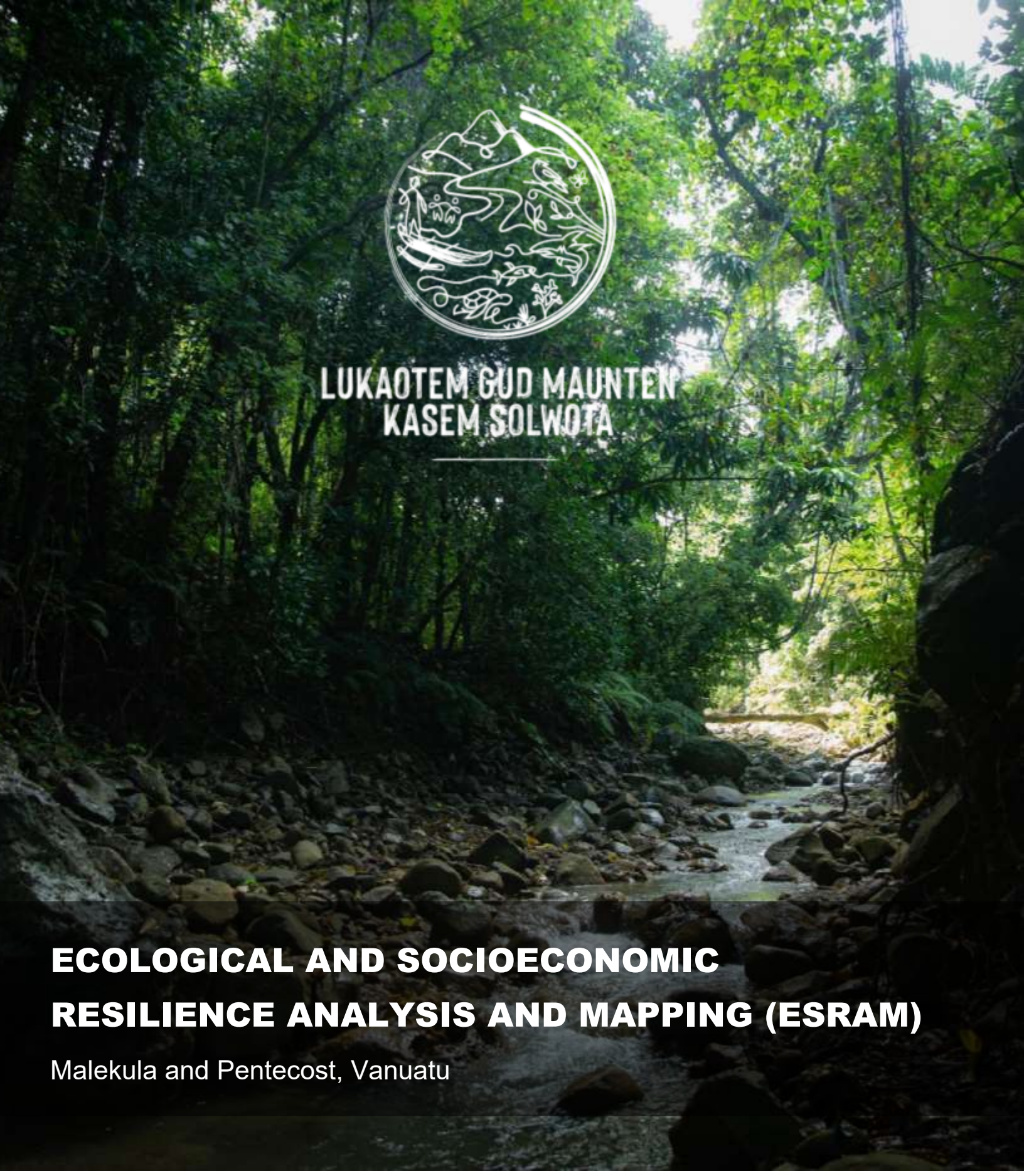

ECOLOGICAL AND SOCIOECONOMIC RESILIENCE ANALYSIS AND MAPPING (ESRAM)

Malekula and Pentecost, Vanuatu

EUROPEAN UNION

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List of acronyms

BIEM	By-catch and Integrated Ecosystem Management
CCA	Climate change adaptation
CEDAW	Convention on the Elimination of All Forms of Discrimination Against Women
CRC	Convention on the Rights of the Child
EbA	Ecosystem-based adaptation
ESRAM	Ecosystem and Socio-economic Resilience Analysis and Mapping
FAD	Fish attracting device
FEBA	Friends of Ecosystem-Based Adaptation
GEDSI	Gender, equity, diversity, and social inclusion
IPCC	International Panel on climate change
MEA	Millennium Ecosystem Assessment
NGO	Non governmental organisation
PACRES	Pacific Adaptation to Climate Change and Resilience Building
PNG	Papua New Guinea
RCP	Representation Concentration Pathway
RD	Research Deputy
SEEA-EA	System of Environmental Economic Accounting – Ecosystem Accounting
SIDS	Small island developing states
SPC	The Pacific Community
SPREP	Secretariat for the Pacific Regional Environment Programme
SUMA	Special, Unique Marine Areas
TEV	Total economic valuation
TESV	Total ecosystem service value
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organisation

EXECUTIVE SUMMARY

BACKGROUND

An Ecosystem and Socio-economic Resilience Analysis and Mapping (ESRAM) process aims to generate a robust planning baseline to inform the identification of ecosystem-based adaptation (EbA) options for strengthening the socio-ecological resilience of communities to the impacts of climate change and other direct anthropogenic impacts. This document provides a comprehensive report on Phase 1 activities that contribute towards such an exercise for four communities in Vanuatu: Laone (on Pentecost island) and Tenmaru, Wiawi, and South West Bay (on Malekula island).

Typical of many households in rural Vanuatu, most food for households on Pentecost and Malekula is produced on a subsistence-basis by both female and male farmers (Vanuatu National Statistics Office, 2009). Human well-being is therefore directly related to ecosystem service delivery (the benefits people receive from nature) the degradation of which risks food insecurity, malnutrition and capacity to respond to severe weather events (Carpenter et al., 2006; MEA, 2005; Savage et al., 2019).

To prioritize management and protection of Vanuatu's marine habitats, local marine experts came together to identify and document areas in Vanuatu's waters that are special and/or unique called Special, Unique Marine Areas (SUMAs) (Gassner et al., 2019). The areas of interests include these SUMAs and the host communities have previously expressed an interest in protecting these areas as Community Conservation Areas.

Biodiversity is under growing pressure from the interplay between climate change risks and human impacts from their growing footprint. The species and ecosystems of inland and coastal areas of Vanuatu are under pressure from expanding human settlement and agriculture. Care needs to be taken to ensure the kinds of adaptation actions being taken do not cause even more loss and degradation of natural environments and exacerbate harmful impacts upon members of socially disadvantaged groups. That is, climate change adaptations should not compound pressures on natural systems. An ecosystem-based approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. By allowing natural ecosystem processes to unfold, preventing further damaging land uses, and restoring degraded habitats, the full mitigation and adaptation benefits of healthy ecosystems can be realised.

DATA COLLECTION

Data collection took place on Malekula from 16 to 20 September 2022 at three sites before travelling to Pentecost on 21 to 29 September 2022. The field team undertook requested cultural protocols in liaison with government and local authorities in terms of planning and gaining approval for data collection, which included formal governmental approvals and arrangements made with the communities themselves to ensure fair and prior informed consent.

The field team also recruited and trained local enumerators from the communities, focussing on women and young people.

DATA SOURCES

This ESRAM draws on five data sources to inform the identification and prioritise preliminary EbAs for the four communities. The five data sources are show in Table 1.

Table 1: ESRAM data sources and summary results.

	Data source	Notes
1.	Literature review of determinants of effective ecosystem-based adaptation and existing policy settings.	Reviews of the literature undertaken in the themes of ecosystem-based adaptation, climate resilience, socio-ecological systems thinking, and sustainable development, particularly through the lenses of gender, equity, and diversity. This literature also provided a generalised typology for ecosystem-based adaptations.
2.	Ecosystem service valuation based on land cover extent and location of different habitats and economic valuation of ecosystem services.	Satellite imagery was used to map the location and extent of key habitat types (including subsistence gardens). Ecosystem service valuation data was then used to generate estimates of total ecosystem service valuations, which informs the level of dependency of local communities on ecosystem services.
3.	Climate risk data summarising current and future climate change related risks.	Regional climate change projections and climate risk assessments were drawn on to provide a high-level view of how climate change may impact Vanuatu.
4.	Household survey inquiring into resource use, livelihoods, perceived socio-economic and environmental risks, and aspirations and preferences for the future.	153 household surveys were completed across the four communities, which incorporated a reported 683 household members.
5.	“Go-along survey” inquiring into community assets and current community projects.	Three ‘go-along surveys’ were completed alongside community leaders and local experts.

KEY FINDINGS

Our data sources led us to identify and prioritise EbA measures for the four areas of interest based upon specific pressures, risks, and opportunities. By considering the unique ecological, social, and economic context of each community, we are able to provide a tailored- and community-data led and socially inclusive approach to prioritising EbA measures that will

support the resilience, well-being and livelihoods of communities. These EbA options are reported in Tables 2 to 5.

Table 2: Ecosystem based adaptation priorities for Laone, Pentecost.

Sector	Potential EbA Projects
Agriculture and livestock	Agricultural extension services focusing on agroforestry, animal husbandry and introduction of soil and water sensitive cropping (mulching) and more drought resistance crops.
Water supply and sanitation	With few or no water sources, projects should focus on accessible rainfall capture for drinking water to meet water security challenges.
Forest conservation	Investment in forest conservation for sustainable resource management, particularly to secure materials for building and medicinal plants and to maintain reasonable fallow periods to enable soil regeneration.
Fisheries and marine conservation	Deep water fishing already seems to be a response to resource management. Fish attracting devices (FADs) could be useful adaptation. (FAD installation is already part of a government program.)
Infrastructure and economy	Project investments in supporting small business needs to be balanced from an equity perspective to ensure benefits are not captured by first movers. Financial capacity building for members of socially vulnerable groups should be included. Tourism-related opportunities may arise in the eco-tourism sector, entailing protection of habitats and ecosystems. This would also entail investments in water supply and waste and sanitation systems. Financial capacity building for members of socially vulnerable groups should be included.

Table 3: Ecosystem based adaptation priorities for Tenmaru, Malekula.

Sector	Potential EbA Projects
Agriculture and livestock	Agricultural extension services should particularly focus on increasing crop diversification and productivity, such as using mulches and improved tillage techniques and retaining soil fertility to maintain food production. Increased local river flooding and coastal erosion may entail setbacks of some garden plots, demanding local institutional structures to enable households at risk of loss to negotiate managed retreat and new plots. Women's access to land for subsistence activities should not be minimised.
Water supply and sanitation	Investments in rainwater tanks, further improvements in sanitation, and solid waste management will prepare the community for increased

	tourism visitation. All hygiene and sanitation activities should ensure gender, equity, diversity, and social inclusion (GEDSI). Investments in improved sanitation will reduce risk of disease from contaminated ground water. Co-related education programmes on hygiene and sanitation, and safety of community members following major flood events (especially children) should be progressed.
Forest conservation	Investment in forest conservation for sustainable resource management, particularly to secure materials for building and medicinal plants and to maintain reasonable fallow periods to enable soil regeneration.
Fisheries and marine conservation	Marine protected areas for sustainable resource harvesting and potential for driving future eco-tourism opportunities. Increased conservation of reef assets is likely to require access to new sources of fish. Offshore FADs and maintenance of the current fleet will be important in the future. Small business aspirations will support specialisation into deep water fishing. Assess to deep water fishing for socially vulnerable groups. (FAD installation is already part of a government program.)
Infrastructure and economy	Project investments in supporting small business needs to be balanced from an equity perspective to ensure benefits are not captured by first movers. Financial capacity building for members of socially vulnerable groups should be included.

Table 4: Ecosystem based adaptation priorities for Wiawi, Malekula.

Sector	Potential EbA Projects
Agriculture and livestock	Agricultural extension services should particularly focus on increasing crop diversification and productivity, such as using mulches and improved tillage techniques and retaining soil fertility to maintain food production. Increased local river flooding and coastal erosion may entail setbacks of some garden plots, demanding local institutional structures to enable households at risk of loss to negotiate managed retreat and new plots. Women's access to land for subsistence activities should not be minimised.
Water supply and sanitation	Investments in rainwater tanks, further improvements in sanitation, and solid waste management will prepare the community for increased tourism visitation. All hygiene and sanitation activities should ensure GEDSI. Improved sanitation will reduce risk of disease from contaminated ground water. Co-related education programmes on hygiene and sanitation, and safety of community members following major flood events.
Forest conservation	Forest conservation for sustainable resource management, particularly to secure materials for building and medicinal plants and to maintain reasonable fallow periods to enable soil regeneration.

Fisheries and marine conservation	Continued work towards the establishment of marine protected areas for sustainable management of marine resource in service of supporting SUMAs. Assess access to fishing areas for socially vulnerable groups.
Social, infrastructure and economy	Agricultural extension projects will also harness the community's latent entrepreneurialism. Improved farming knowledge and access to new varieties and techniques could encourage micro-investment into productivity improvements and diversification. Support for the development of women-focussed business development, through capacity and skills building could support people in establishing new enterprises, particularly in utilising local produce.

Table 5: Ecosystem based adaptation priorities for South West Bay, Malekula.

Sector	Potential EbA projects
Agriculture and livestock	Agricultural extension services should particularly focus on productivity and new techniques, such as using mulches and improved tillage techniques to retain soil fertility to maintain food production. Increased local river flooding and coastal erosion may entail setbacks of some garden plots, demanding local institutional structures to enable households at risk of loss to negotiate managed retreat and new plots. Women's access to land for subsistence activities should not be minimised.
Water supply and sanitation	Investments in improved sanitation will reduce risk of disease from contaminated ground water. Co-related education programmes on hygiene and sanitation, and safety of community members following major flood events (especially children) should be progressed.
Forest conservation	Forest conservation in key upper catchment areas to maintain water quality and quantity in both rivers and lakes.
Fisheries and marine conservation	The integrity of freshwater systems needs to be maintained through forest conservation in upstream catchments and active management for sustainable harvesting of freshwater resources. Offshore FADs and maintenance of the current fleet could be tested. The current small offshore fishing fleet could support specialisation into deep water fishing. Assess access to deep water fishing for socially vulnerable groups.
Infrastructure and economy	Support for the development of an artisanal class, through capacity and skills building could support people in establishing new enterprises, particularly in utilising local produce. Financial capacity building for members of socially vulnerable groups should be included.

Other specific and important findings from the surveys included:

- When considering EbA options, community preferences were mixed. Many options were either important or not important, with very few people indifferent. This suggests that when

implementing projects such as EbAs, certain options may meet the demands of a sub-section of the community, but they need to be implemented in a way that if one group receives a benefit, another must not lose out. Such equality of benefit is essential to retain the social cohesion of smaller-scale, rural communities.

- While all communities were aware that forest and marine resources are getting scarcer and they generally support conservation, there is still a need for to manage conservation efforts to ensure that such efforts do not affect people's daily and normal livelihood activities, such as fishing. Some people feel there is a risk of being cut-off from resources as there are no management systems put in place, or effectively communicated. This affects their normal livelihood activities.
- A good number of interviewees in the households are not aware that there are conservation efforts already in their areas (e.g. the SUMAs). Others do not know the conservation boundaries. The are some community leaders who see the importance of conservation areas and are keen to see more implementations and assistance on potential projects identified in the SUMA process, but others are not clear about what their conservation plans should be working to achieve.
- Market prices for purchased food is high and, for some, selling food is their main source of income. Markets are also inconsistent. Communities are depending more on processed foods from shops, especially canned meat, which is likely to have a medium to longer term deleterious impact on health.

NEXT STEPS

The next phase of this ESRAM is to undertake a detailed cost-benefit analysis of alternative adaptation options for key social assets and ecosystem services (e.g., drinking water provision) on the islands. This will involve the following steps:

1. Identify a shortlist of potential options;
2. Perform cost-benefit analysis of these options; and
3. Develop a capacity building strategy to facilitate implementation of recommended option(s).

The team will develop, costs and determine the benefits from a short list of options. Following the cost-benefit analysis method proposed by Buckwell et al. (2020), which assessed options for climate change adaptation options for Tanna based on data from the prior Vanuatu/Tanna ESRAM (Mackey et al., 2017), the team will generate a range of economic metrics for assessing the value of each project (e.g., benefit-cost ratio, net present value). Following the economic analysis and options report, the project team will draft an implementation plan in consultation with SPREP and other in-country experts. (Note that consultation with the communities will take place following this process).

CHAPTER 1: PURPOSE OF THIS DOCUMENT

The purpose of this Ecosystem and Socio-economic Resilience Analysis and Mapping (ESRAM) process is to provide a comprehensive report on Phase 1 activities that contribute towards such an exercise for four communities in Vanuatu: Laone (on Pentecost island) and Tenmaru, Wiawi, and South West Bay (on Malekula island). The objective of an ESRAM process is to generate a robust planning baseline to inform the identification of ecosystem-based adaptation (EbA) options for strengthening the socio-ecological resilience of communities to the impacts of climate change and other direct anthropogenic impacts.

Phase 1 activities include the substantive data collection elements, including conducting a large household level survey and analysis of results, a go-along survey (a community 'stock take'), ecosystem mapping and economic valuation of ecosystem services, and a climate risk assessment. These lines of evidence are combined to generate a series of key risks and features for each community. We also highlight our methodology for translating these risks and features into a series of recommended EbA options and a high-level assessment of priorities for each of these communities. The findings and the recommendations are intended to generate discussion and feedback from SPREP but also from community leaders, policy makers and practitioners.

Phase 2 of the project will assess the cost effectiveness of the EbA options to generate a more comprehensive implementation and staging plan for the preferred options.

CHAPTER 2: PROJECT SITE CONTEXT

2.1 OVERVIEW OF PROJECT SITES

2.1.1 Project sites

Pacific Small Island Developing States (SIDS) have a long history of resilience and adaptation to environmental variability (Barnett, 2011), yet their rural communities face a range of chronic threats to the sustainable management of their natural resources. These threats are exacerbated by a rapidly warming climate and new climate-related risks, such as increased incidence of extreme weather events, and sea level rise (Kossin et al., 2020; Pachauri et al., 2014). The increasing pressures on their natural resources from population growth (in most instances), tourism development (in some instances), falling agricultural productivity, and over-harvested fisheries are being magnified and compounded by climate-related impacts, including more severe tropical cyclones, ocean acidification, coral bleaching, droughts, increasing coastal inundation, and erosion (Faivre et al., 2022; Fleming, 2007; Mackey et al., 2017).

Typical of many households in rural Vanuatu, most food for households on Pentecost and Malekula is produced on a subsistence-basis by both female and male farmers (Vanuatu National Statistics Office, 2009). Human well-being is therefore directly related to ecosystem service delivery (the benefits people receive from nature), which is affected by climate change impacts, which in turn, risk food insecurity, malnutrition and capacity to respond to severe weather events (Carpenter et al., 2006; MEA, 2005; Savage et al., 2019). In addition, in Vanuatu, non-climate change related risks such as seismic and volcanic activity further increase sudden-onset disruptions in ecosystem service delivery. Social and economic development and demographic pressures also play their part (Buckwell, Fleming, Muurmans, et al., 2020).

2.1.2 Biodiversity conservation

Biodiversity is under growing pressure from the interplay between climate change risks and human impacts. The species and ecosystems of inland and coastal areas are under pressure due to the concentrations of human settlement and infrastructure they support, particularly in North Pentecost. In response, governments are acting to adapt to climate change so that people avoid or minimise the harmful impacts of a rapidly changing climate. Care needs to be taken to ensure that adaptation actions do not cause even more loss and degradation of natural environments nor exacerbate harmful impacts upon members of socially disadvantaged groups. For example, in response to rising sea levels and storm surges, governments can seek to replace natural coastal ecosystems, such as mangrove forests, with sea walls, which might protect coastal assets but has ecosystem impacts in terms of biodiversity regeneration and carbon sequestration (Mackey & Ware, 2018), and has negative impacts on women and girls' food security because these are environments where they collect shellfish. Another example of a perverse climate change action is where natural forests, which provide significant ecosystem services, are being cleared to develop commercial agriculture to generate cash incomes, which impacts the wider community's capacity to sustain itself through natural resource harvesting.

To prioritize management and protection of Vanuatu's marine habitats, local marine experts came together to identify and document areas in Vanuatu's waters that are special and/or unique, called Special, Unique Marine Areas (SUMAs) (Gassner et al., 2019). The areas of interests include these SUMAs and the host communities have previously expressed an interest in protecting these areas as community conservation areas. Further engagement with the communities has been conducted by SPREP since to confirm their support for further work towards community conservation areas.

Vanuatu law relating to customary ownership of natural resources is based on the fundamental concept, enshrined in the Constitution (Chapter 12, Article 71), that all land and in-shore reefs are the inalienable property of the Ni-Vanuatu (Amos, 2007). In support of customary management, the *Vanuatu Environmental Management and Conservation Act 2002* allows for establishment of community conservation areas. Creating community conservation areas must follow an established procedure, which allows for community consultation, biodiversity audits, community approval of a management plan, notification of neighbouring communities and support from both the island Council of Chiefs and the provincial government. Whilst this legislatively established procedure provides checks and balances to creating equitable, sustainable, and worthwhile conservation areas, the technical, managerial and logistical demands create barriers to their establishment. These areas, however, are often subject to significant criticism on the basis that it focuses on the interests and the skill sets of the international NGO community, which benefits from being seen establishing formal conservation, without obligation for ongoing resourcing at the expense of local communities who risk the loss of control of their resources with no ongoing benefits (Hickey, 2008; Ruddle & Hickey, 2008). Informal community conservation areas are more widespread and have proven to be highly effective (Buckwell, Ware, et al., 2020).

2.1.3 The benefits of ecosystem-based approach

The key to dealing with climate change without compounding pressures on natural systems is to take an ecosystem-based approach. Functioning ecosystems provide a range of overlapping benefits to communities – often referred to conceptually as a 'basket of benefits' (Morgan et al., 2021). An ecosystem-based approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. By allowing natural ecosystem processes to unfold, preventing further damaging land uses, and restoring degraded habitats, the full mitigation and adaptation benefits of healthy ecosystems can be realised. Natural ecosystems sequester carbon dioxide from the atmosphere and securely store carbon in trees and soil.

2.1.4 Ecosystem-based adaption to climate change

Ecosystem- based adaptation (EbA) to climate change describes a potentially fruitful class of CCA interventions. EbA is the deployment of biodiversity and ecosystem services to help communities adapt to the adverse effects of climate change – it is not simply habitat conservation for its own sake (Andrade et al., 2011; FEBA, 2018; Munang et al., 2013; Nalau & Becken, 2018; Nalau, Becken, & Mackey, 2018). EbA is the key to helping species adapt to a rapidly changing climate, maintaining the resilience of ecosystems, and providing critical ecosystem services to local communities including CCA benefits. Removing other stressors from habitats such as industrialisation, unsustainable use, invasive species and pollution, results in healthier ecosystems that are naturally more resilient to climate impacts and can provide a more reliable supply of services and benefits.

Supporting the conservation and high integrity functioning of habitats and ecosystems is therefore vital for the continuation of efforts to improve livelihoods of the people of the Pacific. Strategies to manage climate change impacts provide a significant opportunity for communities on Pentecost and Malekula to simultaneously deal with climate change-induced risks and progress towards the 2030 Agenda for Sustainable Development, the goals set out in the Convention on Biological Diversity and Vanuatu's own National Sustainable Development Plan (Republic of Vanuatu, 2016). Strategies can also be aligned with Vanuatu's ratified core human rights treaties, which include The Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), The Convention on the Rights of Persons with Disabilities (CRPD), and The Convention on the Rights of the Child (CRC) to ensure the human rights of all members of the community are supported and addressed in climate change planning and management (https://www.un.int/vanuatu/vanuatu/human-rights, accessed 7/2/2023).

2.1.5 Ecosystem and social resilience and mapping

The objective of an ESRAM process is to generate a robust planning baseline to inform the identification of EbA options for strengthening the socio-ecological resilience of selected areas in Vanuatu to the impacts of climate change and direct anthropogenic impacts.

The process involves the collation and collection of information and data through interviews, training, and observation of communities. The training component is to train community members including women, men and youths in the design, implementation, and reporting of ESRAMs through theoretical and practical exercises.

The scope is to train and engage trained community members, civil society and provincial officers who can contribute to designing a system or process of socio-ecological resilience governance. The scope includes identification and mapping of their natural resources and existing systems, including those which are working or need reviewing, identifying other community services and goods that can impact the sustainability of the socio ecological resilience of the sites, identify, and document, the trend for the status of the conservation systems and also identify partners and stakeholders who can help the communities surrounding the sites to support their socio-ecological resilience governance.

CHAPTER 3: FIELD TRIP ACTIVITIES

The areas of study are four (4) sites identified on the islands of Malekula and Pentecost in Vanuatu. These two islands are governed by the provincial governments of Malampa and Penama, who report to the Ministry of Internal Affairs.

The team worked on Malekula from 16 to 20 September 2022 at three (3) sites before travelling to Pentecost on 21 to 29 September:

- South West Bay, west coast, Malekula;
- Tenmaru, northwest coast Malekula;
- Wiawi, northwest Malekula; and
- Laone, northern Pentecost.

The team undertook data collection by employing two key methods:

1. Household survey (section 5)
2. Go-along survey (section 6)

3.1 PLANNING

The in-field team undertook several tasks, in liaison with government and local authorities, in terms of planning and gaining approval for data collection.

First, we sought approval through a letter to the Secretary General of the two provinces and copied in the Director of Local Authorities. We further engaged with Area Secretaries of the four communities regarding logistics and informing them of the plan of activities by the team. The arrangements were made two months before the travel date.

The team worked with the Department of Local Authorities, provincial governments of Malampa and Penama including Area Councils of the nominated communities visited. The process included:

1. Arrangement and management of logistics including organising of protocol meetings, transportation including boats, land transport, food, accommodation to the sites.
2. Identification of community representatives and ensuring the list was inclusive of women, youths, girls and people living with disability.
3. Briefing of the team and their familiarisation with the questionnaires, Code of Conduct, Consent Forms and the governance system of each island.
4. Discussion, familiarisation and training, ensuring field officers fully understood their roles and responsibilities, and were comfortable in being actively involved in each assessment and mapping exercise.
5. Confirmation of the photos and videos to be taken during the survey that showcase the survey work and the ecosystems surveyed.

The team emailed on July 28 to seek approval from the provinces of MALAMPA and PENAMA and copied in the Director of Local Authorities. The email introduced the team and the purpose of their field assessment and the objective. The Presidents verbally gave their

approval for the team to visit the sites and conduct assessments and run training with the community members and civil society in each site.

3.2 CULTURAL PROTOCOLS

The team met with the chief of each village and presented a gift (mat) to gain approval to continue with our training and research (see Figure 1). The token was a sign of appreciation for accepting us to conduct our field work.

Figure 1: Field trip leader Linda Kenni meets with paramount chief of Dixon Reef, Malekula, prior to surveying activities.

On Malekula, the team paid a visit to the provincial office. Mr Lester Makikon went a few days ahead of the team and met and reconfirmed logistics on the island of Malekula. He met with the Acting Secretary General of Malampa Province, Ms Jilda Shem, and briefed her about the work to be conducted at the three (3) sites on Malekula and engagement of the community through training and assessments.

Once the team was on the ground, unfortunately due to other commitments, the Acting Secretary General was unavailable for an introductory meeting. However, with prior approval the team continued as planned (see below itinerary at each site).

3.3 TRAINING

Our Vanuatu based field team led recruitment and training during the survey phase. Ms Linda Kenni, as in-country manager, supervised training and data collection, supported by two in-country facilitators (Ms Jennifer Kausei and Mr Lester Makikon. See Figures 2 and 3).

The Pacific Research Guidelines and Protocols developed at Massey University (2017) guided all field activities, respecting people and place, empowering the researcher, and focusing on local researcher collaboration and reciprocity. The Pacific Gender and Climate Toolkit (SPC, 2012) was a further guiding document, supporting the team's recognition that gender equality is central to achieving a sustainable and resilient future for the Pacific Islands and that gender must be incorporated into all aspects of policy, programming and project work. In this project the concept of gender was expanded to include disability and social inclusion, i.e., GEDSI.

As a value-add contribution to the project, via Griffith University's Professional Learning Hub, the Vanuatu-based field team and all community-based data collectors were able to complete a short course and receive a Griffith University endorsed credential that recognises the skills and experience they have gained during this project. These credentials were developed by the project team during the project and were awarded following project completion. Griffith University credentials are typically issued as a digital badge as a means of symbolising achievements in a way that can be displayed, accessed, verified, and shared online (e.g., on LinkedIn profiles). Digital badges provide employers (for example) concrete evidence of what the recipient had to do to earn them and what skills they now have gained. Recognising inequalities in digital access and literacy, paper-based certificates were also issued.

Figure 2: Training with enumerators in Laone, Pentecost Island.

Figure 3: A mother is being interviewed by a trained enumerator at Laone, north Pentecost.

CHAPTER 4: CONTEXT

4.1 CLIMATE PRESSURES

Vanuatu is one of the most vulnerable nations in the South Pacific. Climate change is both a direct threat and a threat accelerator. Hazards include droughts, floods, extreme temperatures, volcanic eruptions, earthquakes, tsunamis, and cyclones. Our climate risk data is drawn from a range of sources, including reports from the World Bank (World Bank Group, 2021), WHO and UNFCCC (2020), the Vanuatu government (2015, 2016, 2018a, 2018b), the IPCC (2022), and the Pacific Gender and Climate Toolkit, from SPC (2015).

4.1.1 Projections

Atmosphere, temperature, rainfall

1. Vanuatu is expected to continue to warm at least to the end of the 21st century. Downscaling estimates of warming is limited by model capabilities but is expected to be in the range of 0.7°C–2.9°C depending on emissions projections. Up to the 1990s there was limited warming in the region, but from 1995 warming accelerated, and temperatures between 2014 and 2018 were averaging around 0.5°C–0.6°C above the long-term average. Temperatures have been rising in the region at around 0.1°C per decade since the 1970s (World Bank Group, 2021).
2. Under a high emissions scenario (RCP8.5) the number of hot days will increase from ~20% (2010) to almost 100% of days on average by the end-of-century. If emissions decrease rapidly, about 60% of days on average are 'hot' (RCP2.6) (WHO & UNFCCC, 2020).
3. Rainfall projections are influenced by natural variability between years, even decades and remain difficult to predict. Best predictions in all scenarios suggest little change in main rainfall but a significant increase in variability. Under a high emissions scenario, the proportion of total annual rainfall from very wet days (about 30% for 1981–2010) could increase a little by the end-of-century (to almost 35% on average with an uncertainty range of about 20% to 50%), with little change if emissions decrease rapidly. This manifests in fewer cyclones overall but more extreme weather events are likely to increase in intensity, though the science underpinning this is still emerging.

Impact on oceans and ocean habitats

4. Sea level is projected to increase. While Vanuatu's volcanic islands have higher elevation than some Pacific Island nations, long-term sea-level rise, in combination with local tectonic movements (Faivre et al., 2022), threatens coastal livelihoods and infrastructure. Sea levels are predicted to rise between 0.4 and 0.9m by 2090.
5. Warming oceans will induce coral bleaching events, which is a significant risk to local reefs. Given the high rates of dependencies on reef fisheries this will impact local economies, livelihoods and subsistence activities (Hafezi et al., 2020).
6. Ocean acidification from increased atmospheric concentrations of carbon dioxide will produce consequences for coral growth and shell-forming organisms (Turley & Gattuso, 2012).

Socio-economic and health impacts

7. Generally, adaptation and disaster risk reduction efforts are hampered by Vanuatu's lack of economic independence, high community dependence on subsistence agriculture, and its inaccessible location. This can also be exacerbated by volcanic and tectonic risks. Severe weather can damage critical infrastructure (roads, airports, ports) and community assets (boats, houses, community buildings).
8. Heat stress is expected to increase as the proportion of hot days increases the frequency of heatwaves, resulting in a greater number of people at risk of heat-related medical conditions and potentially risks to animal (domesticated and wild animals) and even plant health. This can result in loss of life (particularly of vulnerable people such as infants and the elderly) but also in loss of livelihoods, subsistence foods, socioeconomic output, and reduced labour productivity.
9. A warming climate can lead to the spread of vector borne diseases to higher latitudes directly impacting health but also labour productivity (Filho et al., 2019).

4.2 ECOSYSTEMS – LAND USE TYPES AND VALUATIONS

This section outlines the methodology for estimating the total ecosystem service value (TESV) provided by the ecosystems in the four areas of interest. TESV refers to the monetary value of the ecosystem services provided by ecosystems to human society and are estimated as valuations of *flows* of services, in monetary units per area per time period – most often $/hectare/year, rather than in terms of *stocks* of natural capital, which would be measured simply as a dollar asset value. These services can include provisioning services such as food and water, regulating services such as climate regulation and waste treatment, cultural services such as recreation and spiritual values, and supporting services such as soil formation and nutrient cycling.

There are four steps to providing a TESV:

1) Determining land-use and land-cover classifications in the area of study;
2) Generating land-use and land-cover maps and extent estimates (and if possible, ecosystem integrity);
3) Estimating economic valuations;
4) Bringing extent values and ecosystem service valuations together.

4.1.2 Determining land-use and land-cover classifications

Terrestrial ecosystems can be identified and mapped using various criteria, from a practical perspective (and in a Melanesia context) they have been defined here according to the major vegetation types that have been recognised by biodiversity and forest surveys. However, the pattern of land cover and land use remains complex and dynamic in Vanuatu, with transition between forest, rotational gardens, and forest regrowth. Thousands of years of shifting cultivation and secondary regrowth has left only the remotest areas and steepest terrain completely unmodified.

Whilst numerous possible classifications are available for ecosystem asset types, in preparation for the economic valuation of ecosystem services component of our study we adopted a simplified classification scheme that could be detected through the training of machine learning tools using the library of support vector machines (libsvm) classification through Google Earth Engine. Cleaned Sentinel-2 satellite imagery dating from 2020 - 2022 was used as the input dataset and trained using locally identified land classifications. Further desktop validation was performed using Maxar high resolution imagery to ensure the accuracy of the outputs.

Consistent with the UN's System of Environmental Economic Accounting Ecosystem Accounting (SEEA-EA) (UN, 2021), in our project sites we include the human-modified land-uses of 'subsistence gardens' and 'plantation forests' as ecosystem assets; as residual values, beyond human labour and capital input, are provided by nature in the delivery of the final ecosystem service (Boyd & Banzhaf, 2007).

A comprehensive qualitative description of these vegetation types and agricultural practices is provided in Mackey, et al. (2017, pp. 6–10). In addition, we identified the marine categories of coral reefs (UNEP/WCMC, 2017). We determined not to map sea-grass beds – despite datasets being available – as sea grass beds tend to be relatively ephemeral.

4.1.3 Ecosystem location and extent

Ecosystem location and extent data were generated from satellite data from Google Earth Engine based on the spatial extent data of the areas of interest provided by SPREP and the classification scheme from Section 7.1. The land cover maps for the four areas of interest are in Figures 4 to 7. An overview of the locations is shown in Figure 4. No mangrove forest habitat was identified in the areas of interest (Global Mangrove Watch, 2023).

Figure 4: Overview of areas of interest on the islands of Malekula and Pentecost.

Figure 5: Area of interest for the Laone community, Pentecost.

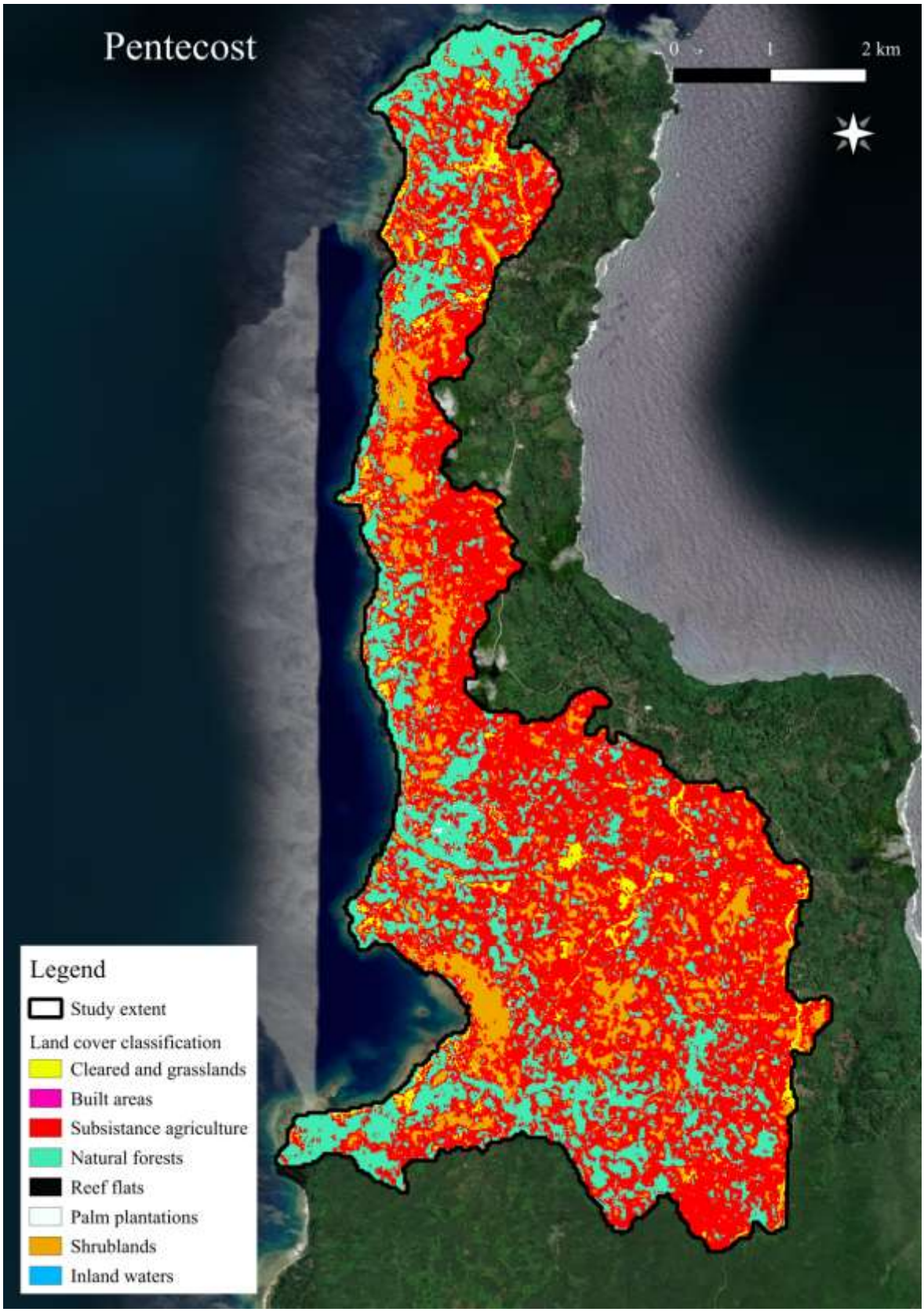


Figure 6: Area of interest for the Tenmaru and Wiawi communities, Pentecost.

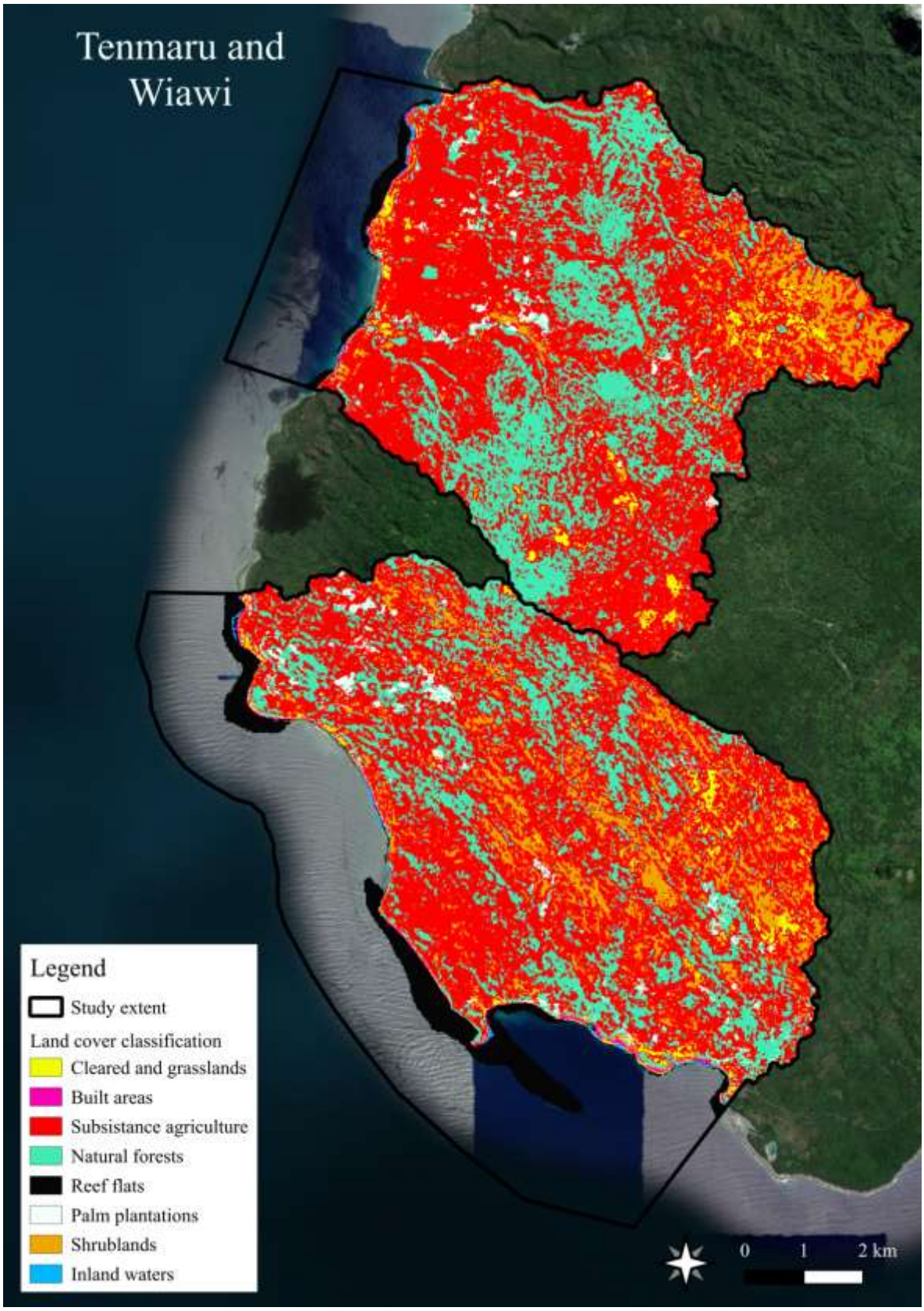
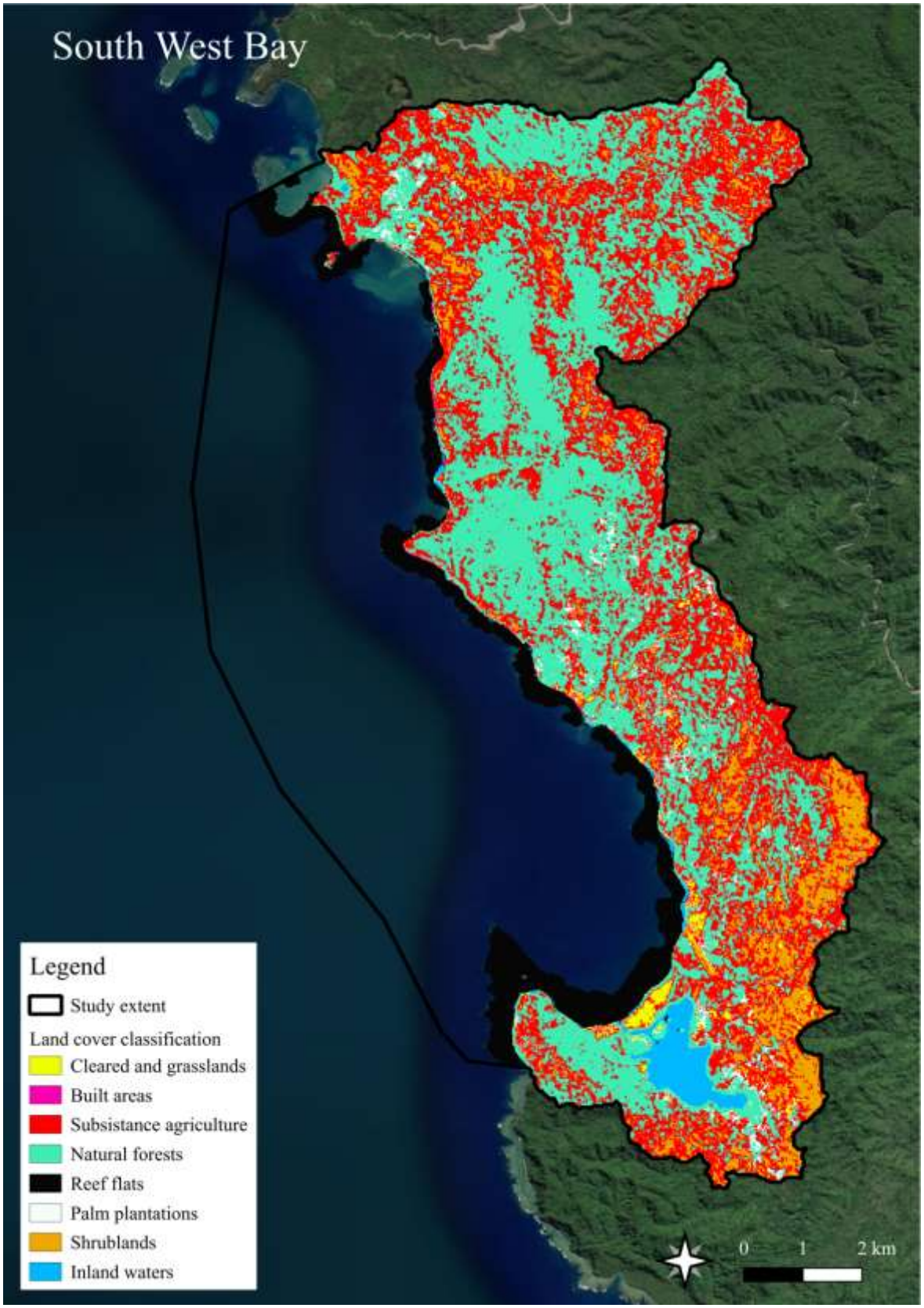


Figure 7: Area of interest for the South West Bay community, Pentecost.

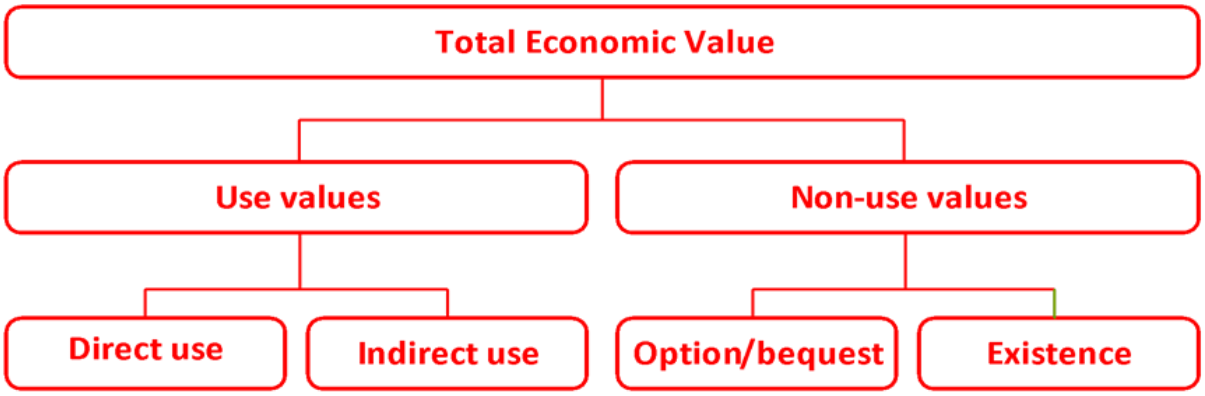


4.1.4 Economic valuation of ecosystem services

The SEEA EA framework allows for the benefits from ecosystem services to be valued in economic, or monetary terms. Economic valuation provides a way of enabling common measures of value between different ecosystem goods and services with other elements of well-being traded in markets to enable trade-offs and benefits to be more effectively assessed. Not all ecosystem services lend themselves well to economic valuation for specific local cultural reasons (for example, some spiritual services).

The team used a Total Economic Valuation (TEV) framework (see Figure 8 below). The TEV framework ensured that both obvious values (e.g., direct use values, such as the production of cash crops) and non-use values (e.g., existence values such as those surrounding unique ecosystems) were incorporated as much as practicable. This provided us with an estimate of TESV.

Figure 8: A simplified total economic value framework.



Benefit transfer

When seeking to estimate the monetary benefits of ecosystem services, several possible valuation techniques can be used depending on data and resource constraints. In this project, market-based methods were used to estimate use values (food and water consumption, for example) where relevant data were available. Benefit transfer was used to estimate non-use values. Benefit transfer is a method of estimating the value of a change in an environmental good or service at a (target) site using information from an existing study (or studies) conducted at another (source) site. This approach is useful when a primary study for the target site is not possible due to time and/or budget constraints (Buckwell, Fleming, Smart, et al., 2020). The team drew estimates from a range of sources, including databases from Taye et al. (2021) and van der Ploeg & de Groot (2010) filtered in accordance with those deployed in assessing TESV for Vanuatu and Tanna by Buckwell et al. (2020). This study could only find a single data point for the value of subsistence farming that would be appropriate for Vanuatu – that by Anderson (2006) for communities in Papua New Guinea. While the authors recognised this as a potential weakness in their study, geographic and

cultural similarities suggest it could be an effective substitute. Unfortunately, no further appropriate, more updated valuation has been sourced.

4.1.5 Estimating TESV

Estimating TESV requires making judgments as to what constitutes intermediate and final ecosystem services—those that are directly "enjoyed, consumed, or used to yield human well-being" (Boyd & Banzhaf, 2007, p. 619) (Boyd & Banzhaf, 2007, p. 619). If both intermediate and final ecosystem service values are totalised, contributions are double counted. For example, pollination services are intermediate inputs into the final food production value provided by agriculture, forests, and plantations. Therefore, the value of pollination services is embedded in the provisioning ecosystem service value for food.

Ecosystem accounting reconciles inputs and outputs so that the value of final services is the sum of value–added through intermediate components. In general, regulating ecosystem services are intermediate services to final benefits enjoyed locally and therefore not totalled in a TESV (though nevertheless present useful information for decision-making). The exceptions to this are (a) air quality regulation (an end in itself); (b) climate regulation, which, although it provides a measure of an intermediate service (a stable climate) that contributes to local food production, for example, it also provides a final service to global society as a public good or a private good if emissions reductions are converted into a carbon permit; and (c) the moderation of disturbance functions of coral reefs and mangroves, providing coastal protection.

Our benefit transfer valuation method therefore identified and used specific valuation estimates with decreasing relevance from the project sites. Therefore, it first examined studies from:

1. Pentecost and/or Malekula (Pascal & Bulu, 2013);
2. Vanuatu (Buckwell, Fleming, Smart, et al., 2020);
3. Melanesia (Anderson, 2006);
4. Pacific / filtered global databases (Taye et al., 2021; van der Ploeg & de Groot, 2010).

The specifics of the methods are in Buckwell et al. (2020, pp. 338-339). Of particular note is the estimate for the economic value of subsistence gardens from Anderson (2006). Anderson's study was based on several communities in Papua New Guinea (PNG) and used a market-price replacement method to provide a per hectare per year value. The estimate is based on the equivalent cost of purchasing the grown food at a local market. The basket of food on which Anderson's estimate is based (staple crops) is broadly similar to the staples grown in Vanuatu. The study accepts that the estimates provided take a narrow view of the sustenance provided from subsistence gardens and ignores additional economic value that may be attributed to "risk management concerns of food security and social security, nor the important but less tangible values of social cohesion and cultural reproduction" (2006, p. 141). Nevertheless, the surprisingly high value estimate provided is contrasted, perhaps provocatively so, with the customary land's relatively low prices customary land achieves when it is transacted for alternative commercial uses. Anderson's value is a per hectare value based on exchange values (economic value is based on quantity X price) and is therefore compliant with the SEEA-EA principles; nonetheless, as it contributes a significant proportion to TESV, it needs to be treated with some caution and seen as more as a *potential* value of subsistence gardens. The value provided by Anderson is significantly inflated from its original 2016 values due to relatively high price inflation in PNG in the subsequent years but is also moderated by a significant loss of value of the PNG Kina

against the US dollar. From this range of sources, the team estimated an ecosystem coefficient based on the median values from the filtered list of appropriate benefit transfer values. This is reported in Table 6.

Table 6: Ecosystem service co-efficient estimates for key habitats/ land-covers (2022 US$/yr/ha).

Ecosystem Service Type	Coastal Coral Reef	Tropical Forest	Grassland	Freshwater Bodies	Subsistence Gardens	Plantation Cropping
PROVISIONING						
Food	69 8 42			23	8,108	61
Water supply	0	232	150	1494		
Raw materials / energy	1	37	8	1		
Genetic resources		7				
Ornamental resources		57				
Medicinal resources	3					
REGULATING SERVICES						
Air quality regulation		497	114			
Climate regulation	231	140	338	65		
Moderation of disturbance	204	52				
Water flow regulation		1				
Waste treatment (inc. water)	3					
Erosion prevention		119				
Soil fertility maintenance		16	277	1		
Pollination		47				
Biological control	0.33					
CULTURAL SERVICES						
Aesthetic	3					
Cognitive	2					
Inspiration	0					
Spiritual	1					
Recreational	381	17	5.4	431		

4.1.5.1 Total ecosystem service value estimates

The following tables (7 to 10) show the total ecosystem service values (in current $US per year) for the four communities. These values appear considerable.

4.1.5.2 Total ecosystem service value for Laone, Pentecost

The TESV for Laone in Pentecost is reported in Table 7. Subsistence gardens land use takes-up an estimated 60% of all terrestrial land in the area of interest, with tropical forest and shrublands accounting for most of the remaining.

Table 7: Total ecosystem service value for Laone, Pentecost (US$/yr/ha).

Ecosystem Type	Coastal Coral Reef	Tropical Forest + Shrublands	Grassland	Freshwater Water-bodies	Subsistence Gardens	Plantation Cropping
Extent (ha)	462	1074	111	3	1750	17
Proportion of terrestrial habitat type (%)		36.3	0.2	0.1	59.1	0.6
PROVISIONING						
Food	32,052	8,154	4,695	62	14,186,081	1,013
Water supply		249,266	16,613	4,033		
Raw materials / energy	501	39,603	843	3		
Genetic resources		6,989				
Ornamental resources		61,734				
Medicinal resources	1,502					
REGULATING						
Air quality regulation		533,477	12,640			
Climate regulation	106,673	150,259	37,559	176		
Moderation of disturbance	94,152	55,910				
Water flow regulation		1,165				
Waste treatment	1,502					
Erosion prevention		128,128				
Soil fertility maintenance		17,472	30,697			
Pollination		50,086				
Biological control	150					
CULTURAL ECOSYSTEM SERVICES						
Aesthetic	1,502					
Cognitive	1,002					
Inspiration	50					
Spiritual	501					
Recreational	175,784	18,637	602	1,163		
Total	**415,372**	**1,320,879**	**103,648**	**5,436**	**14,186,081**	**1,013**

4.1.5.2.1 Total ecosystem service value for Tenmaru, Malekula

The TESV for Tenmaru in Malekula is reported in Table 8. Subsistence gardens land use takes-up an estimated two-thirds of all terrestrial land in the area of interest, with tropical forest and shrublands accounting for most of the remaining.

Table 8: Total ecosystem service value for Tenmaru, Malekula (US$/yr/ha).

Ecosystem Type	Coastal Coral Reef	Tropical Forest + Shrublands	Grassland	Freshwater Waterbodies	Subsistence Gardens	Plantation Cropping
Extent (ha)	64.49	1815.41	139.1	7.13	3588.5	16.68
Proportion of terrestrial habitat type (%)		32.2	2.5	0.1	63.7	0.1
PROVISIONING						
Food	4,477	13,786	5,885 162		29,095,558	1,013
Water supply		421,444	20,824	10,651		
Raw materials / energy	70	66,958	1,056	8		
Genetic resources		11,816				
Ornamental resources		104,376				
Medicinal resources	210					
REGULATING						
Air quality regulation		901,968	15,844			
Climate regulation	14,901	254,048	47,080	464		
Moderation of disturbance	13,152	94,529				
Water flow regulation		1,969				
Waste treatment	210					
Erosion prevention		216,630				
Soil fertility maintenance		29,540	38,479	8		
Pollination		84,683				
Biological control	21					
CULTURAL ECOSYSTEM SERVICES						
Aesthetic	210					
Cognitive	140					
Inspiration	7					
Spiritual	70					
Recreational	24,556	31,510	754	3,071		
Total	**58,024**	**2,233,257**	**129,922**	**14,363**	**29,095,558**	**1,013**

Total ecosystem service value for Wiawi, Malekula

The TESV for Wiawi in Malekula is reported in Table 9. Subsistence gardens land use takes-up more than 60% of all terrestrial land in the area of interest, with tropical forest and shrublands accounting for most of the remaining.

Table 9: Total ecosystem service value for Wiawi, Malekula (US$/yr/ha).

Ecosystem Type	Coastal Coral Reef	Tropical Forest + Shrublands	Grassland	Freshwater Waterbodies	Subsistence Gardens	Plantation Cropping
Extent (ha)	336	1,843	123	13	3,387	129
Proportion of land habitat type (%)		33.3	2.2	0.2	61.3	2.2
PROVISIONING						
Food	23,330	13,992	5,222	305	27,458,147	7,866
Water supply		427,756	18,478	20,032		
Raw materials / energy	365	67,961	937	15		
Genetic resources		11,993				
Ornamental resources		105,939				
Medicinal resources	1,094					
REGULATING						
Air quality regulation		915,477	14,059			
Climate regulation	77,644	257,853	41,776	873		
Moderation of disturbance	68,531	95,945				
Water flow regulation		1,999				
Waste treatment	1,094					
Erosion prevention		219,874				
Soil fertility maintenance		29,983	34,144	15		
Pollination		85,951				
Biological control	109					
CULTURAL ECOSYSTEM SERVICES						
Aesthetic	1,094					
Cognitive	729					
Inspiration	36					
Spiritual	365					
Recreational	127,949	31,982	669	5,775		
Total	**302,338**	**2,266,706**	**115,286**	**27,014**	**27,458,147**	**7,866**

Total ecosystem service value for South West Bay, Malekula

The TESV for South West Bay in Malekula is reported in Table 10. Subsistence gardens land use takes-up an estimated two-thirds of all terrestrial land in the area of interest, with tropical forest and shrublands accounting for most of the remaining. South West Bay was the only area of interest with any significant freshwater bodies.

Table 10: Total ecosystem service value for South West Bay, Malekula (US$/yr/ha).

Ecosystem Type	Coastal Coral Reef	Tropical Forest + Shrublands	Grassland	Freshwater Waterbodies	Subsistence Gardens	Plantation Cropping
Extent (ha)	758	4,272	103	176	3,212	154
Proportion of land habitat type (%)		53.8	1.3	2.2	40.5	1.9
PROVISIONING						
Food	52,638	32,441	4,338	4,012	26,046,545	9,331
Water supply		991,775	15,351	263,069		
Raw materials / energy	822	157,572	779	191		
Genetic resources		27,807				
Ornamental resources		245,627				
Medicinal resources	2,467					
REGULATING						
Air quality regulation		2,122,584	11,680			
Climate regulation	175,185	597,846	34,706	11,463		
Moderation of disturbance	154,623	222,454				
Water flow regulation		4,634				
Waste treatment	2,467					
Erosion prevention		509,791				
Soil fertility maintenance		69,517	28,365	191		
Pollination		199,282				
Biological control	247					
CULTURAL ECOSYSTEM SERVICES						
Aesthetic	2,467					
Cognitive	1,645					
Inspiration	82					
Spiritual	822					
Recreational	288,685	74,151	556	75,845		
Total	**682,153**	**5,255,482**	**95,774**	**354,770**	**26,046,545**	**9,331**

4.1.5.3 Value of subsistence farming

Subsistence gardens are of particular importance to the livelihoods of the people of Vanuatu – almost all households (between 86% and 96% from our household survey, see below)

produce at least some of their food. Table 11 reports the per capita potential economic value of subsistence gardens based on the estimated population of the areas of interest from Vanuatu census data and population densities (City Population, 2006; Vanuatu National Statistics Office, 2020). The lower per capita estimate for Laone is a function of the significantly greater population density of this region of Vanuatu when compared to communities on Malekula. This represents the much greater pressure on land uses in northern Pentecost, particularly at the expense of forested areas.

Table 11: Value of subsistence gardens to areas of interest.

	Area (km2)	Density (people/km2)	Population Estimate	Value of Subsistence Gardens ($UD/yr)	Per Capita Value of Food Gardens ($US/yr)
Laone, Pentecost	29.6	74.61	2209	14,186,081	6,422
Tenmaru, Malekula	56.3	16.16	911	29,095,558	31,939
Wiawi, Malekula	55.2	16.16	893	27,458,147	30,732
South West Bay, Malekula	79.3	5.653	449	26,046,545	58,068

CHAPTER 5: HOUSEHOLD SURVEY

The household survey was designed to gather data on household demographics, each household's resource use and dependency, community vulnerabilities, adaptive capacity, and some elements of their aspirations for the future. Key aspects of the survey findings are reported in isolation here but are integrated into findings from the go-along survey, the ecosystem assessment and economic valuation assessments later in the report.

The survey data was collected at a household level, therefore only one person from each household was required to complete the survey, but they were instructed to complete the survey on behalf of all householders.

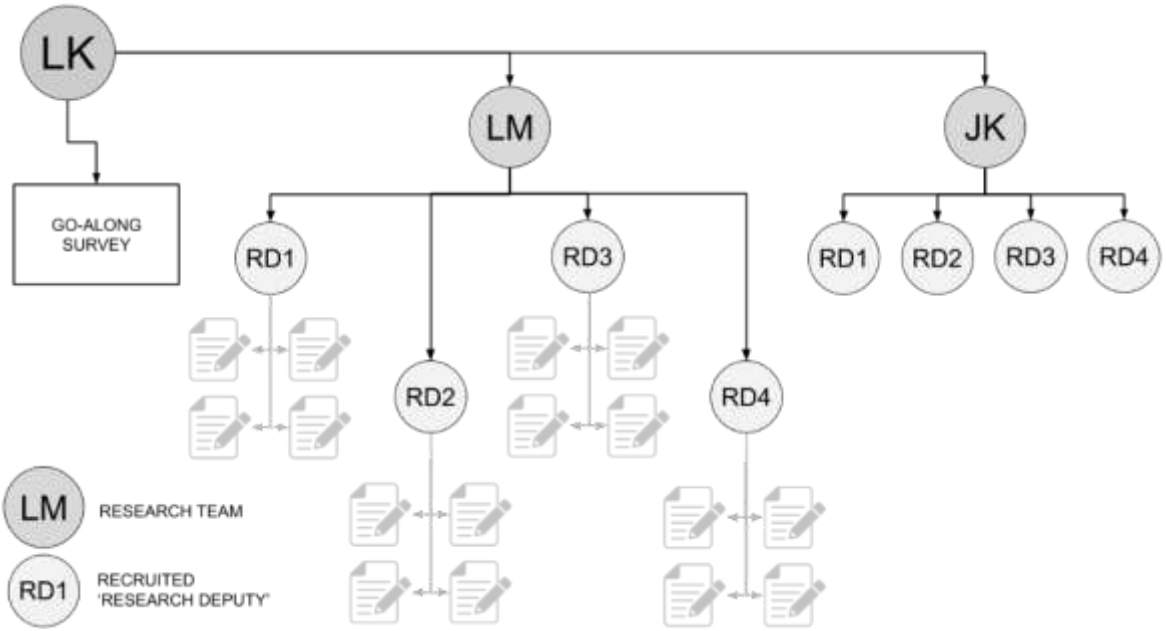
The full survey and consent form is provided as Appendix A.

Research deputies

To assist in the productivity of the efforts and to play a role in building community capacity, young people, with a focus on women, were recruited in each community. These 'Research Deputies' (RDs) were to then recruit participants and conduct the household survey (Figure 9).

Recruitment of RDs by the research team focused on young people from each settlement / village (between the ages of 18 and 30), with a further focus on recruiting women. The names and contact details of each of the recruits were recorded for later awarding of their certificates of achievement for completion of their task. Each RD was briefed on how to conduct the household survey, including the ethics components, before conducting the interviews.

Figure 9: Model of data collection in the field.



5.1 Household survey results

The household survey focused on the resources and livelihoods of households. The survey was paper-based, and questions were tick box answers to maximise data integrity by minimising the potential for mistakes by choosing more than once answer, particularly given the limitations of using locally-recruited inexperienced enumerators. The survey had the following sections:

1. About the respondent – who is completing the survey;
2. Household structure – characteristics of the household, who else lives there, gender/age/disability;
3. Subsistence and livelihoods assessment – subsistence, cash incomes and household ownership and materials;
4. Agriculture, gardens, non-garden products – garden size, location, produce grown, livestock, problems with production, forest use;
5. Water resources – water sources, reliability;
6. Sanitation – sanitation and waste;
7. Reef and marine resources – where, what and when marine resources are harvested;
8. Household development – impact of environmental change, impact of Covid-19, emergency management planning, household opportunities.
9. Governance – involvement in community decision making.

5.1.1 Margin of error

Table 12 reports the margin of errors at 90% confidence for the household survey samples, based on population estimates for the smallest available population units (statistical division in the Vanuatu census). These margins of error should be kept in mind when considering survey results.

Table 12: Margin of errors for household survey.

Sample Description	Sample Size (household members)	Statistical Area(s)	Population (from census)	Margin of Error
Full sample	683	North Pentecost, North West Malekula, South West Malekula	16,023	3%
Laone, Pentecost	203	North Pentecost	6,745	6%
Tenmaru, Malekula	283	North West Malekula	5,503	5%
Wiawi, Malekula				
South West Bay, Malekula	197	South West Malekula	3,775	6%

Sections A and B household membership and demographics

Overall, the team collected 153 household surveys from the four communities, which captured data from 683 people (360 men and 323 women).

Household membership

- The average household size in Laone was 4.3, slightly lower than the average across all communities.
- The average household size in Tenmaru was 4.4, slightly lower than the average across all communities.
- The average household size in Wiawi was 5.9, considerably greater than the average across all communities.
- The average household size in South West Bay was 4.0, which is lower than the average across all communities.

Full results are reported in Table 13.

Table 13: Household surveys and structure of households.

	Household Surveys	Total People in Households	Total by gender			Average Occupancy	Median Occupancy
			Male	Female	Non-Binary		
Laone, Pentecost	47	203	82	91	0	4.3	4
Tenmaru, Malekula	35	153	65	87	0	4.4	4
Wiawi, Malekula	22	130	130	62	0	5.9	6
South West Bay, Malekula	49	197	83	83	0	4.0	4
Total	**153**	**683**	**360**	**243**	**0**	**4.5**	**4**

Question B.2.2. Age group of household members

Table 14 reports the proportion of people in each age range for household members reported in the household survey.

- Laone has a very young age profile.
- Tenmaru has a younger age profile than the average for all communities.
- Wiawi has a moderate age profile, very similar to South West Bay.
- South West Bay has a moderate age profile, very similar to Wiawi.

Table 14: Proportion (%) of household members by age group.

	Total Where Age Stated	<18	18-35	36-45	46-60	>60	Visual representation
Laone, Pentecost	203	43	21	17	10	10	
Tenmaru, Malekula	142	41	24	13	16	6	
Wiawi, Malekula	118	32	27	26	10	4	
South West Bay, Malekula	172	30	34	19	12	6	

Question B.2.3. Education attainment level

We asked about educational attainment and report the results for all four communities (including the survey respondent). The full results are reported in Tables 15 (by community) and 16 (by gender).

- All communities reported lower educational standards than what is reported in the 2020 Vanuatu Household Census for rural households, South West Bay, quite significantly (Vanuatu National Statistics Office, 2020). This may be attributed to respondent under-reporting. Whilst our data should not challenge the census data, it is still useful for cross-community comparison for identifying specific priorities.
- Laone's educational levels were generally better than average across the whole sample, particularly so for primary education (57%).
- Tenmaru's educational levels were generally better than average across the whole sample, particularly so for primary education (60%).
- Wiawi's educational levels were slightly above average across the whole sample, with completion of primary education at 55%.
- South West Bay's educational levels were considerably lower than the average across the whole sample, with completion of primary education at 37%.
- University education was rare. We also broke this data down for men and women across all communities. This is reported in Table 16. Generally, men had a slightly higher standard across all levels of attainment, but the differences were quite small. Table 15 reports the results.

Table 15: Educational attainment by community (percent sample stating level of achievement and average percent across communities).

	Finished Primary School	Finished Secondary School	Finished University	Post-School Training	Other Qualification	Don't know
Rural Population from 2020 Census	66	31	1	2		
Laone, Pentecost	57	24	1	4	1	0
Tenmaru, Malekula	60	20	1	6	6	3
Wiawi, Malekula	55	21	2	8	6	0
South West Bay, Malekula	37	18	1	2	2	2
Average from Sample	**51**	**21**	**1**	**5**	**3**	**1**

Table 16: Educational attainment by gender (Percent stating level of achievement and average percent across communities).

	Finished 1° School	Finished 2° School	Finished University	Post-School Training	Other Qualification	Don't Know
Male	56	28	1	6	6	1
Female	46	26	1	4	2	1

Section C: Household livelihoods

Key findings from all household livelihood questions:

- Nearly everyone in Laone undertakes some subsistence activity, growing food and preparing gardens is most important. Collecting and catching marine resources is moderately and jointly important to growing food.
- In Tenmaru, fishing is very important, as is growing food. Hunting wildlife is not as important.
- In Wiawi, fishing is very important, as is growing food and preparing gardens.
- In South West Bay, growing food is important but fishing not quite so (but still ~40%). Hunting wildlife is not important.

C.1.1. Subsistence activities

We asked the survey respondent to state whether anyone in the household undertook any subsistence activities and which members of the household carries out what types of subsistence activities.

Table 17 reports the answer to the overarching yes/no question and Table 18 reports the follow-up question, broken down by community and island. Unsurprisingly, a very high proportion of households undertook *at least one* form of agricultural activity for household consumption (subsistence). These figures are somewhat higher than what is stated in the 2022 Vanuatu National Agriculture Census Preliminary Report (2022), which reports that 74.5% of households are involved in subsistence agriculture. This lower figure is likely to be skewed by the growing urban population and no regional breakdown is currently available. Note that this is significantly down on the 2009 census figure of 98% for the country as-a-whole (Vanuatu National Statistics, 2009).

Table 17: Proportion (%) of households stating they undertake subsistence activities.

	Tenmaru	Wiawi	South West Bay	All Malekula	Laone, Pentecost
Yes	89	86	88	87	96
No	11	14	12	13	4

Table 18: Types of subsistence activities undertaken by household members (percent of household members undertaking this activity).

	Tenmaru	Wiawi	South West Bay	Laone, Pentecost
Preparing land for food gardens	41	46	25	43
Growing food	41	46	50	62
Fishing	56	48	39	40
Collecting shellfish / marine resources	22	28	37	40
Hunting wildlife	20	31	6	20
Collecting plants	21	35	27	26

We also broke subsistence activities down by gender (male/female/non-binary) for all the communities together. This is reported in Table 19. In general, there was a reasonable degree of shared contributions to these activities, with males reported to undertake more preparation of land for food gardens and hunting wildlife.

Table 19: Subsistence activities (all communities). Percent of household members and percent of men and women undertaking each subsistence activity (male: n=290, female: n=343).

	Preparing Land for Food Gardens	Growing Food	Fishing	Collecting Shellfish/ Marine Life	Hunting Wildlife	Collecting Plants
Male	62	54	49	35	34	34
Female	57	49	44	32	20	20

Question C.2.1. Do any members of the households earn cash?

Survey respondents were asked to describe their cash-earning activities. Table 20 reports the responses to the overarching question about earning cash and Table 21 reports the proportion of people in each household who undertake an activity from the list of activities presented in the survey. Also reported in Table 21 for comparison is the proportion of people aged over 15 earning cash as reported in the 2020 Vanuatu Household Survey (Vanuatu National Statistics Office, 2020).

- In Laone, 87% of households reported earning some cash income. Earnings are mostly from sale of produce and marine resources and cooked food. Compared to Malekula, there is a lower proportion of people engaged in wage-earning activities.
- Tenmaru is approximately at the average proportion for cash earning for Malekula. Earnings are mostly from selling raw produce and cooked food. Wage earning is higher than on Pentecost, but on the average for Malekula.
- 85% of Wiawi households report some cash income, nearly half from selling raw produce, but also from cooked food. 1-in-4 report income from wages and from the education and health sectors.
- More than three quarters of South West Bay households report some income, mostly from working for wages and selling grown food.

Table 20: Proportion (%) of households undertaking some cash-earning activities.

	Tenmaru	Wiawi	South West Bay	All Malekula	Laone, Pentecost
Yes	77	86	78	78	87
No	23	14	12	22	13

Table 21: Proportion of people (%) undertaking some form of cash-generating activity, by community.

	Malekula			Laone, Pentecost
	Tenmaru	Wiawi	South West Bay	
2020 VANUATU HOUSEHOLD CENSUS	67.2		30.1	24.5
Selling grown food / animal products	35	49	22	39
Selling fish / marine products	32	29	12	34
Selling cooked food	28	27	12	29
Selling forest materials	11	18	15	22
Tourism accommodation / restaurant	6	11	1	1
Selling handicrafts	7	22	9	14
Education / health	6	23	2	2
Work for wages	22	25	23	17
Casual labouring	15	15	13	12

The analysis also broke down cash-earning activities by gender across all communities. This is reported in Table 22. There is a fair degree of similarity between women and men in terms of earning additional cash in aggregate, with the only significant difference being in jobs for wages, including other casual work and education and health in which men predominate, and in selling cooked food and handicrafts in which women predominate. 1 in 4 men and 1-in-5 women declared some cash income.

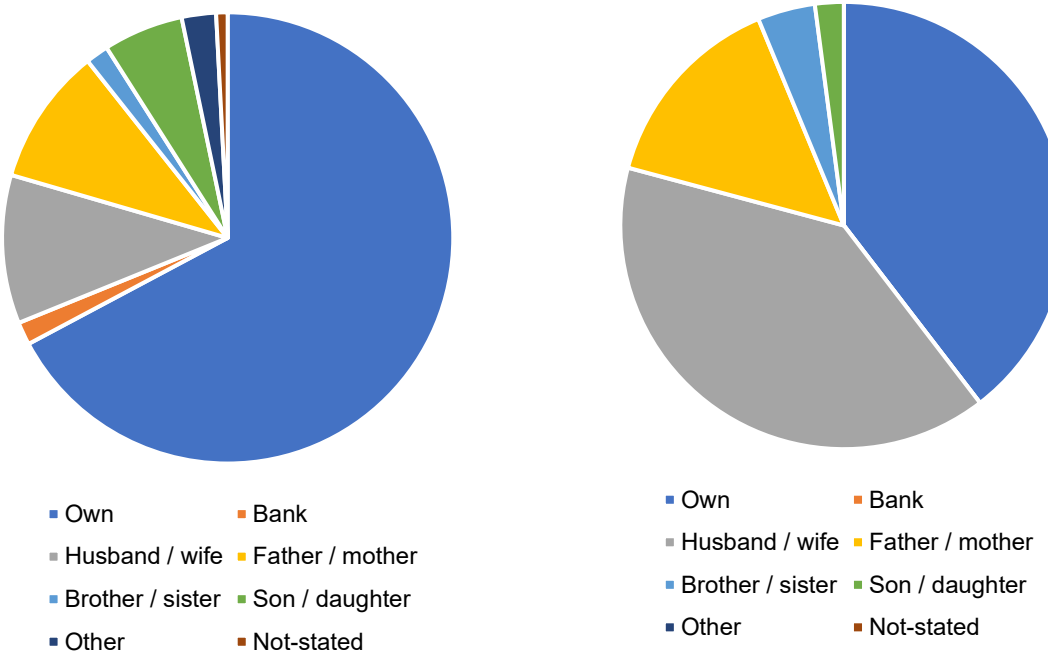
Table 22: Cash earning activities (all communities). Proportion (%) of men and women undertaking each activity (male: 290, female: 343).

	Male	Female
Selling grown food/ animal products	37	36
Selling fish/ marine products	32	31
Selling cooked foods	26	29
Selling forest materials	17	17
Tourism accommodation/ restaurant	5	4
Selling handicrafts	11	14
Education/ health	9	6
Work for wages	25	19
Casual labouring	19	13

Question C.3.1. Who owns the house you live in?

Respondents reported on the ownership status of their main dwelling. This is reported in Figure 10, categorised by island. In the vast majority of cases the respondent's house is owned by them, or their spouse. It is likely the differences between the two islands, in terms of the answer 'own' and 'husband / wife' is down to the interpretation of the enumerators. In each case, the total between 'own' and 'husband / wife' is approximately 75%. Virtually no houses were mortgaged / owned by the bank.

Figure 10: Who owns the house you live in Malekula (left) and Pentecost (right).



Question C.3.2. What is the house made of?

Tenmaru had the largest proportion of housing made from some brick / breeze block (51%). 64% of all housing in Wiawi were constructed solely from plant materials. Laone, Pentecost also had a high proportion of housing constructed solely from plant materials (45%). Table 23 reports the full results.

Table 23: Composition of main house and roof. Percent of respondents reporting main house's construction materials by community.

	Tenmaru		Wiawi		South West Bay		Laone, Pentecost	
	House	Roof	House	Roof	House	Roof	House	Roof
No answer	17	11	9	14	27	12	2	21
Plant materials/ timber only	31	69	64	73	27	78	45	53
Plant materials/ timber, Brick/ breeze block only	40	11	27	5	24	8	36	2
Brick/ breeze block only	11	3	0	5	22	0	13	11
Metal	0	6	0	5	0	2	9	13

Section D: Agriculture

The next series of questions asked respondents about their agricultural practices, in particular about the land utilised, crops grown and livestock management and belief-based questions on respondents' perception of limitations and risks in their agricultural practices.

Key findings from all agriculture questions:

- The distribution of plot size in Laone was slightly larger than other communities. The diversity of crops was the greatest, with 16 listed. 81% of all households stated they sold some of their grown food. Around a third (the lowest) of households stated they face problems that limit how much food they grow. The main reasons given were storms and cyclones and not enough rain. Livestock management rates were lower than on Malekula, with less than half of households stating they owned poultry, and approximately 1-in-3 stating they ate chicken or eggs regularly. Around 1-in-5 households listed they managed pigs.
- The distribution of plot size in Tenmaru was smaller than other communities. The diversity of crops was joint lowest for all communities, with 8 listed. 1-in-3, the lowest proportion of households, stated they sold some of their produce. 83% of households stated they face problems that limit how much food they grow. The main reasons given were not enough rain, getting food to market and insufficient labour. Livestock management rates were much higher than on Pentecost, with 60-65% eating chicken and eggs regularly and around 4-in-10 households listing they managed pigs.
- Average plot sizes in Wiawi were larger than other communities. The diversity of crops was joint lowest for all communities, with 8 listed. More than half of all households stated they sold some of their produce. All households stated they face problems that limit how much food they grow. The main reasons given were cyclones, floods, not enough rain, not enough tools, fertilizers, and mulch, and getting food to markets. In addition – and peculiar to Wiawi – a high number of respondents cited access to their gardens as an issue, though unfortunately the structure of the survey did not allow for any exploration of this issue (see Section 6 in the go-along survey section). Livestock management rates were much higher than on Pentecost, with 60-65% eating chicken and eggs regularly and around 4-in-10 households listing they managed pigs.
- The distribution of plot size in South West Bay was smaller than other communities. The diversity of crops was the largest for Malekula, with 12 listed. 43% of households sold some of their produce. Nearly all households stated they face problems that limit how much food they grow. The main reasons were floods, cyclones, not enough rain and problems getting food to markets. Livestock management rates were much higher than on Pentecost, with 60-65% eating chicken and eggs regularly and around 4-in-10 households listing they managed pigs.

Question D.1.1. Garden plot extent, ownership, changes

Respondents were asked to list the garden plots under their management and describe their size and tenure. This datapoint involved the respondent reporting the approximate length and width of each block, as opposed to 'pacing out' each area. The enumerator then calculated the area under management. The upper ranges reported were very large. One respondent reported managing 300,000 m^2 (30 hectares) and another 150,000 m^2. We have no independent verification of the veracity of this data and omitted it from the following figures.

Figures 11 to 14 show histogram distributions of gardens under production for each community.

Figure 11: Distribution of total garden plot size under household management for Laone, Pentecost.

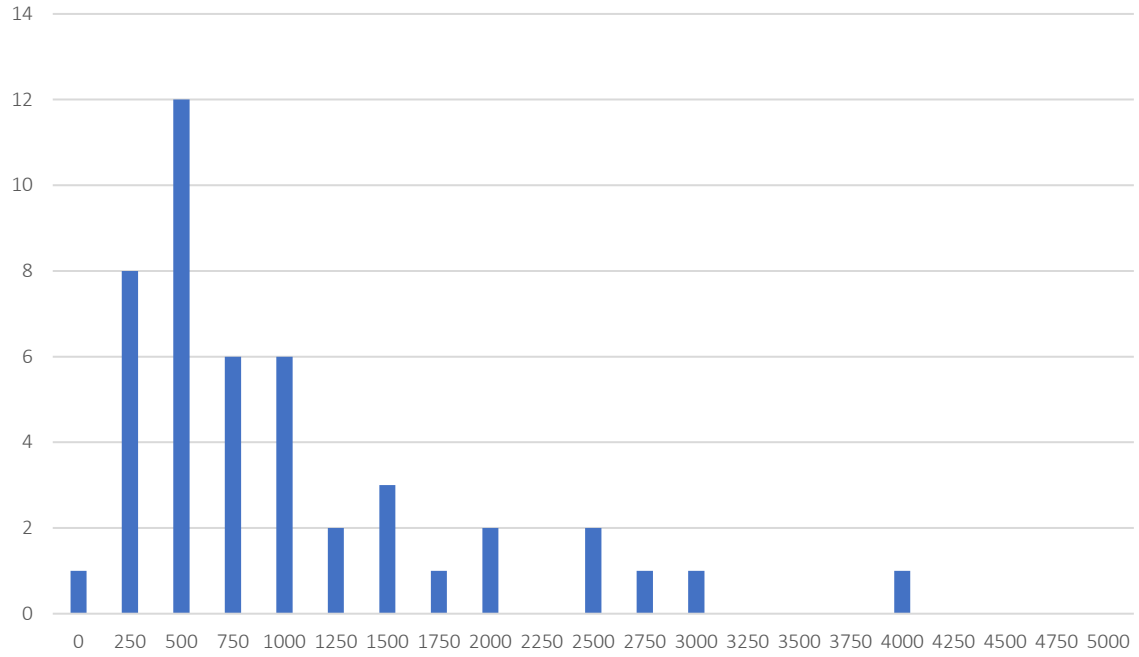


Figure 12: Distribution of total garden plot size under household management for Tenmaru, Malekula.

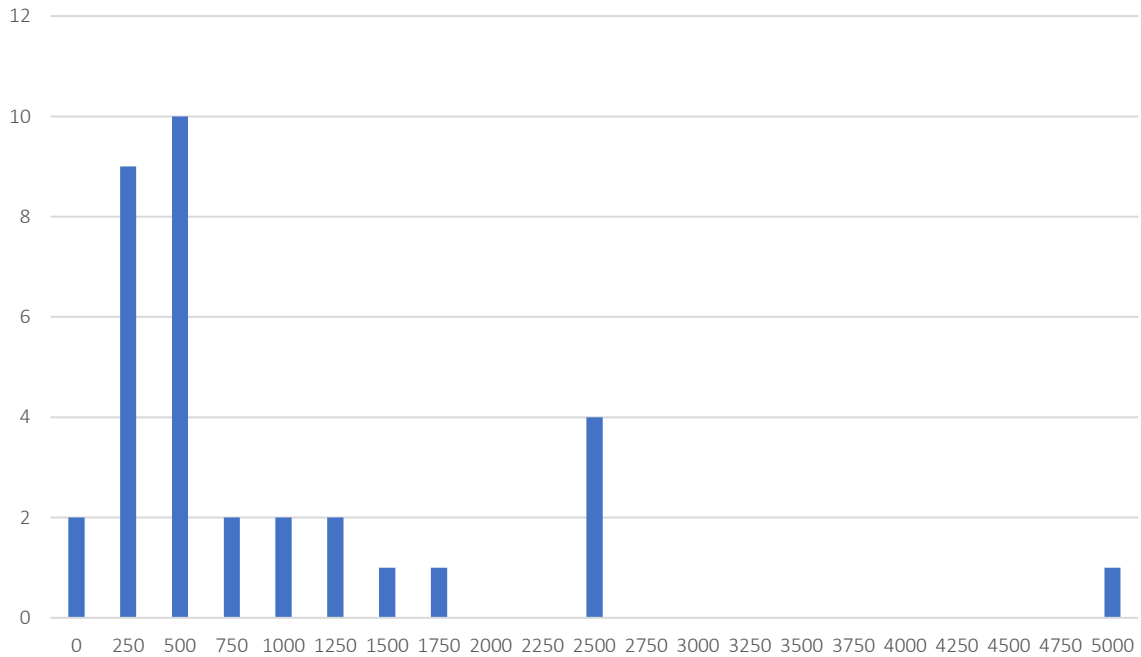


Figure 13: Distribution of total garden plot size under household management for Wiawi, Malekula.

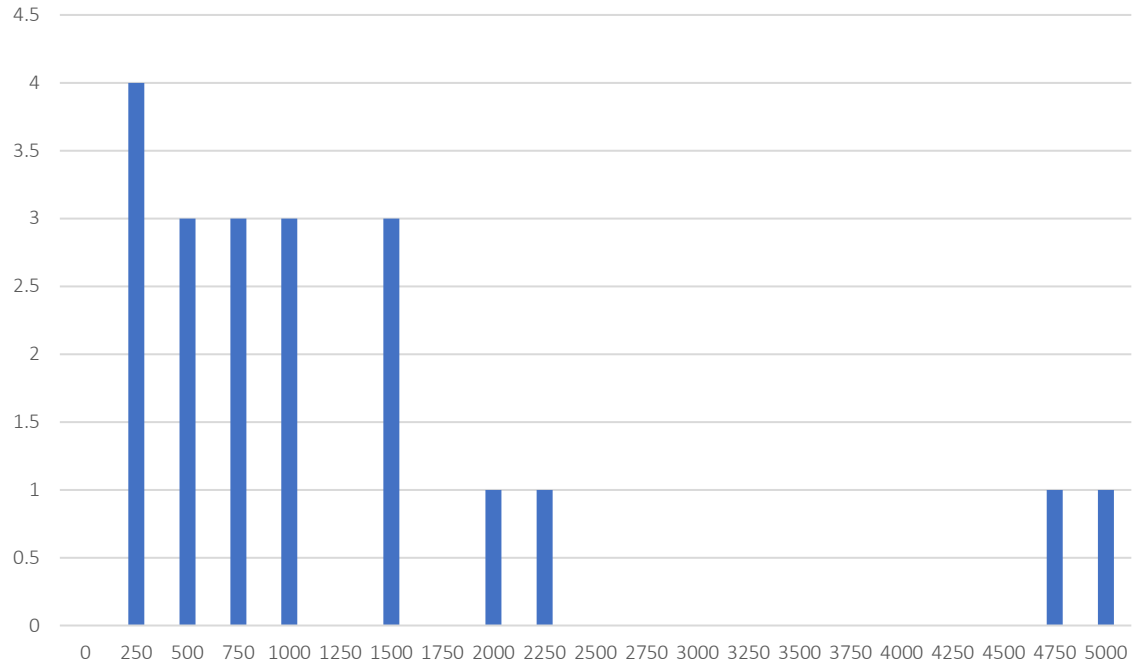
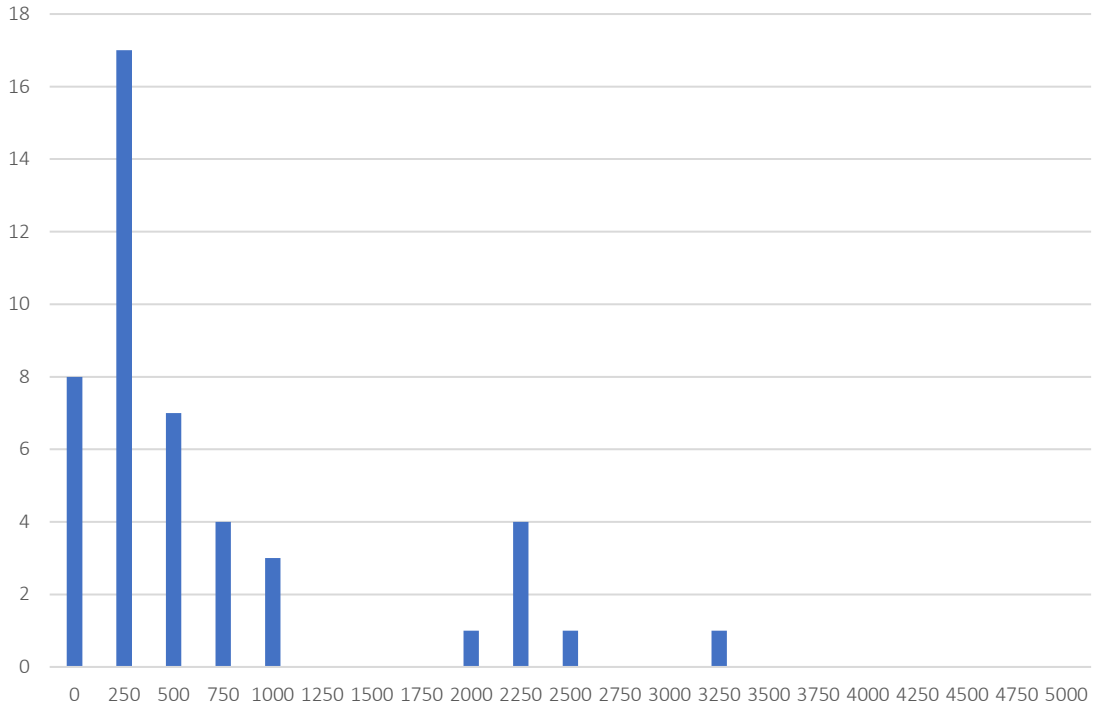


Figure 14: Distribution of total garden plot size under household management for South West Bay, Malekula (outliers removed: 3).



D.1.2. Most important crops grown

Households were asked to list a maximum of eight of the most important crops grown, state whether they produced surpluses, and what they did with any surplus. The proportion of households listing Vanuatu staples in all communities was relatively similar between all communities and both islands – taro (85%), manioc (73%), banana (78%), and yam (75%). Whilst this list should not be seen as definite (and would have been influenced by the numerators), it is still likely that the greater diversity of crops reported for Laone (Pentecost) reflects a greater diversity grown. Table 24 reports the full spectrum of crops listed.

Table 24: Commonly grown crops for each community. Percent of households listing item.

	Malekula				Pentecost	Total
	Tenmaru	Wiawi	South West Bay	All Malekula	Laone	
Taro	66	86	96	84	87	85
Kava	9	50	0	13	40	22
Manioc	60	59	63	61	98	73
Banana	77	86	76	78	77	78
Yam	80	73	57	68	91	75
Fijian taro	0	0	0	0	51	16

Kumula	23	0	41	26	45	32
Wild yam	0	0	6	3	19	8
Cabbage	37	23	59	44	72	53
Watermelon	0	0	0	0	6	2
Cucumber	0	0	2	1	13	5
Sugar cane	0	0	2	1	2	1
Corn	0	0	6	3	15	7
Paw paw	0	0	0	0	0	0
Beans	0	0	0	0	2	1
Ginger	0	0	0	0	2	1
Pineapple	0	0	0	0	2	1
Pumpkin	9	5	2	5	0	3
Water taro	0	5	6	4	0	3
Range of Crops Listed	**8**	**8**	12	13	16	18

Table 25 reports the total number of households reporting the sale of at least one line of produce. A very high proportion (~80%) of households in Laone (Pentecost) are selling surplus produce when compared to all the communities in Malekula.

Table 25: Proportion (%) of households that sell some of their grown produce.

	Malekula				Laone, Pentecost
	Tenmaru	Wiawi	South West Bay	All Malekula	
Sale	34	55	43	44	81
No sale	66	45	57	56	19

D.1.3. Do you face any problems that limit how much food you can grow?

Table 26 reports results of an overarching question on whether households are experiencing any issues with growing food. The results show nearly all households in Malekula reported some issues (and continued to report them in D.1.4.). This was considerably lower for Laone in Pentecost, but there was still a large majority here.

Table 26: Proportion (%) of households reporting issues with growing food.

	Malekula				Laone, Pentecost	All
	Tenmaru	Wiawi	South West Bay	All Malekula		
Yes	83	100	94	92	68	84

No	17	0	6	8	32	16

D.1.4. What are the main problems you encounter that limit your food growing?

The team asked those respondents who experience issues with growing food to rank one or more of those issues from a list. Upon feedback from the data collection team, it was clear the intent of the ranking was too complex to effectively collect robust data so, as a result, we totalled the number of respondents who selected the issue, regardless of ranking. This is reported in Table 27.

The data shows respondents are overwhelmingly concerned about weather and climatic issues associated with extreme weather events – both too much rain and too little. Almost all agriculture in these communities rely solely on being rainfed, with little or no irrigation, hence the weather and climate are big drivers of uncertainty in the immediate future for food security.

As a result, respondents pointed significantly towards a lack of seed stock, not enough tools, and no fertilizers (~40% of Malekula households and slightly fewer in Pentecost). Many of these issues can be alleviated through agricultural extension programmes (Buckwell, Ware, et al., 2020), which should be designed to also target the requirements of women and members of socially disadvantaged groups. Concerns were generally higher in Wiawi than elsewhere (e.g., twice that of Laone). Our data cannot determine why this is the case, however, this is identified as a key priority to address in considering adaptation options.

Table 27: Proportion (%) of all households reporting specific issues with growing food.

	Malekula				Laone, Pentecost	Total
	Tenmaru	Wiawi	South West Bay	All Malekula		
Not enough rain	60	82	53	61	43	56
Flood	51	86	84	74	6	53
Storms and cyclones	71	86	76	76	53	69
Volcanos, earthquakes	23	64	14	27	17	24
Can't get food to market	51	77	37	50	23	42
No seed stock	46	73	22	41	28	37
No fertilizers / mulch	43	77	16	38	43	39
Not enough tools	49	77	24	43	38	42
No labourers	51	86	14	42	32	39
No where to make my garden bigger	20	68	29	34	30	33

Cannot get to my land	14	77	16	28	4	21
Can't access banking	37	77	24	40	23	21

D.2.1. Number and use of livestock

We asked respondents about their livestock management. These data are reported in Tables 28 and 29 for each island.

Table 28: Livestock management on Pentecost (total households, n=47).

	Produce/ Own	Eat Regularly	Buy It	Sell It	Would You Like Eat More
Poultry meat	44	38	25	30	36
Eggs	25	37	24	13	31
Pigs	22	27	19	12	23
Cattle	7	15	12	4	14
Milk	3	11	11	2	12
Goat	0	1	1	0	6
Goat milk	0	0	0	0	5

Table 29: Livestock management in Malekula (n=106).

	Produce/ Own	Eat Regularly	Buy It	Sell It	Would You Like Eat More
Poultry meat	63	64	36	52	53
Eggs	47	59	29	28	46
Pigs	39	33	21	23	33
Cattle	37	50	44	26	37
Milk	7	7	4	3	5
Goat	3	8	4	0	5
Goat milk	0	1	0	0	1

D.3.1. How important are the forest and grassland resources?

We asked respondents to state on a scale of 1 to 3 (0 = *no answer*, 1 = *not very important*, 2 = important, and 3 = *very important*) how important forest and grassland communal resources were to them.

- For Laone, common forest and grassland harvesting were important, with more than 9 in 10 collecting some harvest. The most important items were bamboo, bananas, coconut products, medicinal plants, fruits, and nuts.
- For Tenmaru, common forest and grassland harvesting were important, with 95% collecting some harvest. The most important items were bamboo, bananas, coconut

products, medicinal plants, fruits, and nuts. Wild animals (hunting) were noticeably more important for Tenmaru than other communities.

- For Wiawi, common forest and grassland harvesting were important, with 98% collecting some harvest. The most important items were bamboo, coconut products, bananas, medicinal plants, fruits, and nuts. Wild animals (hunting) were noticeably less important for Wiawi than other communities.
- For South West Bay, common forest and grassland harvesting were important, with 90% collecting some harvest. The most important items were bamboo, coconut products, bananas, medicinal plants, fruits, and nuts.

Table 30 reports the mean score provided by respondents, which has been normalised to generate a score between 0 and 100 for ease of comparison. Forest and grasslands are generally equally important between the four locations and the two islands. Bamboo products, banana, and coconut food products are particularly important. Specifically noteworthy is the importance of medicinal plant collection, which had an 84% score in the whole sample (and equally important in all locations).

Table 30: Importance of forest and grassland produce (total households).

	Malekula				Laone, Pentecost	All
	Tenmaru	Wiawi	South West Bay	All Malekula		
Wild animal food	71	41	62	60	62	61
Bamboo	95	98	90	93	91	92
Banana	94	92	89	91	90	90
Coconut products	88	97	88	89	89	89
Rattan	59	65	27	45	80	56
Medicinal plants	85	91	80	83	87	84
Cultivated fruits	77	85	80	79	84	81
Wild fruits	75	89	75	77	85	80
Nuts	76	88	81	80	84	81
Bush meat	64	80	75	72	67	70
Mushrooms	44	54	55	51	43	48
Average for All	**75**	**80**	**73**	**75**	**78**	**76**

Section E: Water resources

This section asked respondents about their access to water resources for drinking, irrigation, and general domestic use.

Question E.1.1. Water sources and reliability

Table 31 reports the proportion of households that reported they accessed the following water sources, aggregated for all households in the survey. Tables 32 to 35 report these data disaggregated by community. We also asked a question around who collected the water from the range of sources. However, this question was poorly attended. As the limited data provided showed this task was generally evenly shared between men and women (not children) it is not reported here.

Table 31: Water resource use, reliability, and accessibility for all communities. Proportion (%) of households stating this option.

	Drinking/ Cooking	Washing	Washing Clothes	Watering Plants	Is this Source Reliable	Is this Source Accessible
Public well/ tap	42	42	41	39	27	27
Private well	11	11	10	7	5	4
Natural spring	15	18	14	7	7	6
River/ lake	33	39	37	27	19	22
Rainwater tank	52	39	38	32	21	30
Piped	59	56	54	53	36	42
Bottled	20	8	8	9	3	7
Trucked in	2	1	1	1	0	0

Table 32: Water resource use, reliability, and accessibility for Laone, Pentecost. Proportion (%) of households stating this option.

	Drinking/ Cooking	Washing	Washing of Clothes	Watering Plants	Is this Source Reliable	Is this Source Accessible
Public taps	19	21	19	9	15	15
Private well	11	15	15	6	9	11
Natural spring	6	11	11	0	4	4
River/ lake	2	4	4	0	0	0
Rainwater tank	79	74	74	60	45	49
Piped	0	0	0	0	2	2
Bottled	11	6	6	4	2	4
Trucked-in	0	0	0	0	0	0

Table 33: Water resource use, reliability, and accessibility for Tenmaru, Malekula. Proportion (%) of households stating this option.

	Drinking/ Cooking	Washing	Washing of Clothes	Watering Plants	Reliable	Accessible
Public well/ tap	31	29	29	26	29	20
Private well	3	3	0	0	3	0
Natural spring	14	23	11	9	9	6
River/ lake	26	34	34	26	23	26
Rainwater tank	14	14	11	11	9	11
Piped	86	80	77	74	71	71
Bottled	11	3	3	6	6	6
Trucked in	0	0	0	0	0	0

Table 34: Water resource use, reliability, and accessibility for Wiawi, Malekula. Proportion (%) of households stating this option.

	Drinking/ Cooking	Washing	Washing Clothes	Watering Plants	Reliable	Accessible
Public well/ tap	36	32	32	36	36	36
Private well	23	9	9	9	9	0
Natural spring	32	14	14	5	9	9
River/ lake	50	50	45	50	36	41
Rainwater tank	45	9	9	5	9	18
Piped	95	95	91	91	86	64
Bottled	18	0	0	0	0	0
Trucked in	14	0	0	0	0	0

Table 35: Water resource use, reliability, and accessibility for South West Bay, Malekula. Proportion (%) of households stating this option.

	Drinking/ Cooking	Washing	Washing Clothes	Watering Plants	Reliable	Accessible
Public well/tap	73	76	76	80	35	39
Private well	12	14	14	10	2	2
Natural spring	16	22	20	12	8	6
River / lake	59	69	67	45	27	33
Rainwater tank	57	37	35	33	12	31
Piped	80	73	73	71	20	51
Bottled	35	16	16	20	4	12
Trucked in	0	2	2	2	0	0

Section F: Waste management and sanitation

This section asked households about access to sanitation services, including waste management facilities, toilets and washing facilities.

Key findings from all waste and sanitation questions:

- In Laone, 89% of households are producing *some* non-compostable waste. The amount of waste produced is below the average for all communities. This waste is disposed of mainly by burying and burning in backyards and in community waste pits. There are no community recycling opportunities.
- In Tenmaru, 86% of households are producing *some* non-compostable waste. The amount of waste produced is generally lower than other communities. Most is disposed of in backyard pits or burned in the backyard. 23% stated some waste is taken to community recycling centres.
- In Wiawi, 68% of households are producing *some* non-compostable waste. The proportion of households producing no waste is the lowest of all surveyed but on the other hand the proportion of households producing a large amount of waste is the highest of those surveyed. Most is disposed of in backyard pits or burned in the backyard, but a high proportion (33%) is disposed of in waterways or the ocean. 60% of households stated some waste is disposed of at community recycling centres and 27% state it is disposed of by authorised collection.
- In South West Bay, 84% of households are producing *some* non-compostable waste. The amount of waste produced is around average for all the communities surveyed. Most is disposed of in backyard pits or burned in the backyard. Few (<10%) households stated waste is disposed of at community recycling centres or authorised collections.

Question F.1.1. How much non-compostable waste does your household produce?

The quantity of non-compostable waste generated in each household is reported in Table 36.

Table 36: How much waste is produced by households each week (% stating option).

	Malekula			Laone, Pentecost	All
	Tenmaru	Wiawi	South West Bay		
None	14	32	14	11	16
Less than 1 bag	60	9	31	60	43
2 to 5 bags	17	18	20	13	17
More than 5 bags	9	32	18	11	16
Other	0	9	16	6	8

F.1.2. How do you dispose of your non-compostable waste?

Nearly all non-compostable waste is disposed of through burial and burning, though some households claim to re-use all their waste. However, this is likely not a longer-term strategy. Unsurprisingly, recycling opportunities remain limited, though are more prevalent on Malekula. Only one household on Pentecost used a community recycling scheme. Note that

the 33% of Wiawi households stating they dispose of waste in the oceans and waterways is five households. How non-compostable waste is disposed of is reported in full in Table 37.

Table 37: What does your household do with your non-compostable waste. Proportion (%) of households that stated an option by community.

	Malekula			Laone, Pentecost	Total
	Tenmaru	Wiawi	South West Bay		
We re-use all waste	33	13	26	12	21
Backyard pit	70	93	51	50	60
Burn in backyard	63	73	69	60	65
Community waste pit	23	53	21	52	36
Ocean/waterway	7	33	8	7	10
Community recycling centre	23	60	10	2	17
Authorised collection	3	27	8	2	7
Other	0	0	8	10	6

Question F.2.1. Accessibility of toilet facilities

The team asked households to describe the sanitary facilities that they had available and accessible to them. Respondents could select multiple entries, so results are presented as total number of households selecting this option. This is reported in Tables 38 (Laone, Pentecost) and Table 39 (Malekula communities).

Flushing toilets remain relatively rare across all communities. Only 8.5% of households on Pentecost have one in their home, compared to 13.3% on Malekula. (However, only 2% of households in South West Bay had a flushing toilet at their house). Accessibility to vulnerable people (pregnant, elderly, or people with a disability) was quite mixed. It is possible this question was too complex, or demanded too much detail, however, it is likely accessibility could be an issue and exclusion from sanitation facilities could be the subject of specific study. Of the 20 households on Pentecost that gave no answer to having a toilet at their house, only one answered that they had access to a flushing toilet in the community. The remainder stated they had access to a bush toilet as a default. For Malekula, of the 11 households that gave no answer to this question, again only one answered they had access to a flushing toilet.

Table 38: Access to toilet facilities for Pentecost. Proportion (%) of households selecting option. (All households stated at least one option).

Type of Toilet	In House	Access To
Bush toilet	51	49
Flush toilet	9	2
Other	6	0
No answer	43	40

Accessible to vulnerable people		
Accessible	38	26
Not stated	28	

Table 39: Access to toilet facilities for Malekula. Proportion (%) of households selecting option (all households stated at least one option).

Type of toilet	Tenmaru		Wiawi		South West Bay		All Malekula	
	At House	Access To	At House	Access To	At House	Access To	At House	Access To
Bush toilet	60	31	77	32	78	43	73	38
Flush toilet	23	11	14	0	2	2	13	5
Other	9	0	5	0	10	2	8	1
No answer	14	54	9	68	8	53	10	58
Accessible to vulnerable people								
Accessible	31	6	41	9	41	29	38	25
Not stated	54	14	50	27	51	16	57	19

Section G: Use of marine resources

This section asked households about their regular (in the last week) use of marine resources, what they collected, who collected them, from where were they collected and what was done with any surplus.

Key findings from all marine resource questions:

- Less than half of households surveyed in Laone collected marine resources in the last week. This was collected in a wider range of locations, including local reefs (77%), other reefs (41%), and in the deep water (55%). Of households that harvested marine and freshwater resources, men were engaged 100% of the time, women 45% of the time. 73% of households harvest sufficient resources to give away to extended family and 73% sold or traded. Nearly half expressed a desire to harvest more resources. Trading / selling is mostly the domain of women (59%) over men (41%).
- Just over half of households surveyed in Tenmaru collected marine resources in the last week. In Tenmaru, every household that harvested marine resources used the local reef to catch fish and 26% caught fish in deep water and nearby freshwater locations. Shellfish were harvested by 26% of households. Of households that harvested marine and freshwater resources, men were engaged 86% of the time, women 61% of the time and children 59%. 64% of households harvest sufficient resources to given away to extended family and 45% sold or traded. 40% expressed a desire to harvest more resources. Trading / selling is mostly the domain of men (42%) over women (18%) and children (20%). (This is across all Malekula communities.)

- Three quarters of households surveyed in Wiawi collected marine resources in the last week. In Wiawi, every household that harvested marine resources used the local reef to catch fish and 88% caught fish in deep water and only 6% used other reefs. Freshwater locations were also important, used by 41% of households. Shellfish were harvested by nearly half of all households. Of households that harvested marine and freshwater resources, men were engaged 86% of the time, women 61% of the time and children 59%. 64% of households harvest sufficient resources to give away to extended family and 45% sold or traded. 40% expressed a desire to harvest more resources. Trading / selling is mostly the domain of men (42%) over women (18%) and children (20%). (This is across all Malekula communities.)
- Three quarters of households surveyed in South West Bay (78%, the highest) collected marine resources in the last week. In South West Bay, 82% of these households harvested marine resources used the local reef to catch fish and there was little use of the deep water and other reefs. Freshwater locations were also important, used by 42% of households for fish and river plants (32%). A very high proportion of households (63%) harvested marine shellfish on local reefs. Of households that harvested marine and freshwater resources, men were engaged 86% of the time, women 61% of the time and children 59%. 64% of households harvest sufficient resources to given away to extended family and 45% sold or traded. Trading / selling is mostly the domain of men (42%) over women (18%) and children (20%). 40% expressed a desire to harvest more resources. (This is across all Malekula communities.)

G.1.2. Collecting marine resources in the last week

First, we asked an overarching, yes/no question, which is reported in Table 40.

Table 40: Proportion (%) of households undertaking some collection of marine resources in the last week.

	Malekula				Laone, Pentecost	All
	Tenmaru	Wiawi	South West Bay	All Malekula		
Yes	54	77	78	70	47	63
No	46	23	22	30	53	37

G.1.2. Where are marine resources caught or collected?

Of those households that caught or collected marine resources, Tables 41 to 44 report *where* they did this. This question provides insight into local environmental pressures. Local reefs were the most important locations for fishing, though a fair proportion (55% and 34% for Pentecost and Malekula respectively) stated they also caught fish in deep water, and freshwater rivers and lakes were important for households on Malekula. There is currently a program of government support for FADs, but the research team was not made aware of any program in the four communities. Thus, any recommendations that are made in Section 7.5 will be adapted once this information is learned.

Table 41: Where do households collect marine resources, Laone, Pentecost. Percent of households stating they undertake some collection (n=22).

	Fish	River plants	Shellfish	Sea weed
Local reef	77	5	36	9
Another reef	41	0	32	5
Deep water	55	0	9	0
River / lake	5	0	0	0
Mangrove	0	0	0	0

Table 42: Where do households collect marine resources, Tenmaru, Malekula. Percent of households stating they undertake some collection (n=19).

	Fish	River plants	Shellfish	Sea weed
Local reef	100	5	26	11
Another reef	5	0	5	0
Deep water	26	5	11	5
River / lake	26	11	5	0
Mangrove	0	0	5	5

Table 43: Where do households collect marine resources, Wiawi, Malekula. Percent of households stating they undertake some collection (n=17).

	Fish	River plants	Shellfish	Sea weed
Local reef	100	12	47	6
Another reef	6	0	0	0
Deep water	88	0	12	0
River / lake	41	6	12	0
Mangrove	6	0	0	0

Table 44: Where do households collect marine resources, South West Bay, Malekula. Percent of households stating they undertake some collection (n=38).

	Fish	River plants	Shellfish	Sea weed
Local reef	82	13	63	11
Another reef	8	5	13	8
Deep water	13	0	0	3
River / lake	42	32	11	5
Mangrove	0	3	0	0

G.1.2. Who caught the marine resources caught or collected

Respondents were asked *who* caught or collected marine resources. This is reported in Tables 45 and 46. Although more men than women tended to be engaged in these activities, labour was generally shared. A large proportion of children were engaged in fishing on Malekula (59%).

Table 45: Who caught or collected the marine resources, Pentecost. Percent by gender undertaking collection of resources (n=22).

	Fish	River plants	Shellfish	Sea weed
Men	100	0	50	5
Women	45	0	36	5
Children	23	0	9	9
Non-binary	5*	0	5*	5
* Note that no-non-binary people were listed in the household survey				

Table 46: Who caught or collected the marine resources, Malekula. Percent by gender undertaking collection of resources (n=74).

	Fish	River plants	Shellfish	Sea weed
Men	86	32	47	7
Women	61	15	43	5
Children	59	8	24	3
Non-binary	12*	1	3	0
* Note that no-non-binary people were listed in the household survey, so this figure is likely erroneous.				

G.1.4. What is done with the harvested marine resources?

Respondents were asked *what they did* with the caught or collected marine resources; this is reported in Tables 47 and 48. A surprising number of households harvesting marine resources sold or traded those resources: 72% for Pentecost and 45% for Malekula. The proportion of households harvesting marine resources in Pentecost was lower (less than half) suggesting a reasonable level of labour specialisation in trading marine resources. Although not a direct proxy for shortages (determining over-harvesting would have been difficult given the circumstances of the survey), between 40 and 50 percent of households responded positively to *"Is there a shortage or would you like more?"* suggesting that a fair proportion of households are experiencing some bio-physical constraints on marine resource harvesting.

No specific questions were asked of use of larger marine species, such as dugongs and turtles, which are commonly used in in community festivities.

Table 47: What do households that undertake some collection undertaking each activity (n=22).

	Fish	River plants	Shellfish	Sea weed
Household use	86	18	55	5
Given to extended family / clan	73	14	50	5
Sold / traded	73	14	50	9
Is there a shortage / require more	45	5	27	5

Table 48: What do households do with marine resources on Malekula. Percent of households that undertake some collection undertaking each activity (n=74).

	Fish	River plants	Shellfish	Sea weed
Household use	89	32	50	8
Given to extended family / clan	64	26	39	0
Sold / traded	45	11	16	3
Is there a shortage / require more	41	14	23	0

G.1.5. If sold, who sells the harvested marine resources?

We asked households that stated they sold collected marine resources who was responsible for that activity. A large proportion of children are involved in selling the marine resources on the island of Malekula (at the expense of women) whilst women were responsible for most sales in Laone, Pentecost. These results are reported in Table 49.

Table 49: If sold, who sells the harvested marine resources. Percent selected of those households that stated it sold some marine resources.

	Pentecost	Malekula	All
Men	41	42	42
Women	59	18	27
Non-binary	0	1	1
Children	5	20	17

Section H: Household development

Section H concentrated on household aspirations, concerns, and likely planned actions for the future.

H.1.1. Has the Covid-19 pandemic changed your household activities?

From a list of pre-determined likely issues, we asked respondents what impact the Covid-19 pandemic had been on them and anyone in their household. This is reported in Figures 15 and 16.

Figure 15: What activities has the Covid-19 pandemic changed for your household (Laone, Pentecost).

Percent of household respondents selecting measure. Key: less: n; no impact: n; more: n.

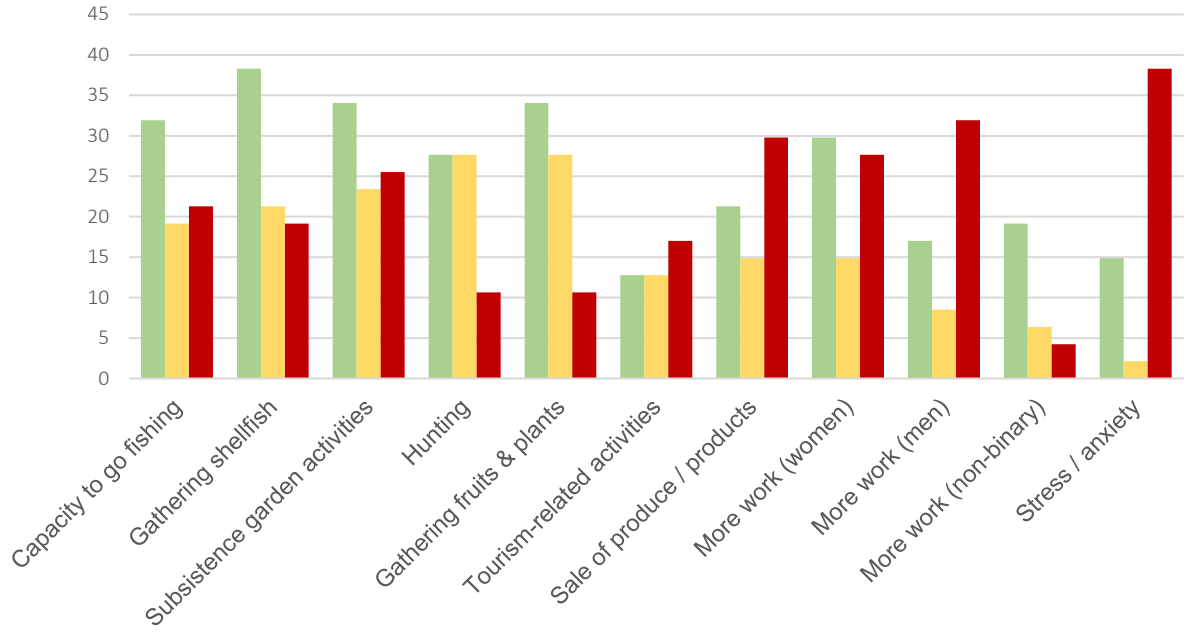
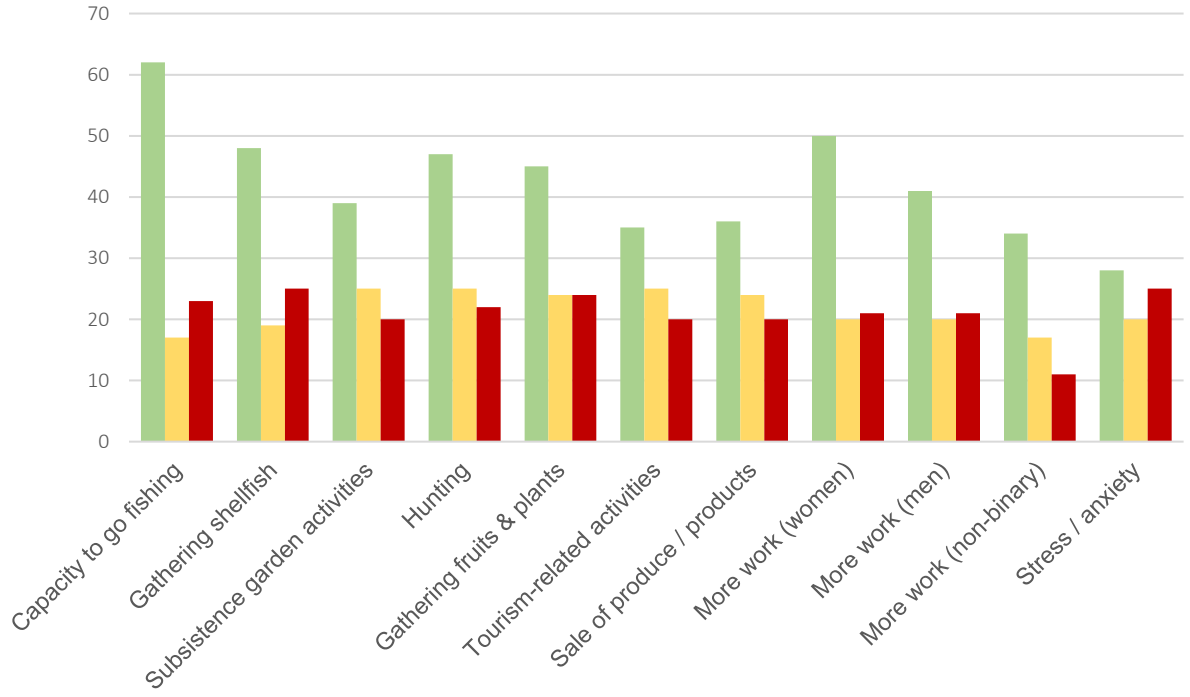


Figure 16: Has Covid-19 changed anything (Malekula).

Percent of household respondents selecting measure. Key: less: n; no impact: n; more: n.



Question H.2.1. Concern about environmental challenges key findings

- The most pressing environmental challenges for Laone were the impact of extreme weather (cyclones), seismic activity, drought, and deforestation. Least pressing was river flooding and soil fertility.
- The most pressing environmental challenges for Tenmaru were the impact of extreme weather (cyclones), coastal erosion, river flooding activity, and deforestation. Least pressing was freshwater availability and food availability.
- The most pressing environmental challenges for Wiawi were the impact of extreme weather (cyclones), river flooding, coastal erosion, and seismic activity. (Deforestation was ranked fifth.) Least pressing was freshwater availability and food availability (in contrast to earlier questions that suggested there were specific shortages).
- The most pressing environmental challenges for South West Bay were coastal erosion, river flooding, the impact of extreme weather (cyclones) and deforestation. Least pressing was soil fertility and food availability.
- Women were generally more concerned with environmental challenges than men, particularly food and freshwater availability (which was generally considered only of minor importance).

These full results are reported in Figures 17 to 20.

Figure 17: Level of concern for environmental challenges, Laone, Pentecost.

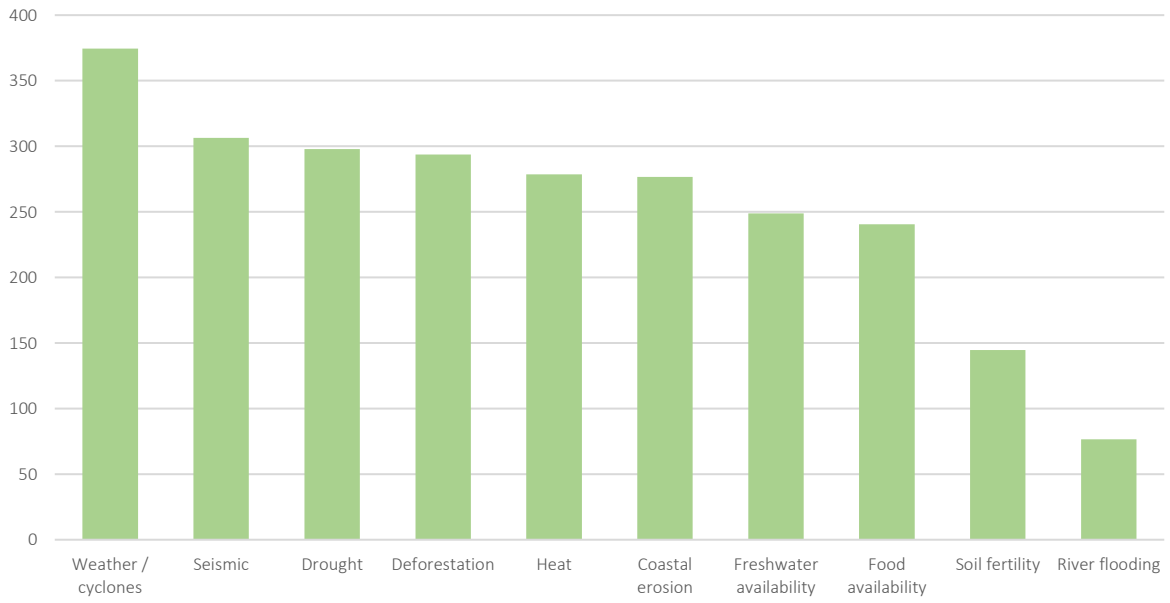


Figure 18: Level of concern for environmental challenges, Tenmaru, Malekula.

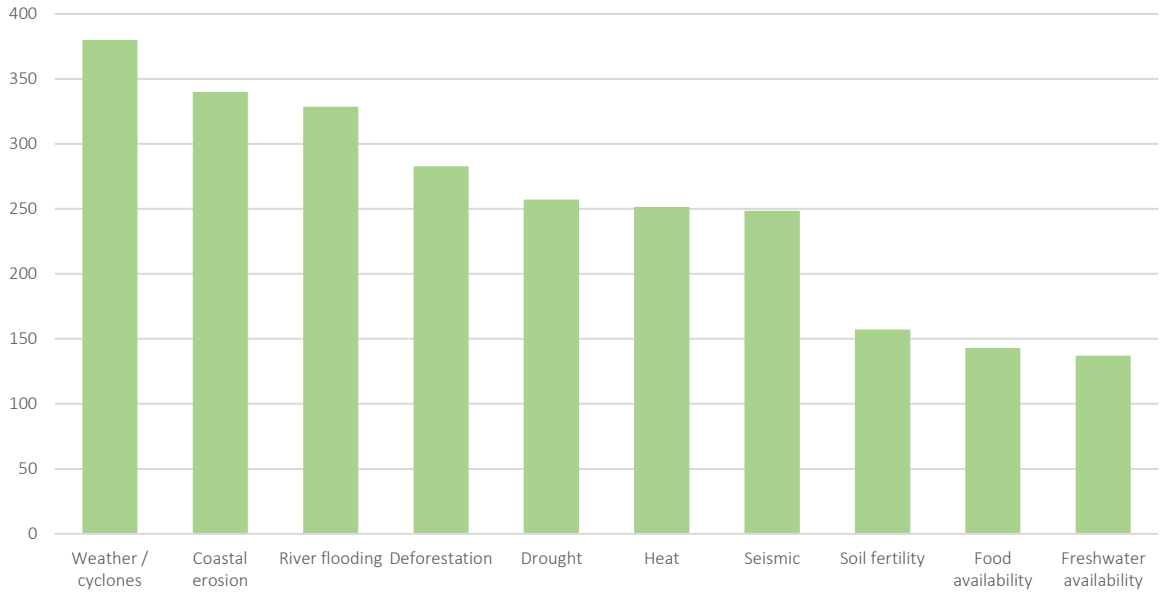


Figure 19: Level of concern for environmental challenges, Wiawi, Malekula.

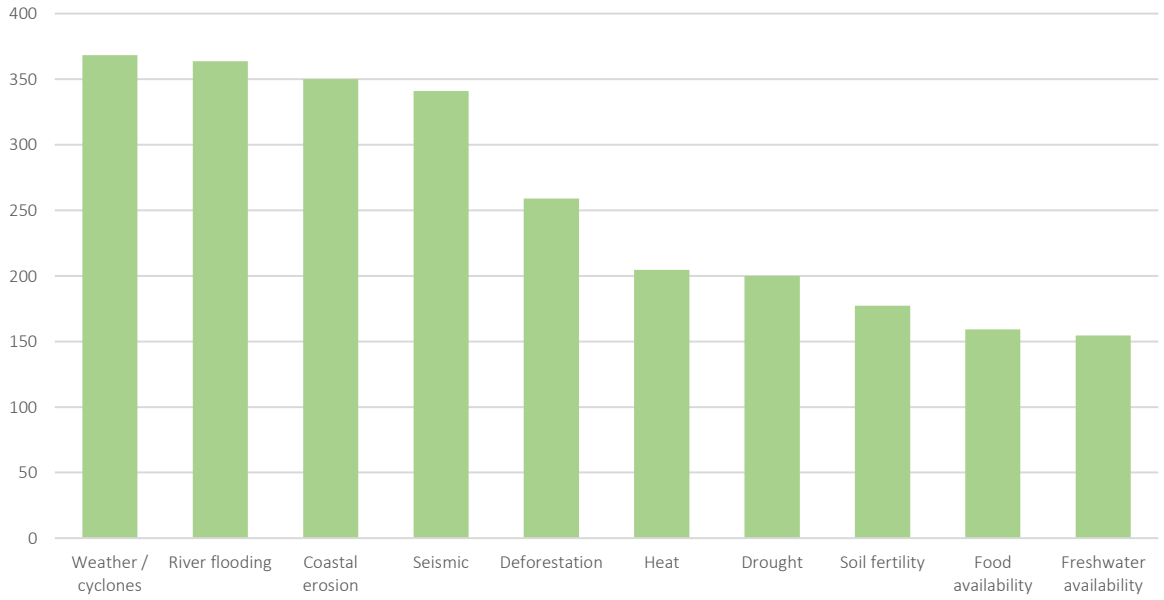
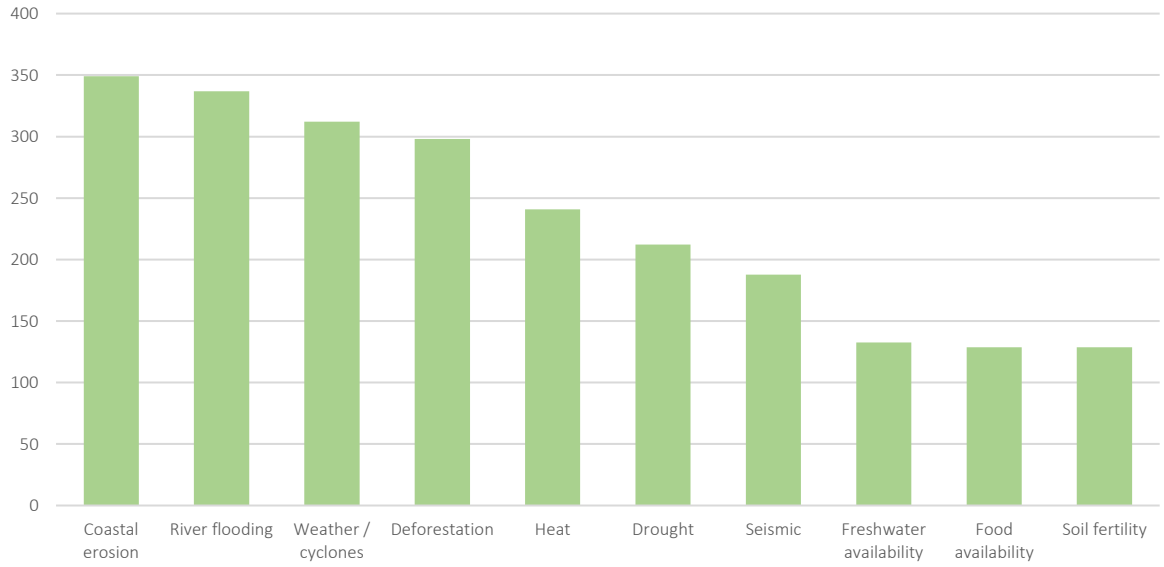


Figure 20: Level of concern for environmental challenges, South West, Malekula.



Environmental concern by gender

We also broke down this data by gender (for the whole sample). Equating no answer to a value of zero and then subsequently scores of 1, 2, 5, and 10 we calculated the average score given to each environmental risk. This is reported in Table 50. In general, women were more concerned about environmental risks than men and were so for all available answers. Women were considerably more concerned about food and freshwater availability (perhaps related to traditional domestic tasks and the health of children, the elderly and disabled) and coastal erosion, seismic activity, and deforestation.

Table 50: Level of concern about environmental risks by gender.

	Women	Men	Proportional Value (women to men)
Drought	3.0	2.3	1.28
Heat	3.0	2.4	1.28
Food availability	2.3	1.5	1.58
Freshwater	2.1	1.6	1.32
Soil fertility	1.6	1.5	1.12
Weather/ cyclones	4.1	3.5	1.18
River flooding	2.7	2.7	1.00
Coastal erosion	4.0	3.0	1.33
Seismic	3.2	2.4	1.33
Deforestation	3.5	2.7	1.28
Average	3.0	2.3	1.28

Question H.2.2. Concern about socio-economic challenges key findings

- The most pressing of the socio-economic challenges presented to respondents in Laone were loss of schools, hospitals and health and safety impacts because of natural disasters. Going hungry and loss of housing materials was least important.
- Pressing issues for Tenmaru were health and safety during and following natural disasters. Coastal inundation and the impacts of weather on food availability were of least concern.
- Pressing issues for Wiawi were the increase in the workloads of women following natural disasters, loss of schools and health services and health following natural disasters. Going hungry from weather and coastal inundation were of least concern.
- Pressing issues for South West Bay were health and safety during and after natural disasters, particularly of vulnerable people. Going hungry from coastal inundation and loss of housing materials were of least concern.
- Women were generally more concerned than men, across all issues bar one (coastal inundation's impact on food production). They were more worried about going hungry as a result of extreme weather, the safety of vulnerable people during natural disasters and the post-disaster workloads for women.

These full results are reported in Figures 21 to 24.

Figure 21: Relative concern about potential socio-economic problems for Laone, Pentecost. Scale is an index of average scores in accordance with the scale described above.

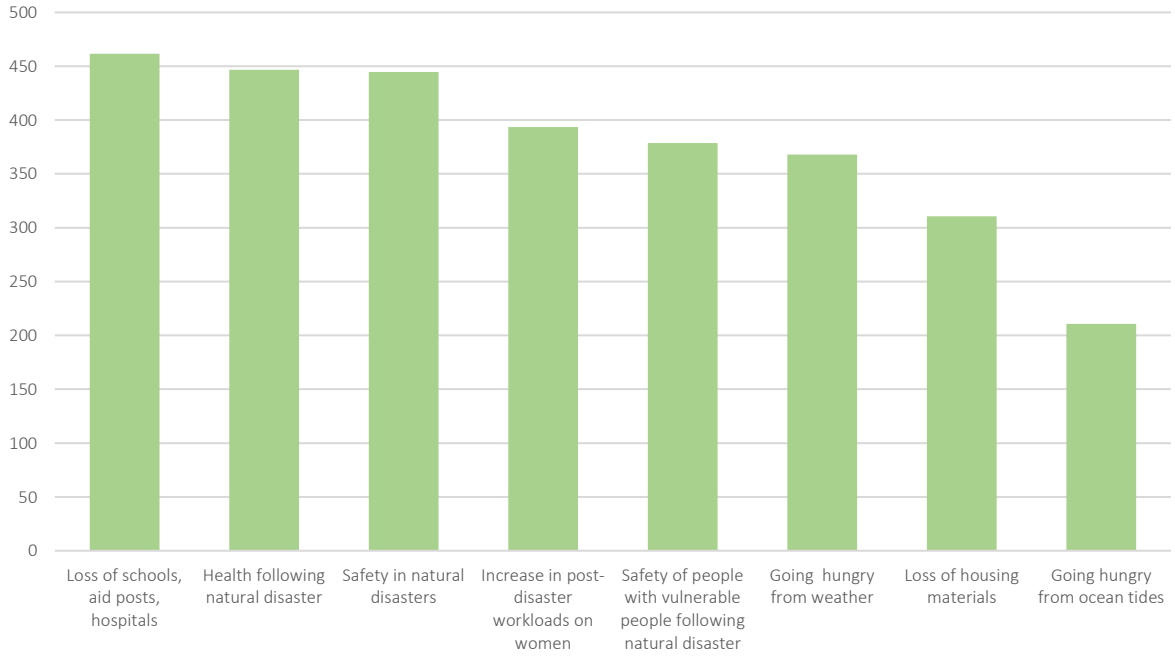


Figure 22: Relative concern about potential socio-economic problems for Tenmaru, Malekula. Scale is an index of average scores in accordance with the scale described above.

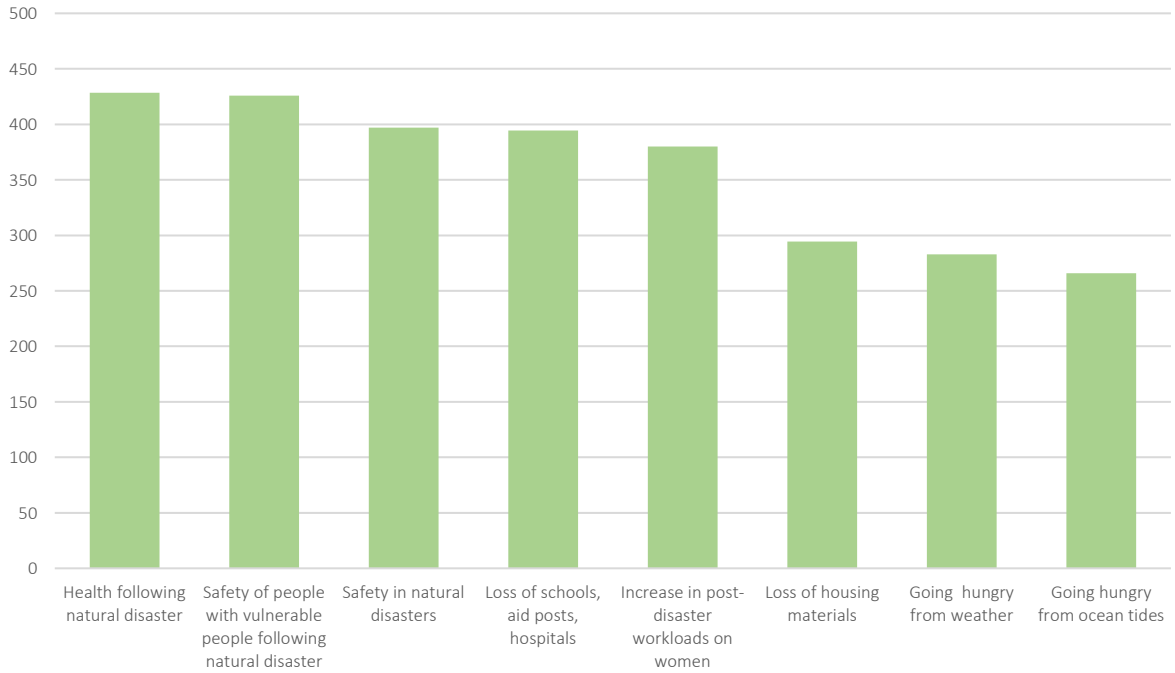


Figure 23: Relative concern about potential socio-economic problems for Wiawi, Malekula. Scale is an index of average scores in accordance with the scale described above.

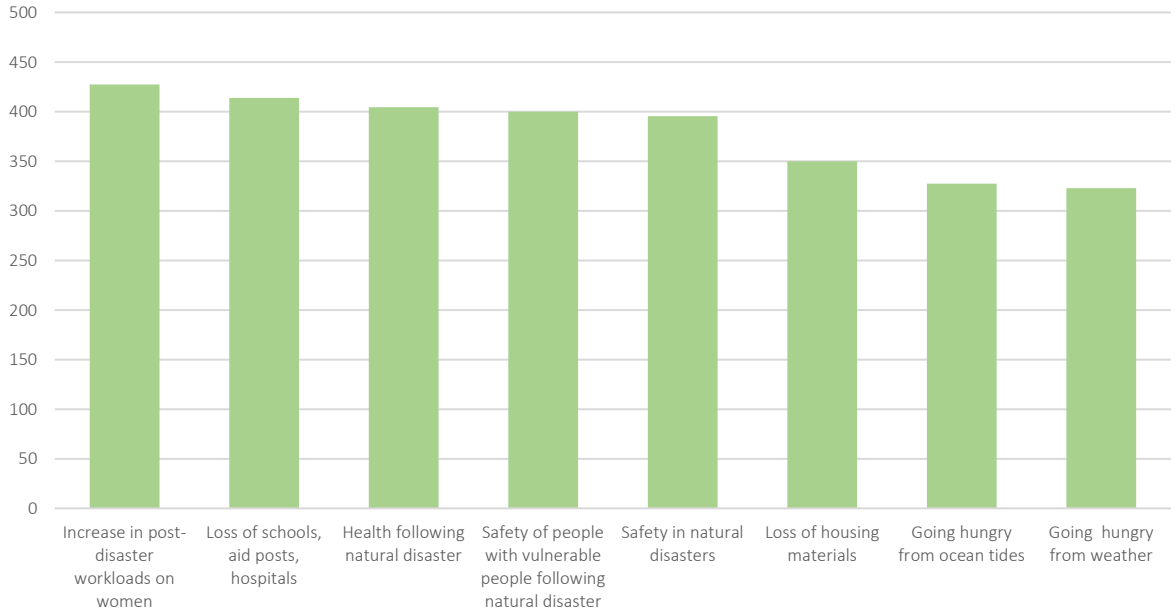
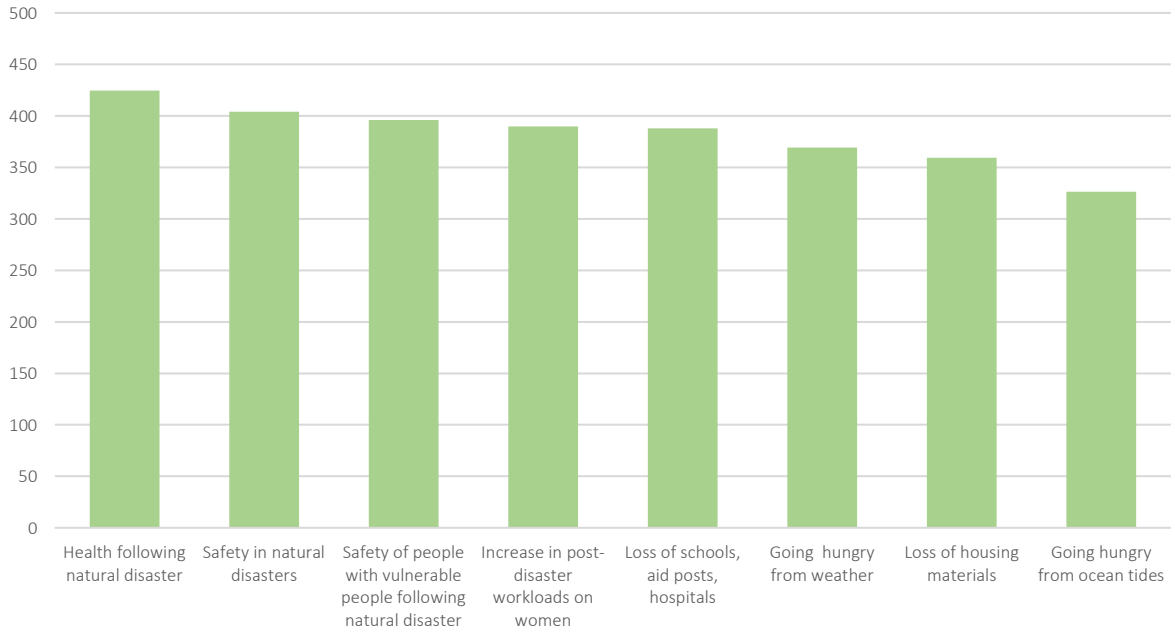


Figure 24: Relative concern about potential socio-economic problems for South West Bay, Malekula. Scale is an index of average scores in accordance with the scale described above.



H.2.2. Socio-economic concern by gender

We also disaggregated the data by gender (for the whole sample). Equating no answer to a value of zero and then subsequently scores of 1, 2, 5, and 10 to 'not very worried', 'a little worried', 'very worried', and 'this would be catastrophic', respectively, the average scores given to each environmental risk is reported in Table 40. Women show a greater level of concern across all and every indicator, except for going hungry because of sea level rise. Women were considerably more concerned about hunger, which ties with concern over food from Table 51, workloads, and issues around natural disasters.

Table 51: Socio-economic concern by gender.

	Women	Men	Proportional Value (women to men)
Going hungry from weather	4.1	3.2	1.29
Going hungry from ocean tides	2.9	2.9	0.99
Loss of housing materials	3.7	3.2	1.14
Safety in natural disasters	4.7	4.0	1.17
Health after natural disaster	5.0	4.2	1.20
Safety of vulnerable people after natural disaster	4.8	3.8	1.26
Loss of schools, aid posts, hospitals	4.9	4.0	1.23
Increase in post-disaster workloads on women	4.7	3.7	1.26
Average	4.1	3.2	1.29

Future household opportunities

The final substantive questions asked respondents to score a series of statements on future potential livelihood opportunities in terms of how important they may be in the future. The full results are reported in Tables 52 to 55.

- Looking to the future, the following opportunities were important for improving a household's happiness and security in Laone: improving farming practices, more equal share of household chores, making and selling food, handicrafts, and clothes, and more livestock (though a large portion of households *also* did not see more livestock as important). Running a small business was of interest to a reasonable cohort. Tourism opportunities (guiding, restaurants, accommodation) were not so important, suggesting that the preference for business opportunities was focussed on local services.

- Looking to the future, the following opportunities were important for improving a household's happiness and security in Tenmaru: more equal share of household chores, improving farming practices, making and selling food, handicrafts, and clothes, and more livestock, catching more fish out to sea, and getting an education. Running a small business was of interest to a reasonable cohort. Tourism opportunities (guiding, restaurants, accommodation) were not very important, suggesting that the preference for business opportunities was focussed on local services.
- Looking to the future, the following opportunities were important for improving a household's happiness and security in Wiawi: education, running a small business and obtaining financial literacy, improving farming practices, making and selling food and handicrafts, more livestock, catching more fish out to sea. Tourism opportunities (guiding, restaurants, accommodation) were not very important, suggesting that the preference for business opportunities was focussed on local services.
- Looking to the future, the following opportunities were important for improving a household's happiness and security in Wiawi: a more equal share of household chores, improving farming practice, making and selling food and handicrafts with a small business. Tourist accommodation and guiding were considered moderately important – the only community where this was the case. This may be linked to turtle conservation opportunities where tourists assist in nesting surveys.
- These preferences were generally equally shared between men and women.
- Across several options, the general shape of the preferences was in a U-shape; that is many options were either quite important or not important at all. There were few options were there was a range of preferences. This suggests that when implementing projects such as EbAs, certain options may meet the demands of a sub-section of the community, but they need to be implemented in a way that if one group receives a benefit, another must not lose out, so they are not negatively impacted. Such equality of benefit is essential to retain the social cohesion of smaller-scale, rural communities.

Question H.4.1. Looking to the future, how important might the following activities be for improving your household's happiness and security?

Table 52: What activities might be important you going forward for Pentecost.

	0	1	2	3	4	5
Tour guiding	30	6	23	15	4	21
Running a restaurant	30	6	17	15	19	13
Running tourist accommodation	30	15	19	13	6	17
Working in tourist accommodation	30	23	17	13	11	6
Running a small business	28	15	2	15	30	11
Obtaining banking literacy	34	4	4	15	21	21
Education to get employment	34	6	6	13	19	21
Catch more fish out to sea	32	4	13	15	13	23
Making and selling handicrafts	30	2	0	11	15	43
Making and selling food	11	6	4	2	30	47
Making and selling clothes	32	6	2	6	13	40
More livestock	40	4	6	2	9	38
Improving my farming practices	17	4	6	2	17	53
More equal share of household chores	15	4	4	2	26	49

Table 53: Tenmaru - plans for the future.

	0	1	2	3	4	5	
Tour guiding	6	51	6	9	23	6	
Running a restaurant	5	57	8	3	19	8	
Running tourist accommodation	5	45	11	8	21	11	
Working in tourist accommodation	5	38	5	8	31	13	
Running a small business	5	20	5	13	35	23	
Obtaining banking literacy	5	18	7	11	23	36	
Education to get employment	4	16	4	8	22	47	
Catch more fish out to sea	7	22	0	5	15	51	
Making and selling handicrafts	3	18	3	2	20	54	
Making and selling food	4	11	3	7	14	60	
Making and selling clothes	4	17	3	4	10	62	
More livestock	2	14	6	1	11	65	
Improving my farming practices	3	3	1	7	15	71	
More equal share of household chores	0	1	1	5	17	76	

Table 54: Wiawi - plans for the future.

	0	1	2	3	4	5	
Tour guiding	5	59	5	0	18	14	
Running a restaurant	5	59	5	0	23	9	
Running tourist accommodation	9	50	0	0	18	23	
Working in tourist accommodation	23	36	0	0	23	18	
Running a small business	5	5	0	5	77	9	
Obtaining banking literacy	9	5	0	0	77	9	
Education to get employment	9	5	0	0	77	9	
Catch more fish out to sea	5	9	5	9	64	9	
Making and selling handicrafts	5	9	0	9	64	14	
Making and selling food	9	5	9	5	64	9	
Making and selling clothes	14	18	9	5	45	9	
More livestock	9	14	0	9	55	14	
Improving my farming practices	5	5	0	5	68	18	
More equal share of household chores	18	5	5	5	59	9	

Table 55: South West Bay – plans for the future.

	0	1	2	3	4	5
Tour guiding	2	31	10	20	10	27
Running a restaurant	20	33	12	12	10	12
Running tourist accommodation	4	35	6	14	8	33
Working in tourist accommodation	16	35	6	14	10	18
Running a small business	16	12	4	22	14	31
Obtaining banking literacy	16	14	6	18	16	29
Education to get employment	2	31	10	16	12	29
Catch more fish out to sea	16	16	2	27	10	29
Making and selling handicrafts	4	29	6	22	8	31
Making and selling food	10	22	2	22	6	37
Making and selling clothes	16	29	6	16	16	16
More livestock	12	24	0	20	10	33
Improving my farming practices	8	6	2	18	22	43
More equal share of household chores	8	4	0	20	14	53

Plans for the future broken down by gender

The team also disaggregated the data by gender (for the whole sample). Equating no answer to a value of zero and then subsequently adding scores of 1, 2, 3, 4, and 5 the team calculated the average score given to each potential plan a household might have for the future. Propensity to see potential in future activities was relatively similar between genders, with women showing a greater propensity to make a living making and selling handicrafts, building livestock numbers, working in tourism accommodation and education and employment, whilst men considered catching more fish out to see, gaining financial literacy, and running tourism accommodation as more important. The full results are reported in Table 56.

Table 56L: Plans for the future by gender.

	Women	Men	Proportional Value (women to men)
Tour Guiding	2.3	2.4	0.96
Running a restaurant	2.1	2.0	1.01
Running tourist accommodation	2.2	2.5	0.86
Working in tourist accommodation	2.2	2.1	1.05
Running a small business	2.9	2.8	1.03
Obtaining banking literacy	2.7	3.1	0.88
Education & employment	3.0	2.8	1.05
Catch more fish out to sea	2.4	2.9	0.82
Making & selling handicrafts	3.2	2.9	1.07
Making & selling food	3.2	3.3	0.98
Making & selling clothes	2.7	2.5	1.07
More livestock	2.9	2.7	1.09
Improving farming practices	3.5	3.7	0.94
More equal share of chores	3.8	3.7	1.04

Question H.4.2. How important will these services and infrastructure be to improving the lives of the people in your household - key findings

The final substantive enquiry was into household aspirations and plans for the future. Whilst the list of options was not exhaustive (as we had to maintain the principle of no hand-written answers, see Section 7.7 on data gaps) it was relatively comprehensive (20 options). Respondents were asked to score each option (from 1 to 5) in order of importance. We accept that simple 'popularity' is only a part of understanding what EbA activities should be prioritised – particularly with respect to the priorities that impact some members of the community and not others (viz gender-based priorities) but the rankings reported in Tables 57 to 60 can provide a reasonable, generalised picture of community preferences and priorities.

- The most important services and infrastructure priorities for respondents in Laone were better health care and schools, improved sanitation, and better access roads. The least important was more livestock. Four issues relating directly to women were also ranked lowly, but this may be an artefact of these issues being specifically important for less the 39% of the respondents who were female.
- The most important services and infrastructure priorities for respondents in Tenmaru were better menstrual hygiene education and services, improved health care, investments in water sources and better access roads. Least important were more livestock, training for women and vulnerable people to help escape in disasters, and conservation projects. Note, that though this issue of training for women and vulnerable

people was listed as least important, when considering any specifics of implementation, GEDSI needs to remain central to any implementation strategy.

- The most important services and infrastructure priorities for respondents in Wiawi were focussed on financial literacy and security, including support for women and the vulnerable to get insurance policies after a disaster, financial training for women and the vulnerable after natural disasters, identity cards and bank accounts for women and the vulnerable to get disaster support, and investments in access roads. Least important were more information about disaster risk management, conservation projects, and coastal protection from erosion.
- The most important services and infrastructure priorities for respondents in South West Bay was better health care, more information about disaster risk management, improved access to markets, and better schools. Least important was coastal protection from erosion, identity cards and bank accounts for women and the vulnerable to get disaster support, and capacity building for women's participation in managing community facilities.
- Across Malekula, as a whole, the most important elements were better access roads, financial training for women and the vulnerable after natural disasters, support for women and the vulnerable to get insurance policies after a disaster, and better menstrual hygiene education and services. Least important was conservation projects, coastal protection from erosion, and more livestock.
- Preferences between men and women were relatively equal, including amongst issues related specifically to women.

Table 57: Mean importance and ranking of services and infrastructure to households in Laone, Pentecost (scores ranked 1 to 5).

Rank	Activity	Average Score
1	Better health care	4.32
2	Better schools	4.23
3	Improved sanitation	4.10
4	Better access roads	4.06
5	More jobs / labouring	3.97
6	Improved water sources	3.84
7	Better access to markets	3.81
8	Conservation projects	3.77
8	Financial training for women and the vulnerable after natural disasters	3.77
10	Coastal protection from erosion	3.74
11	Better menstrual hygiene education and services	3.71
12	Identity cards and bank accounts for women and the vulnerable to get disaster support	3.68
13	Support for women and the vulnerable to get insurance policies after a disaster	3.65
14	Information about disaster risk management	3.61
15	Emergency and disaster management plans for women and the vulnerable	3.52
16	Disaster management plans for women and the vulnerable after natural disasters	3.48
17	Training for women and the vulnerable to help escape in disasters	3.45

18	Ensuring women can make decisions about disaster management evacuation centres	3.32
19	Capacity building for women's participation in managing community facilities	3.29
20	More livestock	2.77

Table 58: Mean importance and ranking of services and infrastructure to households in Tenmaru, Malekula (scores ranked 1 to 5).

Rank	Activity	Average Score
1	Better menstrual hygiene education and services	4.40
2	Better health care	4.37
2	Improved water sources	4.37
2	Better access roads	4.37
5	Identity cards and bank accounts for women and the vulnerable to get disaster support	4.34
6	More jobs / labouring	4.31
6	Information about disaster risk management	4.31
6	Capacity building for women's participation in managing community facilities	4.31
6	Financial training for women and the vulnerable after natural disasters	4.31
6	Support for women and the vulnerable to get insurance policies after a disaster	4.31
11	Better schools	4.29
12	Coastal protection from erosion	4.26
12	Ensuring women can make decisions about disaster management evacuation centres	4.26
14	Disaster management plans for women and the vulnerable after natural disasters	4.23
15	Better access to markets	4.18
16	Improved sanitation	4.11
17	Emergency and disaster management plans for women and the vulnerable	4.09
18	Conservation projects	4.03
19	Training for women and the vulnerable to help escape in disasters	4.00
20	More livestock	3.94

Table 59: Mean importance and ranking of services and infrastructure to households in Wiawi, Malekula (scores ranked 1 to 5).

Rank	Activity	Average Score
1	Support for women and the vulnerable to get insurance policies after a disaster	4.09
2	Financial training for women and the vulnerable after natural disasters	4.05
2	Identity cards and bank accounts for women and the vulnerable to get disaster support	4.05
4	Better access roads	3.91
4	Better access to markets	3.91
6	Better menstrual hygiene education and services	3.86
6	Better schools	3.86
6	Disaster management plans for women and the vulnerable after natural disasters	3.86
9	Improved sanitation	3.82

9	Training for women and the vulnerable to help escape in disasters	3.82
11	Ensuring women can make decisions about disaster management evacuation centres	3.77
12	More livestock	3.73
13	Better health care	3.68
13	More jobs / labouring	3.68
15	Emergency and disaster management plans for women and the vulnerable	3.64
15	Capacity building for women's participation in managing community facilities	3.64
17	Improved water sources	3.59
18	Information about disaster risk management	3.55
19	Conservation projects	3.50
20	Coastal protection from erosion	3.45

Table 60: Mean importance and ranking of services and infrastructure to households in South West Bay, Malekula (scores ranked 1 to 5).

Rank	Activity	Average Score
1	Better health care	4.59
2	Information about disaster risk management	4.55
3	Better access to markets	4.53
4	Better schools	4.51
5	Improved sanitation	4.50
6	Improved water sources	4.49
6	Better access roads	4.49
8	Better menstrual hygiene education and services	4.43
8	Emergency and disaster management plans for women and the vulnerable	4.43
10	More jobs / labouring	4.41
10	More livestock	4.41
12	Training for women and the vulnerable to help escape in disasters	4.39
13	Ensuring women can make decisions about disaster management evacuation centres	4.37
13	Financial training for women and the vulnerable after natural disasters	4.37
15	Conservation projects	4.35
16	Disaster management plans for women and the vulnerable after natural disasters	4.33
17	Support for women and the vulnerable to get insurance policies after a disaster	4.31
18	Capacity building for women's participation in managing community facilities	4.27
19	Identity cards and bank accounts for women and the vulnerable to get disaster support	4.22
20	Coastal protection from erosion	4.20

Importance of services and infrastructure by gender

We also looked at the importance of services and infrastructure by gender (Table 61). Women generally ranked the importance of services and infrastructure more highly, though concern was relatively evenly shared. The largest discrepancy was support for conservation projects (more important for men), and concern for building women's capacity to participate in managing community facilities (more important for men, surprisingly).

Table 61: Importance of services and infrastructure by gender.

	Women	Men	Proportional Value (women to men)
Conservation projects	3.7	4.0	0.92
Better health care	4.4	4.3	1.03
Improved water sources	4.2	4.0	1.03
Improved sanitation	4.1	4.1	1.00
Better menstrual hygiene education & services	4.0	4.1	0.96
Better schools	4.4	4.3	1.01
More jobs / labouring	4.1	4.1	1.01
More livestock	3.6	3.6	1.00
Better access roads	4.3	4.2	1.02
Better access to markets	4.2	4.0	1.04
Coastal protection from erosion	3.9	3.6	1.07
Information on disaster risk management	4.1	4.0	1.02
Emergency and disaster management plans for women and vulnerable people	4.0	3.9	1.02
Ensuring women can make decisions about disaster management evacuation centres	3.9	3.9	0.98
Capacity building for women's participation in managing community facilities	3.7	4.0	0.92
Training for women & vulnerable people in disasters	4.4	4.3	1.03
Disaster management plans for women & vulnerable people	4.2	4.0	1.03
Financial training for women & vulnerable people	4.1	4.1	1.00
Identity cards and bank accounts for women & vulnerable people	4.0	4.1	0.96
Emergency and disaster management plans for women and vulnerable people	4.4	4.3	1.01

CHAPTER 6: GO-ALONG SURVEY RESULTS

6.1 ABOUT 'GO-ALONG' SURVEYS

Go-along surveys, sometimes called 'transect walks', are a qualitative data collection method that act as a supplement to maps and spatial data layers on electronic maps, such as land use and land cover.

They operate like a roving interview style, using space and experience to prompt important discussion. They are an excellent tool for creating a record of environmental, social, and economic conditions, such as those arising in the natural, built, and experienced environments.

For example, whilst a formal map may record the location – and perhaps even the reliability – of a freshwater drinking well, a go-along survey can reveal, or prompt discussion about, the lived experiences using that well – for example, is it accessible to everyone, or do vulnerable people in the community, such as the elderly, or people who live with a disability have trouble accessing it?

Key topics covered in the go-along survey included:

1. General information about the community, such as population and number of households.
2. Location of key community assets, such as Nakamals (traditional meeting place), schools, medical centres, tourism enterprises, and potential tourism opportunities.
3. The boundaries of the community, perhaps tying in quantitative information from physical maps, to ascertain the boundaries of household gardens, communal forests, and marine resources.
4. Water resources, including the sources and reliability, and water resource and sanitation vulnerabilities and risks.
5. Community conservation areas and projects. For example, are there existing or planned community conservation projects and what form do/will they take?
6. Climate change and environmental pressures. For example, what are the key hazards faced by the community from extreme weather, changes in fish stocks, tsunamis, volcanoes, earthquakes, and droughts? And what emergency facilities are available?

The go-along survey was completed with key community members who had local knowledge and access authority and key advisors with relevant technical knowledge, to help identify plant and animal species, or who can legitimately make a judgement on quality and adequacy of local infrastructure.

6.2 KEY FINDINGS

While all communities were aware that forest and marine resources are getting scarcer and they generally support conservation, there remains a need to enhance awareness of conservation efforts to ensure that such efforts do not affect people's daily and normal livelihood activities, such as fishing. Awareness could include:

- what trees you can or cannot cut and for what reason;
- what marine resources can or cannot be caught and why (e.g., the parrot fish that clean coral and produces sand);
- managing sand digging; and
- managing forest clearance for gardening so there is no or very limited soil runoff to the sea, which can damage the reefs.

6.3 OTHER FINDINGS

Conservation and resource management

- A good number of interviewees are not aware that there are conservation efforts already in their areas (i.e., the SUMAs). Others do not know the conservation boundaries. The are some community leaders who see the importance of conservation areas and are keen to see more implementations and assistance on potential projects identified in the SUMAs process, but others are not clear about what their conservation plans should be working to achieve.
- Some people feel there is a risk of being cut-off from the resources as there are no management systems put in place, or effectively communicated. This affects their normal livelihood activities.
- Only individuals with boats can go outside the "no-go fishing boundary zone" to fish, which can be exclusionary to the majority, and may impact some vulnerable people such as widows and/or the elderly.
- While some communities depend on up-hill streams as their main water source, others harvest rainwater.
- In some communities, the landowners feel that only they have the right to cut down hardwood trees on their land to build bungalows, even when their land is in the conservation area. Again, this is because no conservation management system has been effectively put in place.
- In some communities there are two forms of conservation: One implemented by the government and one by community leaders. The ones implemented by community leaders are seasonal and have certain times of the year where the taboo is lifted for a few days.
- As part of its conservation project, **Laone** is examining how to make its marine community conservation areas into a tourist attraction site (despite generally low support in the community), to generate income to help with its management. Continued pursuit of marine community conservation areas must ensure that local decision making takes

steps to ensure greater inclusion and communication of decisions that might impact community resource use restrictions.

- The **Laone** community has a custom ceremony that manages land fertility and forest conservation in a 4-year cycle. Changes are being implemented to allow communities to have access to resources for up to 3 months to crop to sustain their livelihood while the rest of the area is within a ban.

Food and markets

- Food market prices are high, and for some, this has now become their main source of income. Markets *for* food are also inconsistent. Communities are depending more on processed foods from shops, especially canned meat, which is likely to have a medium to longer term deleterious impact on health.

Infrastructure

- Transport services in most areas are very expensive due to high fuel prices.

Natural hazards

- Signs of sea level rise are evident in most areas. There are reports that in some cases sea levels have risen by to up to 2 metres in the last 6-8 years. Whilst this claim might seem to require substantiation, it has been found in some areas of Vanuatu where land is subsiding. Experienced sea level rise is a combination of a rise in ocean levels and subsidence (Faivre et al., 2022).
- Most communities live along the coastline, but communities such as Laone have migrated inland onto higher, steeper terrain.

Social and economic

- There are several micro businesses in the communities such as fishing boats, shops, land transport.
- Youth population is low. (Note this is somewhat contradicted by the household data.)
- There are a few home improvements due to seasonal work.
- Most houses and bungalow are rundown. The two main causes are Covid-19 and cyclones.
- There are few communities that cooperate and work well together and with others. Smaller communities such as in Dixon reef (South West Bay) have a weekly community work schedule and meetings.
- Some communities have a very poor or zero telecommunications network.
- No communities have mains electricity and use solar-powered appliances only.
- The frequency of reported disability is very low in most communities visited.
- Some communities have self-funded projects such as solar streetlights and public toilets.

6.4 FINDINGS FROM EACH COMMUNITY

Tables 62 (Laone), 63 (Tenmaru), and 64 (South West Bay) report on a community asset 'stocktake' undertaken during the go-along survey. (No data is available from the smaller community of Wiawi.) Figures 25 and 26 are photographic evidence of activities at Tenmaru, including cattle grazing and marine conservation.

Table 62: Community assets at Laone, Pentecost.

Asset	Quantity	Notes
Schools	2	1 French school & 1 English school
Churches	1	Anglican, in almost all villages
Poultry farm		Virtually every household has free range chickens
Cattle farm	4	Not fenced
Piggery		Almost every household has pig pens
Tilapia Pond	nil	
Docks		Kava stored at home
Shops	>30	Bring in supplies from Santo, 1 big shopping centre
Cooperative		
Fiberglass boats	8	Own by individuals
Water source		Every household collects rain water as there are no rivers or stream in the area. There are also rain water harvest facilities in a few communities
Power source		Solar power in every household. Solar street lights are self-funded by community
Access to Area		By boat, road, and plane
Police post	1	Vanuatu Police Force
Aid post		
Women's Centre	1	Vanuatu Women's Centre branch
Community halls		In every community. Built from forest materials
Bank	1	National Bank branch
Money Transfer	1	Western Union agent
Post office	1	Vanuatu post branch
Satellite TV rental office	1	CANAL SAT
Market Houses	2	Selling mainly cooked food and handicrafts
Air strip	1	Closed at time of survey
Telecommunications Network		Very good for both Digicel & Vodafone

Table 63: Community assets at Tenmaru, Malekula.

Asset	Quantity	Notes
schools	2	1 French school and 1 English school
churches	1	Anglican, in almost all villages
Poultry farm		Every HH have free range chickens
Cattle farm	4	Not fenced
piggery		Almost every household has pig pens
Tilapia Pond	nil	
docks		Kava stored at home
Shops	>20	Bring in supplies from Santo, 1 big shopping centre
Cooperative		
Fiberglass boats	8	Own by individuals
Water source		Every household collects rain water as there are no river/stream in that area. There are also rain water harvest facilities and a few communities
Power source		Solar power in every HH. Solar street lights self-funded by community
Access to Area		By boat, road, and plane
Police post	1	Vanuatu Police Force
Aidpost		
Women's Centre	1	Vanuatu Women's Centre branch
Community halls		In every community. Built from forest materials
Bank	1	National Bank branch
Money Transfer	1	Western union agent
Post office	1	Vanuatu post branch
Satellite TV rental office	1	CANAL SAT
Market Houses	2	Selling mainly cooked food and handicrafts
Air strip	1	Closed at time of survey
Telecommunications Network		Very good for both Digicel & Vodafone

Figure 25: Cattle farming is an asset for some of the families in the nominated communities. This one is at Tenmaru, north west Malekula.

Figure 26: Conservation coastal area of Tenmaru village, North West Malekula.

Table 64: Community assets at South West Bay, Malekula.

Asset	Quantity	Notes
Schools	2	1 French school and 1 English school
Churches	1	Catholic
Poultry farms		One fenced. Nearly every household has free range hens
Cattle farms	4	Not fenced
Piggery		Almost every household has pig pens
Tilapia pond	nil	
Docks	3	For copra and cocoa
Shops	8	Mini stores bring in stock from Santo
Cooperative	nil	
Fiberglass boats	4	Own by individuals
Water source	2	Sourced from streams by DoWR and ADRA
Power source		Solar power in nearly every household
Access to Area		By boat, road, and plane
Aid post	1	
Police post	nil	
Women's Centre	nil	
Community halls		In every community. Built from forest materials
Bank	nil	
Money Transfer	nil	
Post office	nil	
Satellite TV rental office	nil	
Market Houses	nil	
Air strip	nil	
Telecommunications Network		Average for both Digicel & Vodafone

7.0 ADAPTATION PRIORITIES AND OPTIONS

7.1 DEFINING ECOSYSTEM-BASED ADAPTATION

Climate change adaptation can be defined broadly as adjustments to social-ecological systems in response to actual or expected climatic changes that ease any adverse effects or take advantage of new opportunities (Adger et al., 2005; Betzold, 2015; IPCC Part A, 2014). By adapting management of natural resources and socio-economic and ecological systems to climate changes, communities can reduce risks and lessen potential future damages that might otherwise occur (Leary, 1999). However, it is important to acknowledge the different vulnerability and capacity of many individuals "to adapt to climate change and how this varies according to their age, sex, gender, education, social status, wealth and access to other strategic resources (e.g., information, finance, land, etc.)". It is also important to recognise that there is "a high degree of diversity between and within groups, making some people more vulnerable, and some more adaptable, than others" (SPC, 2015, p. 1).

To enable the project to present early options to the community, the team developed very high-level EbA concept proposals before the field trip, so they could be confirmed or amended in the field trip. The team's EbA options were based on our concept of the EbA *approach* (see Figure 27) where no matter how the option is categorised (restoration, conservation actions, social/policy actions, or engineering actions), the starting point is always with the deployment of biodiversity, ecosystems, and ecosystem services in the service of adaptation. To support this, we also drew on SPREP's PACRES (Pacific Adaptation to Climate Change and Resilience Building) project, which has been developing an online EbA decision support tool to support planning for EbA interventions.

At this stage, the EbA options will not be costed, nor any of the environmental and social benefits be quantified (only qualified). Costing will occur in the next phase of the project.

EbA options will then be further refined through a process of:

1. using the outcomes of the household surveys and community transect mapping to identify key assets and ecosystem service uses;
2. identifying vulnerabilities of those assets and ecosystem services flows under climate change scenarios;
3. from survey results and the adaptation literature, identifying possible adaptation options from a qualitative perspective, particularly identifying the social and environmental costs and benefits that are likely to flow from each option; and
4. assessing feasibility of EbA implementation by identifying stakeholder organisations that will be able to advise, enable, implement, and support the EbA projects.

EbA links habitat conservation and active, adaptive management with broader social and economic development strategies that assist communities adapt to trends and shocks associated with climate change and, in parallel, to improve social and economic well-being. EbA interventions are not rigidly defined but can be best understood in terms of their position on a continuum from 'hard', infrastructure-based interventions to those that solely deploy

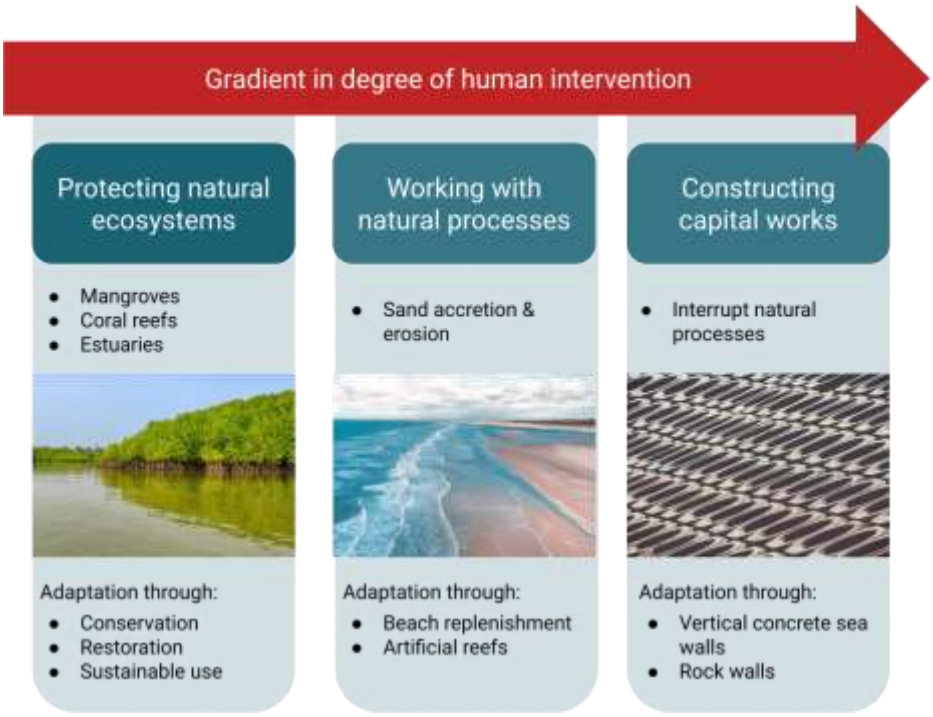
ecosystems in adaptation (see Figure 27). In this sense, EbAs work *with* nature and natural processes (even when containing some hard components) and therefore provide the support and space to assist habitats to also adapt to changing conditions in ways that are beneficial to human society. EbA is often closely tied with community-based adaptation, which is focused on a community scale and ensures that adaptation efforts are integrated with local development goals and community well-being and resilience (Nalau, Becken, & Mackey, 2018). Therefore, EbA is an *approach*, rather than a prescribed set of solutions.

Place- and sector-based (economic/lifestyle mainstays, such as fishing or tourism) EbA approaches need to consider different aspects of climate and environmental risk alongside other community needs. More transformative adaptation presents even greater challenges but is also burdened with definitional ambiguity (Panda, 2018). Three key issues arise in the context of Vanuatu:

1. The identification, level, distribution, and management of the costs, for example, many transformational adaptations will demand significant costs today (e.g., the complete evacuation of an island due to volcanic activity) with many benefits not accruing to many years into the future (and many costs – like loss of access to spiritual lands - may also accrue).
2. The definition of, the potential for, and need to avoid maladaptation (activities that add to environmental risk, such as over extraction of natural resource inputs into intensified agriculture), especially as knowledge and risks change through time.
3. The human knowledge and capacity demands that this level of adaptation present; and the role of government in this adaptation (e.g., logistics, provision of funding, financing, research).

Hybrid approaches (Figure 27) to adaptation involve combining both traditional grey infrastructure, such as concrete and steel structures, and nature-based infrastructure, such as natural and restored ecosystems, to enhance the benefits or reduce the limitations of either approach alone. These hybrid options often involve innovative design approaches that merge ecological principles with engineering and technology. Examples of hybrid adaptation measures include the use of artificial reefs to restore coral reefs, infiltration wells and rainwater harvesting techniques for water management and improved access to the socially vulnerable, and slope stabilisation measures that combine grey and green features. These measures can be used to restore watersheds, improve water quality, manage aquifer recharge, and reduce flood risk. Hybrid approaches can provide effective alternatives to more traditional approaches, often at intermediate cost, but require the necessary resources and expertise.

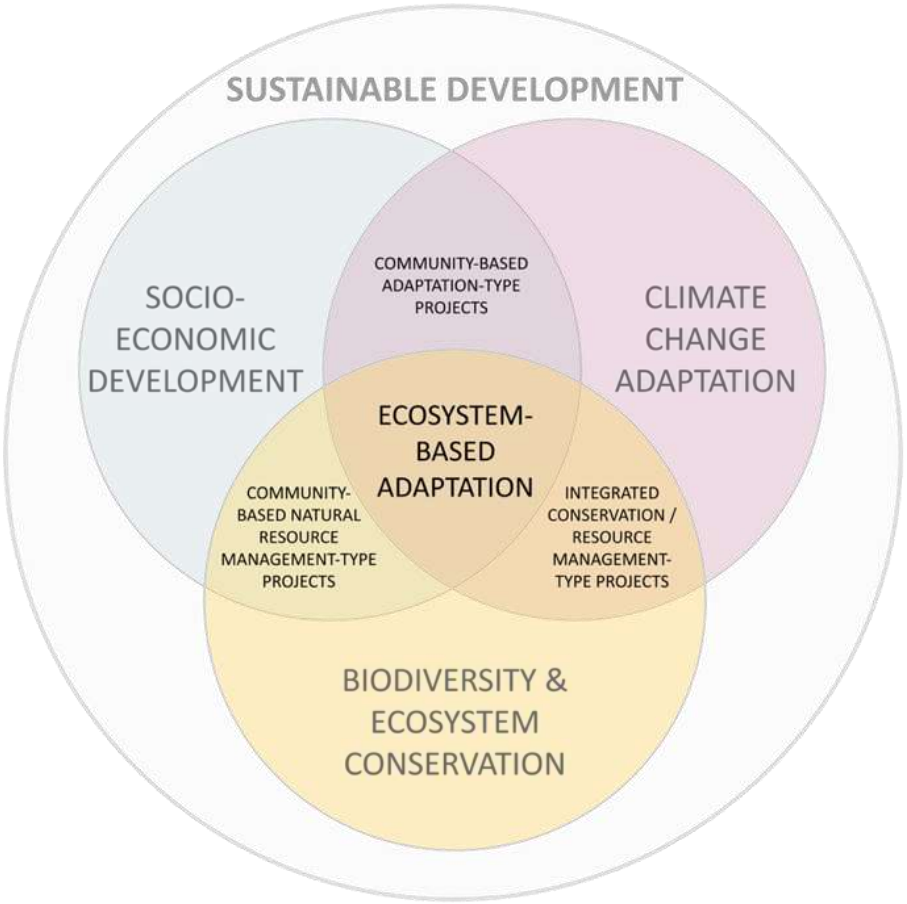
Figure 27: A spectrum of adaptation options are available in the coastal zone, from interventions that maintain or build ecosystem integrity through to pure engineering solutions.



7.2 EbA AND SUSTAINABLE DEVELOPMENT

EbA approaches to adaptation projects in rural Pacific communities can take a range of forms and must lay at the intersection of socio-economic development pathways, biodiversity conservation, and climate change adaptation (see Figure 28). At a very high level – and particularly for the communities at Laone – the importance of socio-economic development is noticeable. This is evidenced through the relative importance of cash-generating activities to household livelihoods, the wide diversity of crops that are grown and sold, the general larger size of the garden plots, and people's aspirations to learn more about running a small business (for local benefit).

Figure 28: Locating ecosystem-based adaptation.



A socio-ecological systems approach is also required, embedding household and community well-being within a complex system that interacts with the range of socio-economic and ecological systems and sub-systems (Sahin et al. 2021). For example, the expansion of animal husbandry (hens and eggs) reduces pressure on the harvesting of wild fish for protein from local reefs, which, in turn, may increase the integrity of coral reef systems, protecting future fish stocks and – in the even longer term – maintaining coastal protection through reducing wave energy through the accrual of coral cover. Other EbA *approaches* may also achieve the same objectives, such as increasing the capacity of a community to harvest fish protein away from local reefs in deeper water, which would demand investments in more robust watercraft, the skills, diesel supplies, and technicians to maintain the fleet, and training and financial support of a broader range of fishers, including members of socially vulnerable groups, than presently exists.

This food sub-system interacts with other sub-systems. For example, through protecting fish stocks and coral cover, and perhaps through the introduction of managed marine protected areas the community can provide future opportunities for tourism businesses that are attracted by high integrity coral reefs and alternative and diverse livelihood opportunities. It is worth noting that tourists also generally demand higher protein diets. However, tourism businesses are only enabled though other infrastructure investments, such as access roads, communications, safe drinking water, sanitation, electricity and pleasant accommodation options.

Conceptualising socio-ecological systems is necessarily complex and must find a balance between explicit local reflection and complexity and conceptual usefulness. Here, the team draws on two conceptualisations from studies in Vanuatu: that provided by Buckwell et al. (2020) for Port Resolution in Tanna and that by Sahin et al. (2021), which explores local, regional and country-level outcomes of EbA interventions. Importantly, both conceptualisations determine end points as household and community well-being that supports community resilience to external shocks. Buckwell et al.'s socio-ecological system is reproduced below, Sahin et al.'s is summarised.

7.2.1 Gender equity

Climate change-related risks are not equally shared by everyone in Pacific communities. In addition, the benefits of EbA are not automatically shared equitably and the aspirations of different members of the community are commonly divergent (Buckwell, Fleming, Muurmans, et al., 2020). Women, particularly poorer, rural women, experience greater vulnerability to climate change impacts than men, due to complex, intersectional drivers, including semi-formal community power dynamics, socially and culturally constructed discourse on the role of women in the family and society, and formal risks of land alienation and access to economic resources (Bendlin, 2014; Djoudi & Brockhaus, 2011). In addition, integrating the broader socially inclusive perspectives generated by a consideration of GEDSI needs into climate change and development priorities is vital for addressing underlying social inequalities between and the intersections of women, men, girls and boys, the gender-diverse, people with a disability, the elderly, youth and children. Only then will climate change planning embrace the full gamut of diversity in local communities and address the concomitant issues arising from GEDSI and climate change.

Furthermore, gender is not only a driver of different vulnerability to climate change but also should play a role in determining appropriate adaptations, as the needs and priorities of women and non-binary people are likely to be different to those of men, or the community as a whole (Bryan et al., 2015). Notwithstanding, women's roles and leadership in adaptation, in the families, in communities, and in formal representative structures, are recognised as being a necessary condition for fostering resilience (Aipira et al., 2017). This is constantly demonstrated empirically, where women's empowerment is linked to adaptation to change and improved social and economic outcomes for themselves and for communities as a whole (Bowman et al., 2009; Kassie et al., 2020).

7.2.2 Alignment with Vanuatu government strategy

The government of Vanuatu has articulated its climate adaptation policies and national development strategies in a range of documents, including the *National Sustainable Development Plan 2017-2030* (Republic of Vanuatu, 2016), *Vanuatu Climate Change & Disaster Risk Reduction Policy 2017-2030*, and in the operations of the Ministry of Climate Change (Hallwright & Handmer, 2021). These plans and strategies also lean on the *Framework for Resilient Development in the Pacific 2017-2030*, the *Sendai Framework on Disaster Risk Reduction 2015-2030,* and the *Pacific Gender and Climate Change Toolkit 2015*. Together, this posits that Vanuatu is well-progressed on implementing the conceptual integration of disaster risk management and climate change adaptation and through sustainable development will conserve key ecosystem assets, such as food gardens, forests, coral reefs, and freshwater assets as being essential to the livelihoods of the Ni-Vanuatu (Betzold, 2015, 2016).

As such, EbA as an adaptation is broadly supported in policy, however, it is essential that local implementation is reflective of community vulnerabilities, needs, and aspirations. Having a strategy and a plan is no guarantee of appropriate and timely action in implementation of adaptations at local level in the more remote communities. Partnership between the international organisation sector, the national government, the provincial government, local communities, and specialist implementation NGOs will be essential.

7.3 CRITERIA FOR QUALIFICATION OF ECOSYSTEM-BASED ADAPTATION

Figure 29 is drawn from FEBA (2018) and describes what qualifies as EbA. It sets a series of standards against which EbA intervention should be considered, for them to both meet the criteria for EbA but also to fulfil the broad social and economic objectives. Each of our EbA recommendations will be assessed against these standards in greater detail in the next phase of the project (EbA costings).

Figure 29: What qualifies as effective ecosystem-based adaptation.

Foundation	Qualification criteria	Standards
EbA helps people adapt to climate change	Reduces social & environmental vulnerabilities	1. Use of climate information 2. Use of local traditional knowledge 3. Adaptations take into account findings of vulnerability assessment 4. Vulnerability reduction at the appropriate scale
	Generates societal benefits in the content of climate change adaptation	1. Quantity and quality of societal benefits compared to other adaptation options 2. Timescale of societal benefits is demonstrated 3. Economic feasibility and advantages compared to other adaptation options 4. Maximising the number of beneficiaries 5. Equitable distribution of benefits
EbA makes active use of biodiversity and ecosystem services	Restores, maintains, or improves ecosystem health	1. Appropriate scale of management 2. Prioritisation of key ecosystem services within management
EbA is part of an overall adaptation strategy	Is supported by policies at multiple levels	1. Compatibility with policy and legal frameworks and policy support 2. Multi-actor and multi-sector engagement (communities, civil society, private sector)
	Supports equitable governance and enhances capacities	1. Accountability and group representation 2. Consideration of gender balance and empowerment 3. State of Indigenous and local knowledge and institutions 4. Long-term capacity to ensure sustainable governance

7.4 METHODOLOGY FOR DETERMINING EbA OPTIONS

Here the team's methodology is described for proposing appropriate EbA options for each of the communities. There are five lines of evidence, shown in Figure 30.

Figure 30: Lines of inquiry informing ecosystem-based adaptations.

Line of Enquiry	Evidence Provided
Literature	• Determinants of effective ecosystem-based adaptation • Government policy
Household survey	• Household resource use • Current household livelihoods • Perceived socio-economic and environmental risks • Household aspirations and preferences for the future
Go-along survey	• Community assets • Current community projects
Ecosystem service valuation	• Land cover extent and location of different habitats • Economic valuation of ecosystem services
Climate risk data	• Current climate change related risks (at regional scale only) • Future climate risks

The team brings these five lines of inquiry together taking a sectoral approach, examining climate and socio-economic risks across (i) agriculture, (ii) water supply and sanitation, (iii) forestry, (iv) fisheries and marine conservation, and (v) infrastructure, society and economy. From these risks the team determined key priorities and distilled down to five priorities. These priorities were then linked to EbAs from a list of options, shown in Table 65.

When assessing data from the household survey, the team leant heavily on *comparisons* between the communities rather than the individual data points themselves. This is, in part, due to the likely low levels of data integrity (given the method of data collection), so we make the assumption that mis-reporting rates are relatively stable and therefore where one community has stated a particular level of concern over a particular issue, it is not the datapoint *per se* that is important but how that data point compares to other communities. For example, if the average plot is size is reported to be 4,000 m^2 in Community A and 5,000 m^2 in Community B, we maintain a relative level of scepticism about the specific values but maintain that, *in general*, plots sizes are larger in Community B.

7.5 POTENTIAL EbA OPTIONS

Table 65 provides a series of potential EbAs appropriate for the areas of interest. These options are drawn from a range of sources, including Mackey et al. (2017), Buckwell et al. (Buckwell, Ware, et al., 2020), Ayers & Forsyth (2009), Andrade et al. (2011), Hills et al. (2011; 2013), and Nalau et al. (2018; 2018; 2018).

Table 65: Common ecosystem-based approaches to adaptation in the Pacific Islands. Drawn from Mackey et al. (2017), Buckwell et al. (2020; 2020), Ayers & Forsyth (2009), Andrade et al. (2011), Hills et al. (2011; 2013), and Nalau et al. (2018; 2018; 2018).

Sector	Adaptation Measure	Localised Adaptation Benefits			Additional Benefits (secondary services and beneficiaries)
		Adaptative Function	Socio-Economic + Cultural	Biodiversity Conservation	
Agriculture	Agricultural extension services & demonstration farms • Crop diversification • Drought resistant crops • Agro-forestry • Tillage improvements • Mulching	• Increased productivity (more with less) and yield stability • Increased crop diversity • Decreased risk of loss of crops from drought and heat	• Job creation • Food security • Continuation of customary practices • Benefits all households, all genders (equity) and is socially inclusive	• Less pressure on forest fringes / reduced deforestation	• Carbon sequestration
	Animal husbandry	• Reduced pressure on reef fisheries	• Wider source of livelihoods (cash incomes)	• Reduced pressure on reef fisheries and wild animals	
	Setbacks / retreat	• Decreased loss of agricultural land to flooding and inundation	• Food security	• Potential for evacuated land to rehabilitated	
Forest and habitat	Forest and habitat conservation	• Reduction of landslide risk • Reduced siltation of reef lagoons	• Management of forest resources for housing materials	• Pollination, biological control • Species conservation.	• Species conservation and genetic resources

		• Freshwater quality and supply through catchment management for forestry • Reduced flooding • Protection from severe weather • Air quality regulation	• Protection of cultural heritage • Management of forest resources for medicinal plants • Management of forest resources energy		• Carbon sequestration
	Wetland protection	• Freshwater supplies • Allow floodwaters to disperse across a floodplain • Decrease the speed and size of the peak of floodwaters	• Production and maintenance of fisheries	• Species conservation, in particular, nursery ecosystem services to maintain stability of marine harvests.	• Species conservation
	Mangrove rehabilitation	• Protection against storm surge and coastal inundation	• Production and maintenance of fisheries	• Local fishery productivity	• Species conservation
Marine and fisheries	Marine protected areas	• Production and maintenance of fisheries • Benefits for coral growth	• Potential for tourism development	• Reduced pressure on reef fisheries	• Species conservation
	Coral reef restoration	• Coastal protection from extreme weather wave energy and sea level rise • Production and maintenance of fisheries • Mitigating against ocean acidification	• Potential for tourism development	• Increased biodiversity	• Species conservation
	Investments in water craft & fish attracting devices	• Reduced pressure on in-shore reefs by encouraging deep water fishing	• Continuation of fishing activities away from local closures	• Reduced pressure on inshore reef fisheries	• Species conservation

Institutional & infrastructure	Local decision-making structures	• Improved decision making to support sustainable natural resource management	• Improved and GEDSI-inclusive decision making to support more inclusive natural resource and spatial allocation	• Reduced pressures on ecosystem integrity	
	• Disaster preparedness response and recovery • Augmented cyclone-proof housing	• Reduce damage to ecosystems following extreme weather events during rebuilding	• Improved and GEDSI-inclusive community resilience		
Waste and sanitation	Investments in solid waste management and sanitation Augmentation, re-location,	• Reduced risk of waste pit leaching and damage in extreme weather • Reduced risk of wastewater contamination of waterways, groundwater, and freshwater bodies during and following extreme weather. • Reduced risk of contamination of coastal marine areas, particularly during flood events	• Reduced risk to health and increased social inclusion • Maintenance of the safety of freshwater and marine harvests	• Reduced risk of freshwater courses and marine pollution	
	Drinking water quality monitoring	• Reducing consumption of dangerous drinking water	• Reduced disease		
	Rainwater collection and storage Household or community rainwater tanks.	• Maintain drinking and irrigation water	• Food security, water security, and increase access and social inclusion	• Reduced pressure on natural stream flow	

7.6 COMMUNITY EbA PRIORITIES

This section details the final output of this component of the ESRAM process. The team highlighted the highest priority EbA measures for the four areas of interest. By considering the unique ecological, social, and economic context of each community, the section provides a tailored- and community-data led and socially inclusive approach to prioritising EbA measures that will support the resilience and well-being and livelihoods of the communities.

7.6.1 Laone, Pentecost

Taking account of both locally specific and general pressures, risks, and opportunities, the team recommends the following EbA projects for Laone, Pentecost (Table 66).

Table 66: Key risks and features and potential EbA projects for Laone, Pentecost.

Sector	Pressures, Risks, and Opportunities	Potential EbA Projects
Agriculture and livestock	• Gardens have a high degree of diversity and households communicated a relatively low risk of threats to food production. • Plots are generally larger. • A key priority identified was a lack of mulch and fertilisers for gardens. • Relatively low use of livestock (compared to Malekula), though walk-through survey response does not reflect this.	• Agricultural extension services should focus on agroforestry, animal husbandry and introduction of soil and water sensitive cropping (mulching) and more drought resistance crops. **(High priority)**
Water supply and sanitation	• Community has no freshwater courses, therefore drinking and irrigation water is collected in rainwater tanks. This is a key risk – a lack of rain, particularly given climate warming, was seen as key concern. Changing rainfall seasonality and intensity also poses a water security risk. • Solid waste is likely to increase over the medium term. If waste is continued to be buried locally, in (likely) poorly engineered pits, risks of deterioration and leakage due to increased severe weather is high.	• Water security is a key risk. With few or no water sources, projects should focus on accessible rainfall capture for drinking water. **(High priority)**
Forest conservation	• Only 36% of land area is forested. • Deforestation ranked as 4th most important environmental risk	• Investment in forest conservation for sustainable resource management, particularly to secure materials for building and medicinal plants and to maintain reasonable fallow periods to enable soil regeneration. **(High priority)**
Fisheries and marine conservation	• Fishing remained important, but less so than on Malekula. A high proportion of fishing already takes place in deep water.	• Deep water fishing already seems to be a response to resource management. Fish attracting devices could be useful adaptation. Assess access to deep water fishing for

	• High level of sales of produce and fish and engagement in local markets, suggesting growing future threats to fish stocks. • 8 recorded fibreglass boats individually owned in the community	GEDSI populations. **(Medium priority)**
Infrastructure and economy	• Community interest in developing small business and sales of goods and services, such as food, cooked foods, and handicrafts. • Access to markets was listed as a concern and there is a desire to increase the quantity of trade in food and handicrafts. • Area appears to have reasonable shopping, financial, civil, and social services, with good access to the region. • Relatively higher interest shown towards tourism-related activities.	• Economic specialisation can bring benefits and investment into local services to increase resilience. Project investments in supporting small business needs to be balanced from an equity perspective to ensure benefits are not captured by first movers. Financial capacity building for members of socially vulnerable groups should be included. **(Medium priority)** • Tourism-related opportunities may arise from in the eco-tourism sector, entailing protection of habitats and ecosystems. This would also entail investments in water supply and waste and sanitation systems. Financial capacity building for members of socially vulnerable groups should be included. **(Medium priority)**

7.6.2 Tenmaru, Malekula

Taking account of both locally specific and general pressures, risks, and opportunities, the team recommends the following EbA projects for Tenmaru, Malekula. (Table 67.)

Table 67: Key risks and features and potential EbA projects for Tenmaru, Malekula.

Sector	Pressures, Risks, and Opportunities	Potential EbA Projects
Agriculture and livestock	• 87% of households communicated problems with garden management. • Tenmaru's gardens have a relatively low degree of crop diversity. • Plots are generally smaller, though there was generally low concern with limits to expansion. A key priority identified was a lack of mulch, seed stock, and fertilisers for gardens. • Environmental risks identified included: flooding from local rivers and coastal erosion. • Area already has reasonable animal husbandry services.	• Agricultural extension services should particularly focus on increasing crop diversification and productivity, such as using mulches and improved tillage techniques and retaining soil fertility to maintain food production on the same footprint. **(High priority)** • Increased local river flooding and coastal erosion may entail setbacks of some garden plots, demanding local institutional structures to enable households at risk of loss to negotiate managed retreat and new plots. Women's access to land for subsistence activities should not be minimised. **(Medium priority)**
Water supply and sanitation	• Water supplies are relatively diverse, with a general reliance on water piped from rivers.	• Investments in rainwater tanks, further improvements in sanitation,

	Water supply is not currently a significant issue, but this remains a risk when the ENSO cycle shifts, or rainfall patterns change. ● Sanitation is relatively developed in comparison (though this is a low base). However, if water is drawn from local water courses, there is a risk of contamination (and solid waste leachates) during extremely wet weather. ● Solid waste and poor sanitation might become key risks if tourism development is pursued.	and solid waste management will prepare the community for increased tourism visitation. All hygiene and sanitation activities should ensure GEDSI accessibility. **(High priority)** ● Investments in improved sanitation will reduce risk of disease from contaminated ground water. Co-related education programmes on hygiene and sanitation, and safety of community members following major flood events (especially children) should be progressed. **(Medium priority)**
Forest conservation	● Forest products are very important for building materials and medicinal plants. ● Deforestation was identified as a risk and the area already has a low proportion of tropical forest cover (33%).	● Investment in forest conservation for sustainable resource management, particularly to secure materials for building and medicinal plants and to maintain reasonable fallow periods to enable soil regeneration. **(High priority)**
Fisheries and marine conservation	● Fishing was very important, and all fish were sourced from the local reef, which is likely to come under further pressure. ● The community has set the aspiration of the MPA as a route to tourism opportunities, though there was only moderate interest in pursuing tourism and most many small business aspirations were generally aimed at supply of local goods and services. ● 8 fibreglass boats listed being owned by households.	● Marine protected areas for sustainable resource harvesting and potential for driving future eco-tourism opportunities. Increased conservation of reef assets is likely to require access to new sources of fish. **(High priority)** ● Offshore fish attracting devices and maintenance of the current fleet will be important in the future. Small business aspirations will support specialisation into deep water fishing. Assess access to deep water fishing for GEDSI populations. **(Medium priority)**
Infrastructure and economy	● Housing is solidly-built, considering the concern over natural disasters. ● Community has a high level of concern for the immediate and post-disaster impacts of extreme weather ● Covid has impacted communities by making fishing and hunting more difficult and more work for both men and women. ● Access to markets was listed as a concern and there is a desire to increase the quantity of trade in food and handicrafts. ● Area appears to have reasonable shopping, financial, civil, and social services, with good access to the region.	● Economic specialisation can bring benefits and investment into local services to increase resilience. Project investments in supporting small business needs to be balanced from an equity perspective to ensure benefits are not captured by first movers. Financial capacity building for members of socially vulnerable groups should be included. **(Medium priority)**

7.6.3 Wiawi, Malekula

Taking account of both locally specific and general pressures, risks, and opportunities, we recommend the following EbA projects for Wiawi, Malekula. (Table 68.)

Table 68: Key risks and features and potential EbA projects for Wiawi, Malekula.

Sector	Pressures, Risks, and Opportunities	Potential EbA Projects
Agriculture and livestock	• Wiawi's gardens have a relatively low degree of crop diversity and every household communicated problems with food production, though the risks from going hungry was considered low. • Plots are generally larger. A key priority identified was a lack of mulch, seed stock, and fertilisers for gardens and the impacts of extreme weather on food production. • Livestock levels were generally satisfactory. • Risks include flooding from local rivers and coastal erosion	• Agricultural extension services should particularly focus on increasing crop diversification and productivity, such as using mulches and improved tillage techniques and retaining soil fertility to maintain food production on the same footprint. **(High priority)** • Increased local river flooding and coastal erosion may entail setbacks of some garden plots, demanding local institutional structures to enable households at risk of loss to negotiate managed retreat and new plots. Women's access to land for subsistence activities should not be minimised. **(Medium priority)**
Water supply and sanitation	• Water supplies were relatively diverse, with reliance on water piped from rivers. This water supply and quality is likely to be at risk if rainfall patterns change. (Though reliability is not a significant problem at present.) • Safe sanitation will remain a key issue, particularly if the area becomes affected by more extreme weather as most drinking water is drawn from local water courses. This also applies to solid waste leachates.	• Investments in rainwater tanks, further improvements in sanitation, and solid waste management will prepare the community for increased tourism visitation. All hygiene and sanitation activities should ensure GEDSI accessibility. **(High priority)** • Investments in improved sanitation will reduce risk of disease from contaminated ground water. Co-related education programmes on hygiene and sanitation, and safety of community members following major flood events (especially children) should be progressed. **(Medium priority)**
Forest conservation	• Forest products are very important for building materials, foods, and medicinal plants. • Deforestation was identified necessarily identified as a key environmental risk. The community already has a low proportion of tropical forest cover, and this is likely to come under further pressure.	• Investment in forest conservation for sustainable resource management, particularly to secure materials for building and medicinal plants and to maintain reasonable fallow periods to enable soil regeneration. **(High priority)**
Fisheries and marine conservation	• Fishing was very important, and everyone sourced fish from the local reef, which is likely to come under further pressure. • In addition, a high proportion of people harvested marine resources away from the	• Establishment of marine protected areas for sustainable management of marine resource harvesting. Assess access to fishing areas for GEDSI populations. **(Medium priority)**

	local reef, suggesting that introduction of an MPA may provide greater reef conservation could be achieved without too significant impact on local access to marine resources.	
Social, infrastructure and economy	• The community would see loss of local services, such as schools and medical facilities as key risks, which could be exacerbated by more extreme weather events. • The community of Wiawi placed significant importance on running small businesses, access to financial services, and financial literacy. Much of the focus on small business was not necessarily directed at tourism operations but more on local services. • The community would see loss of local services, such as schools and medical facilities as key risks, which could be exacerbated by more extreme weather events. • Covid has impacted communities by making fishing and hunting more difficult and more work for both men and women. • In Wiawi women's issues received high ranking. • Households were significantly larger in Wiawi than other communities.	• Agricultural extension projects will also harness the community's latent entrepreneurialism. Improved farming knowledge and access to new varieties and techniques could encourage micro-investment into productivity improvements and diversification. **(High priority)** • Support for the development of women-focussed business development, through capacity and skills building could support people in establishing new enterprises, particularly in utilising local produce. **(Medium priority)**

7.6.4 South West Bay, Malekula

Taking account of both locally specific and general pressures, risks, and opportunities, we recommend the following EbA projects for South West Bay, Malekula. (Table 69).

Table 69: Key risks and features and potential EbA projects for South West Bay.

Sector	Pressures, Risks, and Opportunities	Potential EbA Projects
Agriculture and livestock	• Garden plots were on the smaller side and cropped showed the greatest level of crop diversity for Malekula. • 92% of households reported difficulties in growing crops related to floods and storms. There was no sense of limits on agricultural expansion or of need for improved agricultural inputs, nor concerned about access to markets. Concern over lack of rain limiting growth was the lowest in the sample. • Coastal erosion and flooding were considered risks, as was severe weather and flooding.	• Agricultural extension services should particularly focus on productivity and mew techniques, such as using mulches and improved tillage techniques to retain soil fertility to maintain food production on the same footprint. **(High priority)** • Increased local river flooding and coastal erosion may entail setbacks of some garden plots, demanding local institutional structures to enable households at risk of loss to negotiate managed retreat and new plots. Women's access to land for subsistence activities should not be minimised. **(Medium priority)**
Water supply and sanitation	• Water sources are relatively diverse, with significant amounts taken from rivers and lakes. • Very few flush toilets are available in the community, encouraging a high reliance on bush toilets. • Households generate a reasonable amount of non-compostable waste, which is mostly burned and buried in backyards.	• Investments in improved sanitation will reduce risk of disease from contaminated ground water. Co-related education programmes on hygiene and sanitation, and safety of community members following major flood events (especially children) should be progressed. **(High priority)**
Forest conservation	• The area retains a high proportion of forest to gardens. Deforestation was a mild concern for households.	• Forest conservation in key upper catchment areas to maintain water quality and quantity in both rivers and lakes. **(High priority)**
Fisheries and marine conservation	• Fishing is not quite as important as it is to other Malekula communities. However, the freshwater sources for food are very important. • Most marine resources are collected on local reefs and freshwater sources, with little harvested from deeper water. 4 households list owning a boat.	• The integrity of freshwater systems needs to be maintained through forest conservation in upstream catchments and active management for sustainable harvesting of freshwater resources. **(High priority)** • Offshore fish attracting devices and maintenance of the current fleet could be tested. The current small offshore fishing fleet could support specialisation into deep water fishing. Assess access to deep water fishing for GEDSI populations. **(Medium priority)**
Infrastructure and economy	• Education levels are the lowest and the resident age levels are highest, suggesting that young adults are staying in the villages. • When considering future aspirations, this community showed some modest interest in	• Support for the development of an artisanal class, through capacity and skills building could support people in establishing new enterprises, particularly in utilising local produce. Financial capacity building for

	small business-type enterprise though this is based off the lowest baseline in the sample. • Homes are relatively secure, and many made of breezeblock. • Covid has impacted communities by making fishing and hunting more difficult and more work for both men and women. • Very few local shopping and social services and poor transport links. • The impacts of extreme weather on health and safety were issues for the community.	members of socially vulnerable groups should be included. **(Medium priority)**

7.7 KEY DATA GAPS

Despite being able to draw on four important data sources (household survey, go-along survey, ecosystem assessment, climate risk assessment) we note there are important data missing:

1. Due to the requirements of the capacity-building aspects of this project (specifically the recruitment of local community enumerators) our survey had to rely heavily on quantitative data points for virtually all aspects of the household survey. Whilst this has proved useful in estimating certain, factual aspects of household and community attributes it also has meant that attitudinal questions (e.g., *what are the key environmental risks?*) needed to be based on a pre-prepared list rather than open-ended questioning. This also meant the capture of richer qualitative data (e.g., *why are these key environmental risks?*) was completely missing.
2. Ecosystem asset inventories and TESV estimates are useful in and of themselves in assessing the status of assets at a point in time. However, time series data on relative changes in, for example, land cover between forest-subsistence gardens-other land uses, provide more useful information on trends in ecosystem asset inventories.
3. Ecosystem condition, particularly for coral reef and forest habitats was missing from all data.
4. Downscaled climate risk data to at least island level would provide more accurate community- and climate-risk assessments, and for specific GEDSI and climate change data to be collected and relevant risk assessments made, and will likely be required before, for example, detailed implementation of any farming extension services.

CHAPTER 8: NEXT PHASE OPTIONS ASSESSMENT

8.1 OPTIONS ASSESSMENT

For the next phase of the project, the team proposes a detailed cost-benefit analysis of alternative adaptation options for key social assets and ecosystem services (e.g., drinking water provision) on the Islands. This will involve the following steps:

4. Identify a shortlist of potential options;
5. Perform cost-benefit analysis of these options; and
6. Develop a capacity building strategy to facilitate implementation of recommended option(s).

The team will develop, costs and determine the benefits from a short list of options. Following the cost-benefit analysis method proposed by Buckwell et al. (2020), which assessed options for climate change adaptation options for Tanna based on data from the prior Vanuatu/Tanna ESRAM (Mackey et al., 2017), the team will generate a range of economic metrics for assessing the value of each project (e.g., benefit-cost ratio, net present value).

The cost-benefit analysis of alternative adaptation options will address key questions such as:

- What are the potential costs of alternative adaptation options to deliver specific outcomes and, what costs might be associated with achieving gender, equity, diversity, and social inclusion (GEDSI)?
- What are the potential benefits of alternative adaptation pathways and strategies and the potential negative GEDSI outcomes?
- How can the value of non-market ecosystem services such as fish hatchery habitat and storm surge protection provided by coastal mangroves, or biodiversity services provided by intact forest be robustly incorporated into decision making, and how can that decision-making include GEDSI groups?
- Assuming a limited adaptation budget, which adaptation options should be considered first?
- What are the key risks and uncertainties of the alternative adaptation options?

Ultimately, cost-benefit analysis will assist greatly in justifying and informing the development of effective and efficient climate change adaptation strategies and pathways through a consistent analysis of the portfolio of adaptation options.

Note: In some instances, where for example, benefits are self-evident but difficult to quantify, it may be more appropriate to employ cost-effectiveness analysis. Such an analysis ranks options based on outcome achieved relative to cost, without explicitly considering or evaluating the value of benefits received.

Following the economic analysis and options report, the project team will draft an implementation plan in consultation with SPREP and other in-country experts. (Note that consultation with the communities will take place following this process.)

8.2 COSTS OF NO ACTION

Vanuatu is facing growing pressure to take action to address the impacts of climate change, particularly in rural areas where a significant portion of the population lives. Failure to take any actions in adapting to the effects of climate change will result in significant social and economic costs, including increased poverty and food insecurity, loss of infrastructure and homes, decreased access to basic services such as education and healthcare, and potentially negative impacts on members of socially vulnerable groups.

Social Costs:

- Increased poverty and food insecurity: Climate change is projected to lead to decreased agricultural productivity, resulting in food shortages, increased poverty and potential damage to people with a disability. This will have a disproportionate impact on rural communities, which are heavily reliant on agriculture for their livelihoods.
- Loss of homes and displacement: Rising sea levels, increasing frequency and intensity of natural disasters, and erosion of coastal areas will result in the loss of homes and displacement of communities, with potential deadly impacts on people with a disability and the elderly.
- Decreased access to basic services: Climate change impacts, such as increased frequency of natural disasters, will disrupt access to essential services such as education, healthcare, and clean water, with potential significant future impacts on youth and children.

Economic Costs:

- Decreased agricultural productivity: Changes in temperature, precipitation, and other climatic conditions will have a negative impact on the agricultural sector, resulting in decreased crop yields and a decline in export revenue.
- Loss of infrastructure and property: Climate change will lead to the destruction of infrastructure and property, incurring high costs for repair and reconstruction.
- Decreased tourism revenue: The tourism sector will be negatively impacted by increased frequency of natural disasters and decreased access to key tourist destinations due to climate change impacts.

The impacts of climate change on Vanuatu's economy and society are clear, and inaction will result in significant costs. It is imperative that the government acts now to address the impacts of climate change and implement socially inclusive adaptation measures to protect the country's economy and citizens. Implementing adaptation measures now will be less expensive than waiting and dealing with the consequences of inaction later.

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APPENDIX: HOUSEHOLD SURVEY

OL KWESTENIA BLO ESRAM SEVEI

SEVEI REFERENS

Section A: Survey Reference

Ol namba blo ol kwesten *A.1.1 Questionnaire number*				
Intaviua *A.1.2 Interviewer*				
Deit *A.1.3 Date*	(dd/mm/yyyy)			
Aelan *A.1.4 Island*	☐	Malekula	☐	Pentecost
Komuniti *A.1.5 Community*	☐	Temaru	☐	Laone
	☐	Wiawi	☐	Loltong
	☐	South West Bay		
	☐	Narawan: _____ *Other*		
Lokeisen blo haos *A.1.6 Household location*	GPS:			

HAOSHOL

Section B: Household

Man we bae ansarem kwesten blo yu.

B.1 The respondent.

Hu nao bae komplitem sevei ia?

Who is completing this survey?

Man o woman *Gender*			Ej grup *Age group*					Memba blo wan mein vileg tribe (Y) *Member of the main village tribe (Y)*	Ol disabiliti *Disabilities*		Igat bel *Pregnant*	Wido *Widowed/ Widower*
F	M	Non-binary	<18	18-35	36-45	46-60	>60		Fisikal *Physical*	Save blo em *Cognitive*		
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Ol fasen insaed lo wan haoshol.

Household characteristics.

Hu nao hed blo haoshol blo yu?

Who is the head of the household?

Sapos man we yu sta intavium hem nao hed blo haoshol ya yu tikem fes box afta yu ko lo B.2.2

If same person as above, check the first box and skip to B.2.2

Sem man we istap andap *Same person as above*	Jenda *Gender*			Ej grup *Age group*					Memba blo mein vilej tribe (Y) *Member of the main village tribe (Y)*	Disabilities Disabiliti		Igat bel *Pregnant*	Wan wido *Widowed/ Widower*
	F	M	Man we ino identifyem hem olsem wan man o woman *Non-binary*	<18	18-35	36-45	46-60	>60		Fisikal *Physical*	Save blo em *Cognitive*		
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Yu bakaken istap liv lo haos ia fultaem wetem yufala?

B.2.2 WHO ELSE LIVES IN THE HOUSE FULLTIME?

Yu no mas inkludem tufala risponden or hed blo haoshol stat lo B.1.1 o B.2.2

Do not include both the respondent or the head of the household from B.1.1 or B.2.2.

	Jenda *Gender*			Ei grup *Age group*					Memba blo mein vilej tribe (Y) *Member of the main village tribe (Y)*	Kam back from reason blo Covid-19? *Returned due to Covid-19?*	Disabiliti *Disability*	
	F	M	Man we ino identifym em olsem wan man o woman *Non-binary*	<18	18-35	36-45	46-60	>60			Fisikal *Physical*	Save mo knoledi *Cognitive*
#2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

#5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#10	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Total												

EDUKEISEN

EDUCATION

Leko box istap empti sapos yu no save.

Leave blank if not known.

	Finis lo primary level *Finished primary school*	Finis lo sekandari level *Finished secondary / high school*	Hemi finisem univesiti *Completed university*	Ol treining afta lo hae skul *Post-secondary / high school training*	Ol nara qualifikeisen *Other qualifications*	No save *Don't know*
Hed *Head*	☐	☐	☐	☐	☐	☐
#2	☐	☐	☐	☐	☐	☐
#3	☐	☐	☐	☐	☐	☐
#4	☐	☐	☐	☐	☐	☐
#5	☐	☐	☐	☐	☐	☐
#6	☐	☐	☐	☐	☐	☐
#7	☐	☐	☐	☐	☐	☐
#8	☐	☐	☐	☐	☐	☐
#9	☐	☐	☐	☐	☐	☐
#10	☐	☐	☐	☐	☐	☐

SABSISTENS (KAREN KAKAE WE YUMI PLANEM BLO USUM LO HAOS NOMO) MO LAEFLIWUD ASESMEN

SECTION C: SUBSISTENCE AND LIVELIHOOD ASSESSMENT

Sabsisten karen

C.1 Subsistence gardening

Igat eniwan lo haoshol blo yufala we istap mekem ol difren sabsisten aktiviti?

C.1.1 Does any member of the household carry out subsistence activities?

Sabsisten aktiviti iminim ol aktiviti olsem Karen, ko kolectem, hunting lo bush, fishing lo solwata, from ol kakae mo ol samting we ol membas blo haoshol blo yufala istap kakae.

Subsistence activities mean gardening, collecting, hunting, and fishing for provisions that are used / eaten by the household members.

☐ Yes ☐ No

Sapos no, yuk o stret lo C2.

If no, then skip to C2.

Wanem activiti nao oli stap mekem?

C.1.2 What activities do they do?

	Oli stap redi lo graon blo planem kakae *Preparing land for food gardens*	Oli lukaotem Karen blo igro *Growing food*	Oli fish lo solwata *Fishing*	Oli pikemap selfis/mo ol nara samting lo solwata *Collecting shellfish / marine life*	Oli ko hunt lo bush (flying fox, pidjen, wild pigs) *Hunting (bats, birds, wild pigs)*	Karem ol plants lo big bush mo lo riva? *Collecting plants from forest and rivers*	Ol narawan *Other*
Hed *Head*	☐	☐	☐	☐	☐	☐	☐
#2	☐	☐	☐	☐	☐	☐	☐
#3	☐	☐	☐	☐	☐	☐	☐
#4	☐	☐	☐	☐	☐	☐	☐
#5	☐	☐	☐	☐	☐	☐	☐
#6	☐	☐	☐	☐	☐	☐	☐
#7	☐	☐	☐	☐	☐	☐	☐
#8	☐	☐	☐	☐	☐	☐	☐
#9	☐	☐	☐	☐	☐	☐	☐
#10	☐	☐	☐	☐	☐	☐	☐

Money we yumi stap mekem

C.2 Cash income

Igat eni memba lo haoshol blo yufala istap engej lo ol activiti blo mekem money?

C.2.1 Does any member of the household engage in cash earning activities?

☐ Yes ☐ No

Sapos no, yu ko stret lo C3

If no, then skip to C3.

Hao nao oli stap mekem ol money ia?

C.2.2 How do they earn that cash?

	Salem kakai we oli planem/ol animol mo samting oli mekem aot lo animol *Selling grown food / animal products*	Salem fish moo l samting lo solwata *Selling fish and marine products*	Salem ok kakae we idon *Selling cooked foods*	Ol ting lo dak bush *Forest materials*	Tourism/restaron/haos blo slip *Tourism/ restaurant/ accommo-dation*	Ol handirafs *Handi-crafts*	Skul/hospital *Education / health*	Wok from money *Work for wages*	Wok olbaot *Casual labouring*	Narawan *Other*
Hed *Head*	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#5	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#7	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#8	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#9	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
#10	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Haos blo yu

C.3 Your house

Hu lo yufala nao hemi ownem haos we yufala stap liv lo hem?

C.3.1 Who owns the house you are living in?

Blo mi wan *Own*	☐	Papa blo mi *Father*	☐	Boy blo me *Son*	☐
Bank *Bank*	☐	Mama blo mi *Mother*	☐	Gel blo mi *Daughter*	☐
Man blo mi *Husband*	☐	Brata blo mi *Brother*	☐	Nara family membea *Other family member*	☐
Woman blo mi *Wife*	☐	Sista blo mi *Sister*	☐	Narawan *Other*	☐

Oli buildem haos blo yu lo wanem? Ol nara haos blo yu oli buildem lo wanem?

C.3.2 What is your home built from? What are any other buildings you own built from?

	Ol bush mo rop blo bush/timba *Plant materials / timber*	Bricks/ redi-made blocks we yu pem aotside *Brick / breeze block brought in*	Bricks we oli mekem insaed lo vilej nomo *Brick / breeze block made in village*	Metal *Metal*
Ol main wall blo haos *Main house walls*	☐	☐	☐	☐
Ruf *Roof*	☐	☐	☐	☐
Ol nara wall blo haos *Other building walls*	☐	☐	☐	☐
Roof *Ruf*	☐	☐	☐	☐

AKRICALJA/ KAREN

SECTION D: AGRICULTURE / GARDENS

Kakai mo ol Karen kakai we yufala yet planem lo ol Karen blo yufala

D.1 Food and garden production

Sapos haoshol ya ino mekem any karen, plis ko lo D.2.

If the household does not undertake any food and garden production, please skip to D2.

Plis traem talem size blo Karen blo yu (lo skwe meta) we yu stap usum naia over lo last 12 manis).

D.1.1 Please indicate the size of garden (in metre squared) that you currently use (last 12 months)

Sapos wanem type onasip yu gat lo graon blo yu, hao yu rentem aot mo hao you usum graon blo yu isemak lo everi graon we yu ownem, plis tritem olsem hemi wan sem graon blo yu nomo. Sapos igat ol difren arenjmen lo ol differen pat lo graon we yu mekem fam lo hem plis yu spesifiem gud.

If type of ownership, rental status and land conversion is the same for all land, please treat as one 'parcel'. If there are different tenure arrangements for different part of the farmland, please specify accordingly.

	Siz *Size*			Hao yufala okupaem graon *Occupancy status*			Karen blo yu ibin jens lo size tu? *Has your garden changed in size?*	
	Wide blo em (W) *Width (W)*	Long blo em (L) *Length (L)*	Total (L x W)	Yu ownem *Owned*	Yu serem/ borowem *Shared/ borrowed*	Yu morgagem/ rentem *Mortgage/ rented*	Bigwan mo *Larger*	Smol mo *Smaller*
Parcel 1	m	m	m^2	☐	☐	☐	☐	☐
Parcel 2	m	m	m^2	☐	☐	☐	☐	☐
Parcel 3	m	m	m^2	☐	☐	☐	☐	☐
Parcel 4	m	m	m^2	☐	☐	☐	☐	☐

Total			m^2					

Listem daon ol impotan Karen kakai we haoshol blo yu istap planem, kakai/o salem lo las 12 manis.

D.1.2 List the most important crops that your household has produced, consumed and/or sold the last 12 months.

Not ol sids we yu stap planem blo nekis Karen kakai ino mas include daon lo ol lis ia.

Note growing seeds for the next crops should NOT be included below.

Karen kaka *Crop*	Yu stap planem fulap kakai beatem hemia we haoshol istap kakae? (Y) *Do you produce more than the household needs (Y)*	What do you do with the surplus		
		Salem *Sell*	Givem lo ol naraman *Give away*	Tradem *Trade*
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Yu stap fesem eni problem tu we imekem se yu no save planem/groem fulap mo kakai?

D.1.3 Do you face any problems that limit your how much food you can grow?

☐ Yes ☐ No

Sapos nogat yuk o stret lo D2.

If no, skip to D2.

Wanem nao ol mein problem we yu gat? Yu save rankem fulap eniwei yu likem, numberem start lo 1 kasem 14

D.1.4 What are the main problems you face? Rank as many as you like, numbered 1 to 14.

Nogat enaf rain *Not enough rain*	☐
Flood *Flooding*	☐
Hurrican mo cyclone *Storms and cyclones*	☐
Volcanoes, earthquakes, and tsunamis	☐
No save karem ol kakai ko lo maket *Can't get food to market*	☐
Nogat enaf sids lo stok *Lack of seed stock*	☐
Nogat enaf fetelisa/compos *Lack of fertilizers / mulch*	☐
Nogat enaf tuls mo equipmen *Lack of tools and equipment*	☐
Nogat wokman *No labourers / workers*	☐
Nogat enaf spes blo mekem Karen ko bigwan *Nowhere to expand my garden to*	☐
No save gat kasem akses lo lan nomo (woman, handicap, olfala, yut) *Cannot physically access land (female, disabled, elderly, youth)*	☐
No save aksesem bank, invesmen, mo finansial infomeisen, blo mekem agrilcalja bisnis. *Can't access banking, investment, and financial information, to expand my agricultural business*	☐

Laefstok mo ol animol

D.2 Livestock and animals

Sapos haoshol ino gat o no manjem eni laefstok plis ko lo D3.

If the household does not own or managed any livestock, please skip to D3.

Wanem nao namba blo laefstok moo l laefstok prodak we haoshol blo yu isalem, pem, o kakai ova lo las manis? Wanem nao namba blo laefstok yugat naia?

D.2.1 What is the number of livestock and livestock products that your household has sold, bought, or eaten during the last month? What is the present number of livestock?

	Yu stap producem/o yu ownem ol laefstok o prodaks ya? *Do you produce it / own it?*	Yu kakai samtaem(wan taem lo wan manis) *Eat regularly (once per month)*	Yu stap pem? *Do you buy it?*	Yu stap salem? *Do you sell it?*	Yu wantem kakai fulap taem mo lo hemia yu stap kakai naia? *Would you like to eat more?*
Poltry(olsem faol, duckduck, turkey, ol kaen meat olsem) *Poultry (chickens, ducks, turkeys etc. for meat)*	☐	☐	☐	☐	☐
Egg blo faol *Eggs*	☐	☐	☐	☐	☐
Mit blo pig (Mit) *Pigs (meat)*	☐	☐	☐	☐	☐
Buluk(Mit blo buluk) *Cattle (meat)*	☐	☐	☐	☐	☐
Milik blo buluk *Milk*	☐	☐	☐	☐	☐
Nani (Mit) *Goat (meat)*	☐	☐	☐	☐	☐
Milik blo nani *Milk*	☐	☐	☐	☐	☐

DAK BUSH LAN/GRASLAN BLO KOMUNITI

D.3 Communal forest land / grassland

Ol nara resos we haoshol blo yu istap colectem lo dak bush mo graslan aria, oli impotan olsem wanm lo olgeta?

D.3.1 How important are the other resources that your household harvests or collects from the forests and grasslands?

Ol prodak blo dak bush *Forest product*	Hemi no impotan tumas *Not very important*	Hemi impotan *Important*	Hemi impotan bigwan *Very important*
Ol kakai blo ol wael animol *Wild animal food*	☐	☐	☐
Bambu *Bamboo*	☐	☐	☐
Banana *Bananas*	☐	☐	☐
Ol prodak blo coconas *Coconut products*	☐	☐	☐
Rattan *Rattan*	☐	☐	☐
Ol leaf meresin *Medicinal plants*	☐	☐	☐
Ol frut we oli planem mo ol plan lo dakbush *Cultivated fruits and plants in forest*	☐	☐	☐
Ol wael frut, leaf mo plan *Wild fruits, leaves and plants*	☐	☐	☐
Ol nuts (olsem nangai, navel,namambe) *Nuts*	☐	☐	☐
Olm it blo dakbush *Bush meat*	☐	☐	☐
Ol masrum *Mushrooms*	☐	☐	☐

OL WOTA RESOS

SECTION E: WATER RESOURCES

Ol soses blo freswota

E.1 Freshwater sources

Yu tingbaot ol difren wota sos blo yu mo ol use blo em afta yu traem talem wij wan ittru lo yu:

E.1.1 Thinking about your freshwater sources and use, please state:

	Wota blo drink mo kukem kakai *Drinking / cooking*	Swim *Washing*	Washem klos *Washing of clothes*	Washem ol flawa mo plans *Watering plants*	Sos blo wota ia igud tu o nogat? *Is this source reliable?*	Wota sos iaksesabol lo everiwan lo haoshol blo yu o no, hemia hemi inkludem ol woman we igat bel, ol pikinini, ol olfala wetem ol olgeta we oli disabol? *Is this water accessible to all people in your household, including pregnant women, children, elderly, people with a disability?*
Ol tap mo well lo puplik ples *Public taps / wells*	☐	☐	☐	☐	☐	☐
Ol privet well *Private well*	☐	☐	☐	☐	☐	☐
Wota we istap kam lo spring wota *Natural spring*	☐	☐	☐	☐	☐	☐
Riva/lak *River / lake*	☐	☐	☐	☐	☐	☐
Wota lo tank we ikam lo rain *Rainwater tank*	☐	☐	☐	☐	☐	☐

Wota suplae *Piped water system (town supply)*	☐	☐	☐	☐	☐	☐
Botel wota *Bottled water*	☐	☐	☐	☐	☐	☐
Wota lo tank we truck ikarem kam putum iko *Tank water trucked in*	☐	☐	☐	☐	☐	☐

Sapos yufala stap collectem wota lo wan well, spring, riva, o lak, hu nao lo haoshol blo yufala istap collectem?

E.1.2 If water is collected from a well, spring, river, or lake, who collects it for your household?

☐ Woman / gel
Female / girl

☐ Man / boe
Male / boy

Sapos wota we yufala karem lo wan well, spring, riva, lak, blo oli usum insaed lo wan haoshol, blo ol olfala wetem ol disabol isum, hu nao istap ko from?

E.1.3 If water is collected from a well, spring, river, lake, who collects it for household elders, people with a disability?

☐ Woman / gel
Female / girl

☐ Man / boe
Male / boy

DOTI, SANITEISEN, WASH

SECTION F: WASTE, SANITATION, WASHING

Ol doti blo haoshol

F.1 Household waste

Hamas doti we ino save dicompost olsem ol tin,botel,plastic,ol diapa(exampol olting we ikam aot lo ol kakai mo ol nara samting we yufal ko pem)?

F.1.1 How much non-compostable waste, such as cans, bottles, plastics, nappies (for example, from food and purchases) does your household produce per week?

Nogat *None*	1 shopping bag nomo *Less than 1 shopping bag*	2-5 shopping bag nomo *2 – 5 shopping bags*	Namba blo shopping bag ibitim 5 *More than 5 shopping bags*	Spos wan nara wei blo caontem yu traem talem? *Another measure (state below)*
☐	☐	☐	☐	

Hao nao haoshol blo uu istap sakem ol doti we inosave dicompost or sting/roten olsem ol tin, botel, plastic? (Tikem olgeta we itru lo yu.)

F.1.2 How does your household dispose of non-compostable waste, such as cans, bottles, plastics? (Check all that apply)

Mifala neva gat eni *We never have any*	☐
Mifala usum bakaken ol waste or doti *We re-use all waste*	☐
Hol blo sakem doti behaen lo haos *Backyard pit*	☐
Bonem nomo behaen lo haos *Burn in the backyard*	☐
Waste/doti blo komuniti *Community waste pit*	☐
Sakem lo solwota o lo wan ples we wota iron lo em	☐

Ocean / waterway	
Wan ples lo komuniti we oli mekem recycle lo em *Community recycling centre*	☐
Olgeta we oli gat pepa blo colectem doti *Authorised collection*	☐
Narawei: _____ *Other*	

Hao nao haoshol blo yu istap manajem ol waste or doti we isave dicompost/sting/roten.

F.1.3 How does your household deal with compostable waste?

Givim o lol animol blo kakai *Feed to animals*	☐
Igat wan compost blo haoshol *Household compost*	☐
Bonem nomo behaen lo backyard *Burn in the backyard*	☐
Saken lo compost/doti blo komuniti *Community compost*	☐
Mixem nomo wetem ol nara waste lo hol blo doti blo komuniti *Mixed with other waste at community waste pit*	☐
Authorised collection Olgeta we oli gat pepa blo colectem rabis/doti	☐
Narawei: _____ *Other way*	

OL SANITEISEN RESOS BLO HAOSHOL

F.2 Household sanitation resources

Wanem toilet fasiliti nao ol memba blo haoshol blo yu igat akses lo em?

F.2.1 What toilet facilities do members of the household have access to?

	Bush toilet	Flas tolilet *Flush toilet*	Narawan *Other*	Ol woman we igat bel. Ol pikinini,o olgeta we oli disabol oli gat akses lo em *Accessible to people who are pregnant, are children, elderly, or people with a disability*
Insaed lo haos blo mifala *In our house*	☐	☐	☐	☐
Igat akses lo *Have access to*	☐	☐	☐	☐

Wanem helt mo haegen facility nao ol memba lo haoshol blo yu igat akses lo em?

F.2. What health and hygiene facilities do members of the household have access to?

	Showa/wash beisen *Shower / wash basin*	Faciliti blo ol gel mo woman blo showa mo manejem ol sikmun nids blo olgeta *Facilities for women and girls to wash cloths/ manage menstrual hygiene needs*	Faciliti blo ol woman mo ol gel blo sakem ol doti blo sikmun blo olgeta *Facilities for women and girls to dispose of waste relating to menstrual hygiene needs*	Igat akses lo olgeta we igat bel, ol pikinini, ol olfala mo ol disabol pipol *Accessible to people who are pregnant, are children, elderly, or people with a disability*
Insaed lo haos blo mifala *In our house*	☐	☐	☐	☐
Igat akses lo *Have access to*	☐	☐	☐	☐

USE BLO RIF MO MARIN RESOS

SECTION G: REEF AND MARINE RESOURCES USE

Use blo Rif mo ol marin resos(ol samting blo solwota)

G.1 Reef and marine resource use

Lo las wik igat eni man lo haoshol blo yu iko kajem or colectem eni samting lo solwota?

G.1.1 Has anyone in your household caught or collected marine resources in the LAST WEEK?

Sapos no, ko stret lo seksen H.

If no, then go to Section H.

☐ Yes ☐ No

Wea ples nao yu stap ko blo kasem kajem o colectem ol marine resos ya?

G.1.2 Where did you catch or collect marine resources?

	Where were they caught / collected *Yu/yufala kajem o colectem lo wea?*				
	Lokal rif *Local reef*	Narafala rif *Another reef*	Dip blu wota *Deep water*	Riva/lak *River/ lake*	Mangruf/natongtong *Mangrove*
Fis *Fish*	☐	☐	☐	☐	☐
Ol plan blo riva *River plants*	☐	☐	☐	☐	☐
Selfis *Shellfish*	☐	☐	☐	☐	☐
Ol narawan (Seawid, seacucumba, coral, mo ol nara samting blo mekem nekles, flasem basket lo em etc.)	☐	☐	☐	☐	☐

Other (seaweed, bêche de mer, coral + ornamental)					

Hu nao ikajem o colectem ol difren marin resos ya mo oli mekem wanm lo olgeta?

G.1.3 Who caught or collected these marine resources and what was done with them?

	Hu ikajem/colectem olgeta? *Who caught / collected them?*				
	Ol woman *Women*	Ol man *Men*	Olgeta we oli no man o woman (50-50) *Non-binary*	Ol gel, ol boe *Girls, Boys*	Olgeta we oli disabol/ol olfala *Disabled person/ Elderly*
Fis *Fish*	☐	☐	☐	☐	☐
Ol pan blo riva *Riverine plants*	☐	☐	☐	☐	☐
Selfis *Shellfish*	☐	☐	☐	☐	☐
Ol narawan (seawid, seacucumba, coral, mo ol nara samting blo mekem nekles, flasem basket lo em, etc.) *Other (seaweed, bêche de mer, coral + ornamental)*	☐	☐	☐	☐	☐

Wanem nao yu stap mekem wetem ol marine resos blo yu?

G.1.4 What do you do with your marine resources?

	Usum lo haos *Household use*	Givem lo ol famili blo mi/tribe memba blo me *Give to extended family/clan*	Salem/trade *Sell / trade*	Inogat inaf lo ol resos ya o yu wantem blo igat mo? *Is there a shortage or would you like more?*
Fis *Fish*	☐	☐	☐	☐
Ol plan blo riva *River plants*	☐	☐	☐	☐
Selfis *Shellfish*	☐	☐	☐	☐
Ol narawan (seawid, seacucumba, coral, mo ol nara samting blo mekem nekles,flasem basket lo em, etc.) *Other (seaweed, bêche de mer, coral + ornamental)*	☐	☐	☐	☐

Sapos yufala sta ko salem ol marine resos ya, hu lo yufala naos tap ko slame?

G.1.5 If the marine resources are sold, who sells the marine resources?

Ko salem olgeta? *Who sells them?*					
No salem *Not sold*	Ol woman *Women*	Ol man *Men*	Olgeta we oli no ma o woman (50-50) *Non-binary*	Ol gel, ol boe *Girls, Boys*	Ol disabol/olfala *Disabled person/ Elderly*
☐	☐	☐	☐	☐	☐

DEVELOPMEN BLO HAOS

SECTION H: HOUSEHOLD DEVELOPMENT

Ol impac blo Covid-19

H.1 Covid-19 impacts

Covid-19 ikam ijensem tu ol activiti we istap happen lo haoshol blo yufala?

H.1.1 Has the Covid-19 pandemic changed household activities?

	Bigwan *More*	Ino tumas *Less*	Inogat eni impac *No impact*	No save *Not sure*
Capaciti blo ko fishing *Capacity to go fishing*	☐	☐	☐	☐
Colectem ol selfis *Gathering shellfish*	☐	☐	☐	☐
Ol activiti blo sabsisten farming *Subsistence garden activities*	☐	☐	☐	☐
Hunt from ol smol animol lo forest *Hunting small animals in forest*	☐	☐	☐	☐
Colectem ol frut mo plans insaed lo forest *Gathering fruits and plants from forest*	☐	☐	☐	☐
Ol activiti we hemi releit lo turism *Tourism-related activities*	☐	☐	☐	☐
Salem ol produce mo handicraf *Sale of produce and handicrafts*	☐	☐	☐	☐
Wok iko andap (Ol woman) More work (Female)	☐	☐	☐	☐
Wok iko andap (Ol man) *More work (Male)*	☐	☐	☐	☐

Owk iko andap (Ol 50-50) *More work (Non-binary)*	☐	☐	☐	☐
Presa/wori *Stress / anxiety*	☐	☐	☐	☐

Narawan: _____

Other:

ENVARAMENTAL WETEM SOSAL JENS

H.2 Environmental and social changes

Wanem kaen wori nao yu gat lo ol envaramental jalens ya?

H.2.1 How concerned are you about the following environmental challenges?

Isu *Issue*	No wori tumas *Not very concerned*	Wori smol *A little worried*	Wori bigwan *Very worried*	Hemia inogud everiwan *This would be catastrophic*
Draot *Drought*	☐	☐	☐	☐
Hot *Heat*	☐	☐	☐	☐
Igat kakai istap oltaem *Food availability*	☐	☐	☐	☐
Igat fres wota istap oltaem *Freshwater availability*	☐	☐	☐	☐
Graon hemi rij *Soil fertility*	☐	☐	☐	☐
Weta/cyclone *Weather / cyclones*	☐	☐	☐	☐
Riva iflood *River flooding*	☐	☐	☐	☐
Graon closap lo solwota istap lus/finis *Coastal erosion / inundation*	☐	☐	☐	☐
Volcanoe, earthquake, tsunami *Volcano, earthquake, tsunami*	☐	☐	☐	☐
Cuttem doan ol tree lo forest, bonem ol tree lo forest etc *Deforestation*	☐	☐	☐	☐

Wanem kaen wori nao yu gat lo ol sosal mo ekonomik jenis ya?

H.2.2 How worried are you about the following social and economic changes?

Ol natural disasta we hemi includem flood, tsunami, cyclone, volcanoe, earthquake

Natural disasters include floods, tsunamis, cyclones, volcanic eruptions, earthquakes.

Isu *Issue*	No wori tumas *Not very worried*	Wori smol *A little worried*	Wori bigwan *Very worried*	Hemi inogud everiwan *This is catastrophic*
Stap ko hangri from draot, flood,nogud weta imekem ol crops/kakai inomo gat. *Going hungry due to loss of crops from droughts, floods, bad weather.*	☐	☐	☐	☐
Stap ko hangri from ol waves blo solwota ikam bigwan mo mekem inomo gat kcrops/kakai. *Going hungry due to loss of crops from increase ocean tides.*	☐	☐	☐	☐
Ol bush material blo mekem haos, ol crops mo kakai inomo gat from inomo gat enaf forest. *Loss of housing materials, crops, and food due from less forest.*	☐	☐	☐	☐
Sefty blo ol family lo taem blo natural disasta. *Family safety in natural disasters.*	☐	☐	☐	☐
Helt blo family lo ol days afta lo wan disasta istrike. *Family health in days following natural disasters.*	☐	☐	☐	☐
Sefty blo ol disabol pipol, ol olfala, ol mama mo ol pikinini during mo afta long wan natural disasta. *Safety people with a disability, the elderly, and mothers and children during and after natural disasters.*	☐	☐	☐	☐
Ol skuls mo hospital inomo gat. *Loss of schools, aid-posts/ hospitals.*	☐	☐	☐	☐
Wok blo ol mama naia ikam bigwan mo afte long wan disasta. *Increase in post-disaster workloads on women.*	☐	☐	☐	☐

Ol emejency mo disasta manejmen plan

H.3 Emergency and disaster management planning

Yu save wanem blo mekem lo taem blo wan emejency o lo taem blo wan natural disasta?

H.3 Do you know what to do in an emergency or natural disaster?

☐ Yes ☐ No

Ol opotuniti blo wan haoshol

H.4. Household opportunities

Sapos yumi lukluk iko lo fuja, hao impotan nao sam lo ol activiti ya lo saed blo impruvum hapines mo sekuriti lo haoshol blo yu?

H.4.1 Looking to the future, how important might these activities be for improving your household's happiness and security?

	Not important Hemi no impotan				Very important Hemi impotan tumas
	1	2	3	4	5
Tua gaed *Tour guiding*	☐	☐	☐	☐	☐
Runem wan restaron *Running a restaurant*	☐	☐	☐	☐	☐
Providem acomodasen blo ol turis *Providing tourist accommodation*	☐	☐	☐	☐	☐
Stap wok lo wan fuja turis acomodasen we hemi stap gohed naia *Working in existing/ future tourism accommodation*	☐	☐	☐	☐	☐
Stap leanem hao blo create mo operetem wan SME/bisnis *Learning how to create and operate a SME/ business*	☐	☐	☐	☐	☐
Stap ko from ol basic banking mo faenasial knoledj *Obtaining basic banking and financial knowledge*	☐	☐	☐	☐	☐
Stap karem ol nesesari edukeisen courses blo gat fulap Janis blo takem ap wok wetem ol bigfala kampani *Obtaining the education necessary to take up employment opportunities in the broader economy*	☐	☐	☐	☐	☐
Katjem fulap mo fish aotsaed lo solwota *Catch more fish out to sea*	☐	☐	☐	☐	☐
Mekem mo salem ol handicraf *Making and selling handicrafts*	☐	☐	☐	☐	☐
Mekem mo salem kakai *Making and selling food*	☐	☐	☐	☐	☐

Mekem mo salem klos *Making and selling clothes*	☐	☐	☐	☐	☐
Gat fulap mo buluk *More livestock*	☐	☐	☐	☐	☐
Stap improvum ol stael blo mekem karen *Improving my garden practices*	☐	☐	☐	☐	☐
Blo gat equal share aot lo ol wok blo haos *More equal share of household chores*	☐	☐	☐	☐	☐

Hao impotan nao ol seves ya mo ol infrastrkja ya istap mean lo yu blo impruvum laef blo ol pipol insaed lo haoshol blo yu?

H.4.2 How important will these services and infrastructure be to improve the lives of people in your household?

	Ino impotan *Not important*				Impotan tumas *Very important*
	1	2	3	4	5
Ol conservation project *Conservation projects*	☐	☐	☐	☐	☐
Gudfala helt kea *Better health care*	☐	☐	☐	☐	☐
Increasem mo improvum fulap mo gudfala akses blo wota sos *Increased/improved access to water sources*	☐	☐	☐	☐	☐
Ol sanitesen/ples blo toilet oli impruv *Improved sanitation/latrine facilities*	☐	☐	☐	☐	☐
Blo gat gudfala tijing lo saed blo takem gud kea lo ol facility mo hao blo sakem ol waste/doti blo sikmun *Provision of/improvement in menstrual hygiene education, facilities and waste disposal*	☐	☐	☐	☐	☐
Blo gat gudfala skuls *Better schools*	☐	☐	☐	☐	☐
Blo gat fulap mo wok *More jobs / labouring*	☐	☐	☐	☐	☐

Blo gat fulap mo buluk *More livestock*	☐	☐	☐	☐	☐
Blo gat gudfala akses lo rod *Better access roads*	☐	☐	☐	☐	☐
Blo gat gudfala akses lo ol maket blo salem ol prodius *Better access to markets to sell produce*	☐	☐	☐	☐	☐
Blo protektem ol coast lo solwota blo ol bigfala waves ino washem olgeta away *Coastal protection from erosion*	☐	☐	☐	☐	☐
Blo gat gudfala andastanding insaed lo haoshol blo me blo save mo abaot ol danja blo wan disasta *Information for understanding my household's risk from disasters*	☐	☐	☐	☐	☐
Blo mas gat ol emejency mo disasta manejmen plan we oli fokas lo ol woman, olgeta we oli dosabol, mo ol nara sosal vulnarabol grup *Emergency and disaster management plans that focus on women, people with a disability, and other socially vulnerable groups*	☐	☐	☐	☐	☐
Blo mek sua se ol gwoman moo l gel oli tek pat lo ol decisen making lo ol lockal disasta manejmen mo lo ol evakiuesen senta *Making sure women and girls can participate in decision making on local disaster arrangements and evacuation centres*	☐	☐	☐	☐	☐
Capaciti building blo sapotem ol womans grup blo tek pat lo ol komuniti komiti we oli stap manejem ol faiciti blo komuniti *Capacity-building to support women's groups for participation in community facility management committees*	☐	☐	☐	☐	☐
Trening blo ol woman, ol disabiliti, ol olfala blo save hao blo ronwei lo taem blo wan disasta mo hao blo rebild bak bakaken *Training for women, people with a disability, the elderly to prepare escape during disasters and rebuild afterwards*	☐	☐	☐	☐	☐
Imas gat ol emejenci mo ol disasta plans istap oltaem blo cutem doan ol woklod blo ol woman afta lo wan disasta *Provision of emergency and disaster management plans to mitigate women's post-disaster workload*	☐	☐	☐	☐	☐
Imas gat ol finansial trening mo risos blo save helpem ol woman mo pipol wetem disability afta lo wan disasta	☐	☐	☐	☐	☐

Provision of financial training and resources to help women and people with a disability following a disaster					
Blo identifyem ol cards mo bank akaon blo ol woman, olgeta wetem disability,ol olfala, moo l pikinini blo gat akses lo ol dosasta rispons sapot *Identity cards and bank accounts for women, people with a disability, the elderly, and children to access disaster response support*	☐	☐	☐	☐	☐
Blo gat sapot iko lo ol woman mo olgeta okanaisesen blo disasbiliti blo oli save oganisem ol insirens polici blo protektem ol risos blo ol haoshol after lo wan disasta *Support for women's and disabled people's organisations to organise insurance policies to protect household resources following a disaster*	☐	☐	☐	☐	☐

KAVANANS BLO KOMUNITI

SECTION I: COMMUNITY GOVERNANCE

Kavanans blo komuniti

I.1 Community governance

Ol kwesten lo ples ya istap refer lo viu blo man we stap ansarem kwesten nomo

The questions in this section refer to the respondent's view only.

Yu stap filim to se wanem we yu stap talem ol man lo komuniti stap lisen lo em mo yu filim se hemi enaf blo influem ol disisen making lo komuniti blo yu?

I.1.1 Do you feel your voice is heard and you have enough influence in village decision making?

Nogat nomo *Not at all*				Oh yes ibigwan tumas *Very much so*
1	2	3	4	5
☐	☐	☐	☐	☐

END BLO SEVEI

END OF SURVEY


EUROPEAN UNION


Sweden
Sverige


PEUMP


SPREP