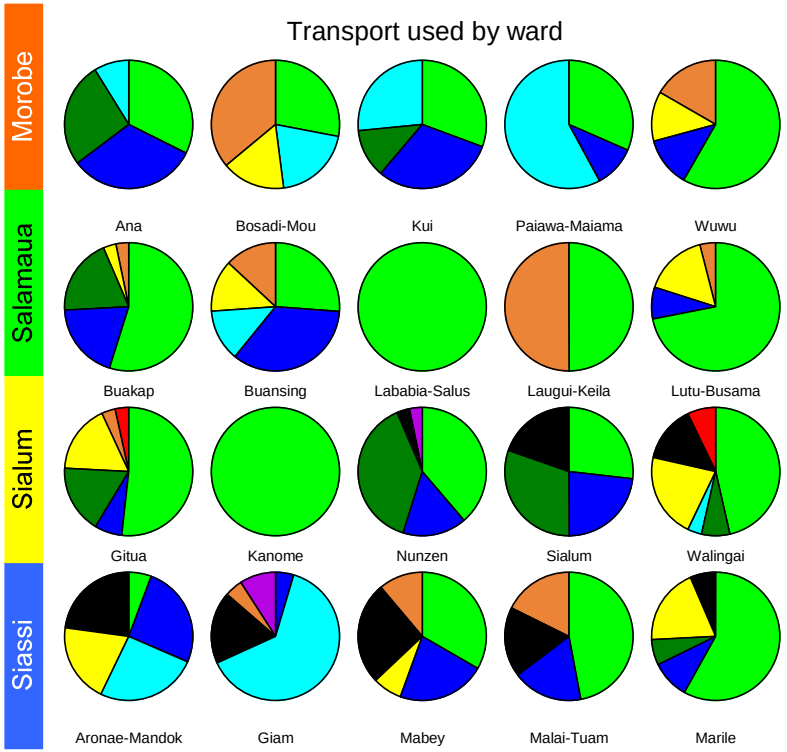
According to key informants, students in all wards were able to access education at all levels from pre-school through to vocational training (Table 53). "Access" included using schools in the village or nearby, as well as travelling to more remote locations that required boarding. In several wards in Siassi LLG, key informants separated access to levels of secondary schooling, with some schools apparently offering just two years of the secondary schooling required.

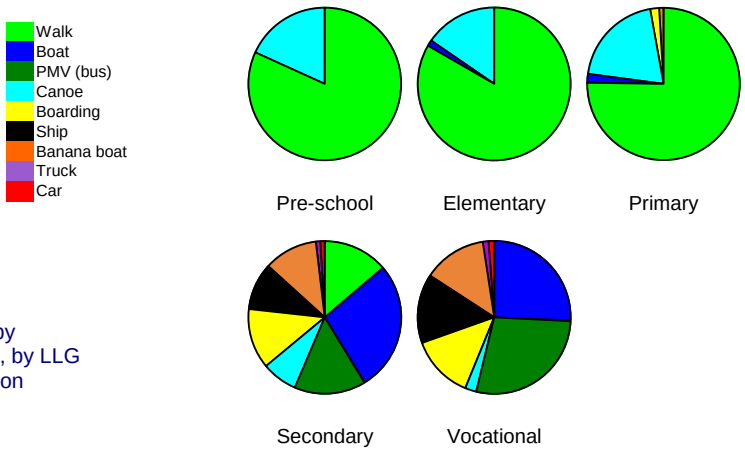
The most common ways for students to get to school were by walking (39%) and by boat (Fig. 80). Walking was the only way for students in Lababia-Salus (Salamaua LLG) and Kanome (Sialum) to get to school. Four different types of sea transport were reported: boat, canoe, ship and banana boat. It is likely that boats and banana boats have been used interchangeably, though there are other small powered boats in use in the area, with some reporting "dinghys". Ships (usually referring to Lushup interisland transport vessels) were mostly used in Siassi, and canoes most used in Morobe and Siassi LLGs.

The types of transport used varied with level of education. Children travelling to pre-school, elementary and primary school tended to walk and use canoes the most. These schools are likely to be the most numerous and close to where the children live. By secondary school level and for vocational training, students use a range of transport types including PMV buses, ships and may board to attend school.

LLG	Ward	Pre-school (<5 yrs)	Elementary (5-6 yrs)	Primary (1-6)	Secondary (7-8)	Secondary (7-10)	Secondary (9-10)	Secondary (11-12)	Vocational
Morobe	Ana	◆	◆	◆		◆		◆	◆
	Bosadi/Mou	◆	◆	◆		◆		◆	◆
	Kui	◆	◆	◆		◆		◆	◆
	Paiawa/Maiama	◆	◆	◆		◆		◆	◆
	Wuwu	◆	◆	◆		◆		◆	◆
Salamaua	Buakap	◆	◆	◆		◆		◆	◆
	Buansing	◆	◆	◆		◆		◆	◆
	Lababia/Salus	◆	◆	◆		◆		◆	◆
	Laugui-Keila	◆	◆	◆		◆		◆	◆
	Lutu-Busama	◆	◆	◆		◆		◆	◆
Sialum	Gitua	◆	◆	◆		◆		◆	◆
	Kanome	◆	◆	◆		◆		◆	◆
	Nunzen	◆	◆	◆		◆		◆	◆
	Sialum	◆	◆	◆		◆		◆	◆
	Walingai	◆	◆	◆		◆		◆	◆
Siassi	Aronae/Mandok	◆	◆	◆	◆	◆	◆	◆	◆
	Giam	◆	◆	◆	◆	◆		◆	◆
	Mabey	◆	◆	◆		◆	◆	◆	◆
	Malai-Tuam	◆	◆	◆	◆	◆	◆	◆	◆
	Marile	◆	◆	◆		◆		◆	◆

← Table 53: Summary of education accessed from each LLG and ward. Access does not mean that the school or institution is nearby.





↑→ Figure 80: Transport used by students to get to school: overall, by LLG and ward and by level of education (n=539 responses).

KI-Q12 Involvement in fishing

What is the estimated number of households in the village involved in fishing? If there are any households that don't participate, why don't they?

Almost 78% of key informants reported that all or nearly all of the households in their village were involved in fishing and/or collecting. Only three key informants said that 10% or less of the households in their area were not involved. The highest proportion of households involved in some form of fishing and/or collecting (89%) was found in Siassi LLG. The least involvement was reported at Sialum LLG at 66% of households. There were also significant differences among wards. Very few households in Kanome were reportedly involved in fishing, while there was said to be 100% involvement in six wards within Morobe, Salamaua and Siassi LLGs (Fig. 81).

The main reasons given by key informants for non-involvement in fishing were that people were involved in other activities or that they had no interest in it (Table 54). Other activities included cattle farming, sago-making, gardening, and growing cocoa, vanilla and coconut. Other reasons given were that people did not know how to fish (often because they had immigrated from inland villages), they could not get the gear required, or that they were just lazy. For some people there was "no interest in fishing because [there are] no buyers around".

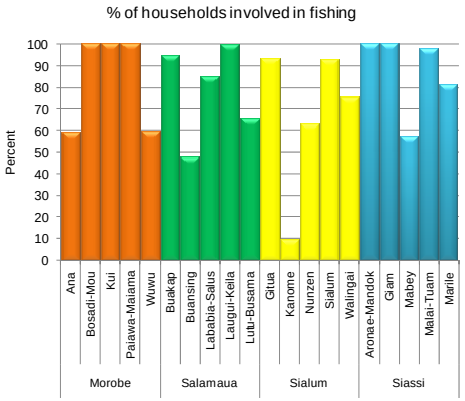
KI-Q18 General community concerns

What are some of the general concerns in the community? (What subjects of importance come up in community meetings?)

Key informants reported that communities were concerned with a wide range of issues in community meetings and discussions (Table 55). The most common issues related to education, particularly with encouraging children to attend school and transport problems. People also raised several issues connected with community development, social problems and land issues. People were concerned with drug and alcohol use and a lack of law and order. These concerns were often directed at youth: "youth [should] be productive and avoid use of drugs".

There were also issues with land, including disputes over boundaries, among clans and between inlanders and coastal people. Issues of insufficient land also emerged: "land owners only to stay in this community due to land and resource shortage".

Figure 81: Households reported by key informants as involved in fishing and collecting (n=92 key informants).



Reasons for not fishing	No.	%KI
Other activities	16	30
No interest	10	19
Don't know how to fish	9	17
No / can't get gears	7	13
Lazy	4	7
Come from inland	4	7
No canoes	3	6
Too old to fish	3	6
Rough seas / strong winds	1	2
No buyers	1	2
Only fish for food	1	2
Under a curse	1	2
Have not learned from parents	1	2
No markets to sell them	1	2
Not fit enough	1	2
Income is not good enough	1	2
No transport	1	2
No time	1	2
Responses	66	
Key informants	54	

Table 54: Reasons given for why some households are not involved in fishing and collecting.

Table 55: General concerns of communities as indicated by key informants.

Concerns	No.
Agriculture	
Extension services	7
People should garden	1
Church	
Church activities	12
Christian beliefs / values	9
Build churches	2
Donations	1
Christian college	1
Community / social	
Drugs	17
Community development	17
Law and order	15
Alcohol	10
Violence / abuse	8
Crime	7
Basic services	5
Unwanted pregnancies	5
Youth behaviour / issues	5
Family / domestic issues	3
Social problems	3
Community participation	2
Adultery	2
Village governance	1
The future	1
Welfare services	1
Population growth	1
Aged housing	1
Rape	1
Lack of goods	1
Relationships	1
Disobedience	1
Government projects	1
Immigrants	1
Economy	
Income activities	8
Financial concern / assistance	5
Business development	4
Jobs	2
Increasing fuel costs	1
Education	
Education / schooling issues	21
Fees	4
Training	2
Distance to school / transport	2
Upgrade school	1
AIDS awareness	1
Teachers absent / lacking	1
Resource centre	1
Environment	
Management / conservation	8
Mineral exploration	1
Forestry	
Management / development	1
Government / infrastructure	
Services	4
Water	4
Wharves / jetties	2
No transport	2
Sanitation	2
Roads	2
Projects	1
Public servants not performing	1
Health	
Services	10
Medical supplies	2
Distance to services	1
Doctors	1
Hygeine	1
Land	
Disputes	16
Land shortage / resettlement	4
Traditional boundaries	1
Land boundaries	1
Marine resources	
Buyers	10
Extension services	8
Markets	5
Transport	4
Management / development	3
Overfishing	2
Fish preservation / ice	2
Fishing boundaries	2
Ice	2
Use of destrucive methods	1
Fuel costs	1
Responses	301
Key informants	96

Main issues	No.
Needs	
Ice / ice machine / chiller needed	34
Transport	24
Buyers	14
Markets	13
Gears / better gears	7
Conservation	4
Extension services	4
Boats / canoes	3
Methods of preservation	3
Awareness / information	2
Communication	2
Development of fishing	2
Aquaculture	1
Financing for buyers	1
Safe anchorage	1
Want to fish in deep sea	1
Problems	
Poison rope / dynamite	12
Fuel expensive / short supply	8
Outsiders poaching	8
Prices low	8
Destructive fishing	5
Diving scares fish / dangers to youth	4
Fishing boundaries violated	4
Commercial fishing takes resources	3
Nets / used regularly	3
Resource shortage	3
Undersize fishing	3
Weather patterns	3
Assistance / projects no benefit	2
Costs too high	2
Fishes declining	2
Foreign fishing takes resources	2
Oil spills	2
Pollution	2
Transport expensive	2
Unnecessary fishing	2
Buyers must be honest	1
Limemaking destroys reef	1
Loss of breeding grounds	1
Mangrove loss	1
Night diving	1
Overfishing	1
Reef breaking for bait	1
Resources now further away	1
Seasonality of fishing	1
Small sizes	1
Tambus	1
Tuna declining	1
None	11
Not interested	1
Responses	222
Key informants	96

← Table 56: Fisheries issues raised during community meetings as reported by key informants.

KI-Q19 Fisheries issues

What are the major issues concerning fisheries in this village? What needs to be done to address them? What has the community tried to do to address the issues? What was the result?

Fisheries concerns are important in community meetings and key informants identified a wide range of issues being discussed (Table 56). Issues fell into two groups: 1) needs for improving benefits from marine resources, and 2) problems that communities face with resource use. Needs were identified by more key informants than were problems, though about 11% said that there were no issues.

The most important needs were for ice facilities and for transport to move marine products to markets where they could be sold (Table 56). There were also issues with a lack of local buyers and the need for fishing gear or better gears. In terms of problems with fishing, the most important issue was to stop destructive fishing, such as poison rope. People were also concerned about fuel costs, outsiders from other villages poaching their resources, and low prices for their fishes and other resources (especially sea cucumbers).

Most communities (31%) did not or could not take any actions to address their issues relating to fishing (Table 57). One key informant reported that the result of inaction only led to the problem becoming worse: "the issues/problems became more of a headache to the villagers".

The most common actions taken were to establish community rules and/or punishments. These were used to curb outsider poaching, and to manage the resources themselves. The outcomes of this action were divided equally between positive and negative effects. On the negative side: "people still cross boundaries resulting in arguments and fights. No one respects this community's laws". Another key informant said that the law had stopped poaching from the reef.

Many communities tried discussing the problem (but not taking any further action) and raising the issues with their councillor, member, Provincial Fisheries, the LLG, leaders, a commercial fishing company, fishing association or NGO. None of these actions lead to positive outcomes (Table 58).

The actions that led to the most positive outcomes included consensus agreements within the community to observe better fishing practices (stopping diving, overuse of nets, use of poison rope and other destructive fishing practices) and the establishment of tambu areas.

Community actions	Negative	Positive	Neutral	No.
Community rules / punishments	2	2	2	6
Discussions	5	1		6
Raised issues with LLG / Government	4			4
Raised with Ward Member / Councillor	4			4
Diving stopped	1	2		3
Groups / associations formed	1	1	1	3
Poison rope stopped	2	1		3
Chased outsiders away	2			2
Planning actions			2	2
Requested financial assistance	2			2
Tambu put in place		2		2
Waiting for LLG / Govt to act	2			2
Approached commercial fisher	1			1
Built a resource centre		1		1
Committee established		1		1
Community bought own fish		1		1
Complained to association	1			1
Compliance with laws	1			1
Cooperation with leaders		1		1
Destructive methods stopped		1		1
Established reserve			1	1
Fundraising		1		1
Individual agreements with buyers	1			1
Law enforced		1		1
Leaders approached outsiders	1			1
Looking for new opportunities			1	1
Net use controlled		1		1
Notice to oustiders to stay away		1		1
Pressure on Fisheries	1			1
Raised to Provincial Fisheries	1			1
Raised with associations	1			1
Requested assistance NGOs	1			1
Requested ice machine from Member	1			1
Small hooks stopped			1	1
Stop activities that scare fish		1		1
Thought about it			1	1
Tried own transport by dinghy	1			1
Tried to find markets			1	1
Tried to fish and sell	1			1
Wait for weather to change	1			1
Nothing	1		26	27
Responses	39	19	36	94
Key informants				88

↑ Table 57: Actions or solutions to fisheries problems that have been tried by communities. Negative, positive and neutral outcomes are reported for each action.

Outcomes of community action	No.
Negative outcomes of community action	
Broken promises	1
Can't purchase gears	1
Diving has increased	1
Have to wait to eat fish	1
Helped in the past, not now	1
Laws not respected	1
No assistance has come	2
No finance	1
No funds available	1
Not profitable	1
Nothing	16
Outcome not satisfactory	1
Outsiders still fish	5
People still break laws	1
Poison rope still in use	1
Problems increased	1
Still fights over boundaries	1
Still using poison rope	2
Still waiting patiently	2
Positive outcomes of community action	
Allowed fishers to be paid	1
Better awareness	1
Fish breeding, returning	3
Fish returning from deepsea	1
Provincial Fisheries may buy fish	1
Funds raised	1
Less use of nets	1
Local buyer established	1
More fish, easier to catch	1
Now referred to LLG	1
Outsiders stopped	2
People cooperative	1
Plenty of resources	1
Resources returned to normal	1
Turtle eggs not taken	1
Youths trained in fishing	1
Responses	68
Key informants	

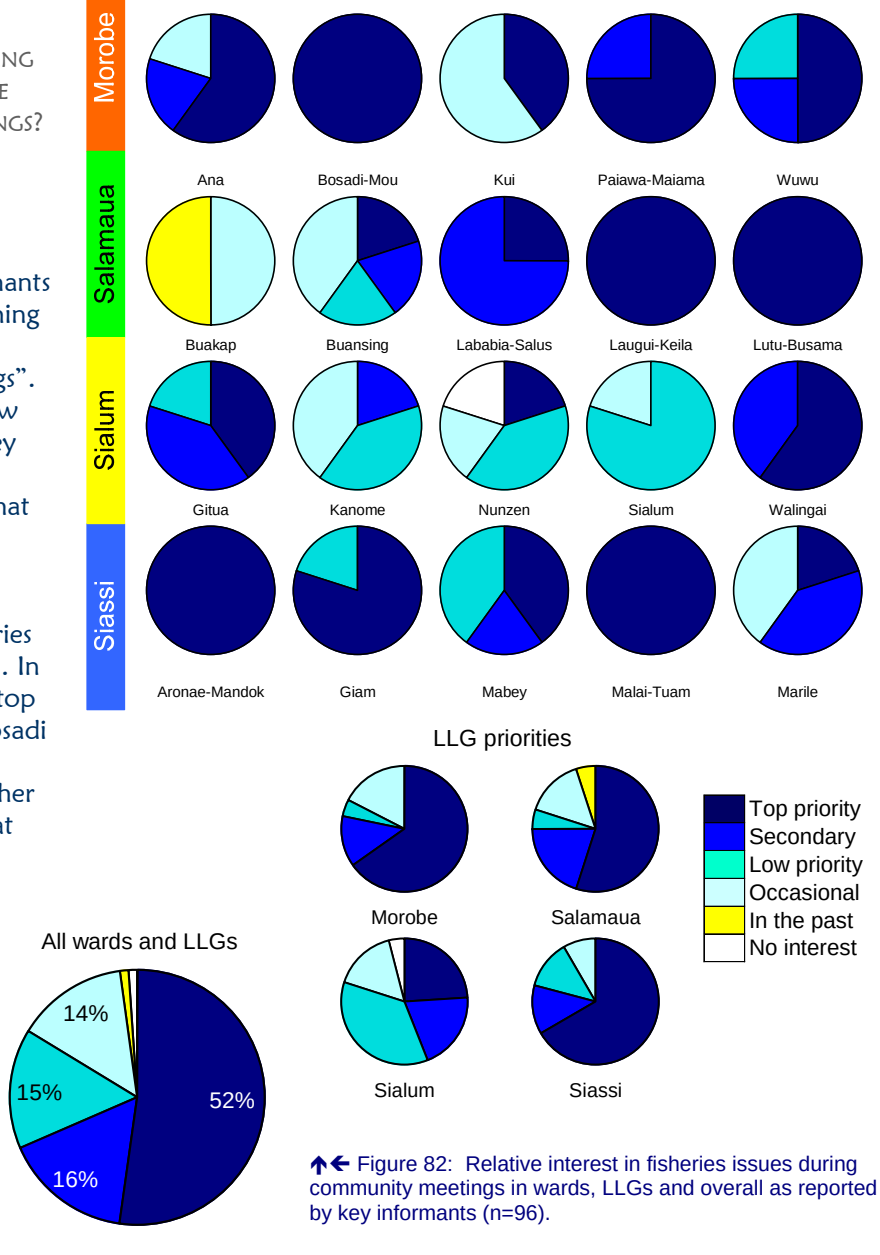
↑ Table 58: Outcomes of community action to address fishing issues (n=90).

KI-Q20 Improving fishing

How much of a priority is it to improve fishing concerns in this village? How often does the community talk about fishing issues in meetings?

Based on the opinions of key informants, communities varied greatly in terms of the importance of fisheries concerns at community meetings (Fig. 82). Overall, 52% of key informants reported that their communities considered fishing issues a top priority where "fishing is the most talked about subject in our community meetings". Around 29% considered that fisheries was a low priority or an occasional issue. About 2% of key informants said that at present there was no interest in improving fishing in their areas, or that there had been interest in the past.

The most interest in improving fishing was reported in Morobe and Siassi LLGs, with fisheries a significantly lower priority in Sialum (Fig. 82). In some wards fisheries issues were reported as a top priority by all key informants. This included Bosadi -Mou, Laugui-Keila, Lutu-Busama and Aronae-Mandok areas. There was more variation in other wards. The least interest in fishing was shown at Buakap (only in the past) and Nunzen wards. Where fishing is a low priority it is often because "no good income is generated" and "people are very far from the city and markets". In other cases, it was because people "are not interested in fishing work and only on inland farming" or "because a lot of people don't know how to fish".



↑← Figure 82: Relative interest in fisheries issues during community meetings in wards, LLGs and overall as reported by key informants (n=96).

KI-Q37 Alcohol and drugs

How common are problems with alcohol or drugs in the village (drunken people disturbing others, violence). No problem/ Happens rarely/Happens occasionally/ Problems are common/Problems arise weekly and cause concern. Describe the types of problems.

Less than 1% of key informants reported that their communities had major concerns with alcohol or drugs (Fig. 83). About 6% said that problems were, however, common and a further 62% reported problems as occasional or rare.

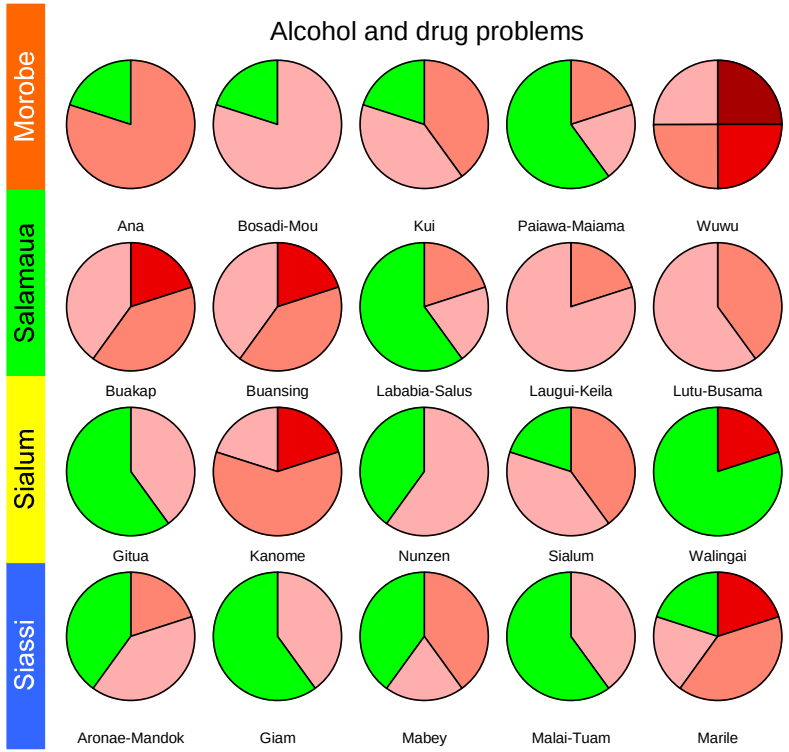
Issues with alcohol and drugs were about the same in the four LLGs surveyed, but key informants differed significantly in their perception of the problems at the level of wards. The wards with the greatest number of key informants saying there were no problems with alcohol and drugs were Malai-Tuam and Giam in Siassi LLG, and Lababia-Salus in Salamaua (Fig. 83).

Problems with alcohol and drugs were often connected with youth (no gender supplied) and in one case with "young men" (Table 59). They were also connected with special occasions and the presence of logging companies. Alcohol problems occur "during [the] Christmas festive season and special occasions" and youth are "drunken because [the] logging company is employing people and selling beer". Another key informant said that there used to be major problems when there was a logging operation and "people had a lot of money to spend on alcohol and drugs". In one case, a key informant said that drugs were being exchanged for guns.

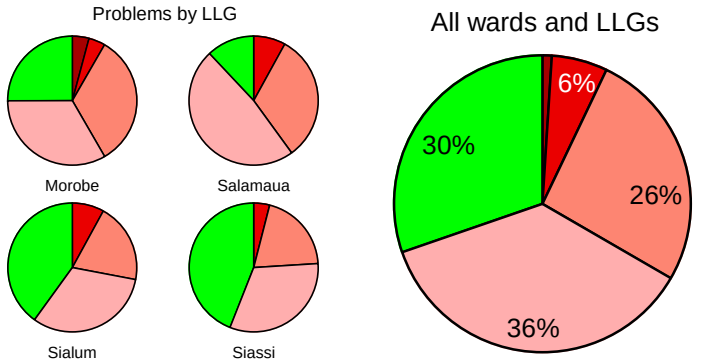
The most common effects were disturbance to the community, drunkenness, fighting and the use of abusive language.

Problems	No.	%KI
Abuse	1	2
Abusive language / swearing	6	12
Addiction	4	8
Arguments	2	4
Associated with logging income	2	4
Brawls	1	2
Clan disputes	1	2
Conflicts between elders and youth	1	2
Disobedience	1	2
Disorder	1	2
Disrupt special occasions	3	6
Disturb community	12	24
Domestic disputes	2	4
Domestic violence	5	10
Drug selling	1	2
Drugs for guns	1	2
Drunkeness	7	14
Fighting	7	14
Laziness	1	2
Loud music	2	4
Mental effects	1	2
Noise disturbance	5	10
Occurs during special occasions	1	2
Rape	1	2
Stealing from gardens	3	6
Theft	1	2
Young men	1	2
Youth	13	25
Responses	87	
Key informants	51	

← Table 59: Problems arising in relation to alcohol and drugs in the community as reported by key informants.



↑↓ Figure 83: Assessment by key informants of alcohol and/or drug problems in villages (n=99). Green indicates an opinion of no problem, while increasing amount and intensity of red indicates an increasing perception of problems.



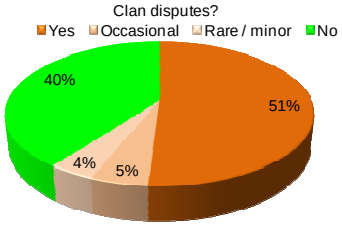
KI-Q38-39 Clan conflicts & their Resolution

Are there any conflicts between clans? What are the main issues? How are Clan conflicts resolved?

Just over half of the key informants (51%) said that there were disputes among clans in their area (Fig. 84). For 40% of key informants there were no clan issues. One key informant said: "there are no clan conflicts and people live in harmony".

The most important reasons for disputes were over ownership or the boundaries of land, the land used for gardens and sea boundaries for fishing areas (Table 60). Of these, disputes over land were by far the most important.

The most common way that clans resolve their conflicts is through community meetings and mediation by community leaders, particularly the councillor (Table 61). Clan meetings and mediation by elders were also important. Surprisingly land mediators were mentioned less frequently.



↑ Figure 84: Frequency of clan disputes (n=98).

↙ Table 60: Types of clan disputes reported by key informants.

Types of conflicts	No.	%KI
Land	39	65
Land boundaries	11	18
Gardens	5	8
Sea boundaries	3	5
Theft	3	5
Theft buai / mustard	3	5
Adultery	2	3
Logging	2	3
Resources	2	3
Theft of pigs	2	3
Alcohol induced	1	2
Canoe trees	1	2
Crime	1	2
Disagreements over arranged marriages	1	2
Discrimination	1	2
Domestic violence	1	2
Drugs	1	2
Family disputes	1	2
Land for cattle	1	2
Marriages	1	2
Outsider fishing	1	2
Pigs damaging gardens	1	2
Sago palm	1	2
Sea areas	1	2
Theft of garden produce	1	2
Theft of tobacco leaves	1	2
Responses	88	
Key informants	60	

↓ Table 61: Mechanisms used for resolving clan conflicts as reported by key informants.

Resolution of clan disputes	No.
Church elders	2
Church leaders	3
Church mediation	1
Clan and community meeting	4
Clan chiefs	5
Clan meeting	11
Committees	3
Community meeting	20
Compensation	3
Councillor	12
Elders	10
Governing body	1
Government representatives	1
Land court	1
Land mediation	9
Law and Order Committee	1
Leaders	17
Legal representatives	1
Legislation	1
Magistrate	6
Pastor	1
Peace Officer	1
Planning Committee	1
Police	1
Resolves itself	1
Traditional resolution	5
Trouble Committee	1
Village court	9
Village magistrate	1
Responses	133
Key informants	79

KI-Q41 Increasing women's' involvement in Fisheries

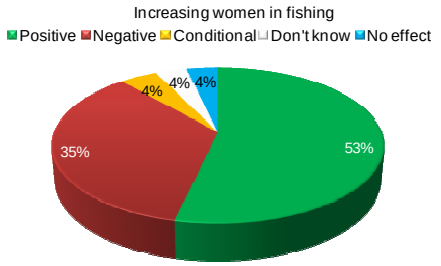
What is the likely effect of increasing involvement by women in fishing activities?

Most key informants (53%) saw positive impacts in the community of increasing the involvement of women in fishing and collecting activities (Fig. 85). The most frequently cited effect was an expected increase in income primarily to the family, but also to the community economy in general. A key informant highlighted more long-term and indirect benefits: "it would raise the status of women in our society with recognition of women on equal standing".

For those predicting negative effects of women's involvement (35%) , the expected impacts included domestic disputes and violence, often following on from neglect of the family and housework (Table 62). One key informant said: "household chores will be neglected, gardening activities will decline, children will be left unattended, all will lead to starvation, malnutrition and domestic violence". Another said: "our women don't know how to fish properly, they will also cause bad luck to us".

Positive	No.
Income increased	37
Catches increased	7
Already involved	3
Help the family	3
Marketing	3
More fish to eat	3
Better economy	2
Earn income	2
Marketing of fish	2
Earn more as a team	1
Healthier life	1
Help husband	1
Increased fishing efficiency	1
Interest in fishing will increase	1
Life easier for family	1
Men could work less	1
More fish to sell	1
More income for fundraising	1
More protein for family	1
Preservation of fish	1
Raise the importance of fisheries	1
Raise womens' status	1
Negative	
Domestic disputes	6
Domestic violence	6
Housekeeping neglected	6
Children neglected	5
Cooking neglected	4
Fishes will decline	4
Gardening neglected	4
Family disorder	2
Women may dominate fishing	2
Meant to stay home	2
Church work neglected	1
Community work neglected	1
Husbands will complain	1
Malnutrition	1
Shells will decline	1
Tradition forbids it	1
Traditional disgrace	1
Will cause bad luck to men	1
Responses	124
Key informants	87

← Table 62: Opinions of key informants on the likely impacts of increasing women's involvement in fisheries.



➔ Figure 85: Overall opinions regarding likely effects of increasing women's involvement in fishing (n=140).

ANNEX 1. TIMETABLE FOR SOCIO-ECONOMIC SURVEY

Week 1	Transport	Fri 15 Jul	Sat 16 Jul	Sun 17 Jul	Mon 18 Jul	Tue 19 Jul	Wed 20 Jul	Thu 21 Jul	Team members		
Luship + Banana		Siassi LLG - MABEY							Gilingde	Paul	Zonggu
Luship + 4WD Hire Car			Sialum LLG - GITUA						Cliveson	Frederick	Jeffrey
Banana Boat			Salamaua LLG - LABABIA-SALUS						Mecham	Mangon	Escol
Banana Boat			Morobe LLG - ANA						Roger	Buckley	Amos

Week 2	Transport	Fri 22 Jul	Sat 23 Jul	Sun 24 Jul	Mon 25 Jul	Tue 26 Jul	Wed 27 Jul	Thu 28 Jul	Team members		
Banana + Luship		Siassi LLG - ARONAE-MANDOK							Gilingde	Paul	Zonggu
Luship + 4WD Hire Car			Sialum LLG - KANOME						Amos	Trevor	Mecham
Banana Boat			Salamaua LLG - BUAKAP						Buckley	Roger	Cliveson
Banana Boat			Morobe LLG - WUWU						Escol	Frederick	Jeffrey

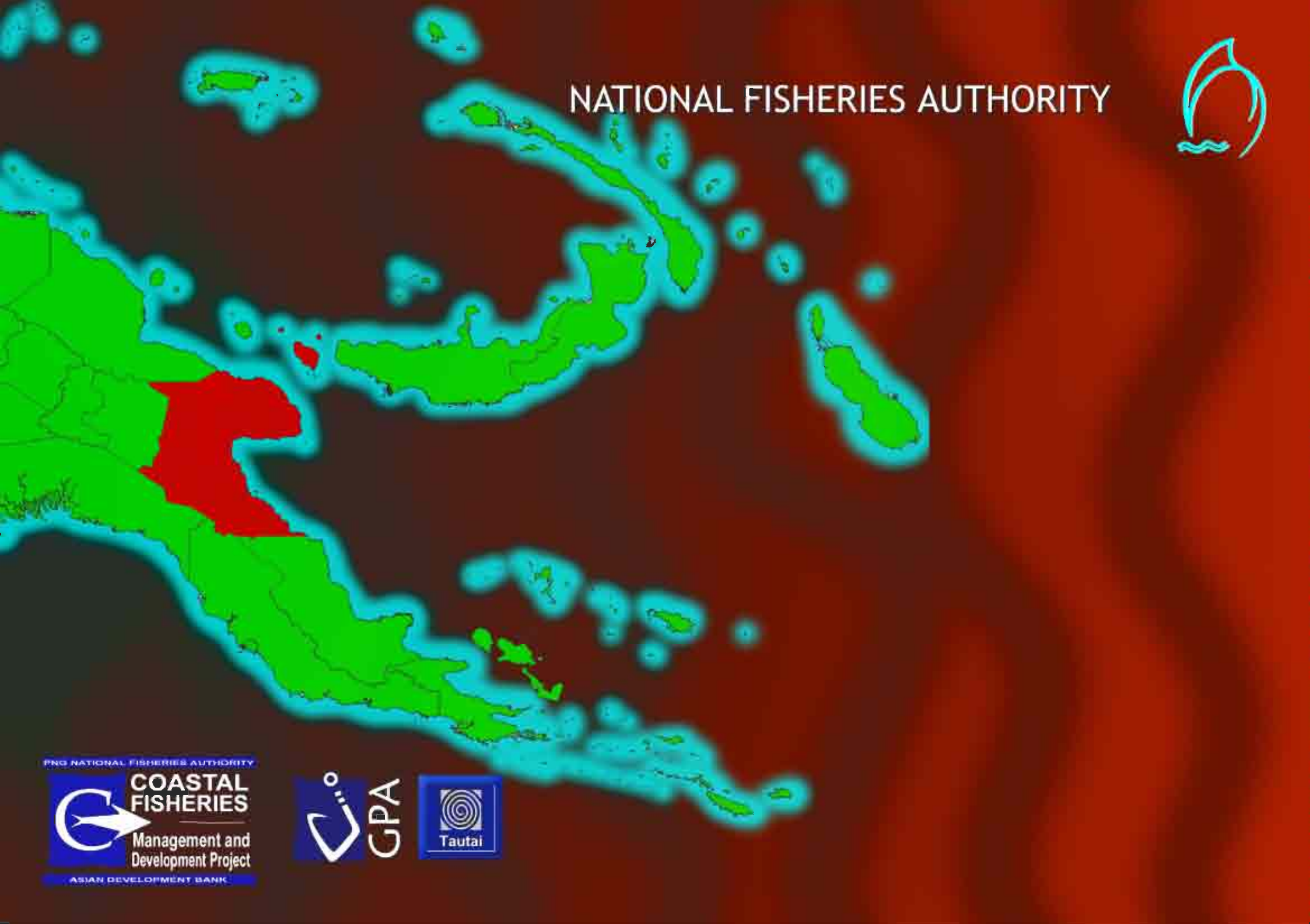
WEEK OFF

Week 3	Transport	Fri 05 Aug	Sat 06 Aug	Sun 07 Aug	Mon 08 Aug	Tue 09 Aug	Wed 10 Aug	Thu 11 Aug	Team members		
Luship + Banana		Siassi LLG - MALAI-TUAM							Buckley	Escol	Frederick
Luship + 4WD Hire Car			Sialum LLG - SIALUM						Mecham	Roger	Trevor
Banana Boat			Salamaua LLG - LUTU-BUSAMA						Amos	Paul	Jeffrey
Banana Boat			Morobe LLG - BOSADI-MOU						Zonggu	Cliveson	Gilingde

Week 4	Transport	Fri 12 Aug	Sat 13 Aug	Sun 14 Aug	Mon 15 Aug	Tue 16 Aug	Wed 17 Aug	Thu 18 Aug	Team members		
Banana + luship		Siassi LLG - GIAM							Buckley	Escol	Frederick
Luship + 4WD Hire Car			Sialum LLG - WALINGAI						Mecham	Cliveson	Zonggu
Banana Boat			Salamaua LLG - BUANSING						Amos	Mangon	Jeffrey
Banana Boat			Morobe LLG - KUI						Roger	Paul	Trevor

WEEK OFF

Week 5	Transport	Fri 26 Aug	Sat 27 Aug	Sun 28 Aug	Mon 29 Aug	Tue 30 Aug	Wed 31 Aug	Thu 01 Sep	Team members		
Luship + Banana + Luship		Siassi LLG - MARILE							Jeffrey	Cliveson	Roger
Luship + 4WD Hire Car			Sialum LLG - NUNZEN						Trevor	Escol	Amos
Banana Boat			Salamaua LLG - KEILA-LAUGUI						Gilingde	Frederick	Zonggu
Banana Boat			Morobe LLG - PAIAWA-MAIAMA						Buckley	Mecham	Paul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COASTAL FISHERIES
Management and Development Project
ASIAN DEVELOPMENT BANK
GPA
Tautai