Mangrove Ecosystems for Climate Change Adaptation & Livelihoods (MESCAL)

BIODIVERSITY ASSESSMENT REPORT MARAMASIKE PASSAGE, MALAITA PROVINCE

SOLOMON ISLANDS

BIODIVERSITY ASSESSMENT OBJECTIVES

1. Improve understanding of mangrove ecosystem functions, values, key threats, and processes at a local and regional scale;
2. Provide a standardized method to assess shoreline mangrove condition and change over time;
3. Generate community awareness of mangroves and encourage local environmental stewardship;
4. Conduct a rapid and representative survey of fish and mobile crustacean assemblages;
5. Conduct a rapid survey to accurately determine key biodiversity and biomass characteristics of mangrove stands at the demonstration site;
6. Establish a long-term visual record of mangroves at the demonstration site.

Supported by:

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GLOSSARY

AGC	ATTORNEY GENERALS CHAMBERS
BMU	FEDERAL MINISTRY FOR THE ENVIRONMENT, NATURE CONSERVATION AND NUCLEAR SAFETY
ISSI	I LUKIM SUSTAINABLE SOLOMON ISLANDS
IUCN	INTERNATIONAL UNION FOR CONSERVATION OF NATURE
JCU	JAMES COOK UNIVERSITY
MDPAC	MINISTRY OF DEVELOPMENT PLANNING AND AID COORDINATION, THE MINISTRY OF PROVINCIAL GOVERNMENT AND INSTITUTIONAL STRENGTHENING
MECDM	MINISTRY OF ENVIRONMENT CLIMATE CHANGE DISASTER MANAGEMENT AND METEOROLOGY
MFMR	MINISTRY OF FISERIES AND MARINE RESOURCES
MESCAL	MANGROVE ECOSYSTEMS FOR CLIMATE CHANGE ADAPTATION AND LIVELIHOODS
MPGIS	MINISTRY OF PROVINCIAL GOVERNMENT AND INSTITUTIONAL STRENGTHENING
SINBSAP	SOLOMON ISLANDS NATIONAL BIODIVERSITY STRATEGIC ACTION PLAN
NEMS	SOLOMON ISLAND NATIONAL ENVIRONMENT MANAGEMENT STRATEGY
SC	STEERING COMMITTEE
SICHE	SOLOMON ISLANDS COLLEGE OF HIGHER EDUCATION
SIDT	SOLOMON ISLANDS DEVELOPMENT TRUST
SNR	SCHOOL OF NATURAL RESOURCES
SPREP	SECRETARIAT OF THE PACIFIC REGIONAL ENVIRONMENT PROGRAMME
SOE	SOLOMON ISLANDS STATE OF ENVIRONMENT REPORT
SVAM	SHORELINE VIDEO ASSESSMENT

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INTRODUCTION

Mangroves have the distinction of forming unique marine habitats that are both forests and Wetlands. As such, they are grouped across a number of international conventions that recognize their immense value and benefit to both coastal and marine environments, and mankind in general. On the global scale mangrove forests are being lost at an alarming rate from pollution, land clearance, coastal development, natural disasters and climate change (FAO, 2007; Spalding *et al.*, 2010). The Pacific region has the world's highest mangrove biodiversity (Ellison, 2009) and has about 12% of the world's mangrove forests (Walker, 2010) however, climate change is expected to have pronounced effects upon marine ecosystems and worsen existing pressures (Duke *et al.* 2007). Around the country, mangrove forests are being cleared to make way for new villages as a result of population explosion in coastal areas. In others, this particular ecosystem has been cleared to make way for log pond storage space awaiting shipment to overseas markets.

In an endeavour to help resource owners make better decisions regarding the fate of their valuable resources, they must have some knowledge or information on the value of their resources. In doing so, the MESCAL Solomon Islands project through the International Union for Conservation of Nature and contracted consultants have embarked on monitoring and gathering baseline information on the mangrove forest of the demonstration site at Maramasike Passage in the Malaita Province. The rapid biodiversity assessment lays a foundation for future monitoring of mangroves in Solomon Islands. It has actually put Solomon Islands mangroves on the global monitoring screen for the first time. With the national capacity now being built coupled with the current loss of the ecosystem in other parts of the country as result increasing pressure from coastal development, and the sea-level rise projections have increased since 1999 (IPCC, 2007), there is an urgent need to embark on a nation-wide assessment to actually capture the current mangrove population status in the entire country which is decreasing as a result of population explosion and world's highest mangrove biodiversity (Ellison 2009), climate change is expected to have pronounced effects upon marine ecosystems and exacerbate existing pressures (Duke *et al.* 2007).

The MESCAL project fulfils part of the SI NEMS 1993 (Solomon Islands National Environment Strategy), "*Section 11.2.1 - Mangrove Documentation, Protection & Rehabilitation Assessment*", as well as the Pacific Regional Wetlands Action Plan (SPREP, 1999) which was endorsed by 26 countries to identify the need for scientific monitoring of mangroves of the region to assess mangrove extent, community structure status and health (Ellison, 2007).

The MESCAL-SI project focus is on developing stakeholder based co-management plan, supported by scientific and traditional knowledge, for at least one demonstration site, with the view of informing the development of mangrove management policies and legislations, and drawing lessons learnt to inform the development of co-management plans in other parts of the country.

The objectives of the demonstration site activities are to:

1. Develop mangrove co-management plan for the demonstration site, adopting the best practice methodology from other natural resource management projects in SI and the Pacific;
2. Identify challenges and lessons learnt in developing co-management plan involving active stakeholder participation and supported by robust scientific and traditional knowledge;
3. Increase awareness of the importance of adaptive management (learning by doing and adapting as new information comes to hand) and provide relevant training to the local communities in monitoring and evaluation for strengthening of mangrove management.

The outputs of these activities would inform MECDM's outcomes under the MESCAL-SI project in the development of:

1. Mangrove management policies, plans and legislation at national and provincial levels;
2. National, provincial and local level advocacy material and capacity in mangrove co-management.

The MESCAL SI project hopes that after the implementation of the project has been completed there would be in place, best practices of mangrove management. This would be documented and used as lesson learning that would be shared with other communities in the country who are also dependent on the mangrove ecosystem one way or the other for their daily subsistence. The document would also be used to inform important decision making bodies in the various sectors in the country (national parliamentarians, provincial governments, resource owning groups) to recognise the important roles the mangrove ecosystem plays in the daily livelihoods of rural communities as well as the fisheries sector. It would also act as a precursor and set guidelines for developers (foreign and national) and investors alike to be conscious of this particular ecosystem.

DEMONSTRATION SITE PROFILE (A BRIEF)

The demonstration site was identified through a set of criteria that was developed by the MESCAL Solomon's Steering Committee (SC). A total of nine localities from all over the country were screened against the criteria. The site with the slightest impact scored the most points and it automatically became the demonstration site.

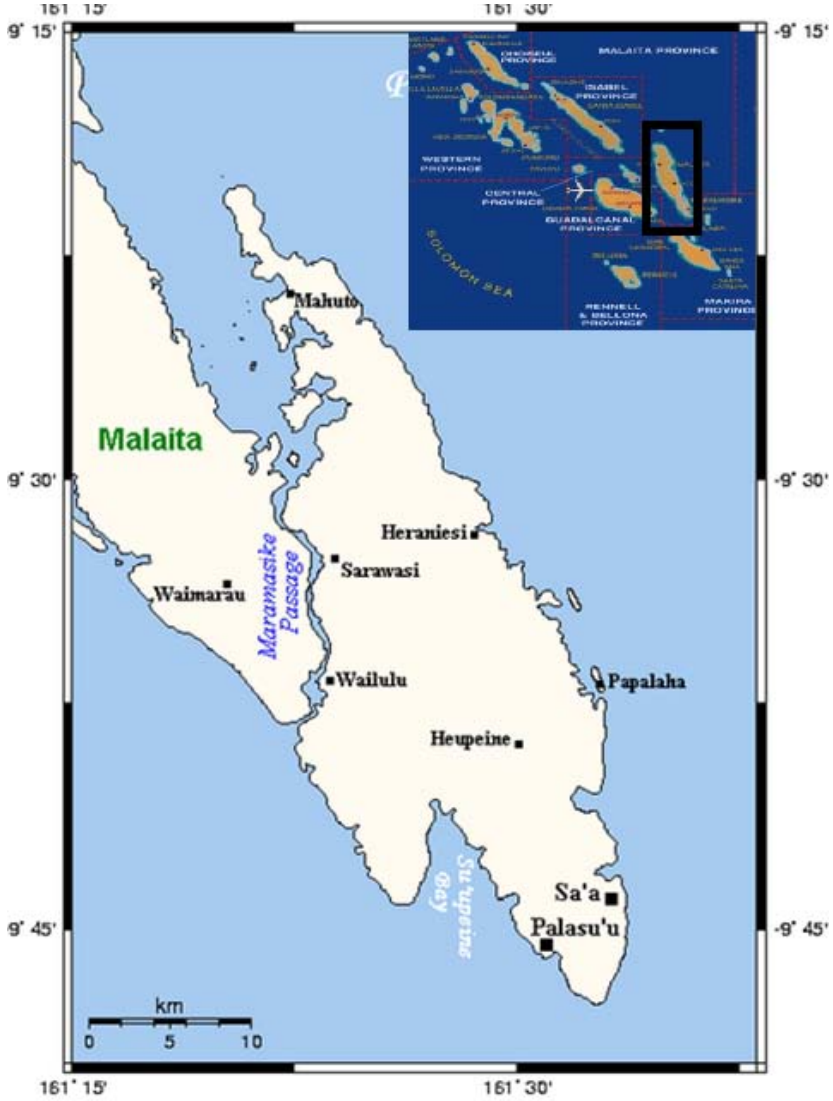

Figure 1: *The demonstration site in Maramasike Passage, Malaita Province, Solomon Islands.*

The demonstration site that was selected is located on Ward 21 in the South Malaita Constituency of Malaita Province, Solomon Islands. It was initially identified by NEMS 1993 as an area in Malaita Province that needed to develop a Coastal Environmental Management Plan because of the extensive mangrove cover that still exists in that region of the country.

Maramasike Passage (9°33′S 161°24′E9.55°S 161.4°E) is a narrow passage which separates the two islands of Malaita Province in the Solomon Islands, the larger Malaita and the smaller South Malaita Island, also known as Maramasike (refer to Figure 1). The northern mouth leads to Raroi Su'u Lagoon, a sheltered bay. The passage is 28 miles long and is navigable by small vessels. The northern mouth is much wider than the southern mouth, and is several miles wide with scattered barrier islands and mangrove patches. It narrows at the southern end, and is much deeper and is surrounded by cliffs. In places, the passage is less than 400 m wide and only about 4 m deep. The Saltwater Crocodile also inhabits the area, particularly the Taha River and Taramata Creek near the northern end of the passage. There are several villages along the passage, particularly on the northern stretch.

Objective of Demonstration Site

The Maramasike Passage supports one of the largest mangrove ecosystems in Solomon Islands. It is also one of the areas in the country that has very little logging activity compared to other similar sites. With the high rate of logging activities taking place in the nearby Wards 24 and 25, the potential for this unsustainable activity to reach Maramasike is fairly high. The overall objectives for the establishment of the chosen demonstration site were:

- Establish a resource management plan that would be geared towards sustainable use of valuable forest and marine resources and further improve it into a National Mangrove Management Plan;
- Conserve mangrove ecosystem / forest as a tool to protect biodiversity and mitigate climate change by reducing deforestation;
- Identify alternative livelihood options to relieve existing pressures already exerted at the ecosystem;
- Adopt best practices learned from existing sites.

Possible Threats to Mangroves at demonstration site

Below are some of the treats that the demonstration site is most likely to face:

- Logging activities by foreign companies which often use the coastlines as log ponds for loading of logs for export;
- Excessive use of mangroves for firewood and timber;
- Clearing of mangrove area for creation of new homes;
- Unsustainable use / harvesting of mangrove resources as the need for cash income arises;

It is hoped that through the floral and faunal assessments outlined through the MESCAL project, that greater awareness can be created on the high level of biodiversity in the demonstration site as it needs to be conserved and appreciated by local communities and relevant stakeholders.

FISHERIES SURVEY

Conducting Net Surveys to Assess Fish Biodiversity in the Maramasike Passage, Malaita Province, Solomon Islands.

Background

The mangrove fishery of Maramasike is being supported by one of the largest mangrove ecosystems in the country that still remains intact and pristine. The mud-crab fishery is an example of which has been going on for a long time now and is under traditional management practices which has enabled communities and resources owners to sustainably manage this particular fishery. The fisheries survey is one of the important components of MESCAL Solomon Islands project as information gathered from this study will be inserted into the co-management plan that is currently been put together by the community with assistance from WorldFish Center. This will inform decision makers to make better decisions regarding their mangrove ecosystem. The community on the other hand will be in a better position to make sound choices as to whether or not they want to conserve their resources. The MESCAL Solomon Islands project through the International Union for Conservation of Nature and Centre for Tropical Water and Aquatic Ecosystem Research (TropWATER - Australia) have embarked on monitoring and gathering baseline information on the fish species in the mangrove forest of the demonstration site. The technical backstopper conducted a scoping visit to the demonstration site before developing a sampling protocol and a short training of local stakeholders. Trainees were those that would be conducting the surveys and collecting data at the demo site. The rapid assessment lays a foundation for future monitoring of fish species in mangroves and provides a strong basis for the development of climate change adaptation strategies for mangrove ecosystems in the Solomon Islands.

Objective of Fisheries Survey

The main objective of the fisheries survey was to conduct a rapid and representative survey of fish and mobile crustacean assemblages of Maramasike Passage as a key step central to understanding the Passage's mangrove faunal biodiversity and fisheries resources.

As outlined by the technical backstopper contracted by the Project Management Unit to provide the technical assistance and sampling protocol of this assessment, the intent of this survey was to produce an initial baseline understanding of fish and mobile crustacean assemblages through the sampling of major mangrove zones as comprehensively as practically possible. Sheaves and Johnston (2012) in their "Fish Survey Implementation Plan" stated that this work will only represent a single snapshot in time but is aimed at providing a strong basis in both faunal representation and methodological approaches to:

- Provide a good spatial representation of the most common species (those making up more than 20% of occurrences) present at the time of sampling;

- Detect the occurrence of at least the most commonly occurring 90% of all mobile fish and crustacean species present at the time of baseline sampling;
- Begin to define the occurrence of key life-history stages in the bay;
- Provide a strong starting point for developing a fisheries fauna guide as a standard allowing comparisons between this and future studies;
- Provide a baseline for:
    - Future sampling at different times of year to allow the base-line data to be extended with temporal understanding;
    - On-going monitoring, and
    - More detailed habitat-specific studies.

The Fisheries Survey at the demonstration site is an outcome of the MECSAL Solomon Islands project which aims to document faunal associations with mangroves under the first outcome in the "National Baseline Information about Climate Change Scenarios, Use & Values of Mangroves & Associated Ecosystems" aspect of the project.

Fisheries Survey (brief summary: sampling design set by technical backstopper)

Prior to conducting the field survey, a brief field visit was conducted in April 2012 by Technical Back-stoppers to get an idea of the geographical set up of the sites to be sampled. This enabled the development of a survey protocol that would be suitable for the demonstration site. The demonstration site was divided according to the major zones. It was observed that there were two main zone types (i) downstream mangrove zone and (ii) upstream mangrove zone. The downstream zone was the mangrove zone lining the Maramasike Passage and is the part of the estuary most influenced by marine waters. The upstream zone was classified as the inner reach of rivers delivering freshwater to the Maramasike Passage and has more constant freshwater influence than the downstream mangrove zone. The upstream zone extends from the area where "freshwater" mangrove species (e.g. *Acanthus ilicifolius*, *Aegiceras spp.*) begins and continues upstream to the limit of safe navigation.

As each zone was observed to be made of different habitats, the intention of the sampling design chosen was to produce a broad understanding of the fauna of each zone by sampling the dominant habitats in each, and concentrating sampling along edges where most fish species occur in highest abundances. Within each zone 3 different habitats types were observed (i) deep edges; (ii) shallow banks; (iii) mangrove drains. Each zone was sampled with a set of gears that was most suited practically and for data purposes for that habitat. Due to the conditions and the physical structure of the different zones and habitats, different gears were employed in specific habitat types. One gear, cast nets, were employed across all zones to provide standardization. There were 4 main sampling gears employed in this survey, (i) Cast Net; (ii) Seine Net; (iii) Gill Net and (iv) Fyke Net.

Methodology

The survey was undertaken on the 30th of August – 6th of September, 2012. The survey involved 3 officers from the Ministry of Environment Climate Change Disaster Management

and Meteorology, 2 students from the School of Natural Resources and 6 community volunteers. Field surveys were conducted predominantly along two river systems, Wea and

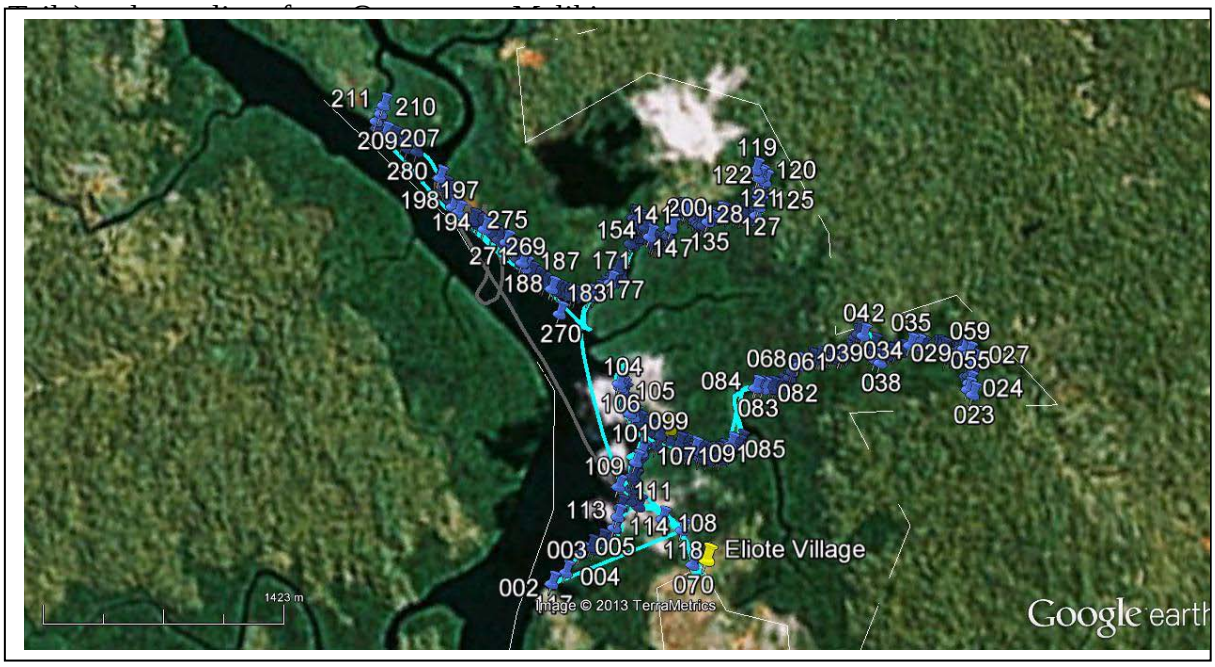

Figure 2: *GPS Coordinates (represented by way points) of fisheries survey, Maramasike Passage. (Refer to Appendix 5 for coordinates) Source: GoogleEarth*©

Cast nets were deployed 143 times and took up most of the sampling time as it was undertaken at any tide, in both zones and all habitats. To prevent unnecessary noise, the boat engine was turned off, talking at low volumes and minimal disturbance of the water was observed in order to not scare the fish. Where the nets were thrown was randomly chosen and schools of fish were not specifically targeted so as to prevent bias in the results. The cast net had to fully open in the air before hitting the water, when this did not occur, the throw was not counted (if any fish caught they were recorded) and another throw had to be undertaken.

Gill net sampling was only conducted on banks deeper than 50cm and was deployed 48 times for this survey. The mesh size of the gill net was 3 inches therefore it was targeting the much larger fish species that are found in the deeper water. Gill netting was restricted in upstream zones as the water was much too shallow to effectively conduct this method as retrieval would be difficult due to entanglement with fallen trees and branches.

Fyke nets were placed in mangrove drains at high tide and specimens retrieved and recorded at dead low tide. 6 Fyke net samples were deployed. This method was selective to species that would seek shelter in mangrove drains (perhaps from predation) during high tides. Therefore this method targeted the more cryptic of fish species.

Seine netting was only conducted in shallow angle banks with firm substrate. This was difficult to undertake in the rivers as the peat depth was very deep therefore seine net sampling was limited to 9 samples for this survey.

Preliminary Findings

Many challenges and limitations were encountered during the fisheries survey, despite this a diverse range of finfish and crustacean species were sampled. Due to data analysis and species identification currently being undertaken by the technical backstoppers, only species that were identifiable by the locals have been recorded. A total of 167 finfish, 2 crabs and 4 shrimps were caught during this survey (refer to Figure 3 below).

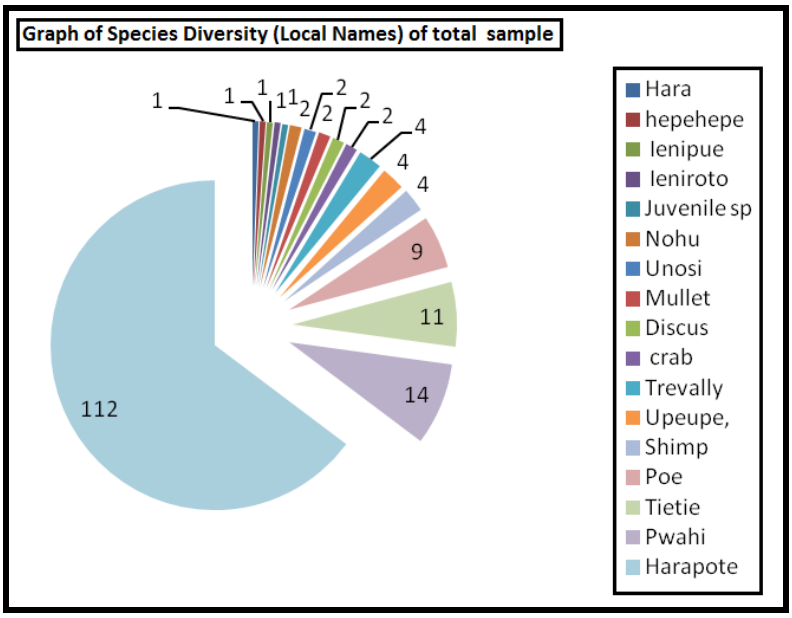

***Figure 3**: A graph of species composition of total catch as identified by the villagers.*

A participatory workshop was held after the gathering of data and 45 species (28 percent of total catch) were identified by the communities and local names were recorded. Most of the finfish and crustaceans caught were in their juvenile stages. The only large size fish that were sampled were trevally's (which have a large juvenile size) and they were caught with the Gillnet. The most popular species sampled during the survey was the *Harapote* with a total of 112 individuals followed by *Pwahi* 14 individuals, *Tietie* 11 individuals, *Poe* (Puffer fish) 9 individuals. Two of the finfish species sampled are of high value to the community in terms of food source whilst the others were noted by the villagers to play a significant ecological role in the mangrove ecosystem. The Mud Crab species that was caught is also one of the major income earners for all communities along the Maramasike Passage.

The fyke net was the most successful sampling method in terms of abundance (154 specimens) and species richness (11 species). This was followed seine net (8 specimens belonging to 5 species), gill net (4 specimens belonging to 2 species). Refer to Figure 4 below.

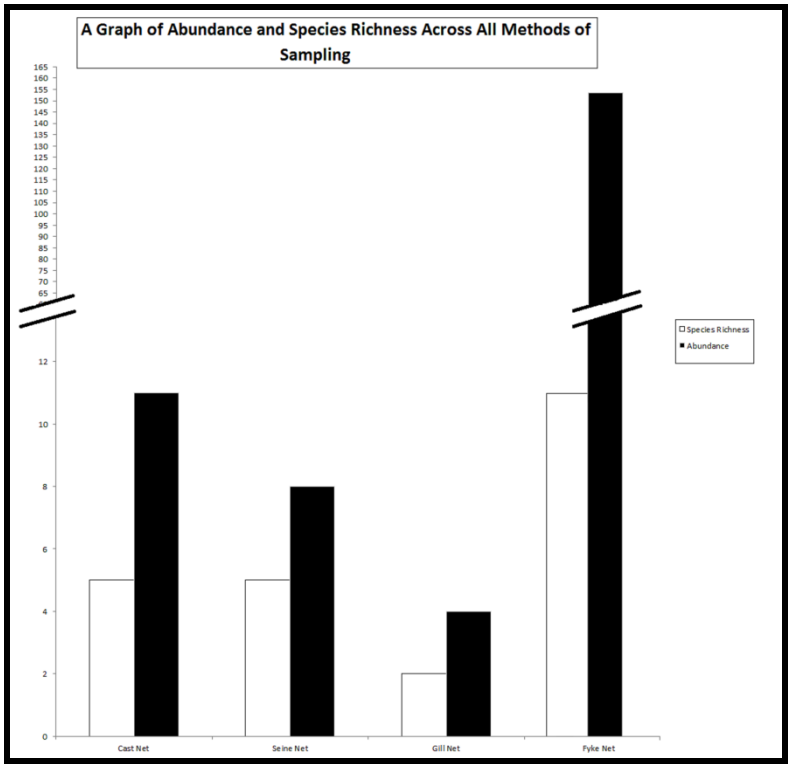

***Figure 4**: A graph of local species richness (as identified by villagers) and abundance of total catch of all sampling gears.*

Discussions

The mangrove ecosystem provides nursery grounds for many fish species and for that reason we would be expecting to see a lot of juvenile fish being sampled in the mixture of passive and active methods of sampling being employed in this survey. Upon completion of the survey, a workshop that brought the survey team and villagers together was held to discuss the findings of the survey. Local names for some of the fish species sampled were ascertained in this small workshop. The villagers could manage to identify 28 percent of the total catch, (please note here that the 28% is the total sampling catch. is a percentage of the known species that exists in the pilot site ecosystem according to locals) and these species were more likely to be edible species or species that the villagers had an often daily interaction with. Species that they could not identify were most like marine species that had different colors and morphological characteristics during their juvenile and adult stages. The data collected provides a good baseline data for the demonstration site and would specifically be termed as data collected with a variety of fishing nets. It would be interesting to employ other methods, methods that are used by the communities during such surveys. This would give a different aspect of traditional knowledge and the biodiversity of species that are found at the demonstration site. The most effective gear used during the sampling was the fyke net. For management purposes though, such gears should be discouraged as there is less effort needed to acquire a large catch.

Conclusion

There were also many difficulties faced by the survey team during this survey. The boat ride to Malaita is long and arduous, weather was not favourable during the survey week, and the team had some difficulty adjusting to the use of the cast net. However, the team managed to complete the survey successfully and fish species were recorded.

There was some misunderstanding with some members of the community who were or might have just returned from the urban centres and were not fully aware of what MESCAL Project was doing at the pilot site. This group of people brought up some misunderstanding during one of the MESCAL partners site visits. This is an experience most organisations working with communities in Solomon Islands have come across at some stage during their implementing period. Such is always instigated by so-called opposing parties in communities. In this situation the misunderstanding was put right during another field visit.

BIOMASS SURVEY

Rapid Mangrove Forest Structure Assessment

Background

Mangroves have the distinction of forming unique marine habitats that are both forests and Wetlands. As such, they are grouped across a number of international conventions that recognize their immense value and benefit to both coastal and marine environments, and mankind in general. It is important to have a standardized and practical way of characterizing structure and condition of these unique wetland forests. Coupled with the current loss of the mangrove ecosystem in most parts of the country from log ponds and increasing pressure from coastal development there is an urgent need to embark on a nation-wide assessment to capture the current mangrove population status in the entire country. In an endeavour to help resource owners make better decisions regarding the fate of their valuable resources, they must have some knowledge or information on the value of their resources. In doing so, the MESCAL Solomon Islands project through the International Union for Conservation of Nature and MangroveWatch (Australia) have embarked on monitoring and gathering baseline information on the mangrove forest of the demonstration site at Maramasike Passage in the Malaita Province. The rapid assessment lays a foundation for future monitoring of mangroves in Solomon Islands.

Objective of Biomass Survey

The Primary objective of the study is to carry out a rapid survey to accurately determine key biodiversity and biomass characteristics of mangrove stands at the demonstration site. These characteristics include: species composition, tree density, tree height, stem diameter and canopy cover. The basic field assessment unit is a plot of sampled trees, although it is useful to record other information, such as, which mangrove species dominate the canopy. The method that was proposed to facilitate the rapid assessment of the mangrove forest biomass was the long plot.

Field surveys in mangrove forests

Long plots are essentially narrow, 2 - 4 metre wide, forest plots laid out approximately parallel to the shoreline. The method is outlined specifically to accommodate mangrove forest characteristics and allows mangrove foresters to evaluate mangrove forests in a way that is scientifically reliable, accurate and low cost, low skilled, simple, pragmatic and relevant. The method describes a practical and effective way to measure biomass and living carbon content of mangrove forests. Long plots involve the use of a Garmin GPS unit to take positions of the plots that are sampled, a tape measure to mark out 2m or 4m width of the plot and the length of the plot, digital camera for visual recordings and recording sheets.

These specialist mangrove forest plots are essential as ground truth and verification for mapping at all scales (designed for this purpose) – specifically providing description and quantification of forest structure, biodiversity and biomass for each vegetation unit identified in mangrove mapping. In terms of long term studies and ecosystem monitoring, long plots need only be repeated each five years unless they occur in a highly dynamic area.

Methodology

The survey was undertaken on the 24th – 27th of October, 2012. The survey involved a total of 4 herbarium staff from the Ministry of Forests and Research, 2 officers from the Ministry of Environment Climate Change Disaster Management and Meteorology, 2 former students from the School of Natural Resources and 4 community representatives. The sites that were sampled include Teile and We'a River, two main tributaries that drain into Maramasike Passage (refer to Figure 5). Long plots were undertaken in each major zone that was identified (upper, mid and low riverine system).

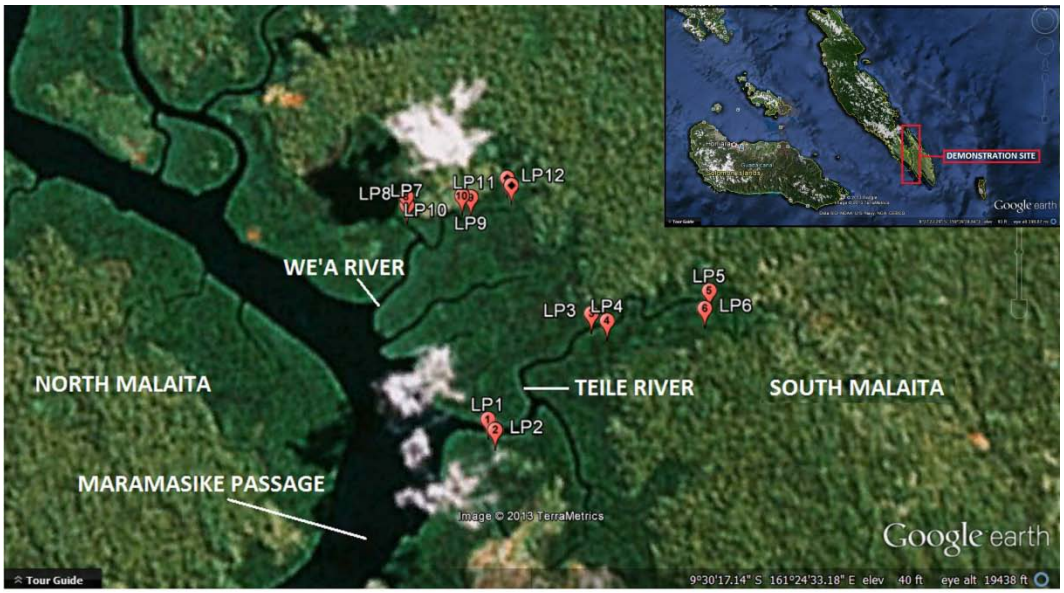

Figure 5: *Long plot sites in Teile and We'a River (Maramasike Passage, Malaita Province) Source: GoogleEarth*©

The long plots were replicated twice in each zone, therefore producing 12 long plots in total. The plots were kept parallel to the main passage (Maramasike). The average lengths of the plots were 50m and the width was kept constant at 2m (1m on each side of the tape). The methods undertaken were as outlined by Duke (2012) in his MESCAL field survey guide.

Preliminary Findings

A total of 12 samples were collected from 3 selected sites along the Wea and Teile Rivers systems of Maramasike Passage. Preliminary findings during that particular survey has put the number of mangrove species found at the study site to be 24 species belonging to 14 mangrove Families (refer to Table 1**).** Not only is this an increase of 10 species observations after the April 2012 scoping visit, this survey also proved that the mangrove species diversity in the demonstration site is relatively high (29 mangrove species for Solomon Islands – 24

occur in Maramasike Passage). There is still high potential for an increase in the species inventory for Solomon Islands if similar surveys are undertaken in other parts of the country.

	Scientific Name	**Family**
1.	*Acanthus ilicifolius*	*Acanthaceae*
2.	*Aegicerus corniculatum*	*Myrsinaceae*
3.	*Avicennia alba*	*Avicenniaceae*
4.	*Avicennia rumphiana*	*Avicenniaceae*
5.	*Barringtonia racemosa*	*Lecythidaceae*
6.	*Bruguiera gymnorhiza*	*Rhizophoraceae*
7.	*Bruguiera parviflora*	*Rhizophoraceae*
8.	*Bruguiera sexangula*	*Rhizophoraceae*
9.	*Ceriops tagal*	*Rhizophoraceae*
10.	*Ceriops decandra*	*Rhizophoraceae*
11.	*Cynometra ramiflora*	*Leguminosae - Caesalpiniaceae*
12.	*Dolichandrone spathacea*	*Bignoniaceae*
13.	*Excoecaria agallocha*	*Euphorbiaceae*
14.	*Heritiera littoralis*	*Sterculiaceae*
15.	*Lumnitzera littorea*	*Combretaceae*
16.	*Nypa fruticans*	*Palmae - Arecaceae*
17.	*Rhizophora apiculata*	*Rhizophoraceae*
18.	*Rhizophora x lamarckii*	*Rhizophoraceae*
19.	*Rhizophora stylosa*	*Rhizophoraceae*
20.	*Scyphiphora hydrophyllacea*	*Rubiaceae*
21.	*Sonneratia alba*	*Sonneratiaceae*
22.	*Sonneratia caseolaris*	*Sonneratiaceae*
23.	*Xylocarpus granatum*	*Meliaceae*
24.	*Xylocarpus moluccensis*	*Meliaceae*

Table 1: *Species observed at the demonstration site.*

The recent findings has put the mangrove species list for Solomon Islands mangrove species at 29 confirmed species, this is expected to rise to 31 confirmed species once two species (*Cynometra iripa* and *Rhizophora annamalayana*) are confirmed by Dr Norm Duke (Mangrove Specialist and Taxonomist) of James Cook University (JCU).

Discussions

The data gathered during the rapid assessment provides baseline information on mangrove flora of a part of the Maramasike Passage mangrove ecosystem. There is need to do a follow up study that would involve taking representative samples at selected locations along the Maramasike Passage to give a fair representation of the flora of the entire Maramasike Passage. The survey was a great opportunity for the biomass team to gain field experience on what they had learnt in April of 2012 during the scoping visit by technical backstoppers from JCU. Not only has the inventory for mangrove species in Solomon Islands increased,

capacity has been built to local staff and villagers on how to conduct these kind of surveys. There is now awareness on the great diversity of mangrove species in our country, therefore the need will arise to conduct more surveys of this scope to fully ascertain the magnitude of mangrove species diversity in the Solomon Islands. Furthermore, should the need arise for this survey to be undertaken, local teams are now capable of conducting the survey.

Conclusion

Although the number of required replicates was not fully achieved during the survey, a good representative of the required data has been collected. The team attempted to be representative during their sampling by choosing the two big river systems (Teile and We'a). Community participation was encouraged and therefore local capacity has been built. MESCAL Solomon Islands will await the analysis of the long plot data by the technical backstoppers before proceeding to produce a technical report on the survey.

Shoreline Video Assessment (SVAM)

A mangrove monitoring program linking communities and scientists to promote better management and conservation of tidal wetlands.*ckground*

Mangroves of the pacific region are rich in biodiversity and biomass and despite being pristine and highly beneficial coastal habitats there are growing pressures from human influences and global climate change. The Shoreline Video Assessment is a great technique to show a visual map of the natural and anthropogenic impacts on coastal ecosystems. SVAM is also a very useful tool in monitoring the health and status of mangrove ecosystems. Through the help of the International Union for Conservation of Nature (IUCN) and MangroveWatch (Australia), MESCAL Solomon Islands project was able to undertake this survey for the first time in the country.

The SVAM method allows for information about the specific areas to be viewed by the people conducting the analysis and as a record, communities can refer at a later stage to see if there were any significant changes to their coastline. This method can both be conducted from the air by aeroplane and by small boats. In April 2012 a team of technical back-stoppers from MangroveWatch conducted training and hands on experience on SVAM techniques with representatives from organisations such as the School of Natural resources, (SICHE), Ministry of Lands Housing and Surveys, Ministry of Forestry and Research and the Ministry of Environment Climate Change, Disaster Management and Meteorology (host Ministry).

SVAM (A Brief Summary)

SVAM is a shoreline habitat assessment method which was specifically designed by the MangroveWatch program to assess mangrove coastlines. The program enables community and the SVAM team easily collect information through the use of:

1. Handycam to capture video data of the mangrove coastline;
2. Handheld GPS to plot positions of historical significance (beside many other interesting features, start and stop points);
3. Digital camera to capture activities that are taking place during the SVAM assessment;
4. Community interpreter or someone familiar with the coastline or estuary that is being filmed to tell the story;
5. Recorder that records all features regarding the coastline that is being told by the describing the coastline.
6. Experienced boat driver to manoeuvre the boat at the required constant speed and distance from the shoreline and with minimal bumps in the ride.

This shoreline habitat assessment method was specifically designed to easily collect information in a standardized format. The primary objective in designing this method was to ensure it was easy to undertake, cheap, and not require complex scientific observations,

whilst still providing improved knowledge and awareness of tidal wetland ecosystems, as well as scientifically relevant outputs. Furthermore, the SVAM method relies on qualitative assessments of shoreline habitat, physical condition and human influence, determined from continuous video recordings of the shoreline and intertidal zone along coastline/estuary banks. The video is then analyzed for a number of features that relate to the 'condition' of the coast. Simultaneous GPS data enables the features observed to be mapped to give a spatial representation of shoreline habitats and their condition. Qualitative interpretations made during analysis are based on quantitative baseline studies. Video interpretation relates only to the intertidal zone and up to 20 m above the tidal limit (mangrovewatch.org).

Objective of SVAM Survey

The primary objectives of the SVAM survey in Maramasike Passage, Malaita Province, Solomon Islands was to:

1. Establish a long-term visual record of mangroves
2. Improve understanding of mangrove ecosystem function, values, key threats, and processes at a local and regional scale.
3. Generate community awareness of mangroves and encourage local environmental stewardship.
4. Provide a standardized method to assess shoreline mangrove condition and change over time

Methodology

The filming was carried out along the pilot site coastline from Nuusi (9.4732 S – 161.38 E) in the east to Weili River mouth (9.548 S – 161.406 E) in the south westerly direction, covering a total distance of 9.5km in 39inins 53sec. This task was initially scheduled to take place during the same time as the Fisheries Survey (September 2012) but was delayed due to bad weather and visibility. The filming took place from 12:10 noon – 13:22pm (1hr 12mins) 10^{h} October 2012 **)** however the actual recording period only lasted 39mins 53 seconds. The filming had to take place just after midday as the rain was a factor that had to be avoided.

Figure 6a (Left): *SVAM of Honiara coastline during the SVAM training, April 2012.*
Figure 6b (Right): *Experienced boat driver that was essential to the Maramasike Shoreline quality video production.*

The implementation the filming during this session involved 4 community representatives who helped out in identifying the important historical locations along the coast. As outlined in the brief given to MESCAL Solomon Islands, equipment used during the filming included a handycam (HDR-XR260V), A Sony digital camera, handheld GPS (GARMIN GPSMAP 62 Series), an umbrella to keep the camera from direct sunlight or rain, outboard engine and enough fuel. Personnel involved included the boat driver, 2 cameramen, 1 GPS handler, 2 narrators (refer to Figure 6a and 6b). The weather on the day the survey was a perfect sunny afternoon with just enough light to carry out this activity successfully.

As the video was to be reviewed by the Hub team in MangroveWatch, Australia, it is important to provide as much information as possible. During the assessment, it was ensured that observations were recorded; opinions and any historical facts that may help to piece together a story about the mangroves and the estuary were recorded. This information will help identify the causes behind the footage, assist in the development of strategies by the MangroveWatch team to improve the estuary condition and/or instigate actions to prevent further environmental degradation, if any.

Results

9.5 km of mangrove coastline was filmed and this was the first set of filmed coastline data ever done for the demonstration site for the country using the MangroveWatch methodology (refer to Figure 1). Analysis is still being carried out by the MangroveWatch Hub team at James Cook University in Australia.

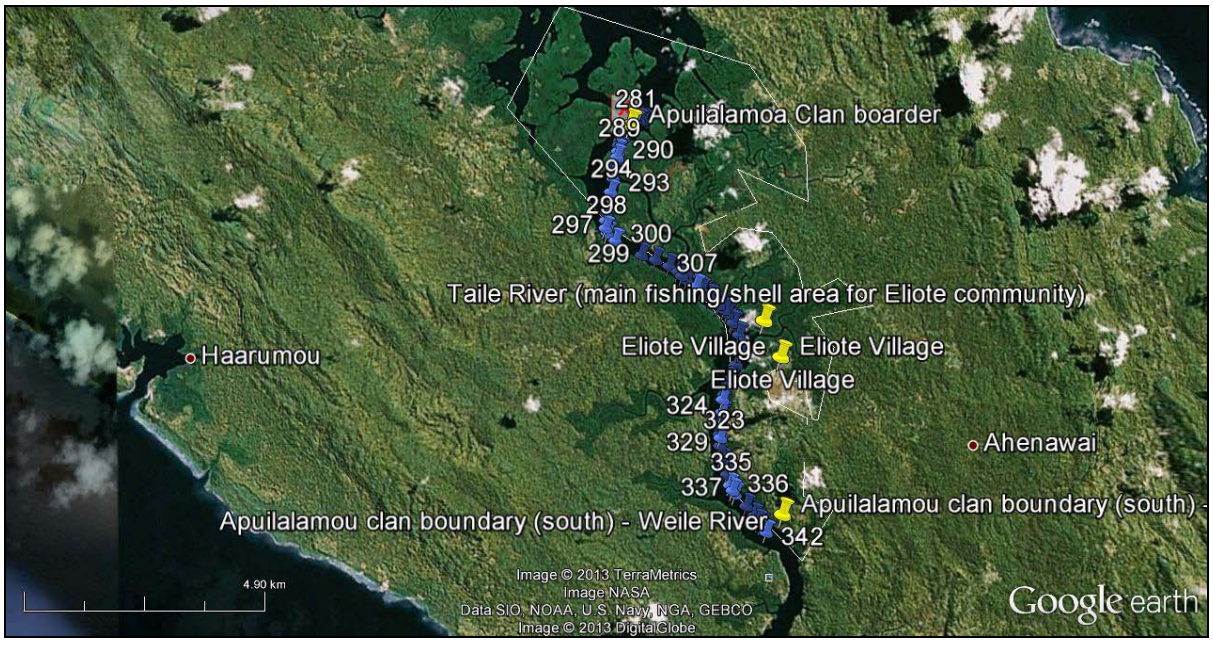

Fig 7 *SVAM Tracks – Maramasike Passage (Refer to Appendix 2 for coordinates)*

Conclusion

The implementation of the SVAM for the country has yet again set another milestone for the country as we break new ground in capacity development of resource personnel from government Ministries, partners and communities in efforts to sustainably manage our mangrove ecosystems against the face of development. It is envisaged that since mangroves are under threat through-out the world, the MangroveWatch methodology is a step in the direction to help coastal communities to be aware of the changes that are happening to their coastline as a result of development as well as the negative effects of climate change. Tools such as SVAM are important as its visual outputs will aid coastal communities in better planning and management of their mangrove resources.

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APPENDIX

Appendix: 1. MangroveWatch Video Log

Date	Video Start Time	Video End Time	Video Duration	Location	File Name	Filmed by	Comments
10/10/2012	12:10:00	12:23:00	00:12:29	Maramasike	00049	Hugo & SI Mescal Team	
10/10/2012	12:26:00	12:30:00	00:04:11	Maramasike	00050	Hugo & SI Mescal Team	Low memory
10/10/2012	12:36:00	12:40:00	00:12:29	Maramasike	00000	Hugo & SI Mescal Team	
10/10/2012	12:42:00	12:48:00	00:00:35	Maramasike	00001	Hugo & SI Mescal Team	Low Battery
10/10/2012	12:55:00	13:07:00	00:12:28	Maramasike	00002	Hugo & SI Mescal Team	
10/10/2012	13:12:00	13:29:00	00:10:49	Maramasike	00003	Hugo & SI Mescal Team	

Appendix 2. Maramasike SVAM Coordinates

W/point	Lat	Long
285	S9.47324	E161.38373
286	S9.47632	E161.38024
287	S9.47689	E161.37956
288	S9.47769	E161.37930
289	S9.47882	E161.37920
290	S9.47984	E161.37906
291	S9.48131	E161.37870
292	S9.48263	E161.37837
293	S9.48380	E161.37834
294	S9.48625	E161.37790
295	S9.49019	E161.37719
296	S9.48928	E161.37749
297	S9.49144	E161.37697
298	S9.49285	E161.37689
299	S9.49376	E161.37723

300	S9.49514 E161.37875	322	S9.52309 E161.39872
301	S9.49779 E161.38354	323	S9.52400 E161.39850
302	S9.49861 E161.38614	324	S9.52630 E161.39834
303	S9.49976 E161.38866	325	S9.52683 E161.39827
304	S9.50077 E161.39033	326	S9.52768 E161.39807
305	S9.50154 E161.39101	327	S9.52898 E161.39787
306	S9.50238 E161.39186	328	S9.53034 E161.39795
307	S9.50347 E161.39359	329	S9.53098 E161.39811
308	S9.50399 E161.39461	330	S9.53246 E161.39807
309	S9.50516 E161.39618	331	S9.53501 E161.39843
310	S9.50536 E161.39621	332	S9.53617 E161.39884
311	S9.50683 E161.39781	333	S9.53697 E161.39913
312	S9.50773 E161.39880	334	S9.53772 E161.39941
313	S9.50839 E161.39935	335	S9.53963 E161.39990
314	S9.50978 E161.40026	336	S9.54058 E161.40039
315	S9.51007 E161.40046	337	S9.54122 E161.40083
316	S9.51225 E161.40153	338	S9.54332 E161.40289
317	S9.51520 E161.40179	339	S9.54511 E161.40433
318	S9.51760 E161.40106	340	S9.54623 E161.40511
319	S9.52044 E161.39983	341	S9.54671 E161.40562
320	S9.52097 E161.39958	342	S9.54817 E161.40659
321	S9.52224 E161.39906		

Appendix 3. GPS Coordinated – BIOMAS SURVEY

Teile River

Long	Lat	Elevation
S9 30 46.7	E161 24 24.3	
S9 30 46.1	E161 24 25.5	0
S9 30 48.2	E161 24 25.3	4m
S9 30 49.9	E161 24 25.4	3m
S9 30 25.4	E161 24 45.9	7m
S9 30 26.1	E161 24 46.9	13m
S9 30 26.7	E161 24 46.7	16m
S9 30 26.9	E161 24 48.9	1m
S9 30 20.4	E161 25 10.7	15
S9 30 21.4	E161 25 09.8	2m
S9 30 23.0	E161 25 09.9	30m
S9 30 23.2	E161 25 10.9	20m
S9 30 24.6	E161 25 09.8	32m

Weile River

Long	Lat	Elevation
S9 30 02.2	E161 24 06.6	22m
S9 30 00.7	E161 24 06.8	8m
S9 30 00.7	E161 24 06.3	15m
S9 30 00.7	E161 24 06.3	- 7
S9 30 00.8	E161 24 20.0	-1m
S9 29 59.3	E161 24 18.9	10m
S9 30 00.2	E161 24 18.3	4m
S9 29 59.2	E161 24 17.3	5m
S9 29 58.4	E161 24 28.6	-1m
S9 29 56.7	E161 24 28.4	9m
S9 29 56.7	E161 24 28.1	12m
S9 29 55.1	E161 24 27.8	0m

Appendix 5. Coordinates for Fisheries Survey

ID	latitude	longitude	System
2	9.52073	161.4003	Teile
3	9.52002	161.401	Teile
4	9.52002	161.401	Teile
5	9.51887	161.4016	Teile
6	9.51857	161.4023	Teile
7	9.51784	161.403	Teile
8	9.51725	161.4033	Teile
9	9.51565	161.4039	Teile
10	9.51453	161.4039	Teile
11	9.51393	161.4039	Teile
12	9.51309	161.4041	Teile
13	9.51253	161.4048	Teile
14	9.51262	161.406	Teile
15	9.51269	161.4065	Teile
16	9.51281	161.4072	Teile
17	9.51282	161.4077	Teile
18	9.51271	161.4084	Teile
19	9.51241	161.4088	Teile
20	9.51192	161.4091	Teile
21	9.51164	161.4093	Teile
22	-9.5072	161.4212	Teile
23	9.50697	161.4209	Teile
24	9.50624	161.421	Teile
25	9.50571	161.4211	Teile
26	9.50545	161.4211	Teile
27	9.50508	161.4207	Teile
28	9.50486	161.4204	Teile
29	9.50511	161.42	Teile
30	9.50534	161.42	Teile
31	9.50553	161.4196	Teile
32	9.50504	161.419	Teile
33	-9.5051	161.4179	Teile
34	9.50512	161.4175	Teile
35	-9.5056	161.4169	Teile
36	9.50583	161.4166	Teile
37	9.50628	161.4161	Teile
38	9.50617	161.4158	Teile
39	9.50589	161.4155	Teile
40	9.50543	161.4156	Teile
41	9.50499	161.4149	Teile
42	9.50495	161.4147	Teile
43	9.50512	161.4145	Teile
44	9.50632	161.4139	Teile
46	9.50586	161.4165	Teile
47	9.50554	161.4171	Teile
48	9.50515	161.4182	Teile
49	9.50502	161.4192	Teile
50	-9.5051	161.4179	Teile
51	9.50509	161.4192	Teile
52	9.50488	161.4203	Teile
53	9.50629	161.4208	Teile
54	9.50662	161.421	Teile
55	9.50507	161.4204	Teile
56	9.50502	161.4201	Teile
57	9.50534	161.4199	Teile
58	9.50508	161.4207	Teile
59	9.50543	161.421	Teile
60	9.50634	161.4139	Teile
61	9.50643	161.4135	Teile
62	9.50647	161.4133	Teile
63	9.50645	161.4131	Teile
64	9.50659	161.4128	Teile
65	9.50676	161.4124	Teile
66	9.50672	161.4123	Teile
67	9.50709	161.4118	Teile
68	-9.5159	161.4043	Teile
71	9.50484	161.4148	Teile
72	9.50615	161.4144	Teile
73	9.50636	161.4141	Teile
74	9.50606	161.4143	Teile
75	9.50643	161.4134	Teile
76	9.50746	161.4115	Teile
77	9.50781	161.4114	Teile
78	9.50819	161.4112	Teile
79	9.50835	161.4109	Teile
80	9.50855	161.4107	Teile
81	9.50854	161.4105	Teile
82	9.50864	161.41	Teile
83	9.50865	161.4097	Teile
84	9.50864	161.4096	Teile
85	9.51187	161.4087	Teile
100	9.51261	161.4081	Teile
107	9.51503	161.4038	Teile
108	9.51299	161.4041	Teile
109	9.51636	161.4057	Teile
110	9.51358	161.4038	Teile
111	9.51439	161.4037	Teile
112	9.51504	161.4031	Teile
113	9.51609	161.4034	Teile
114	9.51662	161.4033	Teile
115	9.51722	161.4032	Teile

116	9.51805	161.4026	Teile
117	9.51845	161.4021	Teile
118	9.52077	161.4003	Teile
119	-9.51677	161.4069	Wea
120	9.49714	161.4078	Wea
121	9.49746	161.4081	Wea
122	9.49754	161.408	Wea
123	9.49768	161.4084	Wea
124	9.49782	161.4083	Wea
125	9.49814	161.4081	Wea
126	9.49848	161.4082	Wea
127	-9.4987	161.4082	Wea
128	9.49904	161.4083	Wea
129	9.49952	161.4082	Wea
130	9.49979	161.4079	Wea
131	9.49969	161.4076	Wea
132	9.49971	161.4071	Wea
133	9.49976	161.4067	Wea
134	9.49973	161.4064	Wea
135	9.50012	161.4058	Wea
136	9.50026	161.4057	Wea
137	9.50051	161.4055	Wea
138	9.50044	161.4051	Wea
139	9.50029	161.405	Wea
140	9.50011	161.4048	Wea
141	9.49998	161.4047	Wea
142	9.49985	161.4044	Wea
143	9.49851	161.4081	Wea
144	-9.4999	161.4041	Wea
145	9.49999	161.404	Wea
146	9.50021	161.4038	Wea
147	-9.5006	161.4037	Wea
148	-9.5009	161.4038	Wea
149	9.50134	161.4037	Wea
150	9.50165	161.4036	Wea
151	-9.5019	161.4034	Wea
152	9.50196	161.4032	Wea
153	-9.5019	161.403	Wea
154	9.50179	161.4029	Wea
155	9.50151	161.4027	Wea
156	9.49888	161.4084	Wea
157	9.50065	161.4017	Wea
158	9.50075	161.4019	Wea
159	9.50091	161.4021	Wea
160	9.50105	161.4024	Wea
161	9.50133	161.4024	Wea
162	-9.5017	161.4022	Wea
163	9.50167	161.402	Wea
164	9.50181	161.402	Wea
165	9.50203	161.4017	Wea
166	9.50208	161.4018	Wea
167	9.49986	161.408	Wea
168	9.50385	161.4015	Wea
169	9.50386	161.4015	Wea
170	9.50401	161.4013	Wea
171	9.50424	161.4011	Wea
172	9.50428	161.4009	Wea
173	9.50448	161.4008	Wea
174	9.50463	161.4006	Wea
175	9.50484	161.4005	Wea
176	9.50489	161.4003	Wea
177	9.50511	161.4002	Wea
178	9.50517	161.3999	Wea
179	9.49973	161.4075	Wea
180	9.50535	161.3992	Wea
181	9.50532	161.399	Wea
182	-9.5052	161.3982	Wea
183	9.50508	161.3978	Wea
184	9.50488	161.3973	Wea
185	9.50465	161.3968	Wea
186	9.50444	161.3966	Wea
187	9.50418	161.3962	Wea
188	9.50399	161.396	Wea
189	9.50377	161.3957	Wea
190	9.50331	161.3953	Wea
191	9.50312	161.395	Wea
192	-9.5029	161.3946	Wea
193	9.50265	161.3942	Wea
194	9.50245	161.3937	Wea
195	9.50229	161.3933	Wea
196	9.50212	161.393	Wea
197	-9.5018	161.3921	Wea
198	9.50154	161.3918	Wea
199	9.50123	161.3916	Wea
200	9.49978	161.4062	Wea
201	9.50059	161.3912	Wea
202	9.50009	161.3908	Wea
203	-9.4989	161.3894	Wea
204	9.49881	161.3889	Wea
205	9.49855	161.3886	Wea
206	9.49837	161.388	Wea
207	9.49824	161.3875	Wea
208	9.49799	161.387	Wea
209	9.49762	161.387	Wea
210	9.49719	161.3871	Wea

211	9.49673	161.3872	Wea
212	9.50053	161.4053	Wea
213	-9.5	161.4044	Wea
214	9.49992	161.4045	Wea
216	9.50064	161.4037	Wea
217	9.50124	161.4036	Wea
218	9.50529	161.3987	Wea
219	9.50196	161.4031	Wea
266	9.54751	161.4076	Wea
267	9.50514	161.398	Wea
268	9.50495	161.3974	Wea
269	9.50476	161.397	Wea
271	9.50634	161.3985	Wea
274	9.50327	161.3953	Wea
275	9.50324	161.3953	Wea
276	9.50298	161.395	Wea
277	9.50239	161.3937	Wea
278	9.50217	161.3931	Wea
279	9.50171	161.3919	Wea
280	9.50097	161.3915	Wea

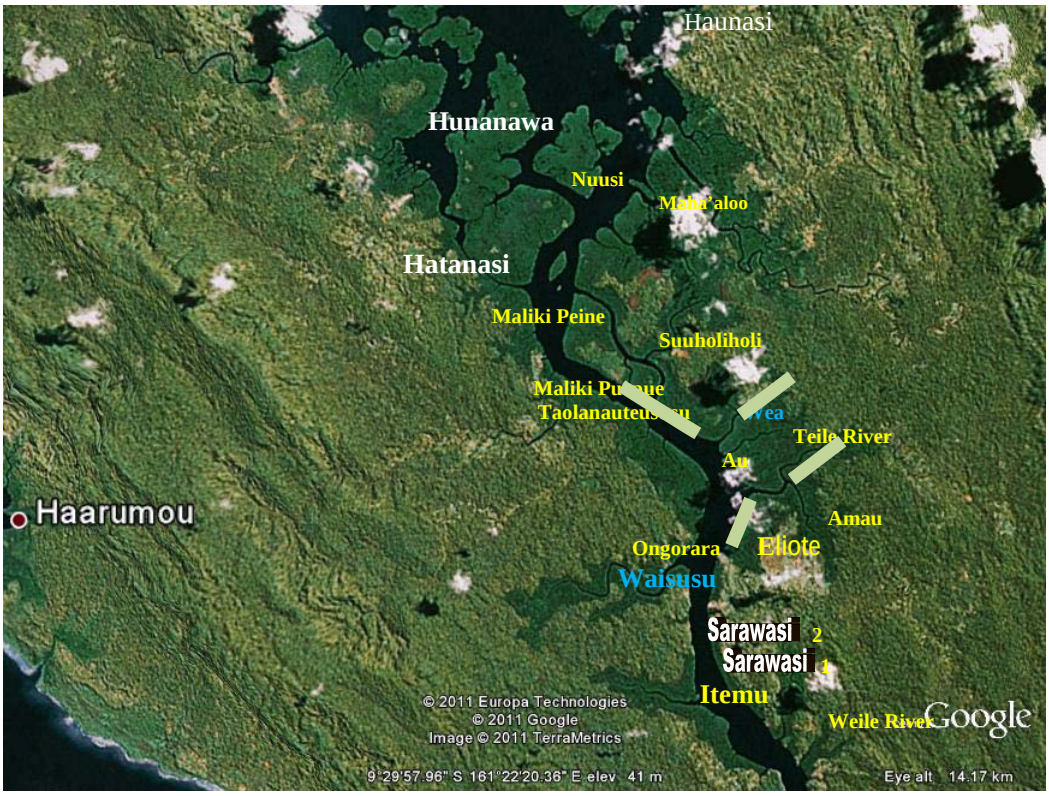

Fig 8 Fisheries Necton Survey Sites, Maramasike Passage

Pasahu

Pasahu

Maka

Pwahi

Unosi

Hepehepe

Upeupe

Poe

Nohu

Nohu

Tietie

Wauho

Ura

Alimango

Ohuohu

Anate

Harapote

Hara

Fig. 9 *Fish and crustacean species caught during the Fish sampling surey.*

Appendix 6 Eliote Mangrove and River Resources (ELIOTE Community Synthesis)

SHELL	***CRAB (U'e)***	***FISH***	***MANGROVE TREE***	***SEA GRASS***	***OTHER***
• Ke'u • Uu • Mengo*(Mangrove)* • Ilo • Sipe • Alimou • A'u • Ke'upora • Wahiu • Aiuli • O'e • Atoma • Karawasi • Roa • Supi • Puli • Tekehenu • Ma'apoa • Mengosalo*(River/Bush)*	• Alimango • U'eloku • Kihio • U'enioou • U'epulu • U'ewauweu • Ahe • Tu'etu'e • Poporoti • Peipeikohe*(Mudskipper)* • U'eawa • U'erere • U'etiutiu	• Pwahi • Upeupe • Tietie • Harapote • Ulehu • Iemela • Hoiehauho • Louasa • Lolo • Anate • Amoamo • Kakapa • Halata • Re'e • Pasahu • Titimiloa • Okolu • Tara *(snake like eel fish)* • Hauho*(eel fish)* • Roeroe • Mwa'aliongo • Mwalihote • Mwike • Hasa • Susuhupa • Ruru • Iepepe • Rahisipou • Boe • Ineti	• Ongomwane • Ongokeni • Ongopue • Ongotapire • Ongotio • Tingale • Ahili • Pulopule • Puloparapara • Pulopale'o • Aimwehi • Ururu • Sasanimwane • Marawarawa	• Momo*(short grass on reef)* • Halahala*(long grass)* • Apaloloniesi*(Banyan tree in sea)*	• Lolopie – *worm (2 types)* - River: stone/stick - Mangrove: stick • Sahao*(worm)* • Mwamwa *(BDM)* • Huwasa*(crocodile)* • Ura *(Prawn)* **<u>Tree animal</u>** • Mwatutu*(BDM)* • Huto*(opossum)* • Unu*(green lizard)* • I'hei*(Iguana)* • Lulusane*(Geko)* • Su'uhuto*(lizard, smaller than unu)* **<u>Birds</u>** • Ao • Kaule • Sisihiu • Manupala • Aoeke*(white bird)* • Osu • Tou • Kiokio*(Kingfisher)*

		• Nohu • Hali • Pwa'ewa (saki) • Salu • Sawa • Ieniroto • Aniwei • Toto • Koukolukeupora • Makiri • Iepo • Honu • Menamena • Ororo • Ohuwohu			• Usuusuliwei*(sml and blue)* • i'i*(back blue/chest white)* • Wisi*(white bird)* • Kirori*(Parrot)* • Siri*(Red parrot)* • Urou*(Kurukuru)* • Kilekile*(green parrot)* • Hiroku*(sml bird)*