Australian Government

Australian Centre for International Agricultural Research

Final report

Project full title	**Spatially Integrated Approach to support a Portfolio of Livelihoods**
project ID	FIS/2020/111
date published	08/10/2024
prepared by	Amy Diedrich, Bethany Smith, Katie Sievers, Dannie O'Brien
co-authors/ contributors/ collaborators	Hensllyn Boseto, David Boseto Aubrey Vavu, Relna Peter (Ecological Solutions Solomon Islands) Stephanie Duce, Claire Holland, Jacqui Lau, Tiffany Morrison, Nick Murray, Roquelina de Sousa de Saboya (James Cook University)
approved by	Dr Chris Barlow
final report number	FR2024-032
ISBN	978-1-923261-23-5
published by	ACIAR GPO Box 1571 Canberra ACT 2601 Australia.

Contents

1 Acknowledgments

We acknowledge and are grateful for the continuous leadership and contributions of the Project Steering Committee and other decision makers who contributed to project workshops, and who provided guidance and insights at all stages of the project. These include Rosalie Masu, James Teri, Ronnie Posala, and Peter Kenilorea from the Ministry of Fisheries and Marine Resources; Gregory Auta'a and Jonathan Taisia from the Ministry of Tourism and Culture; Reeves Moveni and Gideon Solo from the Ministry of Forestry and Research; Barnabas Bago, Nelly Kere, Marlchom Row, and Thaddeus Siota from the Ministry of Environment, Climate Change, Disaster Management and Meteorology; Roy Mae from the Ministry of National Planning and Development Coordination; Michael Ho'ota from the Ministry of Agriculture and Livestock; Roy May from the Ministry of National Planning and Development Coordination; Patrick Toiraena, Cornell Dalipanda, Chilleon Panasasa, Jully Misimake, Kristen Forsyth, Naghelyn Sogotee, Simeon Baeto from the Western Provincial Government.

We also thank the leaders and residents of the partner communities of Babanga, Pusiju and Uriaopo for their gracious hospitality and for their commitment to engaging in the project research activities, including the participatory mapping, development of the Livelihoods Risk Profiles and the adaptation planning workshops.

We acknowledge the contributions of the participants of the workshop hosted by A/Prof Amy Diedrich from James Cook University and Prof Hampus Eriksson from WorldFish/ANCORS, held in Townsville, Australia in November 2019 in helping to conceptualise the ILA. Those who are not members of the SRA team include Hampus Erikkson, Daykin Harohou, Gina Koczberski, David Mills, Tessa Minter, Dirk Steenbergen and Max Torell.

We would also like to extend our gratitude to the Crawford Fund for their generous support in funding capacity-building training workshops through their student award programme in the use of spatial mapping software for the in-country research team.

Finally, we thank the ACIAR Fisheries Program Managers who supported us throughout the SRA and the subsequent full proposal development process. These are Ann Fleming, Christopher Cvitanovic, Chris Barlow, and Ingrid van Putten. Thank you also to Lia Fraser for her unwavering support in all ACIAR processes.

2 Executive Summary

Inconsistent outcomes for livelihoods projects in small-scale fishing communities are common and are partly due to the focus on single sector initiatives and/or on small spatial scales, including limited engagement with complex adaptive systems. Often success is not sustained as projects are driven by external stakeholders, with adaptation responses not reflecting community realities, interests, and capacities. In this context, the aim of this SRA was to establish the strengthened networks, integrated governance and policy, and diagnostic framework required to implement an Integrated Livelihoods Approach (ILA) to support livelihood improvement project planning and assessment in Western Province, Solomon Islands. The ILA is intended to equip small-scale fishing communities and other decision-makers who support them with spatially explicit information about interacting hazards and livelihoods so that they may strengthen their livelihoods proactively and autonomously towards more equitable, sustainable, risk-informed futures.

The project employed a participatory, inclusive approach to research and was led by a multi-sectoral Steering Committee comprised of National and Provincial Government representatives from Solomon Islands. The main bodies of work included a national level governance review, the development of a Livelihoods Risk Profiling approach, and the implementation of this approach and a series of adaptation planning workshops in three coastal communities in Western Province. The SRA also initiated the development of a national level spatial database, comprised of layers representing key hazards (both climatic and non-climatic) affecting communities in Solomon Islands. The SRA had a central focus on providing skills-based training for local project staff in managing the ongoing engagement with communities and stakeholders, and the use of spatial data in livelihood project decision-making. The SRA established the partnerships, and laid the methodological, theoretical and applied foundations for advancing the Participatory and Integrated Planning Approach (PIPA) that will be developed via FIS/2023/122 *Planim Fiuja fo Yumi' - Co-planning Risk-informed and Equitable Livelihood Futures with Small-scale Fishing Communities through a Participatory and Integrated Approach to Community Engagement*. This full project seeks to refine, align and extend the application of the ILA in Western Province, and leverage opportunities to scale to other Provinces and countries in the Pacific.

The governance review confirmed a need and desire for more integration among sectoral policies, both in practice and in writing, and a more unified, coordinated approach to supporting community livelihoods. At the community scale, the data collection and community adaptation planning workshops supported the co-development of community specific Livelihood Risk Profiles and community-led adaptation pathways to achieve local visions. This information supported communities to develop adaptation pathways and livelihoods planning in the context of locally relevant challenges, including potential forest and coastal fishery resource exploitation. The community level assessments generated spatial data depicting interacting hazards at the local level. Our spatial database included national level maps of fishing and logging potential, sea level rise, and sedimentation that can give a broader understanding of which communities and regions are most at risk and why. These spatial resources, which will be further developed via FIS/2023/122, and will allow for an understanding of how hazard exposure varies over multiple spatial and temporal scales, providing a unifying point of reference for the development of nested spatial plans. Community-level spatial planning can be coherently integrated with Provincial level spatial planning, which can be nested within national level spatial plans.

Our research has developed an innovative approach to supporting integrated decision-making related to livelihoods in coastal communities in the context of risk and interacting hazards across the land-sea interface. This approach represents a significant departure from traditional methods by evaluating livelihood risk across sectors and scales and contributes to more comprehensive, place-based community adaptation planning.

3 Background

Communities in Solomon Islands and other Pacific nations are generally characterised by a diversity of interacting natural resource uses. Some of the more common activities include fishing, agriculture, logging, tourism, mining and aquaculture. Projects that promote alternative, supplemental or enhanced livelihoods are seen as a strategy to improve people's resilience to climate change and reduce pressure on natural resources but these projects often focus only on one sector (e.g. fisheries, tourism, agriculture, logging); thus, they fail to acknowledge the complexity of Pacific people's lives (Adger et al. 2002; Hill et al. 2012), which generally involve engaging in multiple livelihoods. Single sector approaches fail to acknowledge the diversity of coastal peoples' lived experiences, and risk missing interactions between sectors and livelihoods (Mills et al. 2017, Pomeroy et al. 2017). Such approaches persist despite some livelihood researchers calling for cross-sectoral interventions (Andrew et al. 2007, Osterblom et al.2016).

Multiple sectors and associated livelihoods that depend on the natural environment interact in the land and sea, and can create undesirable ecological and social outcomes, particularly when they compete for space and resources, or when they receive varied support from local people. Neighbouring communities in a landscape may differ in their engagement with these activities, and their choices may affect each other (e.g. unsustainable logging or agriculture in one community may affect fisheries and tourism in communities downstream). Understanding the spatial context of coastal people's livelihoods is crucial to support sustainability across interacting uses of natural resources, thus maximising the scale of benefits. Evaluating and managing livelihood activities from an integrated, spatial perspective will support the ability to address cumulative impacts on fisheries, and negative feedbacks, thereby increasing social-ecological resilience at large spatial scales.

This project aimed to address the challenge of balancing interactions between multiple livelihood activities and associated impacts in coastal areas by establishing an Integrated Livelihoods Approach (ILA), which seeks to guide decision-makers engaged in livelihood improvement project planning and assessment. The ILA provides an approach to diagnose and help navigate interrelated and cumulative impacts, trade-offs and co-benefits of interacting livelihood activities occurring in spatially defined coastal areas. Participatory and interdisciplinary research, integrated governance, negotiation, trust-building, ongoing conflict management, and cross-sectoral and political engagement are central to the ILA (Figure 1).

The SRA addressed five key limitations in the livelihoods field: (1) The general failure of single sector interventions (i.e. focus on a single sector), (2) the limited focus on small spatial scales (i.e. focus on a single community, habitat, or ecosystem), (3) externally-driven approaches (i.e. external problem-definition and solutions), and (4) lack of consideration for future uncertainty and rapid systems change (i.e. mal-adaptive, locked-in solutions that do not account for current and future risks).

The initial framework for the ILA was developed via a workshop hosted by A/Prof Amy Diedrich from James Cook University and Prof Hampus Eriksson from WorldFish/ANCORS, held in Townsville, Australia in November 2019. The workshop drew on the expertise of a scientific panel of twelve experts in Pacific livelihoods with research interests related to key industries operating in the Pacific Islands. This project sought to develop and pilot an Integrated Livelihoods Approach in partnership with stakeholders from Western Province, Solomon Islands (Diedrich et al. 2022).

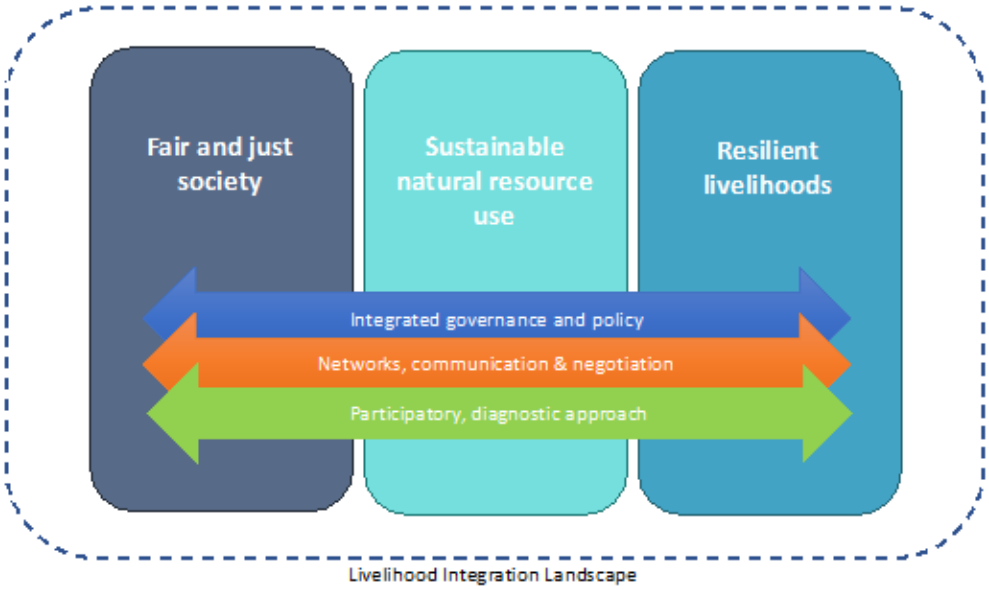


Figure 1 Schematic diagram of the key elements of the Integrated Livelihoods Approach

This project supports an emerging emphasis on risk-based planning in Solomons Islands. The *Solomon Islands National Development Strategy (2016 – 2035)*[1] centres on improving livelihoods and has the objective of sustained, inclusive, and value-added economic growth across key resource sectors. This goal is underpinned by the need for equity, cross-sectoral integration, and knowledge of how to achieve outcomes in the context of the risks posed by rapidly accelerating global change. Also, the *Solomon Islands National Fisheries Policy (2019-29)*[2] states that "fisheries management and development systems need to be resilient to unpredictable and potentially destabilising events in the environment that are external to the fishery". An integrated approach to livelihoods planning in the context of rapid, unpredictable change can support this policy goal.

Australia's International Development Policy (2023)[3] points to challenging times of rapid change and has the central objective of supporting Indo-Pacific countries to "enhance state and community resilience to external pressures and shocks", which is a core outcome for the ILA. This Policy also highlights the need to "consult closely and consider diverse perspectives to ensure we are focusing on where we can add most value and achieve most impact," has an explicit focus on equity, and on "genuine and respectful partnerships, supporting local leadership and local actors". The ILA is founded on the principles of equity and increasing local agency in shaping livelihoods futures and associated investments. At the regional level, this project aligns with Australia's commitment to supporting climate change adaptation in the Pacific[4] and with the goals of *Australia Pacific Sustainable Oceans and Livelihoods Partnership*[5] that aims to enable coastal fisheries to provide enhanced food security, nutrition and diversified livelihoods for Pacific people. Moreover, the *Solomon Islands-Australia Partnership for Development*[6], has a focus on stability and supporting economic growth, with an emphasis on rural livelihoods and effective governance. This work will also align with the SPC-led, multi-stakeholder partnership *Framework for Resilient*

[1] https://solomons.gov.sb/wp-content/uploads/2020/02/National-Development-Strategy-2016.pdf
[2] https://www.fisheries.gov.sb/mfmr-docs/mfmr-national-fisheries-policy-2019.pdf
[3] https://www.dfat.gov.au/sites/default/files/international-development-policy.pdf
[4] https://www.dfat.gov.au/about-us/publications/climate-change-action-strategy
[5] https://www.dfat.gov.au/geo/pacific/engagement/supporting-sustainable-oceans-and-livelihoods
[6] https://www.dfat.gov.au/geo/solomon-islands/development-assistance/development-assistance-in-solomon-islands#:~:text=Australia%20and%20Solomon%20Islands%20are,in%20response%20to%20COVID%E2%80%9119.

Development in the Pacific - An Integrated Approach to Address Climate Change and Disaster Risk Management 2017-2030[7].Finally, this research aligns closely with two of **ACIAR's priorities** in Solomon Islands: "Integration and sustainability of agriculture, fisheries and forestry resource management and development" and "increasing resilience and reducing the effect of climate change on sustainable agriculture, fisheries and forestry".

This report documents the development of the ILA in Western Province Solomon Islands for a Small Research Assessment (SRA) FIS/2020/111 commissioned by the Australian Centre for International Agriculture Research (ACIAR): Spatially Integrated Approach to support a Portfolio of Livelihoods, which was completed between June 2021 and June 2024.

[7] *https://gem.spc.int/projects/frdp*

4 Objectives

The overall aim of this SRA was to establish the strengthened networks, integrated governance and policy, and diagnostic framework required to implement an Integrated Livelihoods Approach (ILA) to support livelihood improvement project planning and assessment in Western Province, Solomon Islands. The ILA is intended to equip small-scale fishing communities and other decision-makers who support them with spatially explicit information, resources, and capacity to strengthen their livelihoods proactively and autonomously towards more equitable, sustainable, risk-informed futures.

Specifically, the five iterative objectives were:

1. To establish an ILA Strategic Partnership and Steering Committee.
2. To determine and initiate the governance and policy integration required to support the ILA.
3. Develop the ILA Diagnostic Framework.
4. Develop an ILA Spatial Database and Decision Support tool.
5. Establish mechanisms required to sustain and further develop the ILA after SRA completion.

5 Methodology

The project research strategy included four overarching elements that contributed to the aim to establish the strengthened networks, integrated governance and policy, and diagnostic framework required to implement an Integrated Livelihoods Approach (ILA) to support livelihood improvement project planning and assessment in Western Province, Solomon Islands (Figure 2). These were:

- A participatory, inclusive approach led by a multi-sectoral Steering Committee from Solomon Islands (objective 1).
- Interdisciplinary research and co-generation of knowledge.
- Foundations and capacity for a self-sustaining process and relationship to other ACIAR Investments.
- Potential for scaling-up to other locations and programmatic areas.

The main bodies of work included a national level governance review (objective 2), the generation of livelihoods risk profiles and the implementation of adaptation planning workshops in three partner communities in Western Province (objective 3), and the development of a national level spatial data layers representing key hazards affecting communities in Solomon Islands (objective 4). These are described in detail in the following sub-sections. This SRA has also informed the development of a full project FIS/2023/122 *'Planim Fiuja fo Yumi' - Co-planning Risk-informed and Equitable Livelihood Futures with Small-scale Fishing Communities through a Participatory and Integrated Approach to Community Engagement,* which will commence in January 2025 (objective 5).

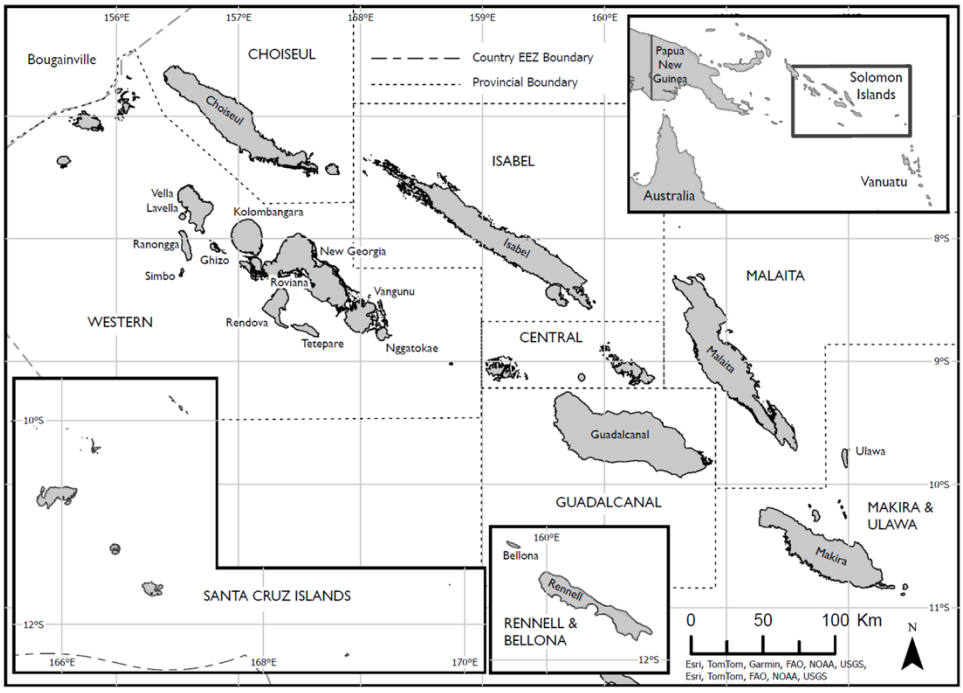


Figure 2 Map of Solomon Islands.

5.1 Governance Review

The overall aim of objective 2 was to assess the integration of fisheries and other sectoral policies in Solomon Islands. Integration was defined as 'the creation of linkages between pre-existing activities by actors bridging across nodes' (Morrison, 2004). Integration can occur at multiple stages of the policy process, whether it be at the capacity-building stage, or visioning, negotiating, exchanging of information and/or implementing tangible works and services (ibid).

The governance review addressed three major questions:

1) What are the current policies and governance integration contexts for the small-scale fisheries and tourism sectors?
2) How do small-scale fisheries and tourism integrate or interact with other livelihoods sectors?
3) Do the current policies and governance systems support the three key objectives of the Integrated Livelihoods Approach (ILA): (1) fair and just livelihoods; (2) sustainable natural resource use; and (3) adaptive livelihoods?

We used secondary and primary data sources to answer the research questions. First, we conducted a systematic review of policies, scientific and governance documents related to key livelihoods sectors in Solomon Islands and Western Province, with an emphasis on the tourism and small-scale fisheries sectors. Next, we conducted a series of key informant interviews with governance actors who were members of our Steering Committee (objective 1) and used these to corroborate and expand on the information we gathered via the systematic review.

A full report on the methods and results of the governance review is found in Appendix 1.

5.2 Livelihoods Risk Profiles and Community Adaptation Planning

5.2.1 Livelihoods Risk Profiling

Objectives 3 called for the development of methods and diagnostic approaches to support integrated adaptation planning at the community level. We collected community-level spatial, quantitative and qualitative data in three partner communities using a multimethod approach (figure 3). This information was obtained using the Livelihoods-Risk Profiling Framework (LRPF) and resulted in the development of Livelihoods Risk Profiles (LRPs) for each community, which are intended to support community-led adaptation planning. The LRPF is an expanded version of the IPCC AR5 Risk Framework (IPCC 2014), which has been adapted to the context of rural livelihoods (Figure 4).

Data Collection

Data for the LRPF were collected using a mixed-methods approach, gathering qualitative and spatial data through focus group mapping workshops and household-level surveys.

Focus group mapping workshops captured local perceptions of hazard exposure. Comprising a diverse demographic group of twelve participants, workshops began with a ranking activity, where participants evaluated and ranked hazards from low to high based on their perceived impact on livelihoods. Two mapping activities followed, these used satellite images to map the location where hazards occurred in a community's land and seascape, and the location of key sources used by community members to access water, food, housing, energy, and income.

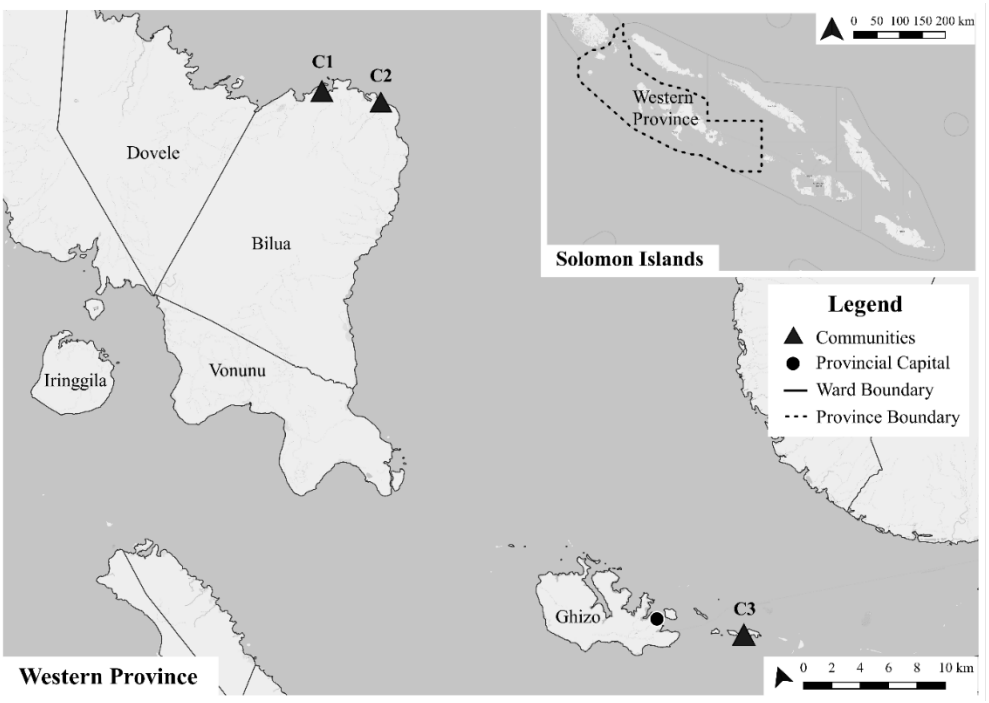
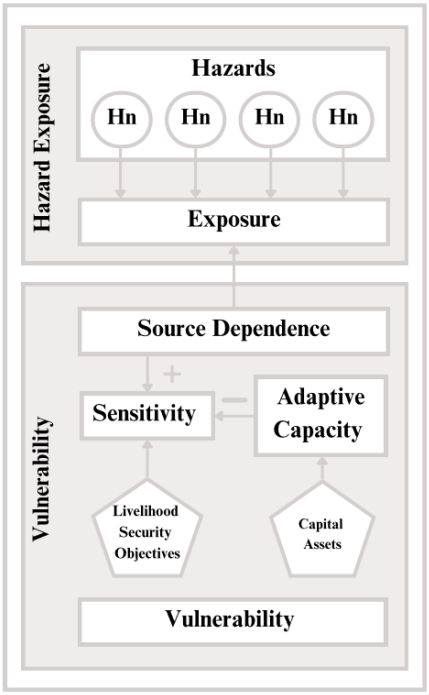


Figure 3 The location of partner communities in Western Province, Solomon Islands



Livelihoods Risk: The potential for impacts where rural livelihoods are at stake, and the outcome is uncertain.

Hazard: The potential occurrence of a shock or stressor event that may impact rural livelihoods.

Exposure: The presence of rural livelihoods in a location that may be adversely impacted by the occurrence of a hazard.

Vulnerability: The degree to which rural livelihoods are sensitive to, or unable to adapt to adverse impacts from hazard exposure.

Source Dependence: The degree to which rural livelihoods depend on source types that may be impacted by hazard exposure.

Sensitivity: The degree to which rural livelihoods may be impacted by hazard exposure.

Adaptive Capacity: The ability for communities engaged in rural livelihoods to respond to potential impacts, take advantage of opportunities, or respond to consequences.

Figure 4 Components of the Livelihoods-Based Risk Profiling Framework (LRPF) and their definitions in the context of rural community livelihoods (adapted from Smith et al. 2024, in review).

Household surveys provided quantitative data on vulnerability. Surveys were developed to encompass a range of socio-economic indicators of adaptive capacity and sensitivity, and information on source dependence and household level hazard exposure (Table 1). Surveys, translated into Solomon Island Pijin, included various questions comprising open ended, categorical and Likert Scale question types. Surveys were conducted by local researchers in the local language through face-to-face interviews which lasted approximately 45 minutes. Convenience sampling was used to ensure a diverse representation of households were accessed within each community, and surveys alternated between male and female household heads to obtain a balanced response across sexes.

Table 1 Data collected through household surveys to measure risk in the LRPF

LRPF Component	**Indicator / Data**	
Adaptive Capacity	• Dependency ratio • Health condition • Access to healthcare • Livelihood diversity index • Extent of coping strategies • Household savings • Household income • Household expenditure • Income satisfaction • Access to financial services • Social networks	• Inclusion in decision making • Local institutional membership • Satisfaction with leadership • Trust • Collective action • Perceptions of fair access to livelihood opportunities • Access to livelihoods-based assets • Perceptions of fair access to natural resources
Sensitivity	• Access to drinking water • Water sufficiency • Water quality • Access to sanitation • Food sufficiency	• Food consumption score • Housing condition • Cooking sufficiency • Lighting sufficiency • Income stability
Source Dependence	• Access to water • Access to food • Access to housing materials	• Access to cooking fuel • Access to lighting • Access to income
Hazard Exposure	• Hazards impacting access to water • Hazards impacting access to food • Hazards impact access to housing materials	• Hazards impacting access to cooking fuel • Hazards impacting access to lighting • Hazards impacting access to income

Data Analysis

Hazard Exposure: Focus group data yielded mean ranking scores which were aggregated by the thematic hazard they related to (e.g., climate change, resource exploitation). Hand drawn maps were digitised using QGIS to create polygons reveal hazard distribution and source type locations within the local landscape. Overlaying these polygons produced a map of hazard and source type interactions (i.e., hazard exposure). Open-ended survey responses were used to obtain additional information on hazard exposure which did not exhibit spatial variation at the local scale.

Vulnerability**:** Household survey data on source dependence were analysed to establish the percentage of households within a community dependent on a specific source type. Data on sensitivity and adaptive capacity were then combined to produce a LRPF vulnerability index. Survey responses were processed to calculate standardised indicators for the index. A multi-criteria evaluation (MCE) approach was then employed using the Analytic Hierarchy Process (AHP) to assign weightings to each indicator. Composite indicators were calculated using the weighted scores and standardised to a 0-100 scale. These composite indicators were further combined to produce a final vulnerability index score using the formula $V = f(AC\text{-}S)$, again standardised to a 0-100 scale. Index scores were classified into ranks ranging from very low to very high.

Decision Support Outputs

Livelihood Risk Profiles: LRPF components were combined to depict community-level risk through a visual profile. These represented hazards and their assigned level of concern to community livelihoods, hazard exposure locations, source dependence, and vulnerability index outputs. Traffic light scales were used to illustrate risk levels and support their interpretation for risk-informed decision making (see sample in Figure 5).

Livelihood Risk Reports: Risk profiles were accompanied by a full report of outputs, including suggested priorities for adaptation based on key local drivers of risk. These are confidential to the communities, so the details are not included in this report.

A detailed description of how to implement the LRPF is in Appendix 2 ‘*Livelihoods Risk Profiling Framework User Manual’.*

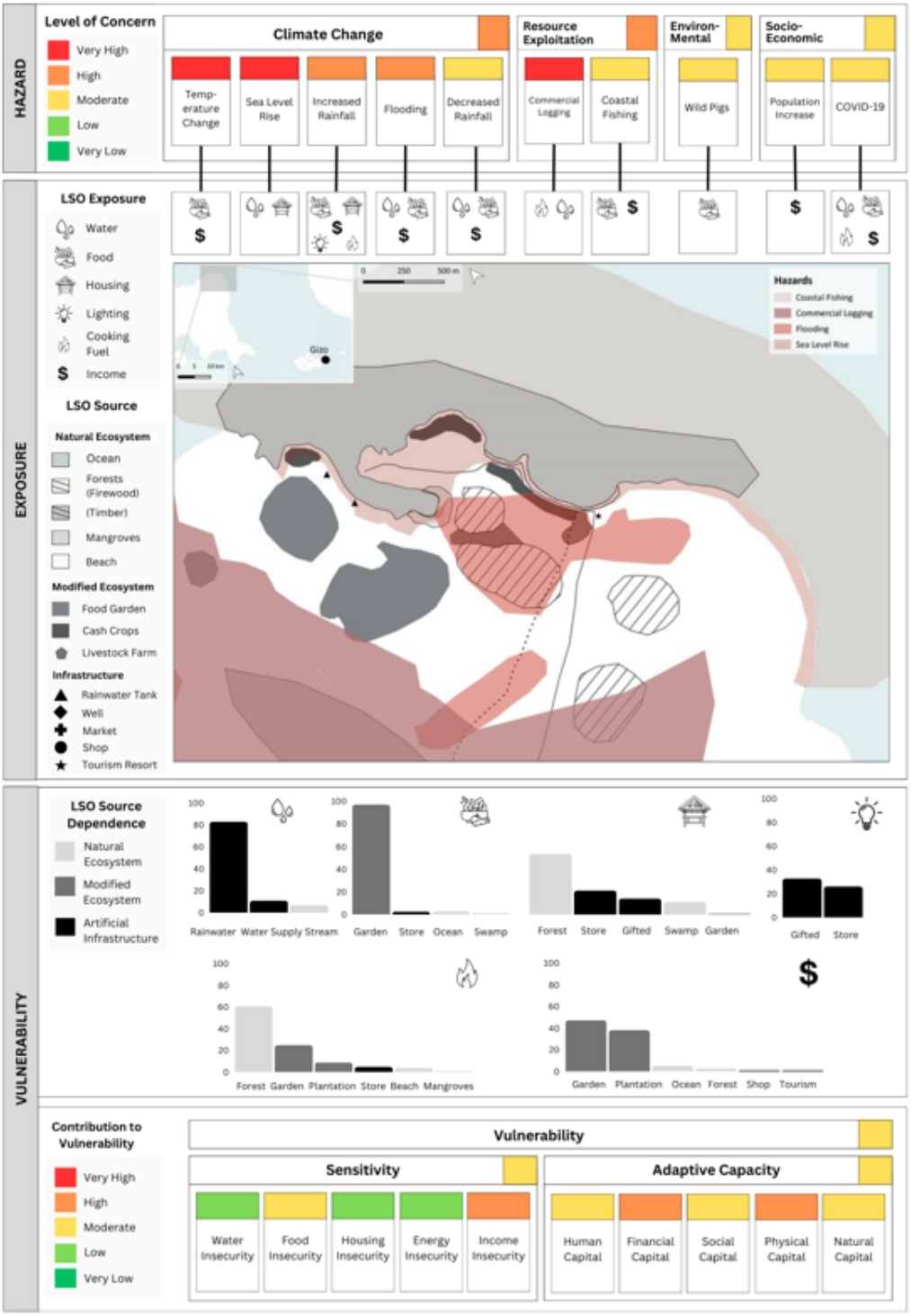


Figure 5 Sample Livelihood risk profile developed for risk-informed decision making at the community scale based on LRPF outputs.

5.2.2 Community Adaptation Planning Workshops

In 2022, we reoriented our approach to objective 3 from developing a new diagnostic approach to adapting an established methodology for community adaptation planning–Community Adaptation Pathways in the Solomon Islands (CAPSI) (Butler et al. 2021). The CAPSI approach provides an opportunity for communities to identify actions that support

them in achieving their desired future, whilst adapting to future drivers of change. The approach applies four major steps (Figure 6).

1. Identifying key drivers of change that may impact a community.
2. Developing an agreed future vision for community livelihoods.
3. Visualising potential futures based on a range of 'drivers of change' scenarios.
4. Making collective decisions on potential 'no regrets' adaptation and development strategies that will enable a community to achieve their desired future and adapt to drivers of change.

The CAPSI was conducted through a one-day participatory workshop in each of the partner communities. Participants were selected with the support of community leaders and comprised a minimum of twelve individuals from a range of demographic groups. Local researchers facilitated workshop activities which were conducted in Solomon Island Pijin.

We expanded the CAPSI approach to incorporate risk (Smith et al. *In Prep*), providing a deeper understanding of the 'no-regrets' status of locally desired adaptation by addressing the underlying drivers of vulnerability and risk within the community. Risk was integrated during step 4 of the CAPSI process, which involves making collaborative decisions on adaptation. For each proposed adaptation strategy, we considered the following questions:

- How might adaptation intersect with other hazards?
- How might adaptation be affected by local sensitivity?
- How might adaptation be affected by local capacity?

To answer these questions, we used the livelihood risk profiles described in the previous section. These profiles offer a comprehensive summary of community level risk analysing environmental, social, and economic factors at the community scale.

A detailed description of the methods used is provided in the appended report '*Livelihoods Risk Profiling Framework User Manual' (Appendix 2)*.

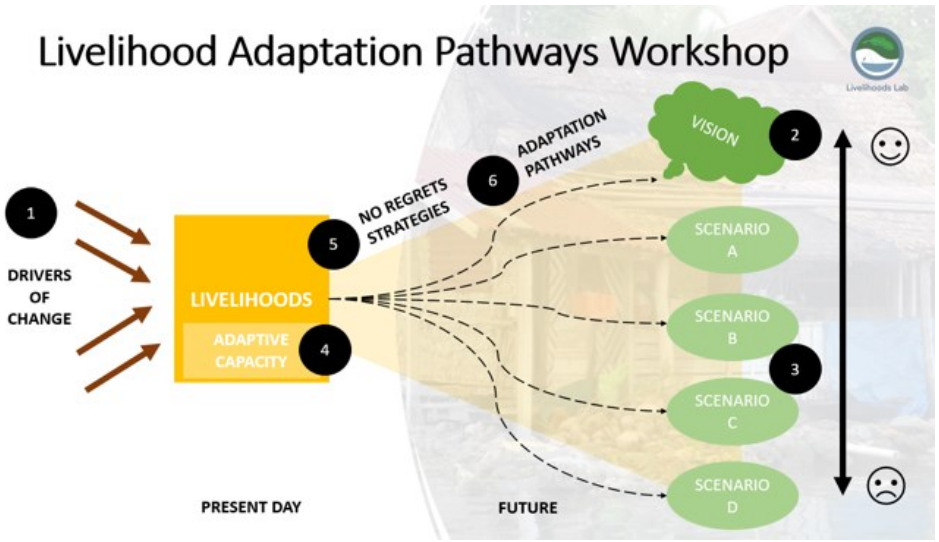


Figure 6 Schematic Diagram of the Livelihoods Adaptation Pathways Workshops implemented with Partner Communities, based on the CAPSI methodology

5.3 ILA Spatial Database

We developed a spatial database comprised of national level data describing key hazards affecting coastal community livelihoods in Solomon Islands (objective 4). The potential exploitation layers serve multiple functions. They provide a model for replicable spatial modelling, and they are essential for validating and refining the decision support framework. Additionally, they aid in calibrating the methodology for assessing livelihood risk when integrating multiple criteria from other tools. This database, which currently sits with the local project leader in Solomon Islands (ESSI) will serve as a baseline for adding more spatial layers and supporting risk-based Marine Spatial Planning in project FIS 2023/122, which starts in January 2025.

Spatial data layers contributing to the database can generally be classified into two categories: biophysical and social. In the database, both individual and modelled layers are included, offering flexibility for various risk profiling scenarios and user needs. By combining biophysical and social criteria, this database generates relevant, accurate, and actionable data to assess livelihood risks within the presented framework.

Biophysical and environmental data were selected based on the following specific criteria:

1. **Relevant.** Spatial data must be relevant to coastal communities and useable within a risk profiling framework (e.g. environmental information that may directly or indirectly affect local communities).
2. **Geographic Coverage.** The data must be nationwide or global to provide the capabilities of scaling out to other provinces, regions, or countries. For data not global (e.g. regional boundaries of Solomon Islands), an analogous data should be available.
3. **Spatially Appropriate.** Data should be, if possible, at spatial resolutions that are relevant to communities (i.e., <5 km grids).
4. **Accessible**. All original spatial layers must be free, available, and open source to allow for widespread access and use by non-scientists.
5. **Current**. Where possible and relevant, data should be regularly updated from reliable sources. For instance, while static data like country boundaries typically remain unchanged, dynamic data such as forest cover requires regular updates to accurately reflect current conditions.

One output of the ILA spatial database was a comprehensive assessment of hazard and exposure for two of Solomon Islands' primary environmental resources: forests and fish. The analysis aimed to develop national maps of these resources and identify locations vulnerable to resource modification or exploitation based on their hazard and exposure levels. The final output for both forest and fish layers are a "Potential Exploitation" index, combining hazard and exposure components from the LRPF. Hazard represents the likelihood of resource modification, extraction, or use, primarily influenced by human accessibility, while exposure indicates the resource's presence. Thus, potential exploitation indicates areas vulnerable to resource pressure due to the interplay of accessibility and resource presence. Full methodology of fish and forest potential exploitation are included as on a GitHub Repository (https://github.com/ktsievers/SB_Spatial_Data_LRPF).

Table 2 A selection of the most relevant spatial data layers used in analysis, and available within the spatial database.

Data Layer	Data Category	Primary Data Source	Resolution	
Land Cover	Resource & Access	ESA World Cover	10 m	https://esa-worldcover.org/en
Marine Benthic Habitat	Resource	Allen Coral Atlas	5 m	https://allencoralatlas.org/
Marine Geomorphology	Resource	Allen Coral Atlas	5 m	https://allencoralatlas.org/
Reef Extent	Resource	Allen Coral Atlas	5 m	https://allencoralatlas.org/
Roads	Access	Open Street Map	<1 m	https://solomonislands-data.sprep.org/dataset/openstreetmap-data-solomon-islands
Elevation	Access	ASTER DEM	1 arc second (~30m)	https://solomonislands-data.sprep.org/dataset/aster-global-digital-elevation-model-gdem-version-3-astgtm-solomon-islands
Land Slope	Access	ASTER DEM	1 arc second (~30m)	https://solomonislands-data.sprep.org/dataset/aster-global-digital-elevation-model-gdem-version-3-astgtm-solomon-islands
Population Size	Access	SPC	100 m	https://pacificdata.org/data/dataset/slb_population_grid_2020
Jurisdictional Boundaries	Access	SPC	1 m	https://pacificdata.org/data/dataset/2009_slb_phc_admin_boundaries

Fish Potential Exploitation

Fish Exposure

For fish, our study focuses on coastal nearshore reef fishes that are the target or subsistence of some commercial resources (Gillet 2014). To address the limited availability of fishery data in Solomon Islands, we developed a proxy-based approach to estimate reef fish biomass. Utilizing data from the Allen Coral Atlas, we incorporated benthic habitat and geomorphic features as indicators of fish presence and abundance. By assigning relative values to different habitat and geomorphic zones, we constructed a model to predict fish biomass distribution. An additional buffer zone was established around reef areas to account for fish movement beyond specific reef zones. The resulting fish exposure layer was a combination of benthic habitat, marine geomorphology, and adjacent habitat areas which were assigned high and low values based on their likelihood of harbouring high fish densities. Integrating these layers yielded a nationwide fish resource map.

Fishing Hazard

To assess the hazard component of potential fish exploitation, a series of spatial layers representing accessibility to fish resources by humans were developed. Distance to coast, population size, and weighted distance to nearest provincial capital were the three access layers used to assess the hazard of nearshore reef fish exploitation.

One method to map fishing pressure is to infer access by measuring the distance from the coast (Thiault et al. 2017, Weeks et al. 2010, Smallhorn-West 2018, Harborne et al. 2018,

Wedding et al. 2018, Magris et al. 2015). Here, we measured access as a Euclidian distance linear decay up to 20 km from shore. This assumes that the greatest access is closest to shore, and the access of fishers to their fishery resource decreases linearly as the distance from shore increases.

To complement the distance from coast layer with a representative layer for the amount fishing effort that may take place on nearshore reefs, population data was extrapolated to coastal areas. Population was mapped at the lowest jurisdictional boundary, Enumeration Area, and data was acquired from the Pacific Data Hub (SPC) as the 2009 Population and Housing Census data, with data projected to 2020 population estimates. Population values were then extended out to the coastal areas, by using the Euclidian allocation tool in ArcGIS Pro 10.1. The resulting layer has population values overlaid onto coastal zones (up to 20 km distance) from adjacent coastal enumeration areas.

Finally, it is well documented that proximity to urban centres can negatively impact fish populations (Brewer et al. 2012, Cinner et al. 2013, Cinner et al. 2018). Increased accessibility from provincial capitals or fish markets often leads to heightened fishing pressure, as demand for seafood rises. Consequently, a shorter distance to urban markets can act as a catalyst for unsustainable fishing practices, jeopardizing the long-term health of marine ecosystems. The presence of nearby fish markets, and a measure of the distance to fish markets provide accurate measures for the condition of reef fisheries (Cinner et al. 2013), and the biomass and diversity of some coral reef fishes (Brewer et al. 2012). Adapted from Cinner et al. 2018, we developed a spatial layer depicting the distance from provincial capitals, with travel time adjusted depending on the land or sea type. For example, roads and sea areas had the quickest traveling speed, whereas forested areas have the slowest travelling speed.

All hazard layers are scaled 0-100 before combining and summing the individual hazard layers to generate a comprehensive hazard access layer (Figure 7).

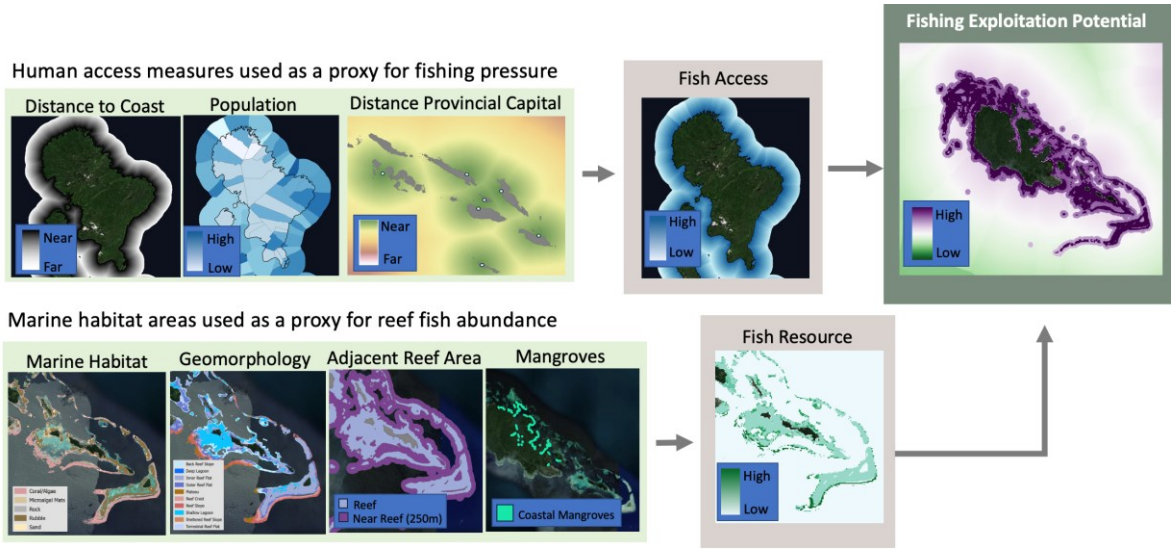


Figure 7 Spatial data layers that contribute to Fishing Exploitation Potential.

Forest Potential Exploitation

Forest Exposure

Forested areas were defined by using ESA WorldCover dataset, and the most recent 2020 data layers was selected. This dataset provides a global land cover product with 11 classes at a 10-meter spatial resolution. Its global coverage, high resolution, and annual updates make it the optimal choice for mapping forest resources within the risk assessment

framework needs. From the 11 data classes, Tree Cover, and Mangrove classes were combined, all other classes removed, and the resulting forest layer was clipped within the polygons of the land areas.

Forest Hazard

To assess the hazard component of potential forest exploitation, a series of spatial layers representing accessibility to forest resources were developed. Generated layers are distance to coast, distance from roads, elevation, slope, and proximity to modified land. These layers were derived from open-source data and contribute to the overall hazard assessment of forest resources. The final and intermediate layers are stored in the spatial database.

Beyond the physical removal of forested areas to create roads, road networks significantly increase the access to forested areas for commercial logging entities and local communities. In Solomon Islands, logging companies most often create temporary (6 months – 3 years) wharf locations knowns as log ponds along the coast, felling nearshore mangroves to create easy access to shore (Minter et al. 2018). In addition, temporary, unpaved, and improper road development follows log pond establishment to generate quick access to forested areas (Minter et al. 2018). Therefore, road locations and distance from coast represent two spatial layers that would be reflective of commercial logging access to forested areas.

Extraction of forest resources for commercial logging and agricultural purposes is significantly influenced by both elevation and land slope. Logging of forest resources is legally restricted to lowland areas less than 400 m elevation under the Forest and Timber (Amendment) Act 1984. Additionally, in Solomon Islands, soils above 400 m can be unstable (Katovai 2012) leading to higher levels of soil erosion, and often have steep slopes that make it hard for large machinery to access for logging purposes. Therefore, Solomon Islands Logging Code of Practice permits only selective harvesting on slopes steeper than 20°, and no harvesting at all on slopes greater than 30° (McIntosh 2013). Land elevation was categorized in two groups, above and below 400-m elevation representing low and high access, respectively. Land slope categorized into flat (0-20° slope), medium (21-30° slope), and high (>30° slope), representing high, medium, and low potential access, respectively.

Areas near urban zones, agricultural lands, and previously forested locations are more likely to be modified compared to remote intact forests. For example, recovery of forests in Kolombangara, Solomon Islands differed when forests were near unlogged forest locations (Katovai et al. 2016). Modified land area classes consisted of all non-forested lands (deforested, shrubland, grassland, cropland, built-up, and bare/sparse vegetation). These land types were combined to represent modified land areas, and a buffer of 200 m was generated around modified land. If forested areas fell within the 200 m buffer, those areas were classified as having a high potential for forest resource modification, whereas areas beyond the 200 m buffer had a low potential.

Roads, distance to coast, elevation, land slope, and areas adjacent to modified land were all scaled to a range of 0 to 100. Where necessary, layers were converted to rasters at 50-meter spatial resolution. The scaled access layers were then combined by summing them. The resulting cumulative access layer was then scaled again before being combined with the forest resource layer.

Combining Hazard and Exposure (Potential Exploitation)

To understand how access layers interact with their specific resource layers, access and resource layers were combined. For the forest impact layer, the access raster layer was multiplied by resource layer. Multiplication was used in this case as access to forest resources cannot occur where forest resources are not present. The resulting layer is a forest impact raster layer where values of 0 represent locations without forest, and values 1-100 represent a continuous scaled assessment of access to the forest.

For fishing impact, the fish resource layer was summed with the access layer. Summation was selected for fishing as the boundaries for fish resources are less distinct, and fishing can occur off reef locations. Both the forest impact and fishing impact layers were scaled 0-100 (Figure 8).

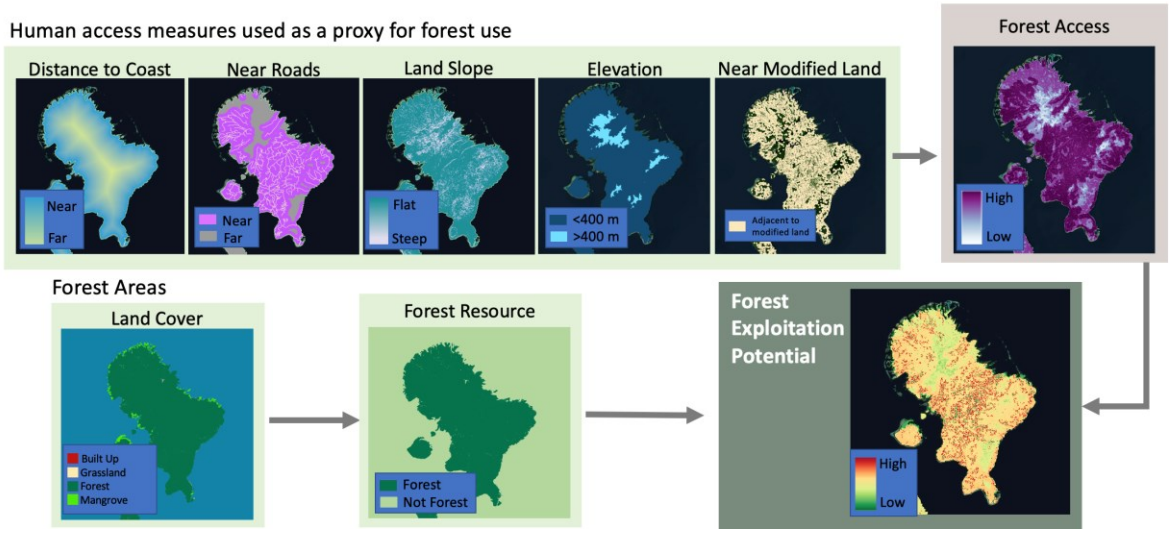


Figure 8 Spatial Data Layers that contribute to Forest Exploitation Potential.

Detailed methods, justification, spatial data layers, and associated code for this objective can be accessed at (https://github.com/ktsievers/SB_Spatial_Data_LRPF).

6 Achievements against activities and outputs/ milestones

6.1 Objective 1: To establish an ILA Strategic Partnership and Steering Committee

Objective 1: To establish an ILA Strategic Partnership and Steering Committee			
No.	**Activity**	**Outputs/ milestones**	**Completion date**
1a	Conduct semi-structured interviews, participatory mapping, and focus group interviews with key stakeholders in the 'livelihood integration landscape'	Key informant interviews Community focus groups and participatory mapping.	Key informant interviews with all project SC members were completed in June 2022 (see Annual Report 2021) and results are included in the Governance Review Report (Appendix 1). Community Focus groups were completed in May 2022 (see Annual Report 2021). Participatory mapping was completed with 3 partner communities in Sept 2022. These contributed to the Livelihood Risk profiling process (Appendix 2).
1b	Engage representatives of key stakeholders in a Strategic Partnership, led by a Steering Committee (SC)	Partnership agreement and Terms of Reference for ILA strategic partnership	Committee formed at project inception and initial consultation held in Sept 2021 (see Annual Report 2021). An in-country Workshop was conducted in Honiara in Sept 2022 (see Annual Report 2022) and then a final one May 2024 at the end of the project.
Comments The current steering committee agreed to continue its leadership in the full project FIS/2023/122 and it was decided to postpone the development and ratification of the ToRs to the inception meeting.			

6.2 Objective 2: To determine and initiate the governance and policy integration required to support the ILA

Objective 2: To determine and initiate the governance and policy integration required to support the ILA			
No.	**Activity**	**Outputs/ milestones**	**Completion date**
2a	Conduct a review of key policies relevant to the management of natural resources, livelihoods, industry and development activities in the landscape.	Report on governance and policy review, including recommendations for integration process	Governance and Policy review, including recommendations for an integration process completed in December 2021.
2b	Generate a strategy for and, where possible, initiate the governance and policy integration process required to support the ILA		Key informant interviews completed in 2021. Results of interviews presented and discussed with the Steering Committee in September 2022.

		The final workshop in May 2024 set the agenda and priorities for the full project FIS 2023/122.
Comments We presented the results of the interviews to the SC in September 2022 and discussed a potential strategy for integration. The strategy for supporting the ILA has been developed via the engagement if the Steering Committee, particularly MFMR, in the full proposal for FIS 2023/122.		

6.3 Objective 3: To develop the ILA Diagnostic Framework

Objective 3: Develop the ILA Diagnostic Framework			
No.	**Activity**	**Outputs/ milestones**	**Completion Date**
3a	Convene a series of workshops to develop the ILA Diagnostic Framework	Community level surveys and mapping focus groups. CAPSI Workshops. Livelihoods Risk Profiles (confidential so not included in this report) Publication (in prep) on adapted CAPSI Methods and Results A methodological paper describing the Livelihoods-Based Risk Profiling Framework (LRPF) and its implementation has been accepted for publication and is in review in the journal 'AMBIO' (Smith et al. *In Review*) 2024 Systematic Review of current progress in Community Based Vulnerability Assessments (Smith and Diedrich, 2024). Perspective paper describing the Integrated Livelihoods Approach (Diedrich et al. 2022)	Data collection of community-scale spatial data and risk profiling information in the integrated livelihood landscape conducted in September/October 2022 (see Annual Report 2022). ILA Decision Support Tool completed as a Livelihoods-Based Risk Profile Framework (LRPF) 2024. Scenario planning workshops with communities conducted in Feb 2023. The results were presented back to the community as part of their Livelihoods Risk Profiles in May 2024. Livelihood risk profiles presented to communities in May 2024.
Comments Workshops to develop the framework were delayed at the beginning of the project due to travel bans. Two visits in September 2022 and February 2023 occurred to conduct data collection and tool development workshops. In the second year, we re-orientated our approach to this objective from developing a new diagnostic approach to adapting an established methodology - Community Adaptation Pathways in the Solomon Islands (CAPSI) approach to community-based livelihoods planning. We implemented scenario planning workshops to develop community adaptation plans with our three partner communities in February 2023. In May 2024 the CAPSI methodology and we the results to partner communities. These results were included in their livelihoods risk profiles, which are confidential and hence not included as appendices to this report.			

6.4 Objective 4: To develop an ILA Spatial Database and Decision Support tool

Objective 4: Develop an ILA Spatial Database and Decision Support tool			
No.	**Activity**	**Outputs/Milestone**	**Completion date**
4a	Collate available spatial data relevant to the 'livelihood integration landscape	ILA Spatial Database and Decision Support Tool Scientific publication describing Spatial database	Collation of national level spatial data completed (4a) in January 2023 and shared on a OneDrive spatial database between all collaborators Report in prep (Seivers et al).
4b	Develop spatial analyses of key biophysical, socioeconomic and governance data in the 'livelihood integration landscape' to identify interactions and provide information to support the ILA Diagnostic Framework	Spatial analysis of national level resource exploitation potential maps is complete for forest and fish resources Participatory mapping and Spatial analysis of community level risk	Jan 2023 Spatial analysis of community level risk conducted in 2023 and disseminated to communities in May 2024 as part of Livelihood Risk Profiles.
Comments Biophysical data are available currently shared on an internal spatial database (OneDrive) among all partner members. The decision support tool has been adapted towards a Livelihoods-Based Risk Profile Framework (LRPF) which is intended to work in conjunction with the spatial database. The LRPF is complete, and the risk profiles for focal communities have been analysed. We have also completed the analysis of potential exploitation risk of two major resources in Solomon Islands (Forest and Fish), and spatial data and results are available within the database. Detailed code are accessible in the GitHub Repository: https://github.com/ktsievers/SB_Spatial_Data_LRPF.			

6.5 Objective 5: To establish Mechanisms required to sustain and further develop the ILA after SRA completion

Objective 5: Establish Mechanisms required to sustain and further develop the ILA after SRA completion			
No.	**Activity Outputs/ milestones**	**Outputs/Milestones**	**Completion date**
5a	SRA Final Workshop	Final training activities (as identified) Final Project Workshop Theory of Change/Full project proposal for broader scope ILA (December 2022) Final workshop report including ILA implementation strategy (January 2023) Scientific publication describing the Western Province ILA implementation case study and its broader implications (February 2023)	Periodic (see 5b) May 2024. FIS 2023/122 to commence in Jan 2024. Included in Full Proposal FIS 2023/122 to commence in Jan 2024. Smith et al, in review, Ambio
5b	Training activities	Facilitator training with ESSI (Appendix 3 & 4) QGIS training (Appendix 5 & 6)	Feb 2023 May 2024
Comments: In the first year (2021) we proposed initiating discussions around the prospect for developing this SRA into a full project proposal to inform this process. In the second year (2022) the concept note was accepted to further develop this work over the next 5 years. The theory of change for this project builds on the outcomes of this SRA and develops a longer-term strategy for implementing the ILA and was developed with the support of Clear Horizon as part of the full project proposal. Presentation of the final SRA results, future activities and full project proposal was presented to steering committee members and relevant government officials in May 2024.			

7 Key Results and Discussion

7.1. Governance Review

The results of the governance review suggest a need for more integration among sectoral policies, both in practice and in writing, and a more unified, coordinated approach to supporting community livelihoods. Respondents agreed that integration could help to support important livelihoods such as fisheries and tourism, and to promote new livelihoods linked to value added products.

Where there were some examples if integration (bi-lateral between Ministries, NGOs, etc.), these were limited, and there was consensus that communication channels and coordination among Ministries/sectors/levels of governance would need to be improved for integration to occur. Another point of consensus was that it was important to involve local communities in project design and decisions about livelihoods, and that they would also need financial support and training/awareness building needed at community level. Importantly, one respondent noted there was a need for **"One goal, one aim, one vision to support the livelihoods of people in the Solomon Islands".**

This review identified a need and willingness to work towards an integrated approach to livelihoods among our SC members. The new project FIS /2023/122 *Planim Fiuja fo Yumi* will extend the analysis conducted the SRA to include informal governance (i.e. community level), updated policies at the national level, and regional scale policy. We also aim to gain an understanding of key interactions and power dynamics within and between existing governance institutions (government and non), public administration, service delivery, and other stakeholders. Strategic oversight of the new project will continue to be provided by the Cross-sectoral Project Steering Committee, which will be led by the Ministry of Fisheries and Marine Resources (MFMR).

For a full account of the Governance Review results refer to Appendix 1.

7.3. Livelihoods Risk Profiles and Community Adaptation Planning

The Livelihoods-Based Risk Profiling Framework (LRPF) addressed key limitations of prior risk and vulnerability assessments applied at the community scale. It included an analysis of climatic and non-climatic hazards and expansion of socio-economic indicators as drivers of risk (Ford et al. 2018; Smith and Diedrich 2024). By incorporating these elements, the LRPF outputs (i.e., livelihood risk profiles) offered a more comprehensive understanding of risk drivers than many prior approaches.

The livelihood risk profiles (LRPs) (e.g. figure 5) shed light on the multifaceted impacts of both climatic and non-climatic hazards on rural livelihoods in Solomon Islands. A prominent finding from the LRPs was the significant role of commercial logging as a driver of livelihood impacts. This non-climatic hazard exacerbated the impacts of climate change by interacting with other stressors. For example, sedimentation caused by logging worsened flooding effects, which in turn adversely impacted both water and food security. Logging also introduced secondary hazards to the landscape in the form of increased wild pig populations which reduced local food productivity from gardens. These interactions highlight the critical need for cross-sectoral adaptation strategies that address locally relevant hazards in tandem, rather than solely focusing on issues such as climate change. Consideration of multiple hazards should be prioritised within risk profiling and adaptation planning to effectively manage these interactions.

Incorporating a broader range of socio-economic indicators into the LRPF revealed important insights into vulnerability. The expanded assessment highlighted that often-

overlooked indicators, like those related to social capital, include critical risk drivers that play a key role in determining the success of adaptation strategies. Financial capital emerged as a significant barrier to adaptation across communities, underscoring the need to adequately address this component within risk-based studies.

Our expanded approach included additional indicators of sensitivity incorporating food, water, housing, energy and income security. While water and food security emerged as critical challenges for rural communities, their importance and urgency varied significantly across communities. The LRPs revealed these differences, highlighting the context-specific nature of adaptation. By providing community-specific information on risk, LRPs can ensure adaptation does not 'miss the mark' and fail to effectively target the most pressing needs.

The introduction of source dependence into the LRPF further enriched the understanding of vulnerability by linking it directly to specific hazards affecting vital resources. For example, in one community, reliance on water sources polluted by logging and flooding has created severe health risks. Similarly, increased dependence on garden crops has heightened vulnerability to shifts in rainfall and temperature. The LRPs highlighted how communities often rely on a single source for critical needs – such as food, water, housing materials, cooking fuel, lighting or income – making them more susceptible to hazards that affect these resources. By addressing source dependence, the LRPF facilitates the development of targeted adaptation strategies that are tailored to the unique context of each community. This approach encourages source diversification and reduces over reliance on vulnerable resources.

The desired adaptation responses to hazards described in the CAPSI workshops focused on climate change and resource exploitation. Responses to climate change focused on enhancing resilience to varying conditions including increased or reduced rainfall and temperature rise. Strategies include improving infrastructure such as drainage systems and water access, adopting new agricultural practices, and implementing replanting and reforestation efforts to mitigate climate impacts. Adaptation also involved bolstering infrastructure to manage flooding and sea level rise. Resource management was proposed to counteract the effects of commercial logging and fishing, strategies included enforcing conservation practices such as area-based management and establishing legal guidelines for future activities.

Desired vision for futures focused on enhancing community resilience and well-being through several key areas. Livelihood opportunities and resource access emerged as critical themes. Livelihood opportunities were prioritised by diversifying income sources and improving market connections, with focus on strengthening food and income security. For resource access, improvements in healthcare were targeted via the establishment of local clinics and better access to medication. Other priorities included enhancements in sanitation, including the elimination of open defecation, and improvements in drinking water access. Additionally, better access to transport, electricity, education, and telecommunication networks were seen as essential for supporting livelihood opportunities and overall quality of life.

Additional vision themes included sustainable resource management, emphasised to support long-term environmental health and access to natural resources. Equity and justice were addressed by improving local safety and security through infrastructural development. Infrastructure improvements were highlighted, with focus on providing solid housing and developing community spaces. Finally, risk management was identified emphasising the need for training to support climate change resilience.

Predicted impacts of future hazard exposure revealed communities' visions of worst-case-scenarios related to climate change and resource exploitation, highlighting significant concerns about flooding, sea level rise, and commercial logging. Predicted impacts included pollution and salinisation of drinking water sources from flooding and sea level rise,

increased soil erosion leading to landslides, and reduced food garden productivity due to flooding, salinisation, and soil fertility loss from logging runoff.

The diagnostic framework established several prioritised for adaptation that were specific to each community. Key trends across communities included:

- Development of integrated water management solutions such us obtaining rainwater tanks and improved sanitation for all households.
- Implementing resilient farming practices including diversified crop types, training for resilient farming and sustainable management and harvest practices.
- Strengthening of community resource management through activities including forest replanting and implementation of area-based management.

The Livelihood Risk Profiles (e.g. figure 5) provided essential insights that can help tailor adaptation strategies to account for multi-hazard exposures and vulnerabilities, thereby enhancing the chances of successful adaptation. Smith et al. (in prep) applied LRPs to priority adaptation strategies for each community to help identify potential barriers to adaptation posed by a community's underlying risk drivers.

The information provided by the LRPs is instrumental in shaping effective adaptation strategies by identifying priority risk-based livelihood initiatives. LRPs become particularly valuable when integrated into adaptation planning processes, transforming broad initiatives into actionable locally relevant strategies. The information provided by LRPs provides essential insights that help tailor adaptation strategies to local hazard exposures and vulnerabilities, thereby enhancing the chances of successful adaptation. By supporting communities to understand and communicate their specific risk factors, LRPs can foster active participation and informed decision making for adaptation at the community scale. This involvement can support locally driven adaptation, building a sense of ownership and responsibility among community members which can lead to more sustainable and effective adaptation outcomes.

LRPs can also improve the alignment of externally led adaptation initiatives with local needs. By revealing how risk factors vary across communities, LRPs can encourage external organisations to support strategies that align with local realities rather than applying generic 'one-size-fits-all' solutions to rural livelihoods adaptation.

While LRPs focus on community-based adaptation, the LRPF also offers analytical capabilities for assessing household level data. This allows for the development of strategies that address the needs of all community members. Furthermore, by collecting disaggregated data based on sex, age, and livelihood activity, the LRPF allows for a nuanced analysis of how risk drivers vary across different demographic groups. This granular approach supports targeted adaptation efforts that can specifically benefit sub-groups within the community.

7.4 ILA Spatial Database

This study developed and populated a spatial database containing pertinent spatial layers for risk profile assessments, including modelled potential resource exploitation layers for forestry and coastal fisheries at a national scale. These layers directly address community needs in responding to climate change and resource exploitation hazards. The database serves as a valuable resource for scientists and practitioners when developing risk profiles and assessing hazards within the Livelihoods Risk Profile Framework (LRPF).

Forest (figure 7) and fish potential (figure 8) exploitation layers were derived from open-source data and modelled to produce high-resolution national maps identifying locations

vulnerable to resource modification or increased exploitation pressure. In a data-scarce environment like Solomon Islands, these layers provide crucial information for improved sustainable management decisions across multiple governance scales. The modelled potential exploitation layers offer valuable insights into the spatial distribution and potential impacts of resource exploitation.

Informed by LRPF components, forest exposure was defined using the ESA WorldCover dataset, identifying areas covered by tree cover and mangroves. Forest hazard was assessed through spatial layers including distance to coast, distance to roads, elevation, slope, and proximity to modified land, influencing accessibility and suitability for logging. A cumulative access layer was created to indicate high potential forest exploitation areas.

Fish exposure was estimated using a proxy-based approach incorporating benthic habitat and geomorphology, resulting in a nationwide fish resource map. Fishing hazard was assessed using distance to coast, population size, and weighted distance to provincial capital, reflecting accessibility, potential fishing effort, and urban centre influence.

Intermediate layers such as distance to coast, roads, elevation, distance to provincial capital, land slope, and elevation offer valuable insights beyond access. They reveal spatial patterns linked to hazards and risks, including cyclone vulnerability, habitat fragmentation, landslide risks, and sedimentation. Analysing these layers alongside the cumulative access layer provides a comprehensive view of potential impacts, aiding risk assessment and management strategies. These layers also contribute to considering multiple hazards in risk profiling and adaptation planning.

The database offers flexibility in selecting, refining, and adjusting spatial layers for livelihoods risk profile assessments and other planning activities. By contributing to multiple approaches and tools, the database and associated layers provide essential data and opportunities to tailor adaptation strategies and risk assessments to local hazards, community vulnerability, and individual needs.

The database and associated methodology, including training resources, were delivered to ESSI in May 2024. Multi-day training sessions on spatial analysis, using spatial software, modelled data layers, and integrating spatial data within the LRPF were provided.

The development of this spatial database represents a significant advancement in understanding resource availability and its implications for livelihoods in Solomon Islands. It serves as a foundational data resource for generating comprehensive vulnerability and resilience assessments through integration with the Livelihoods Risk Profile Framework. This information will be integrated with local-scale profiles to reflect variations in the potential impact of resource exploitation based on community-specific factors. Moreover, the database will continue to serve as a benchmark for tool calibration when generating more complex livelihood risk profile assessments.

Full methods and codes for making up the spatial data layers can be accessed at https://github.com/ktsievers/SB_Spatial_Data_LRPF.

8 Impacts

8.1 Scientific impacts – now and in 5 years

Our research has developed an innovative approach to supporting integrated decision-making related to livelihoods in coastal communities in the context of risk and interacting hazards across the land-sea interface. This approach represents a significant departure from traditional community adaptation planning approaches by evaluating livelihood risk across sectors and scales. The framework produces a comprehensive risk profile that encompasses a range of relevant needs, providing a more nuanced understanding of community-level challenges. We have published a perspectives paper (Diedrich et al. 2022) that confirms and describes the foundations of a need for the integrated livelihoods approach that is the focus for this SRA. We have also published a systematic literature review on community-based vulnerability assessments in the multidisciplinary journal 'Regional Environmental Change' (Smith and Diedrich 2024). This review was used to inform the methodology of the integrated risk profiling framework.

A core component of the ILA framework is the Livelihood-Based Risk Profile Framework (LRPF). This novel approach extends current risk frameworks by providing a more comprehensive summary of community-level risk, encompassing environmental, social, and economic factors. Unlike traditional methods focusing on single risk values, our framework adopts a multi-scale perspective to explore direct and indirect drivers of risk. The resulting risk profiles offer a broader understanding of community vulnerabilities to inform tailored adaptation strategies. This holistic perspective enables a more accurate assessment of community-level risks. A methodological paper describing the Livelihoods-Based Risk Profiling Framework (LRPF) and its implementation has is currently being revised after a favourable response from reviewers for the journal 'AMBIO' (Smith et al. In Review). A comparative evaluation paper describing contributions of the LRPF to the vulnerability assessment literature is being prepared for publication in the 'International Journal for Disaster Risk Reduction'. A research paper describing how the LRPF informs the development of risk-based adaptation planning is in preparation for publication in the journal 'Climate and Development'.

This impact of the tools developed to support the ILA will be extended and enhanced via the full project FIS/2023/122, which aims to develop the Participatory Integrated Planning Approach (PIPA) in Solomon Islands. The SRA established the partnerships, and laid the methodological, theoretical and applied foundations for developing the PIPA. The full project seeks to refine, align and extend its application in Western Province, and leverage opportunities to scale to other Provinces and countries in the Pacific. Our overall goal is that government and CSOs (including communities) will use the PIPA to inform programs to support SSF community livelihoods, and that risk-based planning to support livelihoods in SSF communities is informed by the PIPA, and provincial-level Marine Spatial Plans are enhanced by the PIPA.

8.2 Capacity impacts – now and in 5 years

The SRA had a central focus on providing skills-based training for local staff at ESSI in managing the ongoing engagement with communities and stakeholders, and the use of spatial data in livelihood project decision-making.

Facilitation Training

In February 2023 a two-day facilitation training was conducted with members of ESSI, JCU in-country partner in supporting diverse livelihoods project (the project) in Western Province, Solomon Islands. The training was designed and delivered by Claire Holland, Director of the JCU Conflict Management and Resolution Program, and Director of Mediators Beyond Borders Oceania (MBBO). The training was designed to facilitate a knowledge sharing and learning opportunity for ESSI staff on facilitation planning and techniques for workshops and meetings between government officials and communities. The training provided a professional development opportunity for ESSI staff with the aim to support the development of facilitation skills and knowledge, and to benefit the work being done to achieve the project objectives.

The training took place in the ESSI offices in Gizo, Solomon Islands. The training was conducted in English, with some break out groups engaging in local languages. A strong emphasis was placed on consolidating and sharing knowledge among the participants, as well as deepening understanding through group discussions. A range of action-orientated activities were planned to provide experiential learning and exemplars of facilitation techniques. At the conclusion of the training participants were presented with a certificate of attendance for two-days of professional development training in group facilitation on behalf of MBBO.

See Appendix 5 and 6 for more details about the training.

Spatial Software Training

With the support of the Crawford Fund, we conducted a 3-day workshop on the use and application of spatial mapping software QGIS to support the decision support tool and LRP framework uptake and implementation in May 2024 (Figure 9). This workshop provided training in the use of i) national level spatial decision support tool data and, ii) community-based participatory mapping information on local-scale hazard exposure. Basic training in the general application of QGIS for map development was also delivered. This training component was developed in consultation with ESSI to meet the specific needs of staff members that extend beyond the scope of this SRA.

The training also supported staff in conducting data analysis and producing outputs for projects beyond the SRA, particularly related to area-based management.

The training covered six main themes, and the final two themes directly relate to the future application of SRA outputs by ESSI:

- Getting started with QGIS
- Introduction to spatial data
- Creating maps in QGIS
- Using QGIS to explore ILA spatial data
- Using QGIS to digitise hand drawn focus group maps

The training manual used for this workshop is provided in the appended presentation ‘ESSI QGIS Workshop Presentation’ (Appendix 5), along with the guide ‘ESSI QGIS Workshop Guide’ (Appendix 7), and the report to the Crawford Fund (Appendix 6).

Figure 9 ESSI staff take part in the QGIS training workshop.

Partner Community Knowledge Dissemination

A knowledge dissemination visit was conducted to SRA partner communities in May 2024 to share results from livelihood risk profiles and provide materials to support communities in applying this information for decision support.

Representatives from each community also attended the final project workshop held in Gizo in May 2024. This bought together stakeholders from the communities and provincial and national government to share ideas around future planning for livelihoods.

FIS/2023/122 will build on the capacity building activities initiated in this SRA significantly. Capacity development is central to the full project because it will enable the implementation, scaling out, and long-term application of the Participatory and Integrated Planning Approach (PIPA) (the extension of the ILA) tools and outputs to risk-based planning. The main objectives the FIS/2023/122 capacity building strategy are:

1. Develop all the capacity required to implement and maintain the PIPA in country by the end of the project cycle
2. Develop the enabling environment to implement and scale of the tool within Solomon Islands.
3. Support partner communities to progress towards the goals they identify via the PIPA so that we can effectively ‘close the cycle’ of planning to implementation.

Capacity development within the SRA enhanced the skills of ESSI team members to implement the PIPA. We also identified other end-users for the PIPA, although additional training activities were outside the scope of the project. The capacity building strategy for the full project will build on this significantly and will be directly informed by a governance and end-user needs assessment which will be conducted in the early stages of the project. A partnership between JCU and Solomon Islands National University (SINU) will also contribute considerably to building capacity in country to support the implementation of our

spatial tool within Solomon Islands. JCU and SINU will work together to develop and deliver a short course/BSc major (around 4 subjects) in spatial science, specifically related to the skills required to implement spatial planning (e.g. GIS, remote sensing, spatial data analysis). This will be open to SINU students and other end-users who want to upskill in this area. For example, MFMR staff have expressed a keen interest in this course. We will also identify and provide opportunities for SINU students and staff to participate in the research activities associated with the project.

The intended impact resulting from these activities is that communities, government and CSO actors will be able to access and use the PIPA. Again, this is contingent not just upon the capacity development activities (where required) but also on the tool development process, and the determination of the most appropriate outputs and interfaces to suit end-user needs.

8.3 Community impacts – now and in 5 years

At the community scale, the LRPF data collection and CAPSI workshops supported the co-development of community specific Livelihood Risk Profiles (LRPs) and community-led adaptation pathways workshops to achieve local visions. The outputs of these workshops were integrated with livelihoods-based risk profiling information to better understand community strengths and potential barriers in the implementation of these pathways in relation to local socioeconomic, and hazard-based characteristics. This information was shared with partner communities in May 2024 during the final SRA in-country activities. Acting as a knowledge sharing exercise, these visits supported communities in the future development of adaptation pathways and planning in the context of locally relevant challenges, including potential forest and coastal fishery resource exploitation. The intended impact of this not known, but will be tracked as part of the MRL plan for FIS/2023/122.

The activities described above intend to support communities make informed decisions about future adaptation. This effort was supported by the ‘futures perspective’ of the CAPSI workshops, which included scenario planning and future visioning exercises up to the year 2040. The SRA outputs therefore support long-term planning for risk reduction.

The LRPF user manual has been developed to facilitate future implementation of the approach in Western Province. ESSI staff have been trained in the approach and can support future community-level implementation. Partner communities were informed about ESSI’s role as the ‘hosts’ of the approach and provided with contact information for ongoing support.

The extension of the SRA into a full project will bring further benefits to communities, who are set for continued engagement. This includes refining the LRPF and CAPSI methods to be more streamlined and implementing them in more communities. Additional efforts will focus on knowledge sharing and training in the application of outputs by communities. This will include training activities developed in project management, proposal writing, and other areas identified by the community as a barrier to the use of SRA outputs. As mentioned before, the overall impact we aim to achieve in the full project is to equip small-scale fishing communities and other decision-makers who support them with spatially explicit information, resources, and capacity to strengthen their livelihoods proactively and autonomously towards more equitable, sustainable, risk-informed futures through a Participatory & Integrated Planning Approach (PIPA). The potential economic, social and environmental impacts described in the following sub-sections will all be enhanced by FIS/2023/122.

8.3.1 Economic impacts

Livelihood risk profiles provided information on financial capital and income security for each community. This analysis offered an understanding of a community's financial status and how this influences local vulnerability to hazard exposure. Livelihood risk profiles also provided information on a community's ability to access new economic opportunities, and whether such opportunities were considered equitable. Information on source dependence identified which livelihood activities were most important within a community, their risk of hazard exposure, and how this might impact access to income.

The dissemination of livelihood risk profiles equipped communities with economic insights, highlighting local economic strengths and weaknesses that contribute to adaptation requirements. This information empowered communities to make informed decisions about risk management and adaptation, which may contribute to long-term economic benefits.

The development of national level spatial data on logging and fishing potential provides economic opportunities for government, enabling more efficient and sustainable management of natural resources. It also facilitates informed decision-making and strategic planning of policies that maximise economic benefits, while minimising social and environmental impacts.

Community level data from livelihood risk profiles can provide local government with 'snapshot information' that can produce economic benefits for rural livelihoods. By understanding the economic vulnerabilities of different communities, the government can tailor development programs and allocate resources more effectively, ensuring that funds are used where they are most needed and will have the greatest impact. Targeted risk-informed adaptation can enhance community resilience, reduce costs associated with disaster response, and promote sustainable economic growth.

8.3.2 Social impacts

Livelihood risk profiles incorporated a significant social component, which can lead to numerous social benefits for the community. By providing detailed insights into key factors associated with social capital, risk profiles can raise community awareness about existing social conditions and vulnerabilities. This increased awareness can empower community members to take ownership of their adaptation process, fostering a proactive approach to addressing local challenges. Additionally, the detailed information on risk can inform targeted interventions that ensure the most pressing social needs within a community are addressed.

By supporting a coordinated community response to adaptation, livelihood risk profiles and the ILA diagnostic framework foster collaboration and support among community members, thereby boosting social capital. ILA outputs encourage the sharing of knowledge, resources, and skills which can strengthen community relationships and trust. This collaboration fosters a sense of belonging and community pride as people work together toward shared risk reduction and adaptation goals.

By supporting community-led adaptation and social collaboration the ILA can benefit governance across broader scales. Stronger community engagement facilitates the local implementation of policies and programmes, while the information provided by ILA outputs offers valuable data for decision-makers, leading to context-specific decision making. By building community capacity for risk-informed adaptation planning, the ILA can support communities in communicating their specific needs to institutions. This self-organisation enhances local management of adaptation responses, reducing the need for (or streamlining access to) external intervention and increasing community resilience to future challenges, thereby reducing the demands on governance structures during crises.

8.3.3 Environmental impacts

Livelihood profiles identified instances of significant environmental impact linked to hazard exposure and highlighted the extent to which local livelihoods depend on these locations to meet essential needs. This information supports communities in developing targeted risk mitigation strategies, thereby protecting critical resources and sustaining livelihoods. By adopting a spatial approach to map hazard exposure, risk profiles also support communities in making informed decisions about land use and resource management. This is particularly relevant for community-led area-based resource management initiatives, which are increasingly popular approach in Solomon Islands for managing forest and ocean resources. Integrating risk-based data with local visions for the future allows communities to prioritise adaptation efforts towards addressing key resources while also considering potential impacts from challenges such as climate change.

National maps of fishing and logging potential hosted by ESSI can be used beyond the SRA, informing policy recommendations and planning within other projects by providing clear visual evidence of the potential impacts of these resource extraction activities. The maps can also be used as a communication tool, raising awareness with local communities about the environmental impacts of these activities, encouraging community support for conservation initiatives. Maps also serve as a baseline to support monitoring and evaluate changes in fishing and logging activities over time.

For government use, maps of fishing and logging potential offer insights to enhance environmental management and policymaking. These maps enable policymakers to identify regions with significant potential for resource exploitation activities, allowing for more strategic and informed decision-making regarding conservation priorities and resource management. The maps provide a clear spatial understanding of locations where interventions will be most needed, while serving as a tool for monitoring and enforcement, helping policymakers to track changes in resource use and availability through time. The maps can also facilitate coordination and collaboration across government sectors and with wider stakeholders, fostering joint policies and management.

8.4 Communication and dissemination activities

Communication:

Articles

- Article on the Livelihoods website: https://www.livelihoodslab.com/solomon-sra
- Article from The Crawford Fund: https://www.crawfordfund.org/news/supporting-a-portfolio-of-livelihoods-in-the-solomon-islands/

  Which was reposted / shared

https://twitter.com/CSTFA_JCU/status/1810810872165704168

https://twitter.com/Bethany_RSmith/status/1800330513326145864

https://twitter.com/CrawfordFund/status/1805365541386830110 and reshared by @JCU

- Posts to The Livelihoods Lab X (Twitter) account: https://twitter.com/AmyDiedrichJCU/status/1725067624420372969
- Sirubai Voko Tribal Association posts on Facebook

Presentations

- Presentation to Wildlife Conservation Society (WCS) on participatory design and local scale marine spatial planning in the Indo-Pacific. May 2024.
- Upcoming conference presentation by Bethany Smith on the Risk-based decision support tool at the Australian Marine Sciences Association (September 2024)

Dissemination

Research Papers

- (see reference list)

Workshops:

- ***Community***: Application of risk-based decision support tool and diagnostic approach to inform community-led adaptation planning
- ***ESSI:*** QGIS training including information on data analysis requirements for the risk-based decision support tool, and spatial database
- ***ESSI***: Facilitator training for implementing the risk-based decision support tool (i.e., LRPF), and diagnostic approach (i.e., CAPSI).

9 Conclusions and recommendations

Projects aiming to diversify, supplement and/or enhance existing livelihood activities have not reached their full potential for improving people's lives, particularly at broader spatial scales. Although the application of integrated approaches to managing land and seascapes has been well established in the context of conservation and agriculture, progress is required to systematically apply such approaches to planning and implementation of livelihoods projects at cross-sectoral scales. This SRA established the strengthened networks, integrated governance and policy, and diagnostic framework required to implement an Integrated Livelihoods Approach (ILA) to support livelihood improvement project planning and assessment in Western Province, Solomon Islands. This has informed the development of a full project FIS/2023/122 Planim Fiuja fo Yumi' - Co-planning Risk-informed and Equitable Livelihood Futures with Small-scale Fishing Communities through a Participatory and Integrated Approach to Community Engagement.

9.1 Conclusions

The views of the inter-sectoral Steering Committee and the results of the Governance Review confirmed a need for more integration among sectoral policies, both in practice and in writing, and a more unified, coordinated approach to supporting community livelihoods. The review also identified a need and willingness to work towards an integrated approach to livelihoods among our Steering Committee members, which will continue through the execution of the new project FIS /2023/122 *Planim Fiuja fo Yumi.*

This SRA made some significant steps towards developing a scientific approach to support decisions and policies related to planning for livelihoods in the context of risk. A key output was the implementation of the Livelihoods Risk Profiling Framework (LRPF) and the subsequent development of Livelihoods Risk Profiles in three partner communities. The LRPF expands the IPCC AR5 Risk Framework, offering a holistic approach for risk assessment. The adaptations to the IPCC AR5 included expanding the definition of hazards to include both climatic and non-climatic hazards, the expansion of the socio-economic vulnerability indicators, and adding a variable to represent source dependence. The inclusion of these new elements provided valuable context relevant to Solomon Island communities, that would be applicable to coastal communities elsewhere. For example, logging poses a significant risk to many communities, which is arguably as important or more in some cases than climate change. Expanding the definition of hazard allowed for risk assessments to capture, and develop adaptation plans for a wider, more indicative range of hazards, where some of the most significant ones would be missed if only climatic hazards were considered. Similarly, broadening the scope of socioeconomic indicators provided a deeper understanding of local impacts and the capacity for communities to respond effectively. Understanding source dependence also meant that direct links could be made to identify the interactions between hazards, and the primary sources that people relied on to achieve their livelihood objectives. This also allows for a more nuanced and context specific planning in the context of risk.

The LRPF also resulted in a series of outputs (e.g. the Livelihoods Risk Profiles and manual) to support community-level planning processes, that could be used to identify and justify specific funding needs to support livelihoods adaptation planning in the context of risk. The participatory approach used to implement the LRPF, and the associated adaptation planning workshops discussed in the following paragraphs, means that the data truly reflect the nuanced needs and realities of the participating communities. This contributed to a

central goal of the SRA to equip communities with the information required to pro-actively plan for the livelihoods futures they desire.

By integrating the LRPF with Community Adaptation Pathways Solomon Islands (CAPSI) learning cycle outcomes, the SRA also demonstrated how risk-based information can guide the development of no-regrets priority adaptation strategies. Specifically, it decreased the likelihood of identifying ineffective adaptation strategies that do not account for the multitude of climatic and non-climatic hazards affecting communities. Moreover, the deeper understanding of sensitivity and source dependence allowed for more targeted interventions that address root causes and priority risks, thus maximising the efficiency of investments. This is critical in Solomon Islands and other resource dependent communities facing a multitude of hazards that affect natural resources that are critical for survival. A more detailed understanding of the factors that influence adaptive capacity also informed practical strategies for addressing adaptation challenges across a range of relevant domains such as infrastructure, financial limitations, and social capital.

Bringing together the CAPSI and LRPF provided valuable information for implementing no-regrets adaptation, which can both determine priority actions and provide supporting evidence and justification for funding applications. The approach also facilitates a broader understanding of interactions that may affect the types of strategies that are needed. An example from one of our partner communities was an overarching need to diversify crops to address climate change, combined with the need for fencing to protect new crops from wild pig populations. A less nuanced process to identifying interacting threats may have overlooked the wild pig issue, and simply focused on the main threat of climate change affecting crops.

The community level assessments generated spatial data depicting interacting hazards at the local level. Our spatial database generated national level hazard maps of fishing and logging potential that can give a broader understanding of which communities and regions are most at risk and why. These spatial resources, which will be further developed via FIS/2023/122 will allow for an understanding of how hazard exposure varies over multiple spatial and temporal scales, providing a unifying point of reference for the development of nested spatial plans. Community-level spatial planning can be coherently nested within Provincial level spatial planning, which can be nested within national level spatial plans.

9.2 Recommendations

The SRA established the partnerships, and laid the methodological, theoretical and applied foundations for developing the Participatory and Integrated Planning Approach (PIPA) that will be developed via FIS/2023/122. This full project seeks to refine, align and extend its application in Western Province, and leverage opportunities to scale to other Provinces and countries in the Pacific. The recommendations below reflect the objectives of FIS/2023/122, which were designed to reflect the recommendations emerging from the SRA. These are:

1) Develop, refine and integrate the PIPA tools with existing risk-based and spatially informed decision-making processes at multiple scales of governance (e.g. Marine Spatial Planning and Risk-based planning)
2) Build a deeper understanding of the governance drivers and barriers – within associated policies, networks, knowledge exchange, and decision-making processes - of local, provincial, national, and international level actors with respect to implementing the PIPA.
3) Build in-country capacity and skills required to implement and sustain the PIPA.

4) Support the scaling up of community-informed, risk-based, spatially explicit planning to marine spatial planning.
5) Support the development of risk and spatially-informed community adaptation planning processes in SSF communities.

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10.2 List of publications produced by project

Peer Review Journal Articles:

Published

Diedrich, A., Duce, S., Eriksson, H., Govan, H., Harohau, D., Koczberski, G., ... Troell, M. (2022). An applied research agenda for navigating diverse livelihood challenges in rural coastal communities in the tropics. One Earth, 5(11), 1205-1215. doi:10.1016/j.oneear.2022.10.005

Smith, B., Diedrich, A. (2024) 'A systematic review of current progress in community based vulnerability assessments'. Regional Environmental Change, 24, http://dx.doi.org/10.1007/s10113-023-02179-z

In Review

Smith, B., Boseto, H., Vavu, A., Relna, P., Duce, S. and Diedrich, A. *(In Review).* Risk-based livelihood profiling to support community adaptation planning. *AMBIO.*

In Prep

Smith, B., Duce, S. and Diedrich, A. (*In Prep*). From vulnerability to risk: Evaluating the role of holistic risk assessment for livelihoods adaptation planning. *International Journal of Disaster Risk Reduction.*

Smith, B., Boseto, H., Vavu, A., Relna, P., Duce, S., Diedrich, A. and Butler, J. *(In Prep*). Risk-based decision support for guiding community-led adaptation planning. *Climate and Development.*

Reports:

Sievers, K.T., Smith, B., Duce, S., Murray, N., Diedrich, A. (In Prep). Important natural resources in Solomon Islands, and their potential to exploitation risk.

Smith, B. et al. (2024). The Livelihoods Based Risk Profiling Framework User Manual. ACIAR.

11 Appendices

11.1 Appendix 1: Review of Governance and Policy to support an Integrated Livelihoods Approach in Western Province, Solomon Islands

11.2 Appendix 2: The Livelihoods-Based Risk Profiling Framework User Manual

11.3 Appendix 3: Facilitation Training Manual

11.4 Appendix 4: Facilitation Training Report

11.5 Appendix 5: ESSI QGIS Workshop presentation

11.6 Appendix 6: QGIS Training report, ‘Spatially Integrated Approach to Support a Portfolio of Livelihoods’

11.7 Appendix 7: ESSI QGIS Workshop Guide

11.1 Appendix 1: Review of Governance and Policy to support an Integrated Livelihoods Approach in Western Province, Solomon Islands

Review of Governance and Policy to support an Integrated Livelihoods Approach in Western Province, Solomon Islands

FIS-2020-11

June 2023

Roquelina de Sousa de Saboya, Tiffany Morrison, Amy Diedrich

James Cook University

Table of Contents

1. Introduction

The overall aim of objective 2 of FIS-2020-111 was to assess the integration (see definitions in tables 2 & 3) of fisheries and other sectoral policies in Solomon Islands. This report presents a review of the governance and policies related to fisheries livelihoods, natural resource management, industries and development operating in Solomon Islands, with a focus on Western Province. The emphasis was on two key livelihood sectors that are particularly relevant in Western Province: tourism and small-scale fisheries. We also sought to assess to what extent these existing policies supported the three key objectives of the Integrated Livelihoods Approach which are; Fair and just livelihoods, adaptive livelihoods, and sustainable natural resource use in coastal communities.

This assessment addressed three major questions:

1) What are the current policies and governance integration contexts for the small-scale fisheries and tourism sectors?
2) How do small-scale fisheries and tourism integrate or interact with other livelihoods sectors?
3) Do the current policies and governance systems support the three key objectives of the Integrated Livelihoods Approach (ILA): (1) fair and just livelihoods; (2) sustainable natural resource use; and (3) adaptive livelihoods?

First, we provide a general overview of the socio-economic development and governance contexts of Western Province and Solomon Islands. Then we assess the integration of livelihoods policy and governance in Solomon Islands and Western Province, and whether the current situation supports the three key objectives of an integrated livelihoods approach (Diedrich et al. 2020): (1) fair and just livelihoods; (2) sustainable natural resource use; and (3) adaptive livelihoods.

a. Development context overview

Solomon Islands is a small and remote Pacific Islands Country (PIC) comprising 992 islands, with only 147 of those inhabited (Solomon Islands Government, 2021a). It has a total population of about 687,000 people (World Bank, 2021a), with 12.7% living below the national poverty line (Solomon Islands National Statistics Office and World Bank, 2015a; **Figure 1**), 24.7% below the international poverty line and 58.1% below the Lower Middle-Income Class poverty line (World Bank, 2021b). In 2019, the country ranked 151 of 189 countries in the Human Development Index with a 0.567 value, positioning Solomon Islands in the category of medium development (United Nations Development Programme, 2020).

Most of Solomon Islands' population live in rural areas (>80%) with restricted access to water, electricity, sanitation and telecommunications (Basel, Goby, & Johnson, 2020), which explains the extremely high rate of the impoverished population residing in rural areas (87%) (Solomon Islands National Statistics Office and World Bank, 2015a). Inland and coastal communities

have limited cash-based activities and are predominantly subsistence-based, depending on domestic gardens and local fisheries for nutrition (Basel et al., 2020).

Western Province, the largest provincial region (5,475 km2), is the main tourist destination outside the city of Honiara. The province is famous for its tropical beauty and remarkable snorkelling and diving spots, considered some of the best in the world (Ministry of Provincial Government and Institutional Strengthening, 2021a). In terms of small-scale fisheries, Western Province holds the second highest fisheries total catch for subsistence among provinces, being a crucial food security and income source for the community (Solomon Islands Ministry of Fisheries and Marine Resources, 2019). In fact, subsistence fishing is important throughout the country with almost 50% of women and 90% of men depending on aquatic resources for nutrition or revenue (Solomon Islands Government, 2009).

With around 99,000 people, Western Province has the second lowest percentage of the population living below the national poverty line (6.6%) compared to the other provinces (**Figure 1**). The Kolombangara islands, Kohinggo and Ghizo are the areas with the highest number of impoverished people in the province (Solomon Islands National Statistics Office and World Bank, 2015b; **Figure 2**).

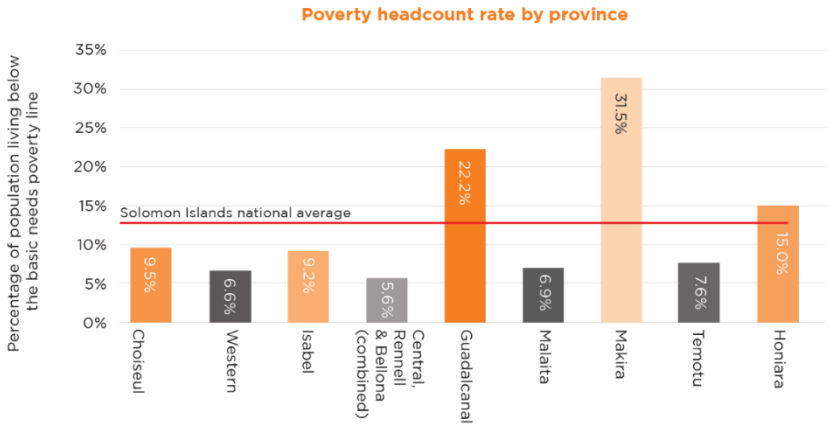

Figure 1. Poverty headcount rate by province (Extracted from Solomon Islands National Statistics Office and World Bank, 2015b).

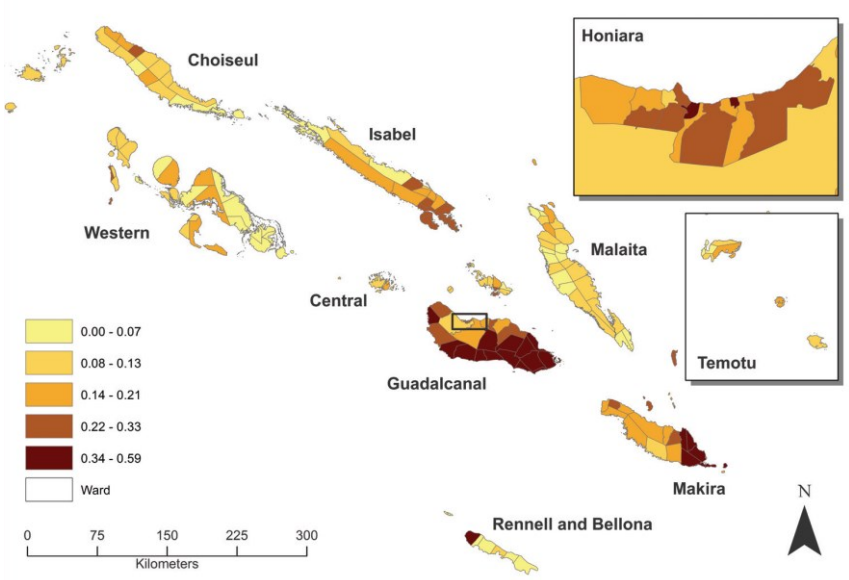

Figure 2. Poverty headcount rate by ward: Share of population living below the basic needs poverty line (Extracted from Solomon Islands National Statistics Office and World Bank, 2015b).

b. Governance context overview

The unitary state of Solomon Islands has two governmental levels: national and provincial (Ministry of Provincial Government and Institutional Strengthening, 2021b). It adheres to the democratic Westminster system, retaining the British Monarch as head of state, which has the representation of an in-country Governor-General; and the parliament-elected Prime Minister as head of government, who leads the ministers in cabinet. In the provincial level, the country divides into 10 administrative regions: the capital city of Honiara, led by a mayor in the city council; and nine provinces, governed by elected provincial delegates (Solomon Islands Government, 2021b).

In Western Province, like in all Solomon Islands' provinces, both formal and informal institutions influence governance. The formal governance is represented by the governmental institutions from the national and provincial levels; and the informal, by local customary bodies that make decisions at the community level (Bennett et al. 2014) (**Figure 3**).

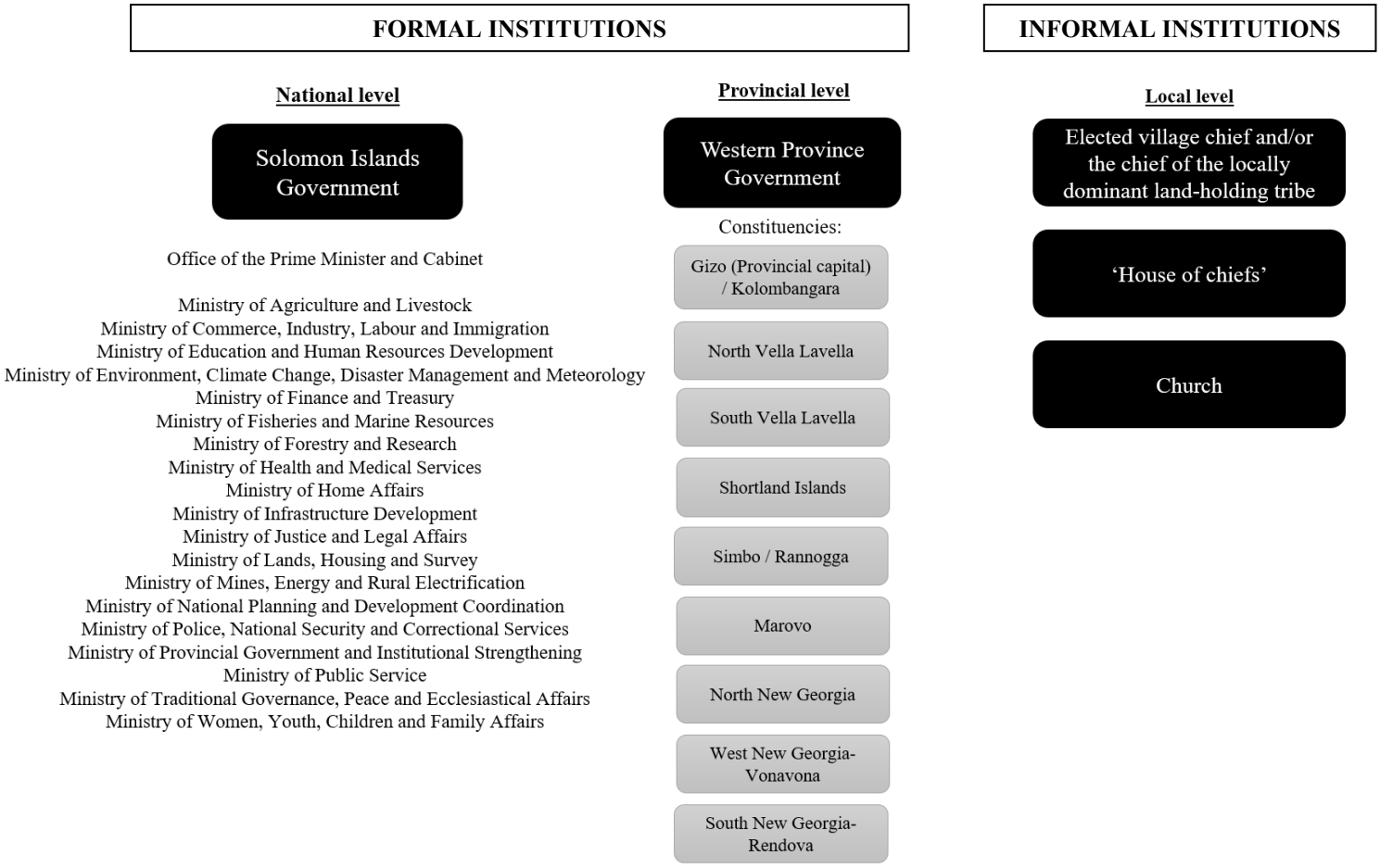

Figure 3. Western Province's formal and informal governance structure (based on Bennett et al., 2014)

Solomon Islands presents complex socio-political and customary tenure arrangements that differ considerably throughout the nation, even between small nearby areas. Solomon Islanders' strong connection and belonging to 'place' significantly influences their relationship to the land and sea. Therefore, any development that may modify their local territory can cause extensive conflicts when communities are not involved in the planning process (Diedrich et al. 2016). For example, a resort was burned down in Anuha Island because the developer was considered insensitive to customary land tenure (Sofield, 1996).

In Solomon Islands, about 87% of all land is under customary law ownership, 9% is governmental land, 2% is owned by individuals, and the last 2% is rented to foreigners (Solomon Islands Ministry of Development Planning and Aid Coordination, 2016). Distinct to Western civilisation systems, most of the land in Solomon Islands is collectively owned with each titleholder acquiring the same rights for farming and construction (Solomon Islands

Ministry of Development Planning and Aid Coordination, 2016). The land use right is designated to tribal or clan members, which means all members own the land instead of an individual (Solomon Islands Ministry of Development Planning and Aid Coordination, 2016). For Solomon Islanders and other Melanesian societies, land means life and is fundamental to culture, social cohesion, and food security. According to the national government, numerous laws need revision, beginning with the boundaries inventory and demarcation of customary land (Solomon Islands Ministry of Development Planning and Aid Coordination, 2016).

A significant challenge in Solomon Islands is, thus, how to balance land (and sea) as a socio-cultural and spiritual value as well as an economic asset (Corrin & Baines, 2020). The national government perceives customary land tenure as a major obstacle for developing the region and argues land reforms are necessary (Solomon Islands Ministry of Development Planning and Aid Coordination, 2016). However, such changes may trigger confrontations at the community-level (Ruddle and Tuong, 2009).

As demonstrated, customary tenure presents unique complexities for incoming cross-sectoral livelihoods activities, such as tourism development in small-scale fishing communities in Solomon Islands. Through the assessment of livelihood-related policies and governance, the next sections will analyse and delve more into interactions between tourism and small-scale fisheries sectors, and their interactions with other livelihood segments, to better understand the current policy and governance context as well as how integration may be achieved.

2. Methods

We used secondary and primary data sources to answer the research questions. First, we conducted a systematic review of policies, scientific and governance documents related to key livelihoods sectors in Solomon Islands and Western Province, with an emphasis on the tourism and small-scale fisheries sectors. Next, we conducted a series of key informant interviews with governance actors and used these to corroborate and expand on the information we gathered via the systematic review.

a. Policy Review

With the support of our in-country partner, ESSI, we identified key National-level governance documents that guide livelihoods-related policies (n = 7; **Table 1**) from each of the Ministries in our Steering Committee (Environment, Climate Change, Disaster Management and Meteorology; Fisheries and Marine Resources; Culture and Tourism; National Planning and Development Coordination; Forestry and Research; Agriculture and Livestock). We prioritised national level documents because we found that provincial documents were scarce or difficult to acquire, which was an important finding of our data collection process. We utilised NVivo 12 and Microsoft Excel to more efficiently gather, organise, categorise and analyse the qualitative information from the secondary and primary data.

To answer the first and second research questions and assess the livelihoods policy and governance integration (or lack there-of) contexts in the documents and interviews, we first

needed to define integration. We used the definition in Morrison (2004), which states that integration is the creation of linkages between pre-existing activities by actors bridging across nodes (**Table 2**). Then we sub-categorised the signs of integration found into more specific types based on the integration typology we developed following work from Morrison (2004) (**Table 3**).

To answer the third research question, we created the nodes 'fair & just livelihoods', 'sustainable natural resource use' and 'adaptive livelihoods' then categorised the text and interview passages that mentioned support to these key objectives of the Integrated Livelihoods Approach (ILA) (**Table 2**). We then sub-categorised the text of each objective into sub-objectives according to the context found in the text and interview passages.

Table 1. Key National Level governance documents that guide livelihoods-related policies[1].

Reference	Actor	Sector	Type	Status
Solomon Islands National Fisheries Policy 2019-2029	Ministry of Fisheries and Marine Resources	Fisheries	Policy	Active
Solomon Islands National Tourism Development Strategy 2015-2019	Ministry of Culture and Tourism	Tourism	Plan	Active / Updating
National Development Strategy 2016–2035	Ministry of Development, Planning and Aid Coordination	Development	Plan	Active
Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010	Ministry of Environment, Conservation & Meteorology and Ministry of Fisheries & Marine Resources	Fisheries and Conservation	Plan	Active / Updating
Solomon Islands Nationally Determined Contribution 2021	Ministry of Environment, Climate Change, Disaster Management and Meteorology	Conservation	Plan	Active
Solomon Islands National Forest Policy 2020	Ministry of Forestry and Research	Forestry	Policy	Active
Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030	Ministry of Agriculture and Livestock	Agriculture	Plan	Active

[1] Note that this review was conducted in 2022, at the start of the project, so some of these policies have since been updated. A subsequent policy review will be conducted as part of FIS/2023/122 to update this information.

Table 2. Categorisation used in the qualitative analysis with examples.

Research Question (RQ)	Category	Description	Example
1) What are the current policies and governance integration contexts for the small-scale fisheries and tourism sectors? **2)** How do small-scale fisheries and tourism integrate or interact with other livelihoods sectors?	Integration	The creation of linkages between pre-existing activities by actors bridging across nodes (Morrison, 2004). Integration can occur at multiple stages of the policy process, whether it be at the capacity-building stage, or visioning, negotiating, exchanging of information and/or implementing tangible works and services (Morrison, 2004).	Extract related to RQ1: "Supporting the development of linked economic activities such as agriculture, **fishing**, and other services which support tourism" (Solomon Islands National Tourism Development Strategy 2015-2019) Extract related to RQ2: "There is a need for new sources of fish to meet future food security requirements, and **aquaculture** is one means of supplying future demand." (Solomon Islands National Fisheries Policy 2019-2029)
3) Do the current policies and governance systems support the three key objectives of the Integrated Livelihoods Approach (ILA): (1) fair and just livelihoods; (2) sustainable natural resource use; and (3) adaptive livelihoods?	Fair & just livelihoods	Mention of support to fair & just livelihoods	"Management of inshore and inland fisheries will be through fisheries management plans platformed on ecosystem-based and **gender-equitable** approaches that promote climate change resilience." (Solomon Islands National Fisheries Policy 2019-2029)
	Sustainable natural resource use	Mention of support to sustainable natural resource use	"Growth in tourism can lead to broad based employment and income generation, as well as support the retention of cultural traditions and the **sustainable management of the nation's environmental assets**." (Solomon Islands National Tourism Development Strategy 2015-2019)
	Adaptive livelihoods	Mention of support to adaptive livelihoods	"[…] use targeted multidisciplinary interventions to diversify agriculture and promote agribusiness and **alternative livelihoods**." (National Development Strategy 2016-2035)

Table 3. Integration typology (Based on Morrison, 2004).

Type of integration	Definition	Example
Contextual	Joint overarching institutions and laws	"**Fisheries** impacts through its **role in the protection** of marine animals and **regulation** of game fishing operations." (Solomon Islands National Tourism Development Strategy 2015-2019)
Structural	Intersectoral social and organisational networks	None found
Procedural	Joint plans and agreements	"Copyright: Citation: © 2010 **Ministry of Environment, Conservation & Meteorology and Ministry of Fisheries & Marine Resources**, SIG, Honiara. **Solomon Islands MECM/MFMR**. (April 2010). Solomon Islands Coral Triangle **Initiative National Plan of Action**, SIG, Honiara, Solomon Islands" (Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010)
Functional	Joint on-ground projects	"The **sustained operation of a rural seaweed farming industry over recent years**, and the ongoing interest of rural entrepreneurs in farming of freshwater, brackish-water and marine fish and marine resources, suggests that aquaculture has potential to develop further as one platform to secure food and nutrition security as well as create rural livelihood and national revenue generating opportunities." (Solomon Islands National Fisheries Policy 2019-2029)
Informational	Data-sharing, joint research, joint meetings	"**The national government facilitates research** into new and emerging aquaculture opportunities to develop science-based policy and implement development plans." (Solomon Islands National Fisheries Policy 2019-2029)
Distributive	Shared programs and funds	"Action 2: Integrate awareness and possible management option advice into integrated community-based approaches to fisheries management and livelihoods. Includes **promotion of mangrove/coastal forest planting programs**." (National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010)
Other	Acknowledgement of other sectors in plans	"Agroforestry systems, forest-based **tourism**, community forest management, and innovative opportunities such as bio-diesel and pharmaceutical products are **not receiving adequate economic incentives** to generate income for forest dependent communities." (Solomon Islands National Forest Policy 2020)

b. Semi-structured key informant interviews

We conducted semi-structured interviews in March – April 2022 with members of our SRA Steering Committee to determine their perceptions and experience of integration and livelihoods policies, with a focus on Western Province (n = 9, see Appendix 1 for interview template). The interviews were carried out in person at the respondents' offices by ESSI staff. They were recorded (with informed consent) and took approximately 45 minutes to complete. The interviews were transcribed by ESSI staff and coded thematically by JCU in an Excel spreadsheet.

3. Results & Discussion

a. Policy Review

We created an integration matrix (**Table 5**) that shows the different types of integration (table 3) reflected in the text of the different policy documents. We also created another matrix that shows how these documents depict the three key objectives of an integrated livelihoods approach (**Table 6**). In the following subsections we highlight some key patterns in the data and provide examples from the policy text to illustrate these.

Table 5. Signs of integration (or lack there-of) between sectors within policies and governance documents.

SECTORS		Fisheries	Tourism	Agriculture	Forestry	Conservation	Mining	Aquaculture
SECTORS	**Fisheries**		*NTS* ☑ *NDS* ☑ *CTI*	*CTI* ☑ *ASP* ☑	*CTI*	*CTI*		*NFP* ☑ *NDS* ☑
	Tourism			*NTS* ☑	*NTS* ☑ *NFoP* ☑	*NTS*		
	Agriculture				*NFoP* *ASP* ☑	*NDC*		
	Forestry					*NDC*	*NFoP*	
	Conservation						*NDC*	
	Mining							
	Aquaculture							

Key Policies

CTI = Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010

NFP = Solomon Islands National Fisheries Policy 2019-2029

NTS = Solomon Islands National Tourism Development Strategy 2015-2019

NDS = National Development Strategy 2016-2035: Improving the Social and Economic Livelihoods of all Solomon Islanders

NDC = Solomon Islands Nationally Determined Contribution 2021

NFoP = Solomon Islands National Forest Policy 2020

ASP = Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030

Types of integration

- Contextual: Joint overarching institutions and laws
- Structural: Intersectoral social and organisational networks
- Procedural: Joint plans and agreements
- Functional: Joint on-ground projects
- Informational: Data-sharing, joint research, joint meetings
- Distributive: Shared programs and funds
- ☑ Other: Acknowledgement of other sectors in plans
- \- No known integration with other sectors

Table 6. Support to the Integrated Livelihoods Approach (ILA) Objectives within policies and governance documents.

Key Policies	Integrated Livelihoods Approach (ILA) Objectives																
	Fair & just livelihoods						Sustainable natural resource use						Adaptive livelihoods				
Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		
Solomon Islands National Fisheries Policy 2019-2029	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓			
Solomon Islands National Tourism Development Strategy 2015-2019			✓	✓	✓	✓	✓	✓			✓	✓	✓				
National Development Strategy 2016-2035: Improving the Social and Economic Livelihoods of all Solomon Islanders	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	
Solomon Islands Nationally Determined Contribution 2021	✓		✓		✓		✓	✓	✓		✓				✓		✓
Solomon Islands National Forest Policy 2020	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		
Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓

Key

- Gender equity
- Food security
- Poverty reduction
- Rural livelihood support
- Community participation
- Benefits sharing
- Conservation
- Sustainable marine resources
- Sustainable logging / Reforestation
- Integrated approach
- Protected areas
- Enforcement / Regulation
- Alternative livelihoods
- Resilience
- Community-based plans / management
- Food production
- Livelihood adaptive capacity

General integration patterns (Table 5)

Fisheries and Tourism

For tourism and fisheries, the types of integration included 'Contextual', 'Functional' and 'Other', with 'Functional' and 'Other' types, and referred almost entirely to opportunities for game fishing as a form of tourism. This was reflected in several policy documents although no mention of tourism was found in the fisheries policy.

> *"[…] marketing needs to focus on areas where Solomon Islands can compete based on the quality of the experience; the activity-based segments based around diving, surfing, fishing, WWII, nature/bird watching and culture/village stay provide a useful basis for such marketing."* (Solomon Islands National Tourism Development Strategy 2015-2019) [Functional integration]

> *"Solomon Islands offer tourists a range of products including dive tourism, adventure tourism related to nature and culture, kayaking, game fishing, village stay tourism and World War II heritage tourism."* (National Development Strategy 2016-2035) ['Other' integration]

> *"Fisheries impacts through its role in the protection of marine animals and regulation of game fishing operations."* (Solomon Islands National Tourism Development Strategy 2015-2019) [Contextual integration]

> *"Fishing: Solomon Islands has good sport fishing and fresh water/estuary fishing; fishing operators are located on Guadalcanal, as well as Gizo, Munda, Marovo and Isabel Province. The major potential source market is Australia, although there are opportunities to attract specialist fishermen from the USA and Europe."* (Solomon Islands National Tourism Development Strategy 2015-2019) ['Other' integration]

Fisheries and other sectors

Fisheries was mentions in policies across almost all sectors (except mining). 'Contextual', 'Procedural', 'Functional', 'Distributive' and 'Other' types of integration were found. The 'Contextual' type was the only one found across all the sectors with signs of integration. However, no 'Structural' or 'Informational' types of integration were found.

> *"Other relevant policy and strategy documents: • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) • Forest Resources and Timber Utilisation Act • Sustainable Land Management • Solomon Islands Agriculture & Rural Development Strategy (ARDS) 2007"* (Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010) [Contextual integration: Fisheries-forestry & Fisheries-agriculture]

> *"Copyright: Citation: © 2010 Ministry of Environment, Conservation & Meteorology and Ministry of Fisheries & Marine Resources, SIG, Honiara. Solomon Islands*

MECM/MFMR. (April 2010). Solomon Islands Coral Triangle Initiative National Plan of Action, SIG, Honiara, Solomon Islands" (Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010) [Procedural integration: Fisheries].

"The sustained operation of a rural seaweed farming industry over recent years, and the ongoing interest of rural entrepreneurs in farming of freshwater, brackish-water and marine fish and marine resources, suggests that aquaculture has potential to develop further as one platform to secure food and nutrition security as well as create rural livelihood and national revenue generating opportunities. The national government facilitates research into new and emerging aquaculture opportunities to develop science-based policy and implement development plans." (Solomon Islands National Fisheries Policy 2019-2029) [Functional and informational integration: Fisheries-aquaculture]

The Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010 is the governance document that integrated with the most sectors (fisheries-agriculture, fisheries-forestry and fisheries-conservation), and was the only policy document in which we found signs of integration for fisheries-forestry and fisheries-conservation.

Between fisheries and agriculture, we found signs of integration in Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030; however, we could not find any signs in Solomon Islands National Fisheries Policy 2019-2029. Between fisheries and forestry, we found no signs of integration in either Solomon Islands National Fisheries Policy 2019-2029 or Solomon Islands National Forest Policy 2020. These findings are relevant because those policies are the key governance documents for those specific livelihood sectors.

Small-scale fisheries & aquaculture are integrated in the National Fisheries Policy 2019-2029 and National Development Strategy with 'Contextual', 'Functional', 'Informational' and 'Other' types of integration; however, no 'Structural', 'Procedural' or 'Distributive' types of integration were found.

"Strategic Policy Objective 3: Develop and establish a sustainable and well-managed aquaculture sector that supports rural livelihoods, food security, economic return and stock enhancement." (Solomon Islands National Fisheries Policy 2019-2029) [Contextual integration - Fisheries-aquaculture]

Tourism & other sectors

Between tourism and other sectors, we found signs of integration with the agriculture, forestry and conservation sectors. We found 'Contextual', 'Functional', 'Distributive' and 'Other' types of integration. However, no 'Structural', 'Procedural' or 'Informational' types of integration were found. We could not find signs of integration between tourism and mining or tourism and aquaculture.

All the signs of integration were found within two governance documents: Solomon Islands National Tourism Development Strategy 2015-2019 and Solomon Islands National Forest Policy 2020. The first policy document integrated with most livelihood sectors (tourism-agriculture, tourism-conservation and tourism-forestry). The second document showed signs of integration only between tourism and forestry.

> *"It is also recognised that value-addition and developing agriculture sector's linkages with the tourism sector can help sustain the revenue/export earnings and create additional jobs."* (Solomon Islands National Tourism Development Strategy 2015-2019) ['Other' integration: Tourism-agriculture]
>
> *"Ministry of Lands and Ministry of Environment – through the development and enforcement of environmental regulations including those relating to environmental impact assessment of development and through the management of National Parks and forests and tourist trails and tracks, which are key assets which attract tourists; also allocates land, facilitates title transfer and maintains register of all titles and influences where tourism development can be located."* (Solomon Islands National Tourism Development Strategy 2015-2019) [Contextual and functional integration: Tourism-conservation]
>
> *"10.5 Promote the forest-based eco-tourism sector*" (Solomon Islands National Forest Policy 2020) [Functional integration: Tourism-forestry].

Evidence of key objectives of the Integrated Livelihoods Approach (ILA): fair and just livelihoods; sustainable natural resource use; and adaptive livelihoods (Table 6)

All documents showed support to the three ILA objectives. Their ILA sub-objectives support varied though, with some showing support to a more diverse suite of sub-objectives than others (**Table 5**). For example, the National Development Strategy 2016-2035 and Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030 support all six sub-objectives related to fair and just livelihoods; and two of the key governance documents support three out of the six sub-objectives. The next sub-sections feature the findings for each of the ILA objectives.

Fair & just livelihoods

The 'Community participation' sub-objective was the most represented across the policy documents, with support found in all of them. 'Food security' was the least represented sub-objective with support found in four of the seven key policies analysed, followed by 'Gender equity', 'Poverty reduction' and 'Benefits sharing', with support found in five governance documents, and 'Rural livelihood support', in six.

We found no mention to ‘Gender equity’ in older governance documents (National Plan of Action 2010 and National Tourism Strategy 2015-2019), which may illustrate how recent it is the movement of gender consideration is in policy.

We found support to all fair and just livelihoods sub-objectives in the National Development Strategy 2016-2035 and Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030.

The key documents with the most gaps were Solomon Islands Nationally Determined Contribution 2021 (gaps in ‘Food security’, ‘Rural livelihood support’ and ‘Benefits sharing’) and Solomon Islands National Forest Policy 2020 (gaps in ‘Food security’, ‘Poverty reduction’ and ‘Benefits sharing’), followed by Solomon Islands National Tourism Development Strategy 2015-2019 (gaps in ‘Gender equity’ and ‘Food security’), Solomon Islands National Fisheries Policy 2019-2029 (gap in ‘Poverty reduction’) and Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010 (gap in ‘Gender equity’).

Sustainable natural resource use

The ‘Conservation’ sub-objective was the most represented across the policy documents, with support found in all of them. ‘Sustainable marine resources’ and ‘Integrated approach’ were the least represented sub-objectives across policies, with support in four of the seven key governance documents, followed by ‘Sustainable logging / Reforestation’, ‘Protected Areas’ and ‘Enforcement / Regulation’, with support in five of the documents.

The key documents with the most gaps were Solomon Islands National Fisheries Policy 2019-2029, Solomon Islands National Tourism Development Strategy 2015-2019 (both with gaps in ‘Sustainable logging / Reforestation’ and ‘Integrated approach’) and Solomon Islands Nationally Determined Contribution 2021 (gaps in ‘Integrated approach’ and ‘Enforcement / Regulation’), followed by Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010 (gap in ‘Enforcement / Regulation’), the National Development Strategy 2016-2035 (gap in ‘Protected areas’), Solomon Islands National Forest Policy 2020 (gap in ‘Sustainable marine resources’) and Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030 (gap in ‘Protected areas’).

Adaptive livelihoods

Compared to the other two ILA objectives, ‘Adaptive livelihoods’ appeared less in the governance documents. The ‘Alternative livelihoods’ sub-objective was the most represented across the policy documents, with support found in six of the seven documents. ‘Food production’ and ‘Livelihood adaptive capacity’ were the least represented sub-objectives across policies, with support found in two of the seven key documents, followed by ‘Resilience’, with support in three documents, and ‘Community-based plans / management’, with support in four documents. We found support to all adaptive livelihoods sub-objectives only in Solomon Islands Agriculture Sector Growth Strategy and Investment Plan 2021-2030

The governance document with the most gaps was Solomon Islands National Tourism Development Strategy 2015-2019 (gaps in 'Resilience', 'Community-based plans / management, 'Food production' and 'Livelihood adaptive capacity'), followed by Solomon Islands National Plan of Action: Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security 2010 (gaps in 'Resilience', 'Food production' and 'Livelihood adaptive capacity'), Solomon Islands National Fisheries Policy 2019-2029 (gaps in 'Community-based plans / management', 'Food production' and 'Livelihood adaptive capacity'), the National Development Strategy 2016-2035 (gaps in Resilience', 'Community-based plans / management' and 'Livelihood adaptive capacity'), Solomon Islands Nationally Determined Contribution 2021 (gaps in 'Alternative livelihoods', 'Resilience' and 'Food production'), Solomon Islands National Forest Policy 2020 (gaps in 'Food production' and 'Livelihood adaptive capacity').

b. Key informant interviews

The following subsections present the main patterns in the data (n = 9). A complete list of de-identified refined responses can be found in Appendix 2.

Most important livelihoods activities in Western Province

Most important current livelihoods activities were fisheries, agriculture (mainly subsistence farming), and tourism (mainly ecotourism). For the future, the respondents considered that local value-added products would be important. These included new and existing markets such as forest carbon exchange, aquaculture (inland and marine), seaweed farming, trochus, crayfish, and beche-de-mer. Ecotourism was also considered important, along with income-based conservation and research. Respondents also mentioned the importance of managing fisheries resources alongside alternative livelihood activities to 'keep them going'.

Biggest challenges affecting livelihoods in Western Province

The challenges highlighted the existence of both external and internal factors, and social and ecological pressures. Climate change, population pressure (resulting in over-fishing) and logging were considered major issues. Several internal, social challenges affected the ability of governments and communities to tackle these pressures. These included lack of funding (for tourism and other livelihoods), lack of continuous support from government, lack of togetherness in local communities, lack of community participation, and lack of training, leadership and guidance for local communities. These responses highlight the relevance and importance of the next question, which focused on what actions could be taken by decision-makers to support sustainable livelihoods in Western Province.

Most important actions to support sustainable livelihoods in Western Province

The respondents emphasised the importance of a bottom-up approach to supporting sustainable livelihoods. Specifically, including communities and landowners in determining the best path forward. I line with this, decision-makers understood that resources would need to be provided to support local communities in achieving livelihood goals, the identification of new markets, and that regulatory and policy support was also necessary. This includes the need for a legal framework to support fisheries management, and the requirement for Provincial government regulate logging activities and encourage people to engage in activities such as ecotourism to ensure sustainable livelihoods and environment.

Respondents also suggested the need for an integrated approach when designing projects, which lends support to the current SRA and emerging full project.

Effectiveness of existing policies and institutions in support sustainable livelihoods in Western Province

The respondents unanimously agreed that the current policies and institutions are not effective. The reasons for this included the existence of contradicting policies; conflict of interest when implementing integrated decision making to support livelihoods; a disconnect between national government decisions and what Provincial Government can achieve; lack of proper consultation with stakeholders and communities; and a lack of NGO involvement in implementation of Provincial ordinances and policies.

One respondent suggested that the policies are okay, but that enforcement is a concern. They suggested that fisheries conservation and management policies were only partially effective because local people need to access fish and cited a need for capacity building in the community to build skills and awareness.

Views on whether integrated decision making could contribute to sustainable livelihoods in Western Province

Eight of the respondents agreed that integrated decision-making could lead to positive outcomes. One person highlighted that locals own the resources, and governments should not overlook this, meaning that government and local communities must integrate their ideas and decisions. Others also considered integrating ideas about livelihoods would lead to decisions that would benefit multiple parties, and that these collective ideas should be incorporated into policy and its implementation.

The responded who disagreed said “the idea is good but soft no”. The reason for this was that it would be too difficult to manage conflicts of interests.

Potential improvements and support for integrated decision-making to support sustainable livelihoods in Western Province

Communication channels between local authorities and communities and lack of coordinated communication between government ministries. Top-down approach. At the Provincial level, tourism and fisheries sectors do not consult with other sectors to implement policies, and there is a barrier due to conflict of interest.

Support: communication, committee representing all ministries, Provincial government to better support communities, support from NGOs and National Government at the Provincial level.

It was suggested that several existing policies, institutions, processes and networks could be strengthened to support an integrated livelihoods approach. These included:

- Landownership policies
- Western Provincial Network for Sustainable Environment
- Western Province Fisheries Ordinance (still in draft stage).
- "Strengthen the government structure to set up its Ministries so that they can work together to support livelihoods"
- New networks like Plastic-wise Gizo or establishment of Western Province farmers association.
- Strengthen government development plan for Provinces
- National Ocean Policy
- Community Base Resource Management (CBRM)

If you could make one change to the way decisions are currently made about livelihoods in Western Province, what would it be?

Several respondents emphasized (again) the need to consult with and involve communities in making decisions about livelihoods (e.g. a bottom-up approach). This included making sure there was appropriate awareness around policies and initiatives so that there could be acceptance for them before projects were rolled out. They emphasized the need to inform/consult with other sectors that would be affected about new policies.

Respondents suggested the need to prioritise livelihoods in the policies of all government ministries, and that there would need to be resources provided to support these, plus political will. Importantly, it they identified a need to change policy and legislation to identify problems before projects were carried out in communities. This validates the ILA in that the process provides the type of information required to engage communities in determining which projects will most suit their needs.

4. Conclusions

The results suggest a need for more integration among sectoral policies, both in practice and in writing, and a more unified, coordinated approach to supporting community livelihoods. Respondents agreed that integration could help to support important livelihoods such as fisheries and tourism, and to promote new livelihoods linked to value added products.

Where there were some examples if integration (bi-lateral between Ministries, NGOs, etc.), these were limited, and there was consensus that communication channels and coordination among Ministries/sectors/levels of governance would need to be improved for integration to occur. Another point of consensus was that it was important to involve local communities in project design and decisions about livelihoods, and that they would also need financial support and training/awareness building needed at community level. Importantly, one respondent noted there was a need for "**One goal, one aim, one vision to support the livelihoods of people in the Solomon Islands**".

This review identified a need and willingness to work towards an integrated approach to livelihoods among our SC members. The new project FIS /2023/122 *Planim Fiuja fo Yumi* will extend the analysis conducted the SRA to include informal governance (i.e. community level), updated policies at the national level, and regional scale policy. We also aim to gain an understanding of key interactions and power dynamics within and between existing governance institutions (government and non), public administration, service delivery, and other stakeholders. Strategic oversight of the new project will continue to be provided by the Cross-sectoral Project Steering Committee, which will be led by the Ministry of Fisheries and Marine Resources (MFMR).

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Appendix 1

Semi-structured Interview: Perspectives on Governance Integration to Support Sustainable Livelihoods in Coastal Communities in Western Province

Date:
Name:
Sex:
Organisation:
Position:
Location (of organisation):

Obtain informed consent to interview (include this consent in. audio recording).

Thank you for agreeing to participate in this interview about ways to support sustainable livelihoods in coastal communities in Western Province. I'd like to start with a few questions about your general views on this topic.

1. Currently, what do you consider to be the most important livelihood activities for coastal communities in Western Province?

    - Why?

2. Are there any emerging livelihood opportunities that you expect to be important in the future?

3. In your view, what are the biggest challenges affecting coastal community livelihoods in Western Province?

4. What do you consider to be the most important actions that decision-makers can take to support sustainable livelihoods in Western Province?

5. In your experience, how effective are existing policies and institutions in supporting sustainable livelihoods in Western Province?

    - Can you please provide any examples?
    - Has anything specific occurred that has influenced your opinion?

Now that I know a bit about your views on livelihoods in Western Province, I would like to focus on policy and decision-making around integrated livelihoods, which is the topic of our project. By integrated decision-making, I am referring to the capacity to make decisions about new or existing livelihoods activities while taking into consideration how those will affect other livelihoods. So, for example, if a decision maker is considering introducing tourism as a new livelihood activity, are there policies or processes in place for them to consider how this might interact (positively or negatively) with other livelihoods such as fishing? Another example would be if a community considering engaging in cash crops or logging considers how this will affect communities downstream? Some practical examples of integration include joint laws and institutions, networks, joint plans and agreements, joint projects, data sharing, meetings, shared programs and funds. Organisations that collaborate via integrated approaches could be cooperatives, NGOs, international organisations, research institutions, government ministries, community groups, or the private sector.

6. Based on what I have described, in your opinion, do you think *integrated decision-making* can contribute positively to sustainable livelihoods in coastal communities in Western Province?

    - Why do you think that?
    - Based on your experience, what are you thinking about why it would be positive/not positive?

7. Can you recall any examples of *integrated decision-making* within your organisation that have focused on livelihoods?

If no, skip to 14. If yes:

8. Please describe the example (who and what?).
9. What was the purpose?
10. What was the outcome?
11. What worked well with this example?
12. In reflecting, is there anything you would have liked to approach differently?
13. Can you think of any other examples of *integrated decision-making* within your organisation? *If yes repeat questions 8 – 12.*

14. In your view, could *integrated decision-making* between your organisation and others be improved for the purpose of making decisions about new and existing livelihoods?

If no skip to 18, if yes:

15. What improvements could be made?
16. Are there any barriers to these improvements?
17. What type of support would be needed for these improvements to happen?

18. Can you think of any examples from outside your organisation where decisions about new or existing livelihoods in coastal communities in Western Province or elsewhere in Solomon Islands have been made from an integrated perspective?

If no, skip to 25. If yes:

19. Please describe the example (who and what?).
20. What was the purpose?
21. What was the outcome?
22. What worked well with this example?
23. Upon reflection, is there anything you would have approached differently?
24. Can you think of any other examples of *integrated decision-making* from outside your organisation? *If yes repeat questions 19 – 23.*

Thank you for your time, we are almost finished with the interview now. I'd like to wrap up with a few final questions about your views on an integrated livelihoods approach in Western Province.

25. In your view are there any policies, institutions, processes and networks we have not discussed already that could be strengthened or created to support a more integrated livelihoods and integrated decision-making approach in Western Province? If yes, please describe.

26. In your view, besides an integrated approach, are there any other policies or approaches we have not discussed that need to be developed to support sustainable livelihoods in coastal communities in Western Province? Please describe.

27. Considering everything we have discussed in this interview, if you could make one change to the way decisions are currently made about livelihoods in Western Province, what would it be? What would be the first step required to make that change a possibility?

Appendix 2. De-identified, refined key informant interview responses (n = 9)

Currently, what do you consider to be the most important livelihood activities for coastal communities in Western Province?	Are there any emerging livelihood opportunities that you expect to be important in the future?	In your view, what are the biggest challenges affecting coastal community livelihoods in Western Province?	What do you consider to be the most important actions that decision-makers can take to support sustainable livelihoods in Western Province?	In your experience, how effective are existing policies and institutions in supporting sustainable livelihoods in Western Province?	Based on what I have described, in your opinion, do you think integrated decision-making can contribute positively to sustainable livelihoods in coastal communities in Western Province? Why do you think that?
Fisheries and agriculture.	Local value added products. Important for forest ecosystem conservation (e.g. Sirebe tribe forest conservation receiving cash for forest carbon exchange). Fisheries, especially opportunities for aquaculture (inshore, inland) and seaweed farming (e.g. Boboe, Western Province).	Population pressure on resources resulting in over fishing.	Integreatd approach when designing a project. e.g. Kolombangara Forest Product Limited (KFPL) and Kolombangara Island Conservation Association (KIBCA) in the Western Province.	Not very effective due to contradicting policies. e.g. the national policies sometimes are not in line with provincial ordinances. Sometimes they are not really enforced and thus have no power to support livelihoods in the provinces and around Solomon Islands.	Yes, because when all the stakeholders integrate their plans and strategies they will have one outcome to support sustainable livelihoods in the Western Province.
Fisheries (especially value added) – e.g. tilapia farming, fisheries farming, smoked fish. Because it is important to support daily needs like schools (need for cash is very high).	Depends on market driven activities - e.g. diving for trochus, crayfish, beche-de-mer. New markets opening that can bring opportunities.	Over fishing – people need to fish for long hours and travel far. Also climate change is causing sea level rise, increase sea temperature, and coral bleaching all affecting and hindering coastal development. Logging activities are also a major challenge.	Put in place a legal framework for fish management.	Existing policies are not really enforced. e.g. selling of small size fish, family relations and culture.	No. Because it is our culture and is important. E.g. fishermen can be a farmer and tourism will not allow fishing, but snorkelling. Integration of livelihood will restrict other activities from happening but it is part of our life. e.g. tourism will restrict commercial fishing but people depend on fish for food and income [MISUNDERSTOOD QUESTION]
Fishing, subsistence farming of food crops & vegetables.	Value added local products	Access to agricultural support, people too dependent on imported food. Climate change is also a challenge causing sea level rise affecting food crops. A need to improve food systems for coastal communities.	Provide resources to assist local farmers/communities. E.g. logistical support, tools and materials.	There are border Policy issues. E.g. Shortland Islands, people crossing the border to sell their produce to new markets in Bougainville with high price compared to domestic market. Also due to covid 19 people find it hard to earn income a make a living.	Yes, because stakeholders and communities can share their views, ideas to make decisions.
Tours, visiting cutlural sites, and supply of tourism operators (fishermen vs guest, small farmers vs guest).	Ecotourism grants for local tourism operators.	Bad weather, cost of operating tourism.	Provincial government needs to regualte logging activities and encourage people to engage in activities such as tourism to ensure sustainable livelihoods. Prioritise ecotourism policies to support sustainable environment.	There is a conflict of interest when implementing integrated decsion making to support livelihoods in every Province (e.g. tourism policy).	Yes, because ideas will be shared including integrated policies. Also community representatives will have their ideas included in the decision.

Currently, what do you consider to be the most important livelihood activities for coastal communities in Western Province?	Are there any emerging livelihood opportunities that you expect to be important in the future?	In your view, what are the biggest challenges affecting coastal community livelihoods in Western Province?	What do you consider to be the most important actions that decision-makers can take to support sustainable livelihoods in Western Province?	In your experience, how effective are existing policies and institutions in supporting sustainable livelihoods in Western Province?	Based on what I have described, in your opinion, do you think integrated decision-making can contribute positively to sustainable livelihoods in coastal communities in Western Province? Why do you think that?
Ecotourism because it has potential for local tourism operators.	Generating income based conservation and research on coastal areas.	Lack of continuous support from government. Lack of togetherness in local community. Transparency and shared ideas by local community dwellers. Lack of community participation.	Support from government – respect ownership of local landowners	Change policies that currently suit our needs. Sometimes our policies are old and out-dated. Sometimes decisions making also afffected the livelihoods we engaged woth. There is a conflic of interest. E.g. Forestry policy and its interests.	Yes because locals own the resources and without their consent government sometimes rule them out. Thus, government and local communities have to integrate their ideas and decisions.
Fishing.	Conservation - marine resources, tourism & value added products.	Leadership and guidance – how to lead the community and to use the resources that are available. Also cash problem no enough trainings provided to rural people. Lack support from national government.	Government to provide support and make decisions including communities	Not effective. Example would be Provincial agricultural division – because the decisions depends on national Government planning, they end up doing nothing in the province	Yes, because the government has to provide support to local people by including them in making decisions.
Fish, because it provide source of income for coastal community and Agriculture also for food (protein) & root crop	Tourism opportunities (WWII) wreckage – site visit for foreign and local tourists. Ecotourism lodges.	Threat from climate change. The impacts affect existing livelihoods. Depletion of resources due to high demand from increasing population. e.g. Babanga community is a small community with high population and the population outnumbered their resources.	Decisions to take bottom up approach so that the local grassroots people can also benefit from any project provided by the government. Decisions to include ideas from communities. Communities to make decisions that best fit them.	Policies are okay - but enforcement is a concern. The case with landowners is how they like things to operate their way. E.g. marine protected areas policies. It is 50% effective. Local people want to access their resources as well. There is a need for capacity building in the community with trainings and awareness.	Yes – more ideas are shared to make decisions that will benefit both parties and also supporting livelihoods.
Fishing.	There are emerging livelihood opportunities; however, due to land disputes over community use and land ownership it is difficult for people to accept opportunities for new livelihoods.	Climate change	Look for other options to support livelihoods in the future.	Policies are okay. The challenge is the institutions to enforce the policies. Because all the development is central only in Honiara. No proper awareness to communities (rural) level about policies.	Yes and no. Good approach that captured everyone's ideas and interest and it can contribute positively to building livelihood. Soft no - conflict of interests and objectives to achieve. How we manage it.

Currently, what do you consider to be the most important livelihood activities for coastal communities in Western Province?	Are there any emerging livelihood opportunities that you expect to be important in the future?	In your view, what are the biggest challenges affecting coastal community livelihoods in Western Province?	What do you consider to be the most important actions that decision-makers can take to support sustainable livelihoods in Western Province?	In your experience, how effective are existing policies and institutions in supporting sustainable livelihoods in Western Province?	Based on what I have described, in your opinion, do you think integrated decision-making can contribute positively to sustainable livelihoods in coastal communities in Western Province? Why do you think that?
CBRM – Community Base Resource Management & Fisheries.	FAD Project – Managing fisheries resources so that communities have alternative livelihood activities to keep them going.	Lack/limited resources. Funding, materials, also climate change.	Implement right/proper policies to support livelihoods and provide resource support to local coastal communities. Also to always include communities in decision making	Fisheries Policies – Both provincial and national policies. The existing policies are not really effective due to lack of proper consultation with stakeholders and communities. Lack of NGO involvment in implementation of provincial ordinance and policies.	Yes, because there can be collective views and ideas put into implementing policies. Also shared decision making and community involvement /participation of communities in making decisionsis important in the livelihood space.

Can you recall any examples of integrated decision-making within your organisation that have focused on livelihoods?	What worked well? What could have been improved?	Can you think of any other examples of integrated decision-making within your organisation?	In your view, could *integrated decision-making* between your organisation and others be improved for the purpose of making decisions about new and existing livelihoods? What improvements could be made?	What type of support would be needed for these improvements to happen?	Can you think of any examples from outside your organisation where decisions about new or existing livelihoods in coastal communities in Western Province or elsewhere in Solomon Islands have been made from an integrated perspective?
GEF project that inovled cooperation between Agriculture, Fisheries and Environment - to support livelihoods for East Rennell, Guadalcanal and Malaita. It may be slowly benefiting communities but not working that well because different ministries have their own interests and seek to achieve their individual outcomes. Still early days so can't say what could be the ultimate outcome or what could be done differently.		No	Yes		WWF and World Fish Gizo with coastal communities. Purpose was to support the community with their community based resource management (sea grapes). It helps people in the community to grow sea grapes to earn income and to sustain their livelihood for future generation.

Can you recall any examples of integrated decision-making within your organisation that have focused on livelihoods?	What worked well? What could have been improved?	Can you think of any other examples of integrated decision-making within your organisation?	In your view, could *integrated decision-making* between your organisation and others be improved for the purpose of making decisions about new and existing livelihoods? What improvements could be made?	What type of support would be needed for these improvements to happen?	Can you think of any examples from outside your organisation where decisions about new or existing livelihoods in coastal communities in Western Province or elsewhere in Solomon Islands have been made from an integrated perspective?
Ministry of Fisheries and Marine Resources & Ministry of Agriculture and Livestock collaborated to encourage cash crops and honey cultivation/farming in communities. Outcome was communities received proper trainings and skills on how to farm cash crops and honey farming.	The part that worked well was that people in the community got their ideas integrated with the ideas from the Ministry and they benefited from it.N1	No	Yes. Proper communication channels. Different criteria are applied to give out projects to people, there is a lack of proper coordination by responsible government ministries.	Project sharing task – committee representing all the ministries.	Yes
Yes - emergency responses. E.g Ministry of Agriculture and Livestock & National Disaster Management Office. The purpose was to consolidate food stock (fish/Tuna and Rice) for Gizo and Shortland to support local communities in terms of livelihoods (food support). Working with communities in Shortland islands was successful as it supported people during the pandemic crisis and lockdowns. It also helped to strengthen their food security measures.	What worked well was that the two government ministries had the same idea and vision to support people during emergency period and covid 19 pandemic crisis. Improvements could to be in the communication channel between authorities and local communities.	No	Yes, we need to improve proper dialogue with relevant government ministries. Communication Channels.	NGOs and Government Ministries need to have proper dialogue that will share ideas and integrated decisions.	Ministry of Agriculture and Livestock & National Disaster Management Office. To support food production in the Shortland Islands. Outcome was that people get support to improve their food supplies.
Ministry of Culture and Tourism and Solomon Airlines. To support local tourism operators, local farmers and also Solomon Airlines enterprise. The outcome was that local tourism requested to be part of the scheme. It also helps to promote local tourism sites in the Solomon Islands.	What worked well was ideas are shared both parties and service provider also benefit from this collaboration between Solomon Airlines and Ministry of Culture. I would have been goood to Involve more partners or Ministries to be part of the scheme to support the livelihood of rural people.	No	Not really sure		
Forestry management Technical Services/Logging/Reforestation. Purpose was to Support local landowners for replanting after logging. The outcome was few communities already involved in reforestation to support their continuous survival.	What worked well was training – resource owner really benefit by receiving subsidies from the ministry (forestry).	No	Not really sure		

Can you recall any examples of integrated decision-making within your organisation that have focused on livelihoods?	What worked well? What could have been improved?	Can you think of any other examples of integrated decision-making within your organisation?	In your view, could *integrated decision-making* between your organisation and others be improved for the purpose of making decisions about new and existing livelihoods? What improvements could be made?	What type of support would be needed for these improvements to happen?	Can you think of any examples from outside your organisation where decisions about new or existing livelihoods in coastal communities in Western Province or elsewhere in Solomon Islands have been made from an integrated perspective?
Yes. 6 miles agricluture farming site. Purpose was to support local/rural farmers and to encourage them to do agricultural activities. The outcome was it provides revenue for WP. The oucome was all the divisions in the province benefit.	What could have been done differently was to invovle the different sectors.	No	Yes. Collaboration and participation of communities. Barrier is the top down approach.	Support from government, NGOs and provincial government	Yes. Provincial Government process. Purpose to provide support to all wards in WP for development (market).
No			Yes. Proper consultation with other provincial sector to implement policies. The barried is that sectors in the province have conflicts of interest.	Support from the provincial government – provide capacity building to proper translate policies to people in the community to better understand them. Also NGOs to provide support the respective sectors in the province. National government also to provide support.	No
Committee for community development fund. Provincial community funding – Combination of all government ministries and provincial stakeholders. Purpose was to support community developments also including livelihoods for rural people. The outcome is that It is really happening and good outcome for communities; however, due to conflict of interest some of the goals and aims were never achieved. The outcome was the ideas shared together so support developments in the communities.		No	Yes. Proper communication channels.	Communication (dialogue)	Yes. Forestry project in Choiseul province – Nakau & Live and Learn (NGO) and landowners conserving of forests. Purpose was forest conservation. Outcome was The landowning tribe conserve their forests' to support their livelihoods.
No		No			No

What worked well with this example?	Can you think of any other examples of *integrated decision-making* from outside your organisation?	In your view are there any policies, institutions, processes and networks we have not discussed already that could be strengthened or created to support a more integrated livelihoods and integrated decision-making approach in Western Province?
Worked well because the communities shared their needs and the types of projects they wanted for their community.	No	Landownership policies (e.g. customary land vs. government land). Sometimes there is conflict between the land owners themselves and between local government and villagers for projects to support livelihoods in the Western Province. Yes. Western Provincial Network for Sustainable Environment. This network is very important for the future of Western Province. It will help sustain the environment and also support the livelihoods of people in the Western Province
What worked well was shared decision making. Both Ministries integrate their ideas to achieve one goal.	No	Improve or strengthen livelihood framework to support livelihood for communities to support coconut production and livestock. Government structure. Strengthen the government structure to set up its ministries so that they can work together to support livelihoods No
Outcome was It creates shared vision and ideas from all sector. Worked well.	No	The government structure should be reviewed or strengthen to support livelihoods. So that non-development sectors in the province should improve. Improvement of structural issues.
Integrated ideas and decisions that captured how people would like to use their natural resources	No	Yes – new institution (Plasticwise Gizo) need to be strengthened to support new livelihoods where women turn garbage into art & crafts and sell it for income. Also to establish Western Province farmers association - networks needed. Yes. Institutions need to be strengthen – Ministry of Environment, Climate Change and Disaster Management. Ministry of Fisheries and Marine Resources. Judicicary. There are networks, policies and process that can be strengthened to support livelihoods. Western Province Network for Sustainable Environment (WPNFSE) – needs to be registered to become an organization itself to be recognised by the government and can be able to get support to improve livelihoods in the Western Province. Ø Western Province (WP) Fisheries Ordinance – the fisheries ordinance is till on draft stage. It should proper implemented and finalised so that the ordinance can fully support fisheries livelihoods. Ø Process to implement provincial ordinance and policies. This need to be improved or working together with the national government to proper implementation. Sometimes the proper processes are skipped Ø thus causing policies and ordinance to be rejected and remained on draft stage.

In your view, besides an integrated approach, are there any other policies or approaches we have not discussed that need to be developed to support sustainable livelihoods in coastal communities in Western Province?	Considering everything we have discussed in this interview, if you could make one change to the way decisions are currently made about livelihoods in Western Province, what would it be? What would be the first step required to make that change a possibility?
No	Prioritising livelihoods in the policies for all government ministries; provide resource input to implement the liveihood components/projects.
Ocean Policy – the 12 ministries to have relations to oceans to work together and integrate their approaches to protect our ocean. This policy is looked after by Ministry of Foreign Affairs at the national level.	Resourcing and budget: Provide budget for provinces to carry out their respective duties, provide technical support to do capacity building in the communities, empower provinces to prioritise the distribution of specific projects.
Budget and Planning Policies, Land Disputes, Livelihood Policies & Tribal/Chief – land and leadership systems.	Understanding the needs of the coastal communities, always including people from the communities to make decisions including men, women, youths and disabilities, & proper awareness about livelihoods and integrated approach
Government to support its ministries to work together to support the livelihoods of local people in the community	One goal, one aim, one vision to support the livelihoods of people in the Solomon Islands
Strengthen government development plan for provinces	Change policy and legislation to identify problems before the actual project to be carried out to communities. Also include communities in decision making because they own the resources.
Support from national government for provincial government to carry out livelihood activities. On the other hand, it should be okay if WP becomes state government	There must be a political will. Leaders to have vision to advance their province to support livelihoods.
No	Bottom up consultation where communities were included to share ideas and make decisions that will support their livelihoods. Also proper consultation and awareness to communities about policies and approaches to support their livelihoods
	Government to change how they conduct government business. Stakeholders to share and integrate their ideas so that all can benefit and livelihoods can be supported in that way. Put aside politics.
Community Base Resource Management (CBRM) – partnering with tourism to promote conservation and recreation purpose	Proper awareness, consultation and involvement of communities in making decisions in the livelihood space. Let the communities, and stakeholders aware and accept the policies or concept before the project can be roll out. Also inform other sector involved to accept the concept.

11.2 Appendix 2: The Livelihoods-Based Risk Profiling Framework User Manual

Australian Government
Australian Centre for International Agricultural Research

The Livelihoods-Based Risk Profiling Framework

User Manual

July 2024

JAMES COOK UNIVERSITY AUSTRALIA

Centre for Sustainable Tropical Fisheries & Aquaculture

ecological Solutions (Solomon Islands)

Authors

Bethany Smith

PhD Candidate, Centre for Sustainable Tropical Fisheries and Aquaculture, College of Science and Engineering, James Cook University

Associate Professor Amy Diedrich

Head, Centre for Sustainable Tropical Fisheries and Aquaculture, College of Science and Engineering, James Cook University

Dr Stephanie Duce

Lecturer in spatial science at James Cook University

Hensllyn Boseto

Project manager at Ecological Solutions Solomon Islands

Aubrey Vavu

Research Assistant at Ecological Solutions Solomon Islands

Relna Peter

Research Assistant at Ecological Solutions Solomon Islands

Acknowledgements

This manual is a product of the small research activity FIS 2020/111 ‘Spatially Integrated Approach to Support a Portfolio of Livelihoods’, funded by the Australian Centre for International Agricultural Research (ACIAR). The manual is based on research outcomes from this project conducted with partners from Western Province, Solomon Islands.

The authors would like to acknowledge the following institutions whose facilities and collaboration has supported the completion of the research presented in this manual:

- James Cook University (JCU)
- The Centre for Sustainable Tropical Fisheries and Aquaculture (CSTFA)
- Ecological Solutions Solomon Islands (ESSI)

We thank the following villages for allowing us to undertake this research in Western Province, Solomon Islands.

- Valapata Village
- Uriaupo Village
- Mbambanga Village

All photographs included in this manual were taken by Bethany Smith.

Abbreviations

CAPSI	Community-Led Adaptation Pathways Approach
ESSI	Ecological Solutions Solomon Islands
IPCC	Intergovernmental Panel on Climate Change
LRPF	Livelihoods-Based Risk Profiling Framework
SLF	Sustainable Livelihoods Framework

Contents

Introduction

The Livelihoods-Based Risk Profiling Framework (LRPF) was developed to support rural communities in understanding and responding to the factors that influence their likelihood of impact from global change.

The LRPF expands the Intergovernmental Panel on Climate Change's (IPCC) AR5 Risk Assessment Framework (IPCC 2014), addressing identified limitations of the AR5 (Smith et al. 2024), and developing a specific methodology for its implementation in the context of rural livelihoods. Specifically, the LRPF assesses how rural livelihoods are at risk of impact from exposure to various hazards, and how underlying community vulnerabilities influence the extent of these impacts and the local capacity for response.

This user guide provides practical guidance for implementing the Livelihoods-Based Risk Profiling Framework (LRPF) as a community-based tool to support adaptation planning for rural livelihoods. The guide aims to equip scientists, practitioners and decision-makers with the necessary knowledge and tools to successfully implement the LRPF. The LRPF itself is intended to guide rural communities in identifying, assessing, and understanding risks to their livelihoods, facilitating the development of tailored adaptation strategies that can enhance local resilience to future challenges.

In this guide you will find detailed explanations and instructions on how to apply the LRPF to your community's specific context. This includes:

- **Overview of the LRPF:** An introduction to the framework's components and objectives.
- **Implementation of the LRPF:** A step-by-step guide to implementing the LRPF within rural communities
- **LRPF Integration with Adaptation Planning Approaches:** A guide to the Community-Based Adaptation Planning approach (CAPSI) and how to integrate LRPF outputs for risk-informed adaptation.

Each section of the guide is designed to build upon the previous, providing a comprehensive approach to risk profiling and adaptation planning. We hope this guide can support the effective implementation of the LRPF, contributing to more resilient and adaptive livelihoods in the face of future challenges. We include case study examples from Western Province, Solomon Islands, where the LRPF was trialled to support the practical application of the approach.

Part 1: Developing the Livelihoods-Based Risk Profiling Framework

Part 1: Developing the Livelihoods-Based Risk Profiling Framework

1.1. Framework Components

To assess risk, the LRPF conducts a mixed method-analysis of its underlying factors.

These include (Figure 1):

Hazard Exposure:

- **Hazard:** The potential occurrence of a shock of stressor event that may impact rural livelihoods.
- **Exposure:** The presence of rural livelihoods in a location that may be adversely impacted by the occurrence of a hazard.

Vulnerability:

- **Sensitivity:** The degree to which rural livelihoods may be impacted by hazard exposure.
- **Adaptive Capacity:** The ability for communities engaged in rural livelihoods to respond to potential impacts, take advantage of opportunities, or respond to consequences.
- **Source Dependence:** The degree to which rural livelihoods depend on source types that may be impacted by hazard exposure.

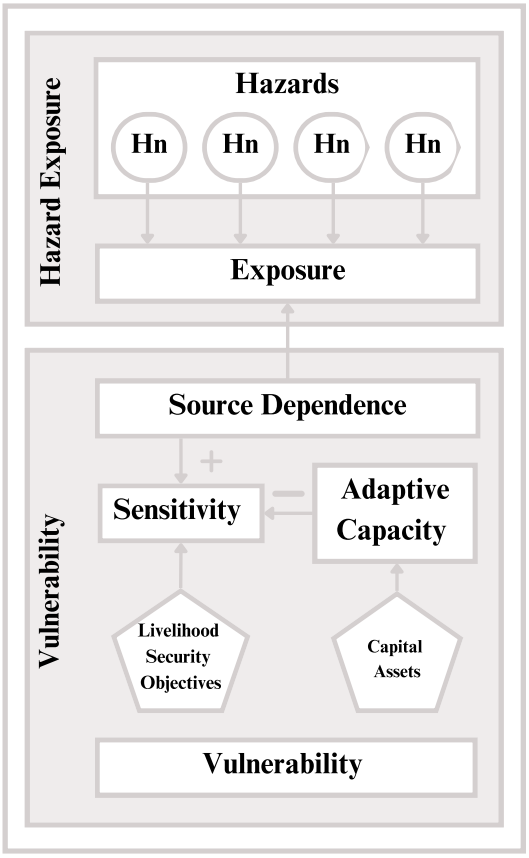


Figure 1: The structure of the Livelihoods-Based Risk Profiling Framework (LRPF).

1.2. LRPF Vulnerability Index

A vulnerability index was developed within the LRPF to conduct a quantitative assessment of adaptive capacity and sensitivity in the context of rural livelihoods.

Indicators were determined through a systematic review of prior risk and vulnerability assessments applied to rural livelihoods (Smith and Diedrich 2024).

These indicators reflect the local context of Western Province, Solomon Islands where the LRPF was trialled. Adaptations may be necessary for different contexts.

A series of composite indicators guide the analysis of sensitivity and adaptive capacity.

These include:

Sensitivity

- **Water Security:** Access to adequate quantities of acceptable quality water for sustaining livelihoods and ensuring protection against water borne diseases.
- **Food Security:** Access to sufficient, safe, and nutritious foods to maintain a healthy and active lifestyle.
- **Housing Security:** Access to adequate housing.
- **Income Security:** Access to reliable and stable income that can meet basic needs.
- **Energy Security:** Access to uninterrupted energy sources.

Adaptive Capacity

- **Human Capital:** The skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives.
- **Financial Capital:** The financial resources that people use to achieve their livelihood objectives.
- **Social Capital:** The social resources upon which people draw in pursuit of their livelihood objectives.
- **Physical Capital:** The basic infrastructure and goods needed to support livelihoods.
- **Natural Capital:** Fair access of households to stocks of natural resources that are important for livelihoods.

Within these composite indicators, 10 individual indicators of sensitivity, and 19 of adaptive capacity were selected for inclusion within the LPRF vulnerability index (Table 1).

Table 1: The components, composite indicators, and individual indicators that comprise the LRPF vulnerability index.

Indicator	Definition
Adaptive Capacity	
Human Capital	
Dependency Ratio	The ratio of dependent (i.e., non-working adults) to non-dependent household members (i.e., working adults).
Health Condition	The number of times in the last year household members missed their livelihood responsibilities due to being sick, ill or injured.

Access to Healthcare	The amount of time a household can access healthcare in times of need.
Livelihood Diversity Index	The number of unique livelihood activities that members of a household are engaged in.
Extent of Coping Strategies	The extent to which a household believes they can cope with locally relevant hazard exposure.
Financial Capital	
Household Savings	The total amount of savings accumulated by a household.
Household Income	The amount of income a household acquires in a one-month period.
Household Expenditure	Household monthly expenditure on basic needs (e.g., food, water, housing, energy and healthcare).
Income Satisfaction	The extent to which a household is satisfied with their ability to purchase basic goods.
Access to Financial Services	Household access to key financial services including bank accounts, pensions, and loans.
Social Capital	
Social Networks	The number of social relationships a household can turn to for support in times of need.
Inclusion in Decision Making	The extent of household satisfaction with their inclusion in community decision making.
Local Institutional Memberships	Household membership in local institutions (e.g., groups, organisations and associations).
Satisfaction with Leadership	The extent to which a household is satisfied with the leadership in their community.
Trust	The level of trust a household has in community members and leaders.
Collective Action	The extent to which a household participates in community-based activities.
Perceptions of Fair Access to Livelihood Opportunities	Household perception of fair access to livelihood opportunities within their community.
Physical Capital	
Access to Livelihoods-Based Assets	Household access to key assets required to support livelihoods.
Natural Capital	
Perceptions of Fair Access to Natural Resources	Household perception of fair access to natural resources within their community.
Sensitivity	
Water Security	
Access to Drinking Water	Household has access to improved sources of drinking water within a 30-minute return distance.
Water Sufficiency	Household has access to sufficient quantities of water to meet basic needs.
Water Quality	The extent to which a household is satisfied with the quality of their drinking water.
Access to Sanitation	Household has access to an improved form of sanitation.
Food Security	
Food Sufficiency	Household has uninterrupted access to sufficient volumes of food to meet household requirements.
Food Consumption Score	The frequency of consumption of different food groups during the previous 7 days.
Housing Security	
Housing Condition	The type of material used for the roof, flooring, and walls of a household's shelter.

Energy Security	
Cooking Sufficiency	The amount of time a household has problems accessing cooking fuel.
Lighting Sufficiency	The amount of time a household has problems accessing lighting.
Income Security	
Income Stability	The extent to which household income has fluctuated over the previous 12 months.

Part 2: Implementing the Livelihoods-Based Risk Profiling Framework

Part 2: Implementing the Livelihoods-Based Risk Profiling Framework

The following section details steps to implement the LRPF.

The LRPF uses a mixed methods approach to assess risk, comprising **focus group mapping workshops** and **household surveys.** The mapping workshops are used to collect data on hazard exposure, while the household surveys are used to collect data on vulnerability.

2.1. Data Collection

2.1.2. Focus Group Mapping Workshop

Sampling Method

The mapping workshop requires a minimum of twelve individuals selected by community leaders. Participants should comprise an equal number of:

- Males and females.
- Youth, adults, and elders.
- Representatives from different livelihood activities.

The workshop should be held in a community gathering space. Participants should be divided into demographic groups that are most suited to the social dynamics within a community, such as by sex or age to encourage equal participation during the sessions.

Several workshop facilitators should be present to support the implementation of activities in the local language.

The workshop is comprised of two activities:

- **Hazard Ranking:** Used to determine the hazards that pose the greatest concern to local livelihoods.
- **Hazard Exposure Mapping:** Used to establish where hazards occur and interact with sources used to meet essential needs.

Activity 1: Hazard Ranking

The hazard ranking activity allows participants to identify and prioritise the major hazards impacting their livelihoods.

In this activity, participants will be provided flashcards depicting hazards deemed 'high concern' within the landscape. These hazards should be selected by local experts

and represent broad issues such as climate change. Participants will rank these hazards based on their perceived impact on livelihoods. If a hazard is not deemed relevant to the local context, it should be removed from the ranking activity.

Participants will also receive blank flashcards to list any additional hazards not identified by local experts and include these in the ranking process.

Participants will have 45 minutes to complete the ranking activity. Workshop facilitators should encourage discussions and negotiation to help each group reach a consensus on the ranking scores.

Step by Step Guide:

Required Materials:

- Marker pens
- Flashcards

Steps:

- Ask participants to breakout into designated groups.
- Provide participants with a pre-identified list of locally relevant hazards.

In the context of Western Province, pre-identified hazards included: commercial logging, coastal fishing, sea level rise, flooding, increased rainfall, decreased rainfall, and temperature increase.

- Provide participants with marker pens and additional flashcards and ask them to list any additional hazards they perceive as a concern for local livelihoods.
- Ask participants to rank all flashcards from high to low in terms of their impact on livelihoods.

Hazard ranking results, showing both pre-identified and locally identified hazards, ordered from highest to lowest perceived impact on livelihoods.

Activity 2: Hazard Exposure Mapping

The hazard exposure mapping activity identifies where hazards occur in the local landscape and how these locations interact with sources used to mees essential needs.

Participants will receive laminated A0-sized satellite images (e.g., Google Maps or Bing) of the land and marine areas used by the community. The extent of these areas should be determined with community leaders before the workshop. Prepare a broader scale map (e.g., district or province

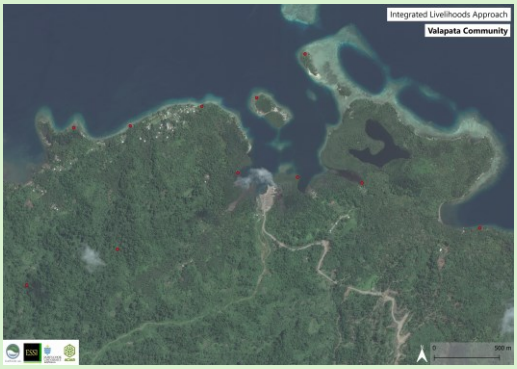
level) to allow for mapping which may involve documenting locations outside the community's land area.

Satellite Image Preparation:

Satellite images and marked up maps will be digitised during the data analysis process. This requires several pre-processing steps:

- Determine the extent of the community's land and sea areas through discussions with community leaders.
- Download satellite imagery of these areas (e.g. from Bing or Google Maps). **Check multiple sources to find the clearest available images for the community.*
- Place Ground Control Points (GCPs) on the satellite images using tools like Google Earth or GIS. This helps to ensure accurate alignment of photographed maps from the activity during digitisation.

Step by step guide for placing GCP points: https://help.inflights.com/en/articles/6495854-ground-control-points-tutorial.



Satellite image preparation using GCP

Before the activity commences, workshop facilitators should help orient participants by pointing out key landmarks on the images.

The activity will then be divided into two sessions each lasting 45 minutes. After each session the maps should be photographed from directly above to enable digitisation, before being wiped clean for the next session. Workshop facilitators should take detailed notes during the activities to help interpret maps.

Session 1: Map the locations where the high ranking hazards (identified in the previous activity) occur.

**Hazards with broad-scale spatial variation that are uniform across the community (e.g., temperature change) will not be included in the mapping process.*

Session 2: Map the locations of sources critical for essential needs including:

- Water
- Food
- Building materials
- Cooking fuel
- Lighting
- Income

Ask participants to either outline or pinpoint the locations of these sources on the map. They should also note what each source is and its specific use. Where relevant,

provide broader scale maps to document the location of sources (such as markets) which may be located remote from the community.

Step by Step Guide:

Required Materials:

- Satellite images
- Marker pens
- Marker pen remover
- Digital camera

Session 1 – Steps:

- Introduce participants to the satellite images and help orient them.
- Re-confirm high ranking hazards from exercise one and determine which of these vary at the community scale.
- Ask participants to draw the locations where these hazards occur within their community.
- Photograph the marked up images before wiping clean for the next session.

Workshop facilitator supports participants in orienting maps, and determining the location of hazards.

Session 2 – Steps:

- Ask participants to map the location of the main sources used by community members to access water, food, building materials, cooking fuel, lighting and income.

Prompts for this activity include:

- Where on the map has this hazard occurred?
- Is there an area where the impacts are the worst?

Workshop facilitator supports participants in mapping the location of sources that meet essential needs.

2.2. Household Survey

The LRPF household survey collects data on community vulnerability. It includes a variety of open ended, categorical, and Likert Scale questions that reflect the indicators of sensitivity and adaptive capacity in Table 1, as well as information on source dependence.

A final section on hazard exposure is included to capture any additional context missed during the focus group workshop.

While the LRPF focuses on community level risk analysis, the survey collects household demographic data, enabling researchers to perform intra-community analysis of vulnerability and identify differences based on characteristics such as livelihood activities.

Sampling Method

Convenience sampling can be used to obtain data from a diverse representation of households within a community. A minimum quota of 40% of households has been established for the LRPF.

Surveys should be conducted in local language through face-to-face interviews at participants homes. Surveys should alternate as much as possible between male and female household heads to obtain a balanced representation of responses across sexes.

Researchers conduct the LRPF household survey with the female head of a household.

The household survey was translated into Solomon Island Pijin prior to its implementation. Each survey should last approximately 40 minutes. The following sections present the household survey questions used within the LRPF.

Section A: Demographic Information

Participant Information

Q1	Sex of participant (Household head)
Male	☐
Female	☐

Q2	How old are you?

Q3	What are your main livelihood activities?

Q4	Are you originally from this community?
Yes ☐ (**If YES,** go to Q5)	
No ☐	
Q5	**If NO,** where are you originally from?
Q6	**IF NO,** how did you come to live in this community?
Q7	**If NO,** how long have you lived within this community?

Household Information

Q8	How many children live in your household?

Q9	What other adults live in your household?
Q10	How old is each household member?
Q11	What sex is each household member?
Q12	What is the main livelihood activity conducted by each household member?

Q13	What is the most important livelihood activity within your household?
Q14	What is second most important?
Q15	What is third most important?

Q16	How much of the food that your household catches & grows did you sell in the last year?			
Almost None	Some	About Half	Most	Almost All
1	2	3	4	5

Section B: Sensitivity

Water Security

Access to Drinking Water

Q18	What sources of water do you use for drinking?
Q19	How long does it take to get to this drinking water?
Q20	How do you get there?

Water Sufficiency

Q21	Does the amount of water that you get meet the needs of your household?		
Yes ☐ (**If YES**, go to Q22)			
No ☐			
Q22	**IF NO, <u>how often</u>** does your household does not have enough water?		
Rarely	Occasionally	Frequently	All the Time
☐	☐	☐	☐

Water Quality

Q23	How happy are you with the quality of your drinking water?			
Very Unsatisfied	Somewhat Unsatisfied	Neither Satisfied or Unsatisfied	Somewhat Satisfied	Very Satisfied
1	2	3	4	5

Access to Sanitation

Q24	What is the main type of toilet facility used by your household (e.g., mangroves, bush, slab toilet with pour, slab toilet with flush)?

Q25	Do you share this toilet facility with any other households?
Yes	
No	

Food Security

Food Sufficiency

Q26	In the past month, how many times were the following true?				
	Never	Rarely	Sometimes	Often	Always
You weren't able to eat the kinds of foods you prefer?	1	2	3	4	5
Your household did not have enough food?	1	2	3	4	5

Food Consumption Score

Q27	How many times has your household eaten these food types in the past week?
	Number of Times Eaten in Past Week
Rice (and other grains)	
Flour	
Roots & Tubers	
Nuts	
Milk & Other Dairy Products	
Canned Meat	
Fresh Meat	
Canned Fish	
Marine Fish/Shellfish	
Freshwater Fish/Shellfish	
Eggs	
Vegetables & Leaves	
Fruits	
Oil, Fat, Butter	
Sugar or Sweets	

Housing Security

Housing Condition

Q28	What material is the roof of your house made from?
Q29	What material are the walls of your house made from?
Q30	What material is the floor of your house made from?

Energy Security

Cooking Sufficiency

Q31	In the past year, were there time when fuel for cooking was not available?		
Yes ☐			
No ☐ (**If NO**, go to Q32)			
Q32	**IF YES,** how often did this take place?		
Rarely	Occasionally	Frequently	All the Time
☐	☐	☐	☐

Lighting Sufficiency

Q33	In the past year, were there times when you didn't have access to lighting?		
Yes ☐			
No ☐ (**If NO**, go to Q65)			
Q34	**IF YES,** how often did this take place?		
Rarely	Occasionally	Frequently	All the Time
☐	☐	☐	☐

Income Security

Income Stability

Q35	Was your household's income this year higher, lower or about the same as last year?
☐	Higher
☐	Lower
☐	About the same

Section C: Source Dependence

Q36	Which is the most important water source for your household?
Q37	Which is the most important food source for your household?

Q38	Which is the most important building material source for your household?
Q39	Which is the most important cooking fuel source for your household?
Q40	Which is the most important lighting source for your household.
Q41	Which is the most income source for your household?

Section D: Adaptive Capacity

Human Capital

Dependency Ratio: ***See Question 3***

Health Condition

Q42	Were there any times in the past year that any member of your household missed their livelihood responsibilities due to being sick, ill or injured?			
None	Few	Some	Many	All the Time
1	2	3	4	5

Access to Healthcare

Q43	In the past year, were there ever times when you or members of your household couldn't access healthcare?		
Yes ☐			
No ☐ (**If NO**, go to Q44)			
Q44	**IF YES,** how often did this take place?		
Rarely	Occasionally	Frequently	All the Time
☐	☐	☐	☐

Livelihood Diversity Index ***See Question 8-10***

Extent of Coping Strategies

Q45	Does your household have ways of **coping** with these problems?				
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Logging	1	2	3	4	5
Changes in Wild Fish Availability	1	2	3	4	5
Sea Level Rise	1	2	3	4	5
Flooding	1	2	3	4	5
Increased Rainfall	1	2	3	4	5
Reduced Rainfall	1	2	3	4	5
Increased Temperature	1	2	3	4	5
Covid-19	1	2	3	4	5
Other (specify)					

Financial Capital

Household Savings

Q46	Approximately how much money does your household have in savings?				
None	Less than $250	$250-500	$500-1000	$1000-2000	More than $2000
☐	☐	☐	☐	☐	☐

Household Income

Q47	How much money does your household make on average in one month?			
Less than $250	$250-500	$500-1000	$1000-2000	More than $2000
☐	☐	☐	☐	☐

Household Expenditure

Q48	Approximately how much money does your household spend in one month?

None	Less than $250	$250-500	$500-1000	$1000-2000	More than $2000
☐	☐	☐	☐	☐	☐

Income Satisfaction

Q49	How satisfied are you with your ability to purchase the items your household needs to survive (e.g., food, water, healthcare etc.,)?			
Very Dissatisfied	Somewhat Dissatisfied	Neither Satisfied or Dissatisfied	Somewhat Satisfied	Very Satisfied
1	2	3	4	5

Access to Financial Services

Q50		
Do you currently use any of the following ?		
Bank Accounts (BSP, ANZ, Bred Bank, POB, Womens Saving Club)	Yes ☐	No ☐
Pension Accounts (NPF, You Save)	Yes ☐	No ☐
Loans (BSP, ANZ, Bred Bank, POB, Womens Savings Club, National Finance etc.,)	Yes ☐	No ☐

Social Capital

Social Networks

Q51	If you suddenly needed access to food, water, fuel (for cooking & transportation) or healthcare how many people that aren't household members could you turn to who would help?			
No One	1-2 People	3-4 People	>5 People	>10 People
1	2	3	4	5

Inclusion in Decision Making

Q52	Are you happy with your level of involvement with decisions that are made within your community?			
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Local Institutional Memberships

Q53	
Please list the groups, organisations or associations that your household belongs to?	
1	
2	
3	
4	
5	

Satisfaction with Leadership

Q54	How much do you agree with the following?				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am happy with the leadership in my community	1	2	3	4	5

Trust

Q55	How much do you agree with the following?				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I trust the people in my community	1	2	3	4	5

Collective Action

Q56	In the past year did anyone in your household participate in community activities?			
Never	Rarely	Sometimes	Frequently	All the Time
1	3	4	5	5

Perceptions of Fair Access to Livelihood Opportunities

Q57	How much do you agree with the following?				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Access to new economic opportunities in my community is fair	1	2	3	4	5

Physical Capital

Access to Livelihoods-Based Assets

Q58	Does your household have access to any of the following items?	
Household Asset	**Items Accessed**	
	Yes	**No**
Generator	☐	☐
Fridge/Freezer	☐	☐
Boat/canoe	☐	☐
Boat with motor/OBM	☐	☐
Other transport (specify):	☐	☐
Communication device (i.e., mobile phone or radio)	☐	☐
Internet	☐	☐
Recreational	☐	☐
Access to land for gardening	☐	☐
Fishing equipment (specify):	☐	☐
Farming equipment(specify):	☐	☐
Livestock (specify):	☐	☐
Other equipment for accessing natural resources (specify):	☐	☐

Natural Capital

Perceptions of Fair Access to Natural Resources

Q59	How much do you agree with the following?				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Access to new natural resources in my community is fair	1	2	3	4	5

Section E: Hazard Exposure

Q60	In the past year has anything affected your ability to access water?
Yes ☐	
No ☐	(**If NO**, go to Q63)

Q61		Q62				
If YES, what is the name of the problem?		**If YES,** how often have you experienced these problems?				
		Very Rarely	Rarely	Occasionally	Frequently	All the Time
A		1	2	3	4	5
B		1	2	3	4	5
C		1	2	3	4	5
D		1	2	3	4	5
E		1	2	3	4	5

Q63	In the past year has anything affected your ability to access food?
Yes ☐	
No ☐	(**If NO**, go to Q66)

Q64		Q65				
If YES, what is the name of the problem?		**If YES,** how often have you experienced these problems?				
		Very Rarely	Rarely	Occasionally	Frequently	All the Time
A		1	2	3	4	5
B		1	2	3	4	5
C		1	2	3	4	5
D		1	2	3	4	5
E		1	2	3	4	5

Q66	In the past year has anything affected your ability to access building materials?
Yes ☐	
No ☐	(**If NO**, go to Q69)

Q67		Q68				
If YES, what is the name of the problem?		**If YES,** how often have you experienced these problems?				
		Very Rarely	Rarely	Occasionally	Frequently	All the Time
A		1	2	3	4	5
B		1	2	3	4	5
C		1	2	3	4	5
D		1	2	3	4	5
E		1	2	3	4	5

Q69	In the past year has anything affected your ability to access cooking fuel?
Yes ☐	
No ☐	(**If NO**, go to Q72)

Q70	Q71
If YES, what is the name of the problem?	**If YES,** how often have you experienced these problems?

		Very Rarely	Rarely	Occasionally	Frequently	All the Time
A		1	2	3	4	5
B		1	2	3	4	5
C		1	2	3	4	5
D		1	2	3	4	5
E		1	2	3	4	5

Q72	In the past year has anything affected your ability to access lighting?
Yes ☐	
No ☐	(**If NO**, go to Q75)

Q73		Q74				
If YES, what is the name of the problem?		**If YES,** how often have you experienced these problems?				
		Very Rarely	Rarely	Occasionally	Frequently	All the Time
A		1	2	3	4	5
B		1	2	3	4	5
C		1	2	3	4	5
D		1	2	3	4	5
E		1	2	3	4	5

Q75	In the past year has anything affected your ability to access income?
Yes ☐	
No ☐	

Q76		Q77				
If YES, what is the name of the problem?		**If YES,** how often have you experienced these problems?				
		Very Rarely	Rarely	Occasionally	Frequently	All the Time
A		1	2	3	4	5
B		1	2	3	4	5
C		1	2	3	4	5
D		1	2	3	4	5

2.2. Data Analysis

The following section details the steps required to develop livelihood risk profiles from LRPF data.

2.2.1. Hazard Exposure

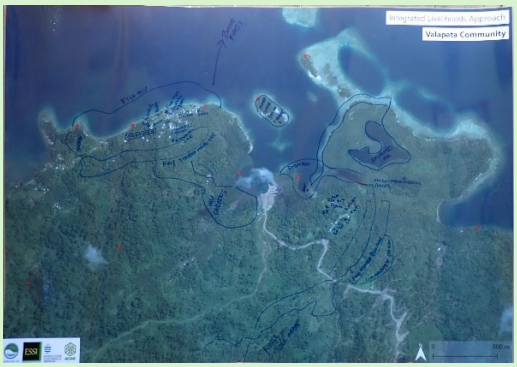
Hazard Ranking

- Combine the ranking scores across breakout groups to calculate a mean ranking score for each hazard within a community.
- Once you have a mean score for each hazard, categorise hazards into thematic groups such as climate change, resource exploitation etc.,
- For each thematic group calculate the mean score by averaging the scores of the individual hazards within that category.
- Present mean scores as 'levels of concern' ranging from very low to very high, reflecting the perceived impact on rural livelihoods.

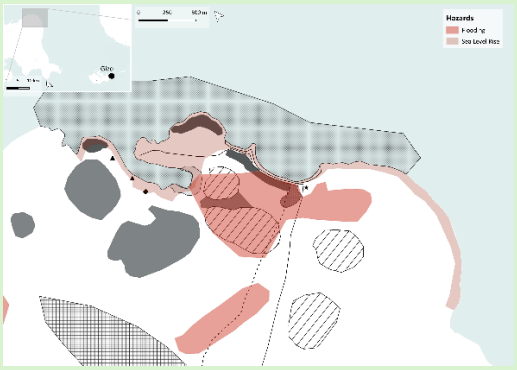
Hazard Exposure Mapping

- Take the hand drawn maps provided by focus groups and digitise them in QGIS including:
    - Polygons of hazard impact areas.
    - Polygons of source types used to access water, food, housing materials, cooking fuel, lighting, and income.
- Categorise source types into natural ecosystems (e.g., oceans, forests), modified ecosystems (e.g., food gardens, cash crop plantations), and artificial infrastructure (e.g., rainwater tanks).
- Overlay the hazard polygons with the source type polygons to obtain a map of hazard exposure.

Hazard Exposure Map Digitisation



Example of a hand drawn map representing hazard locations.



Digitised version of hazard locations in QGIS.

*The full protocol for digitisation is provided in appendix 3.

Hazard Exposure Survey Outputs

- Review responses from open-ended questions in household surveys to

identify the different hazards that source types are exposed to.

- Summarise this data at the community level to provide a clear picture of the specific hazards impacting source types.

2.2.2. Vulnerability

2.2.2.1. Source Dependence

- Calculate the percentage of households that rely on different source types to access water, food, housing materials, cooking fuel, lighting and income.

2.2.2.2. Vulnerability Index

Indicator Development

- Use raw data from household surveys to compute the standardised indicators listed in Table 1.
- A full list of the methods used to develop LRPF indicators has been provided in appendix 3 of this manual.

Index Development

Step 1: Weight Indicators

- Use the Analytic Hierarchy Process (AHP) to weight the indicators within the Index (Saaty 1980; Maanan et al. 2018).
- This method compares each indicator with every other indicator to determine their relative importance and assign them weights within the index.
- Identify key local experts to conduct this process within your study area.
- Apply the Delphi technique to reach consensus on the weighting scores amongst experts (Linstone 1985).

Step 2: Calculate Composite Indicators

- Calculate composite indicator scores by combining the indicators within a given sub-component of the index using the formula:

Composite indicator score = w1 x Score1 + w2 x Score 2.... Where w = indicator weighting value, and Score = indicator value.

- Standardise each composite indicator to a 0-100 scale.

Step 3: Calculate Component Scores

- Combine composite indicators using the same formula to calculate adaptive capacity and sensitivity where:

Adaptive Capacity (AC) = human capital + financial capital + social capital + physical capital + natural capital.

Sensitivity (S) = water security + food security + housing security + energy security + income security

- Standardise component scores to a 0-100 scale.

Step 4: Calculate Final Vulnerability Index

- Combine components to obtain a final index value for vulnerability using the formula:

$$V = f\,(AC - S)$$

- Adaptive capacity is subtracted from sensitivity due to their inverse relationship.
- Standardise vulnerability index scores to a 0-100 scale.

Step 5: Classify Vulnerability

- Use the standardised household scores for vulnerability, its components and sub-components to obtain a mean value across the community.
- Classify the final values into ranks including:
    - Very low (0-20)
    - Low (21-40)
    - Moderate (41-60)
    - High (61-80)
    - Very high (81-100)

*Adaptive capacity (and composite indicator ranks) will occur in reverse order.

2.2.3. Livelihood Risk Profile

Data representing each risk component will be combined to create a summarised livelihood risk profile for a community (Figure 2).

This includes:

- Hazard concern ranks
- Hazard exposure household survey and mapping data
- Source dependence scores
- Vulnerability index scores

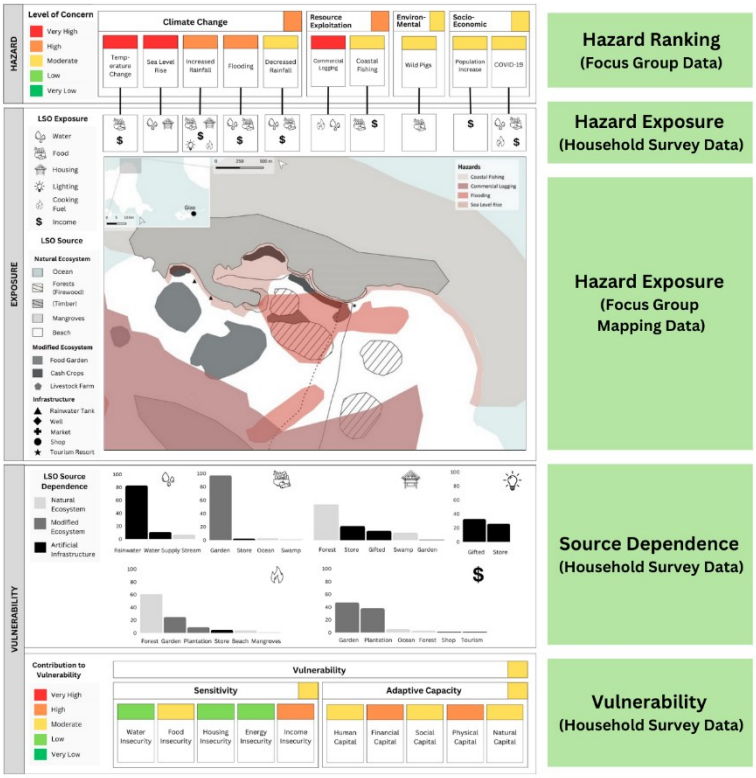
Livelihood risk profiles present data using a traffic light scale where:

- Red = very high risk of impact
- Orange = high risk of impact
- Yellow = moderate risk of impact
- Dark Green = low risk of impact
- Light Green = very low risk of impact

Indicator scores within each sub-component of vulnerability are not presented in livelihood risk profiles. This information should be provided in a separate table (e.g., Table 2).

***Table 2**: Example of indicator scores from the LRPF vulnerability index.*

Indicator	C1	C2	C3
Adaptive Capacity			
Human Capital			
HC1 Dependency Ratio			
HC2 Health Condition			
HC3 Access to Healthcare			
HC4 Livelihood Diversity Index			
HC5 Extent of Coping Strategies			
Financial Capital			
FC1 Household Savings			
FC2 Household Income			
FC3 Household Expenditure			
FC4 Income Satisfaction			
FC5 Access to Financial Services			
Social Capital			
SC1 Social Networks			
SC2 Inclusion in Decision Making			
SC3 Local Institutional Membership			
SC4 Satisfaction with Leadership			
SC5 Trust			
SC6 Collective Action			
SC7 Fair Access to Livelihood Opportunities			
Physical Capital			
PC1 Access to Livelihoods-Based Assets			
Natural Capital			
NC1 Fair Access to Natural Resources			
Sensitivity			
Water Insecurity			
WS1 Access to Drinking Water			
WS2 Water Sufficiency			
WS3 Water Quality			
WS4 Access to Sanitation			
Food Security			
FS1 Food Sufficiency			
FS2 Food Consumption Score			
Housing Security			
HS1 Housing Condition			
Energy Security			
ES1 Cooking Fuel Sufficiency			
ES2 Lighting Sufficiency			
Income Security			
IS1 Income Stability			



Hazard Ranking
(Focus Group Data)

Hazard Exposure
(Household Survey Data)

Hazard Exposure
(Focus Group Mapping Data)

Source Dependence
(Household Survey Data)

Vulnerability
(Household Survey Data)

Figure 2: *Application of LRPF data within the livelihoods risk profile.*

Part 3: Applying the Livelihoods-Based Risk Profiling Framework

Part 3: Applying the Livelihoods-Based Risk Profiling Framework

3.1. Risk Profiles for Decision Support

The LRPF risk profiles are a tool designed to guide adaptation planning by highlighting key risk drivers across a community.

This can be done by:

- Reviewing the profiles to understand specific hazards and vulnerabilities faced by a community.
- Using hazard exposure maps to pinpoint areas most susceptible to hazard impacts.
- Examining dependencies on high risk resources (e.g., water sources) that are critical to livelihoods.
- Analysing strengths and weaknesses associated with sensitivity and adaptive capacity.

By following these steps, the LRPF risk profiles can help communities to develop effective, targeted adaptation plans to enhance livelihoods resilience to future challenges.

3.2. Risk-Informed Adaptation Planning

While livelihood risk profiles allow for a specific response to local risk drivers, they do not consider the adaptation desires of a community. By integrating the LRPF with community input and aspirations for the adaptation process, researchers can ensure that adaptation is not only effective, but also aligns with the community's vision for the future (Butler et al. 2016).

The Community-Led Adaptation Pathways Approach (CAPSI) was developed by Butler et al. (2015) to provide a mechanism to identify, plan, and implement communities priorities for adaptation within rural communities in Solomon Islands.

The following section outlines the steps to implement the CAPSI approach and explains how to incorporate LRPF profiles to incorporate risk within the planning approach. The CAPSI has been adapted to integrate with LRPF outputs (Smith et al. *In Prep)*.

3.2.1. The CAPSI Process

The adapted CAPSI is comprised of four major steps (Figure 3):

- Identifying key drivers of change that might impact a community.
- Developing an agreed future vision for community livelihoods.

- Visualising potential futures based on a range of 'drivers of change scenarios'.
- Making collective decisions on potential 'no regrets' adaptation and development strategies that will enable a community to achieve their desired future and adapt to drivers of change.

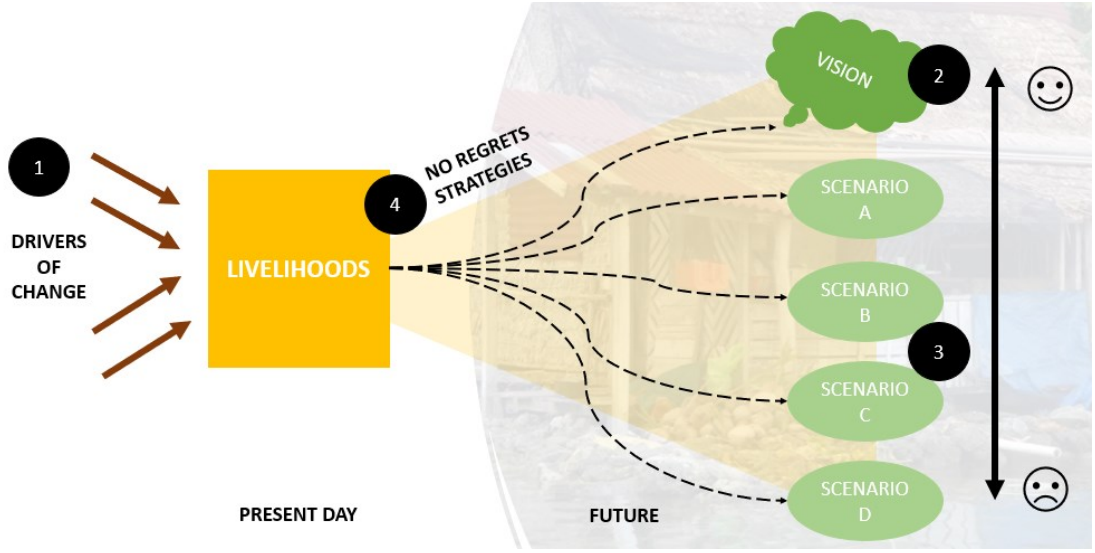


***Figure 3**: Steps to implement the CAPSI process adapted from Butler et al. (2015) to support integration with livelihood risk profiles.*

Data Collection

The CAPSI workshop requires a minimum of twelve individuals selected by community leaders. Participants should comprise an equal number of:

- Males and females.
- Youth, adults, and elders.
- Representatives from different livelihood activities.

The workshop should be held in a community gathering space. Participants should be divided into demographic groups that are most suited to the social dynamics within a community, such as by sex or age to encourage equal participation during the sessions. Participants should be divided into four equal sized breakout groups.

Several workshop facilitators should be present to support the implementation of activities in the local language.

The two-day workshop will be divided into four main activities, reflecting each step of the adapted CAPSI approach.

Workshop Day 1 (Activities 1-3)

1. Drivers of Change:

The drivers of change activity asks participants to confirm the high-priority

hazards identified in their livelihood risk profiles.

In this activity, participants will be presented the hazards ranked 'high concern for livelihoods' in their risk profile.

Workshop facilitators will guide participants to review and confirm the ranking scores of hazards to determine which ones are priorities for adaptation. If participants agree on the importance of hazards not included within their risk profile, these can be included in the CAPSI process.

After confirming high priority hazards, participants will have 45 minutes to discuss their current adaptation responses to these hazards and suggest future adaptation measures to reduce their impact on livelihoods.

Step by Step Guide:

Required Materials:

- Paper
- Marker Pens

Steps:

- Present the hazards ranked high concern within the communities risk profile.
- Ask participants to discuss their importance within breakout groups, before reporting back to the room.
- Develop a final list of high concern hazards.
- Distribute paper and marker pens and ask breakout groups to list the main adaptation responses to these hazards used by the community, and Desired responses for adaptation in the future.
- Ask each group to present their ideas to the room.

Participants write down their desired adaptation to hazards ranked high concern for livelihoods.

2. Future Visions:

The future visions activity asks participants to envisage what they would like their community to look like by the year 2040.

During the activity, each group will receive butcher paper and coloured pens to document their vision through writing, drawing, or mapping. This creative approach allows participants to express their ideas in the way they feel most confident.

Each group will have 45 minutes to complete the activity before presenting back to the room. Workshop facilitators should take detailed notes on these

presentations to ensure illustrated visions are accurately interpreted.

Step by Step Guide:

Required Materials:

- Butcher Paper
- Marker Pens

Steps:

- Provide groups with butcher paper and pens.
- Ask participants to imagine how they would like their community to look by the year 2040.
- Support participants in translating these visions into a written or illustrated format.
- Ask each group to present their visions to the room.

Participants present their vision for the community.

3. Scenario Planning:

The scenario planning activity asks participants to imagine how hazards might evolve by 2040, considering both worst-case and best-case scenarios.

Before this activity commences, a scenario matrix should be developed that addresses the two major thematic hazards that impact community livelihoods in their risk profile (e.g., climate change and resource exploitation).

The matrix (Figure 4) should place these themes at opposite ends of two intersecting arrows, representing 'best' and 'worst' case scenarios for the future.

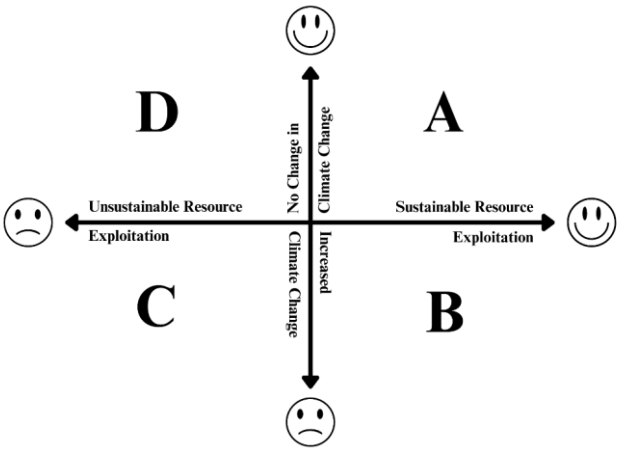


Figure 4: Example scenario planning matrix for worst and best case scenarios of climate change and resource exploitation.

The matrix will generate four distinct scenarios. Using climate change and resource exploitation as an example where climate change is on the y axis and resource exploitation on the x axis, these scenarios would include:

(A) Best case scenario (i.e., slow climate change and sustainable resource exploitation).

(B) Intermediate scenario (i.e., fast climate change and sustainable resource exploitation)

(C) Intermediate scenario (i.e., slow climate change and unsustainable resource exploitation)

(D) Worst case scenario (i.e., fast climate change and unsustainable resource exploitation).

Present the scenario matrix to participants, and assign one scenario to each breakout group. Provide examples of best and worst-case scenarios for each thematic hazard. Each group will then be given 45 minutes to write or illustrate the potential impacts they believe their assigned scenario on livelihoods by the year 2040.

Upon completion of the activity, each group will present their findings to the room.

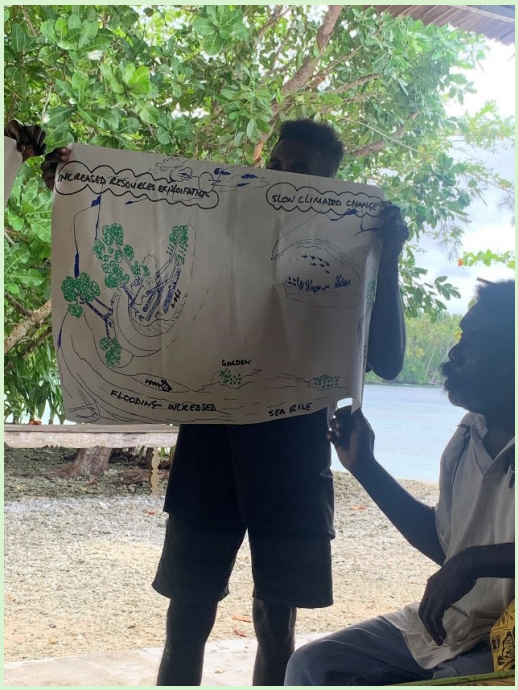
Step by Step Guide:

Required Materials:

- Butcher Paper
- Marker Pens

Steps:

- Provide groups with butcher paper and pens and assign each group a future scenario.
- Ask participants to imagine what the impacts of this scenario would be on their livelihoods by the year 2040.
- Provide several examples of what a 'best' or 'worst' case scenario could look like for each thematic hazard
- Support participants in translating their ideas into a written or illustrated format.
- Ask each group to present their visions to the room.



Participant presents their vision of the potential impacts of future climate change and resource exploitation on livelihoods.

Workshop Day 2 (Activity 4)

4. No Regrets Adaptation:

The no-regrets adaptation activity asks participants to identify priority adaptation strategies for the future based on the outcomes of activities 1-3.

Present the results of day 1 back to participants, summarising the main adaptation strategies emerging from:

- Desired adaptation to hazards
- Desired community visions
- Potential impacts on livelihoods from future hazard exposure.

Discuss these strategies with the community and explain how they have emerged as local priorities.

3.2.2. Using Livelihood Profiles for Risk Informed Adaptation

Livelihood risk profiles can be used to inform the development of no-regrets adaptation.

The following diagnostic questions were developed to guide the approach:

- How might adaptation intersect with multi-hazard exposure?
- How might adaptation be affected by local sensitivity?
- How might adaptation be affected by local adaptive capacity?

Information from livelihood profiles can be used to answer these questions, and evaluate the no-regrets status of adaptation.

Additionally, this process can help identify strengths and barriers to implementing adaptation. Addressing these barriers and leveraging strengths can enhance the likelihood of successful and sustainable adaptation.

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Appendix

Appendix 1: LRPF Hazard Exposure Digitisation Process

Appendix 2: LRPF Indicator Development

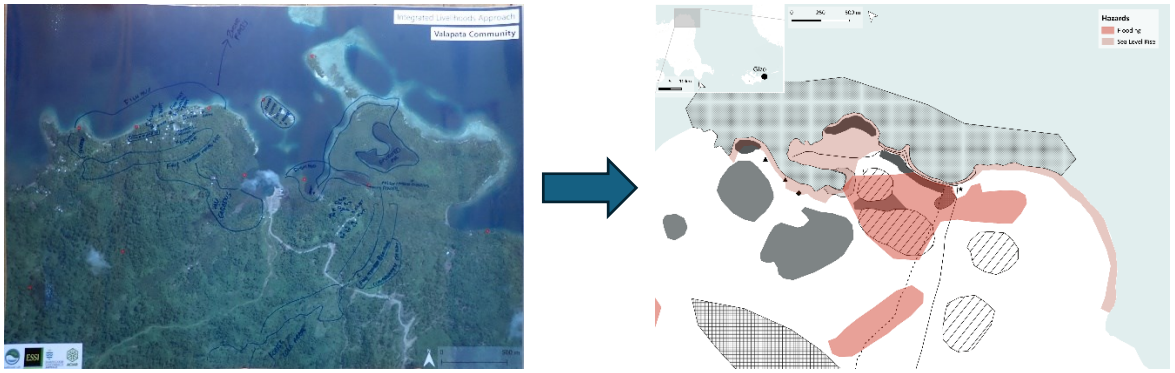
Appendix 3: CAPSI Workshop Protocol

Appendix 1: *Hazard Exposure Digitisation Process*

Readying Hand Drawn Maps for Digitisation

Digitisation is the process of converting data into a digital format.

In terms of participatory mapping this refers to the process of converting hand drawn maps into spatial files (e.g., vector or raster). This enables data to be stored and processes and presented in a digital format.



To prepare hand drawn maps for digitisation:

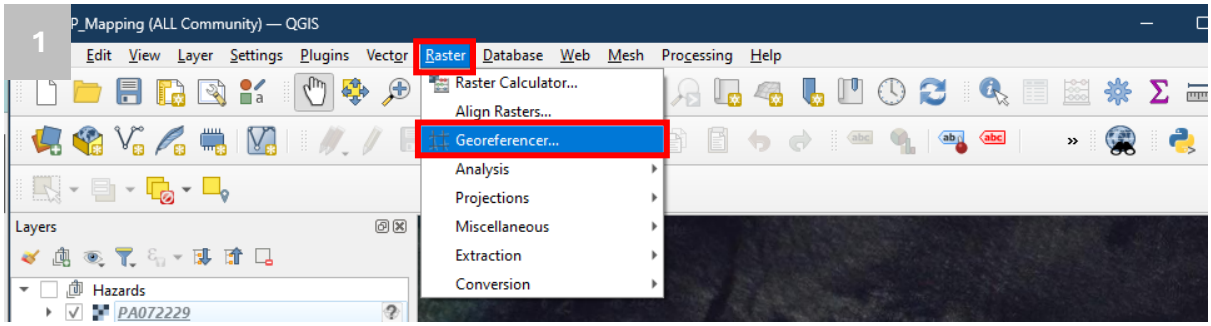
1. Take a clear image of the map from an overhead position.
2. Upload this image as a jpg file onto your computer.

Importing Hand Drawn Maps into QGIS

To digitise hand drawn maps, the map must first be be georeferenced. Georeferencing is the process of associating a spatial location with a hand drawn map.

To georeference your hand drawn map:

1. Go to raster > Georeferencer.
2. When the georeferencer tool opens go to top left 'open raster button' and navigate to the jpeg file of the hand drawn map
3. Accept the transformation settings.
4. On the image of your map select 'Add Point' and click on a point of interest that stands out on your image.
5. In the 'Enter Map Coordinates' box select 'choose from map canvas'.
6. Navigate to the same point on the map in the QGIS main interface and click.
7. Repeat this process until you have georeferencing points evenly spaced throughout the map.
8. Click 'start georeferencing'.
9. Your map should now show up in QGIS interface overlayed onto the correct location.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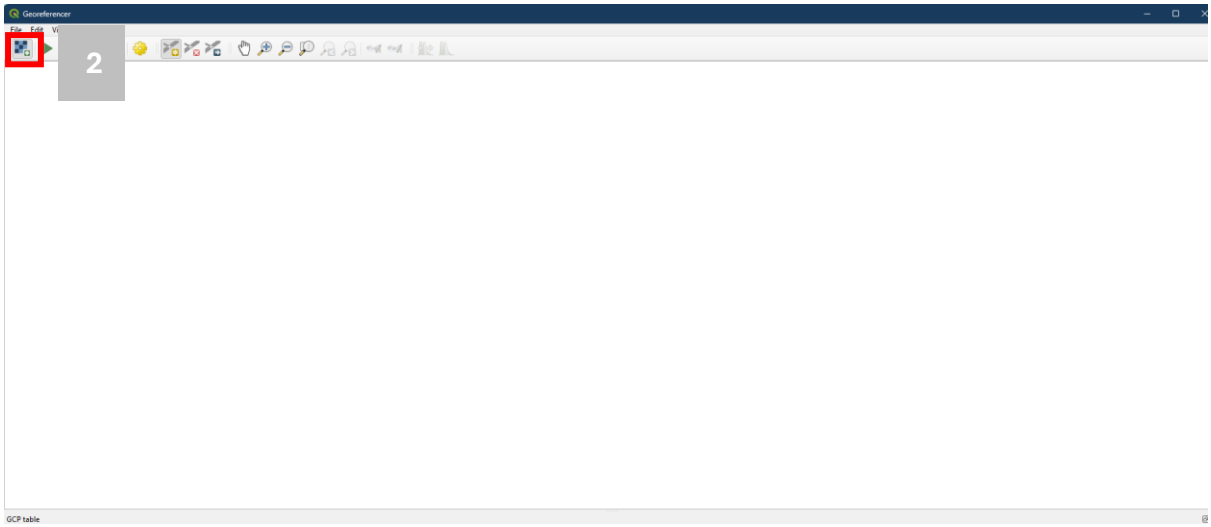
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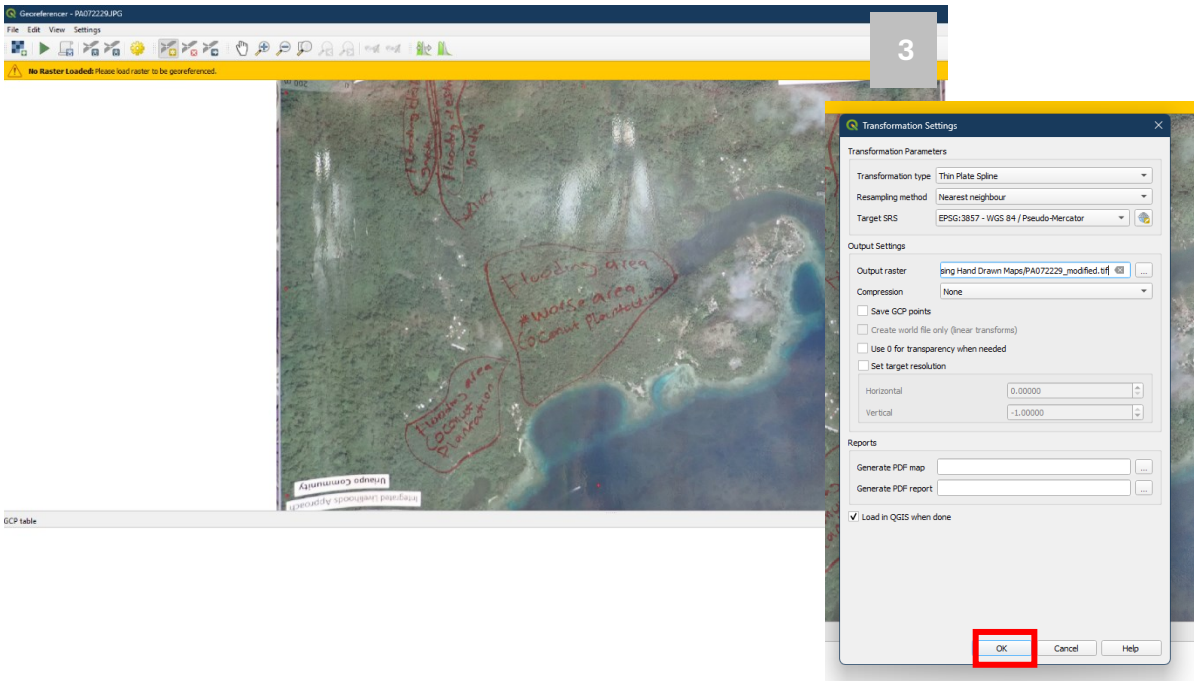
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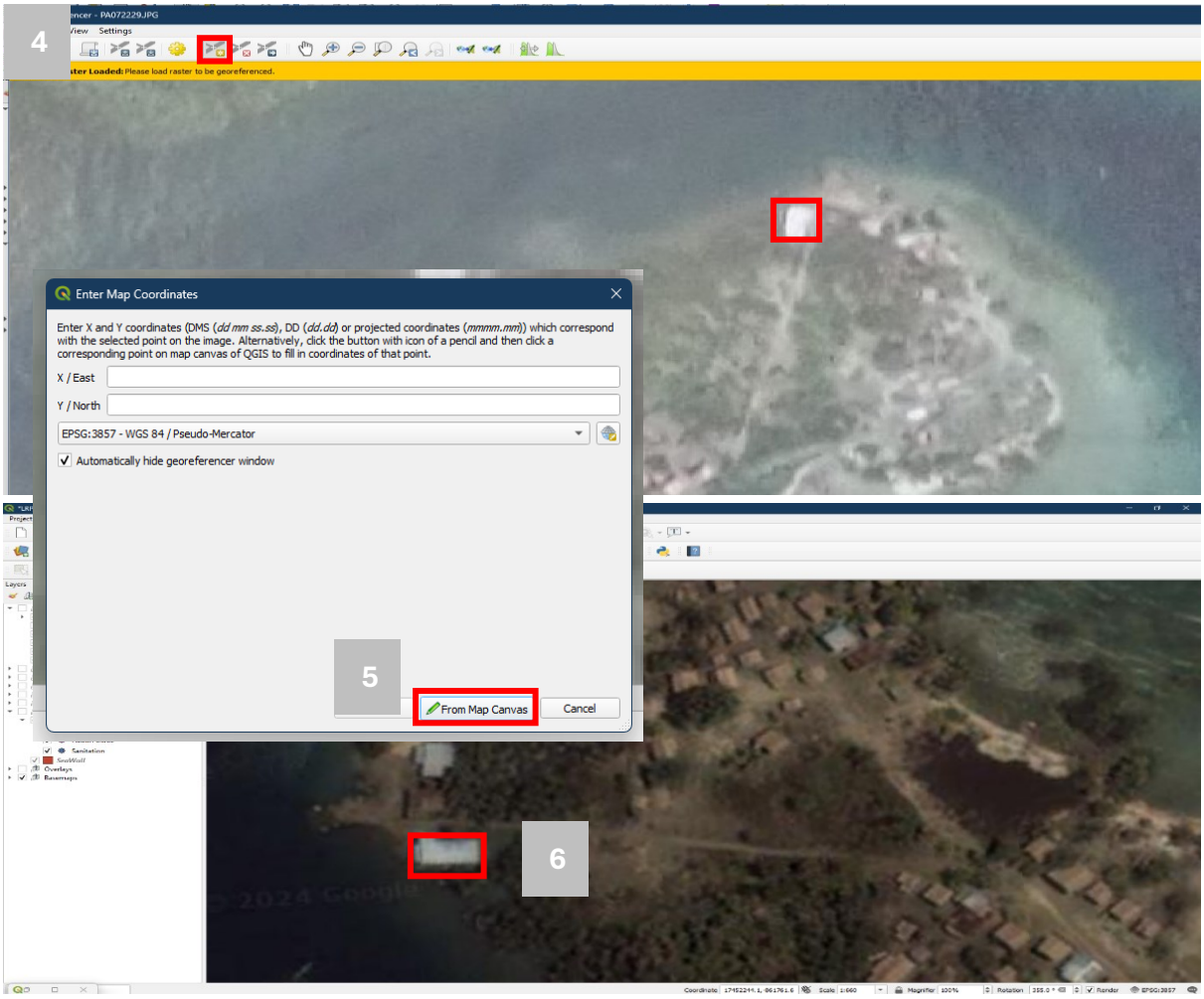
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Enter X and Y coordinates (DMS (dd mm ss.ss), DD (dd.dd) or projected coordinates (mmmm.mm)) which correspond with the selected point on the image. Alternatively, click the button with icon of a pencil and then click a corresponding point on map canvas of QGIS to fill in coordinates of that point.
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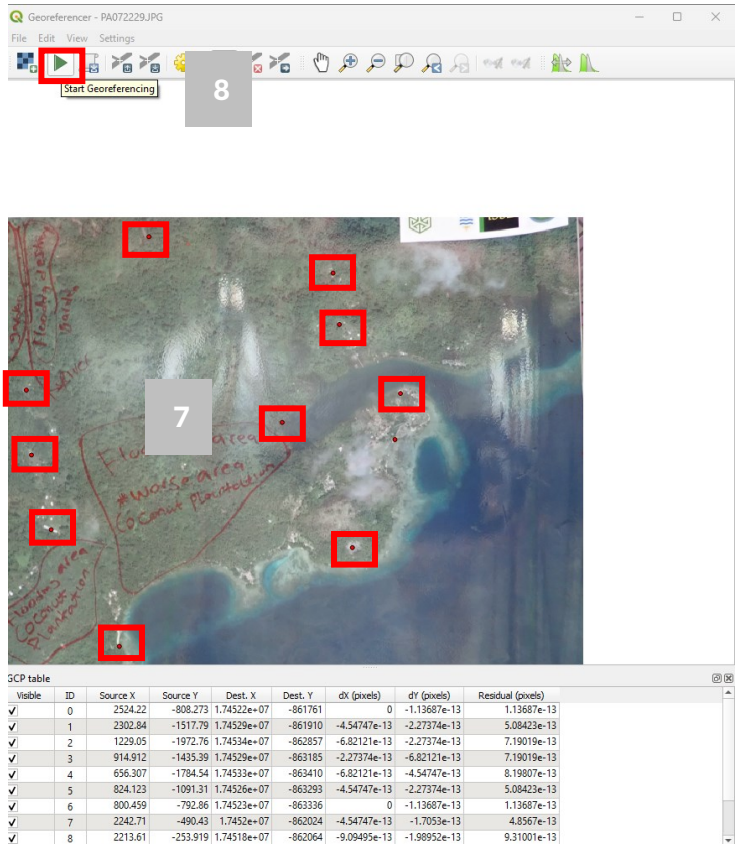
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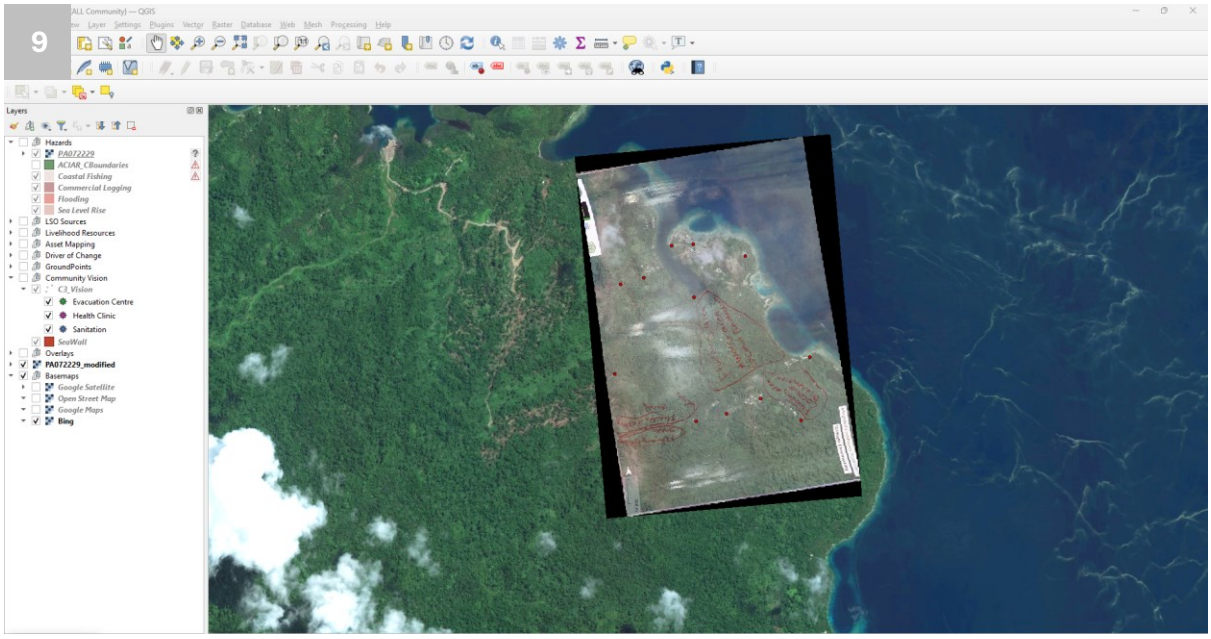
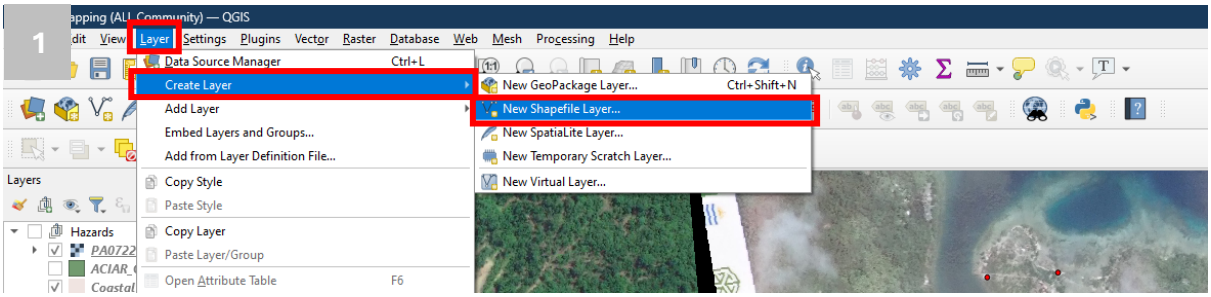


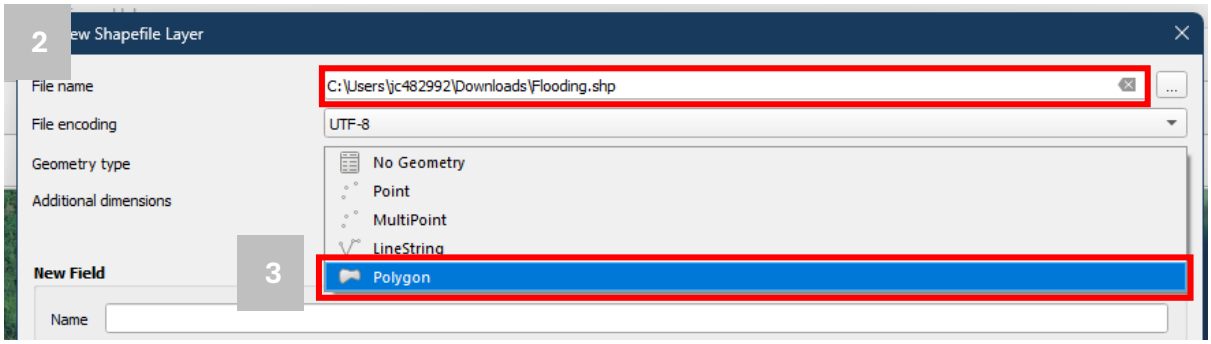
Digitising Your Georeferenced Map

Once you have georeferenced your map, you can digitise the information within the map into spatial layers.

Use the following steps to do this:

1. Navigate to the ‘layer’ tab and select ‘create layer’ > ‘new shapefile layer’.
2. Give a name to the shapefile and choose the folder you would like to save it in.
3. Select the type of shapefile you will be creating (E.g., point, polygon, line).
4. Click on the layer in the layers box and select ‘toggle editing’.
5. Select ‘add feature’.
6. Begin to draw over your hand drawn map to create a digital feature (e.g., drawn around the forest area).
7. Right click to save the feature.
8. Repeat this process until all features have been drawn.
9. Reclick on the ‘toggle editing’ button and select ‘save changes’.
10. You will see a digitised version of the features in your hand drawn map.
11. You can adjust these features by right clicking on the layer and selecting the properties, style or attribute table buttons. For example, by going to the styles button you can change the colour of the features in the layer.

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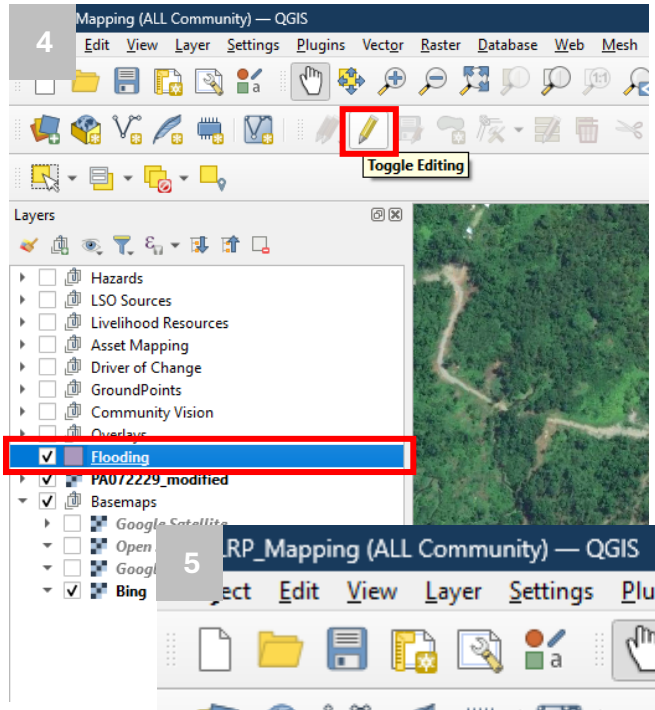
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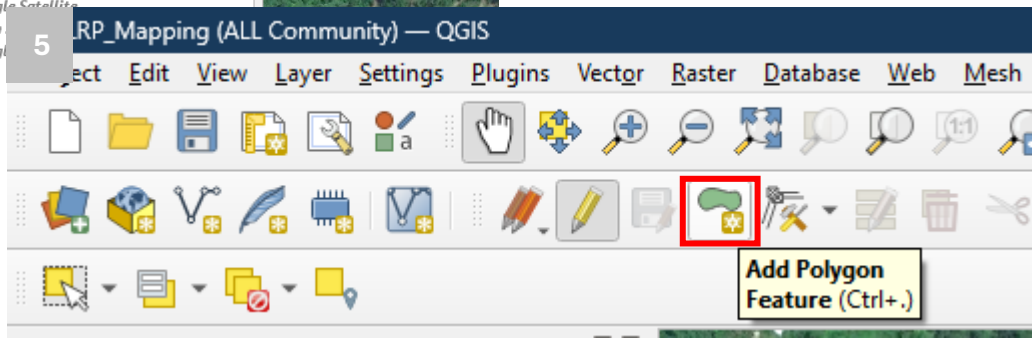
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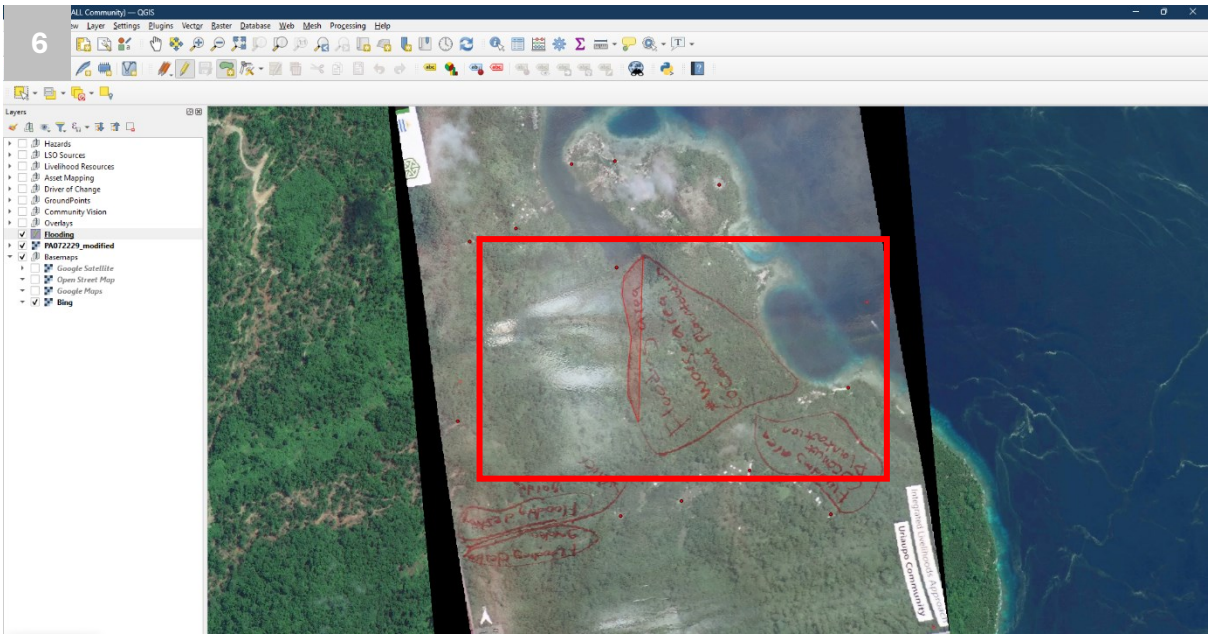
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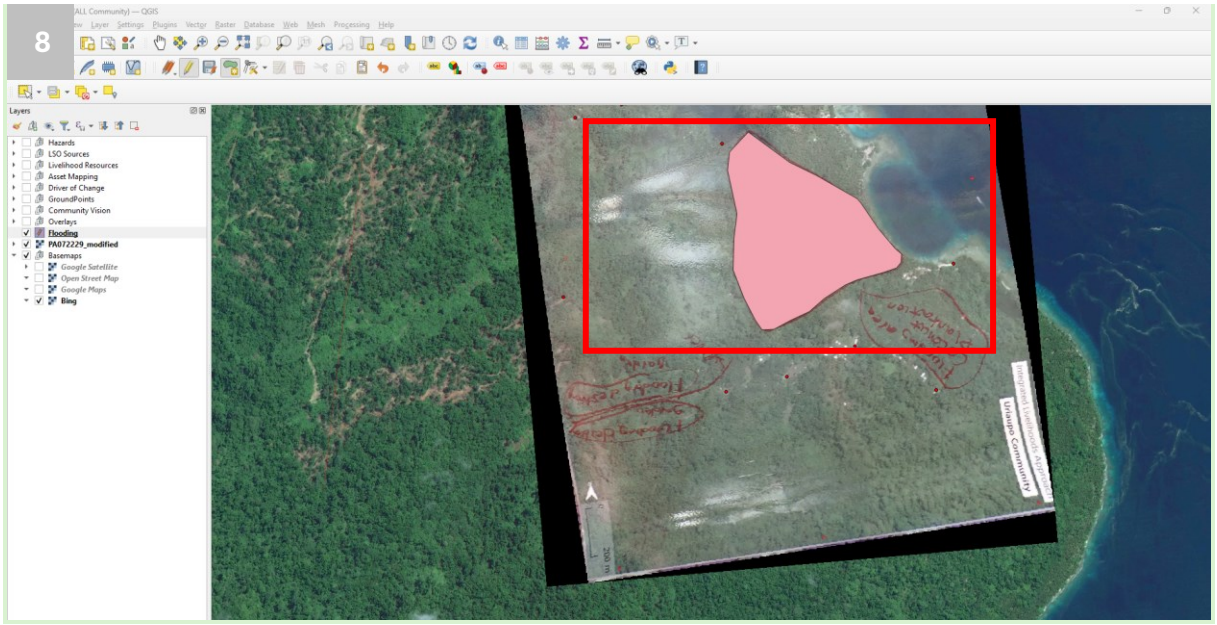
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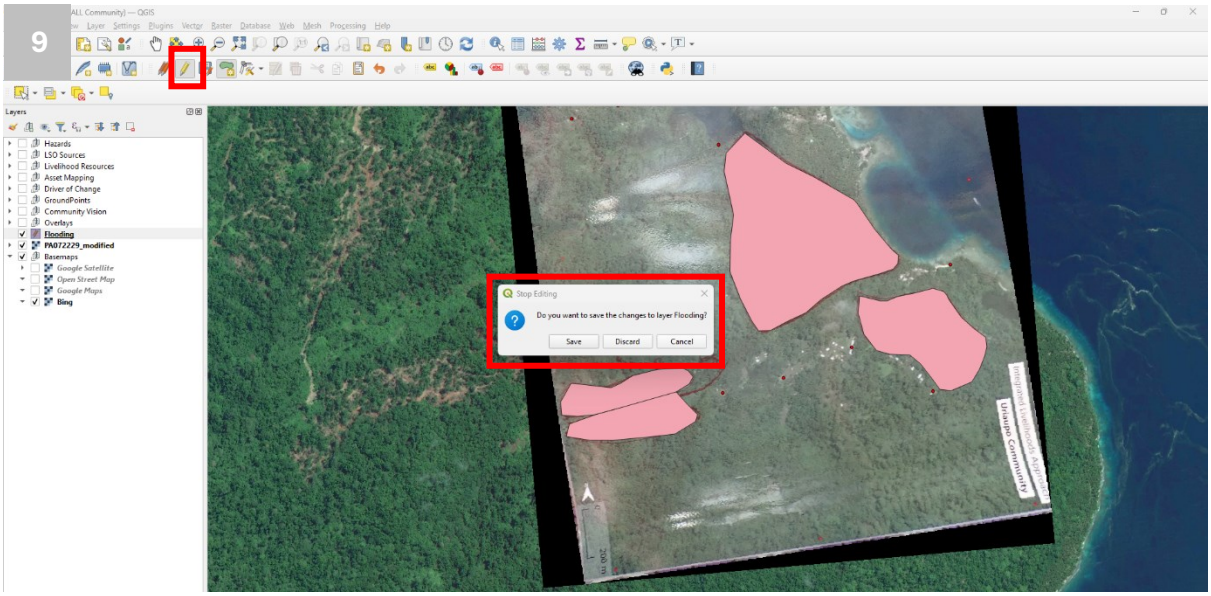
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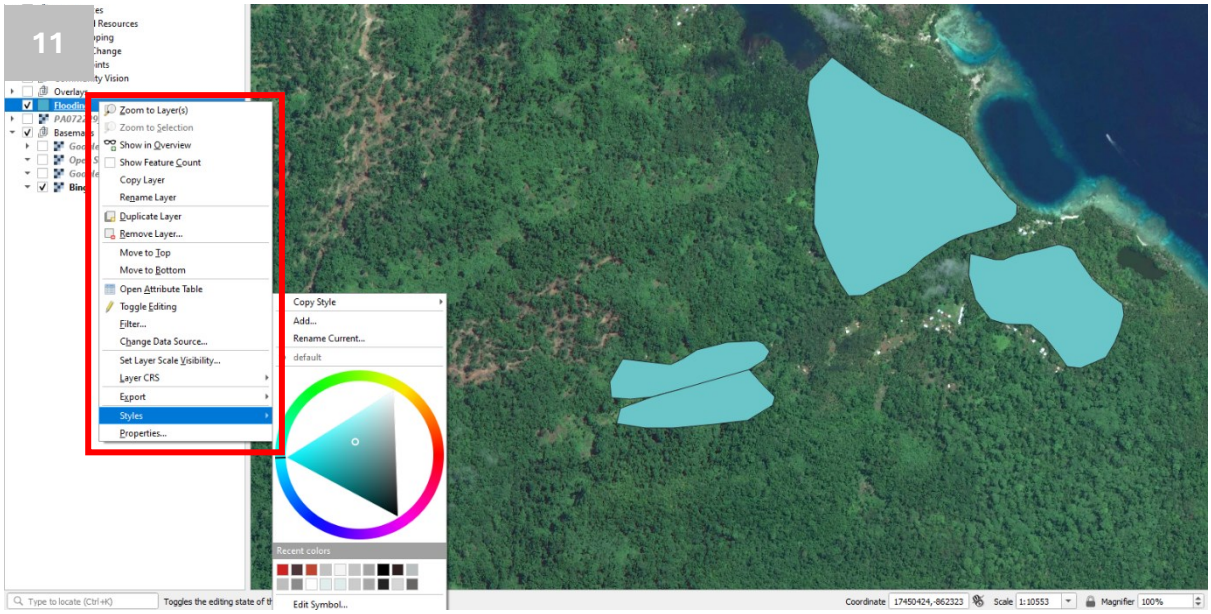
11
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Set Layer Scale Visibility...
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Properties...
Copy Style
Add...
Rename Current...
default
Recent colors
Edit Symbol...

Additional Support

For more support feel free to contact: bethany.smith1@my.jcu.edu.au

Online Resources

The following links refer to online resources that offer comprehensive support in QGIS:

- https://qgis.org/en/docs/index.html
- https://www.qgistutorials.com/en/
- https://opensourceoptions.com/blog/qgis-tutorial-for-beginners/

Appendix 2: *LRPF Indicator Development*

Indicator	Definition	Survey Question	Data Analysis	Indicator Ranking
Adaptive Capacity				
Human Capital				
Dependency Ratio	The ratio of dependent (i.e., non-working adults) to non-dependent household members (i.e., working adults).	What is the main livelihood activity conducted by each household member?	1. Classify responses into dependents (1) those who are not contributing to livelihood activities, irrespective of age and non-dependents (2) those who are contributing to livelihood activities irrespective of age. 2. Calculate the dependency ratio using the formula (number of non-working household members/number of working household members)*100). 3. Assign dependency ratio data ranks using below categories (based on equal interval binning from dependency ratio data range).	**Rank** / **Definition** / **Description** 1 Very Low — 321-400% — High Dep Ratio 2 Low — 241-320% 3 Medium — 161-240% 4 High — 81-160% 5 Very High — 0-80% — Low Dep Ratio
Health Condition	The number of times in the last year household members missed their livelihood responsibilities due to being sick, ill or injured.	Were there any times in the past year that members of your household missed their livelihood responsibilities due to being sick, ill or injured?	• Input survey data based on the 1-5 scale whereby high adaptive capacity = (5 - household members missed their livelihood responsibilities no times), and low adaptive capacity = (1 - household members missed their livelihood responsibilities all the time).	**Rank** / **Definition** / **Description** 1 Very Low — All the time — Missed responsibilities 2 Low — Many 3 Medium — Several 4 High — A few — Never missed responsibilities 5 Very High — None

Access to Healthcare	The amount of time a household can access healthcare in times of need.	In the past year, were there ever times when you or members of your household couldn't access healthcare?	- Input household survey data ranging from (1) household never has issues accessing healthcare (very low sensitivity) to (5) always has issues accessing healthcare (very high sensitivity) into standardised indicator rankings.	

Rank		Definition	Description
1	Very Low	All the time	Never has access
2	Low	Frequently	
3	Medium	Occasionally	
4	High	Rarely	
5	Very High	Never	Always has access

Livelihood Diversity Index	The number of unique livelihood activities that members of a household are engaged in.	What is the primary livelihood activity conducted by each household member? What other livelihood activities does each household member (including yourself) participate in?	• List the types of primary livelihood activities and additional livelihood activities conducted within a household. • Sum the number of UNIQUE livelihood activities conducted by household members, to calculate the final livelihood diversity score. • Assign ranking scores based on the data range.	

Rank		Definition	Description
1	Very Low	0-1 Activities	Participates in few activities
2	Low	2-3 Activities	
3	Medium	4-5 Activities	
4	High	6-7 Activities	Participates in many activities
5	Very High	8-9 Activities	

Extent of Coping Strategies	The extent to which a household believes they	Does your household have ways of coping with	• Determine focus group outputs ranking hazards based on perceived impacts to local livelihoods.	

Rank		Definition	Description
1	Very Low	0-20%	No strategies
2	Low	21-40%	

	can cope with locally relevant hazard exposure.	these problems?	• Input survey responses onto a 1-4 scale (from (0) strongly disagree (i.e., household has no coping strategies), to (4) strongly agree (i.e., household has a lot of knowledge of coping strategies)), to obtain an overall understanding of the extent of household coping strategies for each type of hazard. • Multiply coping strategy scores by the rank of a given hazard. • Add coping strategy types together to calculate household scores, transformed into a % of the maximum possible score of combined ranks. • Rank household coping strategies using the following ranking categories.	3	Medium	41-60%	
				4	High	61-80%	
				5	Very High	81-100%	Many strategies
Financial Capital							
Household Savings	The total amount of savings accumulated by a household.	Approximately how much money does your household hold in savings?	• Input household survey data relating to household savings. • Identify instances where households responded with 'don't know' or 'refuse to answer' and use average data imputation to replace this response. Average data imputation was identified as an appropriate mechanism to replace missing data given significant comparability across households in a community in relation to savings and the low rate of missing data (i.e., <5%) across the sample. • Rank household savings on a scale reflecting adaptive capacity (see below) ranging from very low (no savings) to very high (more than SI$1000 savings).	**Rank**		**Definition**	**Description**
				1	Very Low	None	No savings
				2	Low	<$250	
				3	Medium	$251-500	
				4	High	$501-1000	
				5	Very High	>$1000	Significant savings
Household Income	The amount of income a	How much money does	• Input household survey data relating to monthly income rates.	**Rank**		**Definition**	**Description**
				1	Very Low	<$250	Low income

	household acquires in a one-month period.	your household make on average in one month?	• Identify instances where households responded with 'don't know' or 'refuse to answer' and use average data imputation to replace this response. Average data imputation was identified as an appropriate mechanism to replace missing data given significant comparability across households in relation to income level, and the low rate of missing data (i.e., <5%) across the sample. • Rank monthly income on a scale reflecting adaptive capacity (see below) ranging from very low (less then SI$250) to very high (more than SI$2000).	2	Low	$251-500	
				3	Medium	$501-1000	
				4	High	$1001-2000	
				5	Very High	>$2000	High income
Household Expenditure	Household monthly expenditure on basic needs (e.g., food, water, housing, energy and healthcare).	Approximately how much money does your household spend in one month?	1. Input household survey data relating to monthly expenditure. 2. Identify instances where households responded with 'don't know' or 'refuse to answer' and use average data imputation to replace this response. Average data imputation was identified as an appropriate mechanism to replace missing data given significant comparability across households in relation to expenditure, and the low rate of missing data (i.e., <5%) across the sample. 3. Rank monthly expenditure on a scale reflecting adaptive capacity (see below) ranging from very low (no expenditure) to very high (monthly expenditure more than SI$1000).	**Rank**		**Definition**	**Description**
				1	Very Low	None	No expenditure
				2	Low	<$250	
				3	Medium	$251-500	
				4	High	$501-1000	
				5	Very High	>$1000	High expenditure
Income Satisfaction	The extent to which a household is satisfied with their ability to	How satisfied are you with your ability to purchase the items your	1. Input data reflecting household satisfaction within income ranging on a scale from (1) very dissatisfied (low adaptive capacity) to (5) very satisfied (high adaptive capacity).	**Rank**		**Definition**	**Description**
				1	Very Low	Very Dissatisfied	""
				2	Low	Dissatisfied	
				3	Medium	Neither nor	
				4	High	Satisfied	

	purchase basic goods.	household needs to survive (e.g., food, water, healthcare, etc.,)?		5	Very High	Very Satisfied	“”
Access to Financial Services	Household access to key financial services including bank accounts, pensions, and loans.	Does your household currently use any of the following services: 1) bank accounts, ii) pensions (and associated accounts) or, iii) loans?	1. Input household access to financial service types (e.g., 1) bank accounts; 2) pensions; 3) loans). 2. Rank access to financial services based on the following scores, whereby no access = (1) very low adaptive capacity and full access = (4) very high adaptive capacity.	**Rank**		**Definition**	**Description**
				1	Very Low	No Access	No services
				2	Low	Single Access	
				3	Medium	Dual Access	
				4	High	Full Access	All services
Social Capital							
Social Networks	The number of social relationships a household can turn to for support in times of need.	If you suddenly needed access to water, food, shelter, energy or healthcare, how many people that are not members of your household could you turn to for help?	1. Input responses from the household survey reflecting the number of social relationships held by a household. 2. Rank the number of social relationships according to the following ranking categories, whereby 1) no social relationships = (1) very low adaptive capacity and 5) >10 social relationships = (5) very high adaptive capacity.	**Rank**		**Definition**	**Description**
				1	Very Low	No One	Small network
				2	Low	1-2 People	
				3	Medium	3-4 People	
				4	High	>5 People	
				5	Very High	>10 People	Large network

Inclusion in Decision Making	The extent of household satisfaction with their inclusion in community decision making.	Are you happy with your level of involvement with decisions that are made in your community?	1.	Input responses from household survey regarding perceived levels of satisfaction with involvement in community decision making where 1) strongly disagree = (1) a household is very dissatisfied with their level of involvement in decision making equates to very low adaptive capacity and, to 5) strongly agree = (5) household is very satisfied with their level of involvement in decision making equates to very high adaptive capacity.	**Rank**	**Definition**	**Description**
					1 Very Low	Very Dissatisfied	""
					2 Low	Dissatisfied	
					3 Medium	Neither nor	
					4 High	Satisfied	
					5 Very High	Very Satisfied	""
Local Institutional Memberships	Household membership in local institutions (e.g., groups, organisations and associations).	Please list any community-based (i.e., local) groups, organisations, or associations that your household belongs to.	1. 2. 3.	List the total number of local institutions available within a community based on qualitative information obtained from key informant interviews, cross-checked with a full list of institutions obtained during household surveys. Sum the number of institutions a household is a member of within a community (and cross-check this list against the full list of available institutions developed in step 1). Rank household membership to local institutions where very low membership (and adaptive capacity) = 0 institutions, and very high membership (and adaptive capacity) = >5 institutions.	**Rank**	**Definition**	**Description**
					1 Very Low	0 Memberships	""
					2 Low	1 Membership	
					3 Medium	2 Memberships	
					4 High	3 Memberships	
					5 Very High	4 Memberships	""
Satisfaction with Leadership	The extent to which a household is satisfied with the leadership in their community.	How much do you agree with the following statement? I am happy with the leadership in my community.	1.	Input responses from household survey reflecting if a household is satisfied with the leadership in their community varying from (1) strongly disagree (very low adaptive capacity) to (5) strongly agree (very high adaptive capacity).	**Rank**	**Definition**	**Description**
					1 Very Low	Very Dissatisfied	""
					2 Low	Dissatisfied	
					3 Medium	Neither nor	
					4 High	Satisfied	
					5 Very High	Very Satisfied	""

Trust	The level of trust a household has in community members and leaders.	How much do you agree with the following statement? I trust the people in my community.	1.	Input responses from household survey reflecting if a household trusts the people in their community varying from (1) strongly disagree (very low adaptive capacity) to (5) strongly agree (very high adaptive capacity).	**Rank**		**Definition**	**Description**
					1	Very Low	Very Dissatisfied	“”
					2	Low	Dissatisfied	
					3	Medium	Neither nor	
					4	High	Satisfied	
					5	Very High	Very Satisfied	“”
Collective Action	The extent to which a household participates in community-based activities.	In the past year, did anyone in your household participate in any community activities?	1.	Input responses from household survey question onto the standardised indicator ranking scale whereby (1) never = very low adaptive capacity and (5) all the time = very high adaptive capacity.	**Rank**		**Definition**	**Description**
					1	Very Low	Never	Never participates
					2	Low	Rarely	
					3	Medium	Sometimes	
					4	High	Frequently	Always participates
					5	Very High	All the Time	
Perceptions of Fair Access to Livelihood Opportunities	Household perception of fair access to livelihood opportunities within their community.	How much do you agree with the following statement? Access to new economic opportunities within my community is fair.	1.	Input responses from household survey whereby (1) strongly disagree that access to new economic opportunities is fair = very low adaptive capacity, to (5) strongly agree that access to new economic opportunities is fair = very high adaptive capacity.	**Rank**		**Definition**	**Description**
					1	Very Low	Very Dissatisfied	“”
					2	Low	Dissatisfied	
					3	Medium	Neither nor	
					4	High	Satisfied	
					5	Very High	Very Satisfied	“”
Physical Capital								
Access to Livelihoods-Based Assets	Household access to key assets required to support livelihoods.	Does your household have access to any of the following items?	*1.*	Input access to asset types (Y/N), for livelihoods equipment, including the full list of available equipment types. (This process led to the identification of n=21 asset types important to support livelihoods in the local context; (1) generator; (2) fridge/freezer; (3) boat/canoe; (4) OBM; (5) other transport	**Rank**		**Definition**	**Description**
					1	Very Low	0-20%	Low access
					2	Low	21-40%	
					3	Medium	41-60%	
					4	High	61-80%	
					5	Very High	81-100%	High access

				types; (6) communication devices; (7) internet; (8) land for gardening; (9) fishing line; (10) fishing hook; (11) fishing bolt; (12) diving gun; (13) diving spear; (14) net; (15) knife; (16) hoe; (17) axe; (18) bow; (19) spade; (20) pitchfork; (21) pig; (22) chicken). 2. Conduct Principal Component Analysis (PCA) using R package 'prcomp' to assign relative importance weightings to each asset type. Calculate rotation loadings for each PCA component and use % variance explanations (75.00%) to calculate the weighting of each livelihood-based asset. Sum asset types using the following equation where: *Resource Access* = ($Resource_1$ * $Weight_1$) + ($Resource_2$ * $Weight_2$) etc., to obtain a final output for resource access. Normalise final indicator outputs onto a 0-1 scale to allow for comparability across the sample. 3. Categorise into indicator rankings where low access = very low adaptive capacity, and high access = very high adaptive capacity.		
Natural Capital							
Perceptions of Fair Access to Natural Resources	Household perception of fair access to natural resources within their community.	How much do you agree with the following statement? Access to natural resources in my community is fair.	1. Input responses from household survey whereby (1) strongly disagree that access to new economic opportunities is fair = very low adaptive capacity, to (5) strongly agree that access to new economic opportunities is fair = very high adaptive capacity.	**Rank**		**Definition**	**Description**
				1	Very Low	Very Dissatisfied	""
				2	Low	Dissatisfied	
				3	Medium	Neither nor	
				4	High	Satisfied	
				5	Very High	Very Satisfied	""
Sensitivity							
Water Security							

Access to Drinking Water	Household has access to improved sources of drinking water within a 30-minute return distance.	What source(s) of water do you use for drinking in your household? Which of these sources is most important? Approximately how long does it take you to obtain drinking water from these sources (return time)?	1. Identify the most important drinking water source used by a household and categorise response into (1) improved sources of drinking water (e.g., piped water, boreholes, tube well, protected dug wells, protected springs, packaged water, rainwater), (2) unimproved water sources (e.g., unprotected dug well, spring) and (3) surface water (e.g., river, dam, lake, pond, stream, canal, irrigation channel) as designated by the World Health Organisation. 2. Categorise distance responses into (1) 0 minutes – in/around shelter; (2) <30 minutes; (3) <30 minutes. 3. Rank responses using the following ranking categories based on the JMP ladder classifications for household drinking water services.	**Rank** / **Definition** / **Description** 1 Very Low / Improved Access / Improved source within homestead 2 Low / Basic Access / Improved source >30 minutes away 3 Medium / Limited Access / Improved source <30 minutes away 4 High / Unimproved Access / Unprotected dug well or stream 5 Very High / Surface Water / Groundwater
Water Sufficiency	Household has access to sufficient quantities of water to meet basic needs.	Over the past year, how often have you NOT been able to access a sufficient volume of water to meet household requirements?	1. Input responses from survey question whereby: low sensitivity (1) = household never lacks access to sufficient quantities of water, and high sensitivity (5) = household lacks access to sufficient quantities of water all the time.	**Rank** / **Definition** / **Description** 1 Very Low / Never / Insufficient access 2 Low / Rarely 3 Medium / Occasionally 4 High / Frequently / Sufficient access 5 Very High / All the Time
Water Quality	The extent to which a household is satisfied with the quality of	How happy are you with the quality of your drinking water?	1. Input household survey responses whereby 1) very satisfied (very low sensitivity) and 5) very unsatisfied (very high sensitivity).	**Rank** / **Definition** / **Description** 1 Very Low / Very Satisfied / “” 2 Low / Satisfied 3 Medium / Neither nor 4 High / Dissatisfied

	their drinking water.				5	Very High	Very Dissatisfied	""
Access to Sanitation	Household has access to an improved form of sanitation.	What is the main type of toilet facility used by your household? Do you share this facility with any other households?	1. Input household survey data categorising type of toilet facility responses into 1) most improved (e.g., slab toilet with flush); 2) improved (e.g., slab toilet with pour) and 3) unimproved (e.g., open defecation). 2. Input household survey data categorising the number of households using a sanitation type into 1) shared or 2) private. 3. Combine type of toilet facility and number of households using a toilet facility and classify into the following ranking categories.	**Rank**		**Definition**	**Description**	
				1	Very Low	Most Improved	Slab toilet with flush	
				2	Low	Improved (Private)	Slab toilet with pour	
				3	Medium	Improved (Shared)		
				4	High	Unimproved (Private)	Open defecation	
				5	Very High	Unimproved (Shared)		
Food Security								
Food Sufficiency	Household has uninterrupted access to sufficient volumes of food to meet household requirements.	In the past four weeks, how many times has the following question statement applied: your household did not have enough food?	1. Input household survey responses into ranking categories whereby (1) very low sensitivity = household never lacked access to sufficient volumes of food, and (5) very high sensitivity = household lacked access to sufficient volumes of food all the time.	**Rank**		**Definition**	**Description**	
				1	Very Low	Never	Never lacks access	
				2	Low	Rarely		
				3	Medium	Sometimes		
				4	High	Often	Always lacks access	
				5	Very High	All the Time		
Food Consumption Score	The frequency of consumption of different food groups during the previous 7 days.	How many times has your household eaten these different types of food in the	1. List the number of days each food group was consumed by a household. 2. Multiply the number of days each food group was consumed by a household based on the nutritional value designated by WFP (2015). i.e., days consumed x nutritional weight = weighted value.	**Rank**		**Definition**	**Description**	
				1	Very Low	89.7 - 112.0	High FCS	
				2	Low	67.3 – 89.6		
				3	Medium	44.9 – 67.2		
				4	High	22.5 – 44.8		
				5	Very High	0.00 – 22.4	Low FCS	

past week (7 days)?

Food Group	1) Days Consumed	Nutritional Weight	2) Weighted Value
Main Staples	6	2	12
Pulses	1	3	3
Vegetables	6	1	6
Fruit	3	1	3
Meat & Fish	4	4	16
Dairy	1	4	4
Sugar	1	0.5	0.5
Oil	1	0.5	0.5

3. Sum the values of each food group to obtain a food consumption score.

   FCS = 12 + 3 + 6 + 3 +16 + 4 + 0.5 + 0.5

4. Use the indicator rankings listed below to designate a sensitivity rank for food consumption scores based on the total range of FCS across partner communities. Whereby very low sensitivity (1) = very high food consumption score (i.e., household has consumed a large amount of nutritional foods over the previous 7 days), and very high sensitivity (5) = very low food consumption score (i.e., household has consumed a small amount of nutritional foods over the previous 7 days).

Housing Security

Housing Condition	The type of material used for the roof, flooring, and	What material is the i) roof; ii) floor; iii) walls	1. Input household survey responses documenting the type of material used for a household's i) roof; ii) floor and iii) walls.	**Rank**		**Definition**	**Description**
				1	Very Low	Excellent Condition	All improved materials
				2	Low	Good Condition	

	walls of a household's shelter.	of your shelter made from?	2. Classify each type of material as strong (i.e., iron, timber and concrete) or weak (i.e., sago palm). 3. Sum the total number of strong housing materials within a shelter. 4. Classify housing condition using the following rankings where very low sensitivity = strong housing condition (e.g., the floor, roof and walls of a shelter are made from strong materials), and high sensitivity = weak housing condition (e.g., the floor, roof and walls of a shelter are made from weak materials).	3	Medium	Fair Condition	No improved materials
				4	Very High	Poor Condition	
Energy Security							
Cooking Sufficiency	The amount of time a household has problems accessing cooking fuel.	In the past year, were there times when you didn't have any access to cooking fuel? If yes, how many times did this take place?	1. Input household survey data reflecting household access to cooking fuel whereby i) household never has problems accessing cooking fuel represents (1) low sensitivity, and v) household always has problems accessing cooking fuel represents (5) high sensitivity.	**Rank**		**Definition**	**Description**
				1	Very Low	Never	Never has problems with access
				2	Low	Rarely	
				3	Medium	Sometimes	
				4	High	Often	
				5	Very High	All the Time	Always has problems with access
Lighting Sufficiency	The amount of time a household has problems accessing lighting.	In the past year, were there times when you didn't have any access to lighting? If yes, how many times did this take place?	1. Input household survey data reflecting household access to lighting whereby i) household never has problems accessing lighting represents (1) low sensitivity, and v) household always has problems accessing cooking fuel represents (5) high sensitivity.	**Rank**		**Definition**	**Description**
				1	Very Low	Never	Never has problems with access
				2	Low	Rarely	
				3	Medium	Sometimes	
				4	High	Often	
				5	Very High	All the Time	Always has problems with access

Income Security							
Income Stability	The extent to which household income has fluctuated over the previous 12 months.	Was your household's income this year higher, lower, or about the same as last year?	1.	Input household survey data reflecting income stability where households income i) remained the same; ii) was higher; iii) was lower than the previous year, where higher income = low sensitivity and lower income = high sensitivity.	**Rank**	**Definition**	**Description**
					1 Low	Higher	Higher Income
					2 Medium	Stable	Stable Income
					3 High	Lower	Lower Income

Appendix 3: *CAPSI Workshop Protocol*

The CAPSI Method Workshops - Developing Livelihood Adaptation Pathways

ORIGINAL APPROACH FROM BUTLER ET AL. (2015)

Workshop Itinerary

WORKSHOP DAY 1
9.00-10.00 Session 1: What are the drivers of change for community livelihoods?
MORNING TEA
10.30-12.30 Session 2: What is the future vision for community livelihoods?
LUNCH
1.30-4.00 Session 3: What are the possible futures for communities?
WORKSHOP DAY 2
9.00-10.30 Session 4: What is the adaptive capacity of communities today?
MORNING TEA
11.00-1.00 Session 5: What are the strategies to achieve the community vision?
LUNCH
2.00-4.00 Session 6: What are the decisions, actions and support needed to implement adaptation strategies?

Introduction

Workshop Setup

Create 4 groups of 6 participants made up of: 2x male adults/elders; 2x female adults/elders; 1x male youth; 1x female youth. Place one packet of pens on each table.

Workshop Aims & Outcomes

The workshop aims to support your community in making decisions, and identifying actions to achieve your communities vision, whilst adapting to the future.

This information will be used to develop an 'adaptation pathway' for your community, which reflects what you would like to see by the year 2040. We hope to come back for a final trip in September of this year to present these adaptation pathways, alongside the risks that your community may face in achieving them, based on the information we collected last year.

On the first day of the workshop, we are going to focus on developing your community vision and understanding how you may achieve this vision in the future given potential threats.

On the second day we are going to work together to develop strategies to cope with these threats based on community strengths, whilst identifying areas that you believe your community may require support.

**Ask for verbal consent for photographs to be taken during this workshop.*

Session 1: Drivers of Change for Livelihoods

Setup: Place a 'drivers of change' poster on each table.

Tasks: Introduce the drivers of change on the table and explain why they have been selected (i.e., these were identified to be the most important drivers of change within your community during the last focus groups).

Session 2: What is the Vision for Community Livelihoods?

Setup: Provide each group with a piece of butchers paper.

Tasks:

1. Introduce activity: *'We are now going to ask you to plan a vision for the future in your community. On the paper please can each group draw or write a vision for how you would like your children or grandchildren to be living by the year 2040'.*
2. Support each group in developing their vision statement.
   Facilitator prompts (if required):
   - *What things would you like to see improved within your community?*
   - *What livelihood activities would you like to be able to do (e.g., fishing, market etc.,).*
   - *Is there anything you would like to be able to access within your community?*
3. Ask representatives from each group to present their vision to participants.

**During this session note down the discussions that are being had and what is being represented within each groups vision.*

Session 3: What are the Possible Futures for Communities?

Setup: Provide each group with a 'scenarios of change matrix' and highlight which scenario they will be working on. Provide butcher paper (with specified scenarios drawn on the page) to each group.

Tasks:

1. Introduce activity: *'Considering how uncertain the future is, we are going to ask you to consider what the future might look like for your community based on di fferent scenario... for example',* explain matrix and scenarios.
2. Explain to each group which scenario they have been assigned and what that means for their community.
3. Ask each group to draw a picture based for how they believe their community will look for that scenario by the year 2040, give the scenario a funny/interesting name.

   Facilitator Prompts (if required):
   - *If this happens....what will the impact be on:*
     - *Livelihood activities (e.g., fishing, farming, market etc.,).*

- *Ecosystems (e.g., coral reefs, forests, streams).*
- *Access to water and food?*

4. Ask a representative from each group to present their scenario and explain what they believe the community will look like by 2040.

**During this session note down the discussions that are being had and what is being represented within each groups future scenario.*

WORKSHOP DAY 2

Session 4: What is the Adaptive Capacity of Communities Today?

Setup: Provide each group with an 'adaptive capacity table', capital definition poster and pens. (*Time allocated to task: 1 hour 30 minutes).*

Tasks:

Introduce activity: 'This morning we would like you to identify your communities adaptive capacity, this means **"The ability for your community to adapt to cope with or manage the impact of issues (e.g., climate change, overfishing, lack of access to sanitation, water etc.,)**

1. Ask participants to think about the 2007 tsunami, and what their community did to survive, cope and recover from this disaster.

2. Explain the different types of capital and give examples (see below).

3. Ask each group to think of different strengths and weaknesses within their community for each type of capital that reflect how they are able to respond to disasters.

4. Ask representatives from each group to present their results.

Types of Capital

Type of Capital	Definition	Examples
Human	Skills, knowledge, ability to work and good health that enable someone to achieve their livelihood objectives.	Education level, skills, health, traditional knowledge.
Social	Social resources to draw upon to achieve their livelihood objective.	Social networks, leadership, culture, community groups.
Financial	The financial resources that people use to achieve their livelihood objectives.	Income, savings, remittances, bank accounts.
Physical	Basic goods and infrastructure that supports livelihoods.	House, boat, transport, water, toilets, lighting, livelihood equipment (e.g., fishing net).
Natural	Natural resources used for livelihoods.	Land, fresh water, forests, coral reefs, fish.

Session 5: What are the Strategies to Achieve the Communities Vision?

Setup: Give each group their community vision, cross-section scenario matrix, adaptive capacity matrix and adaptation strategies table.

Tasks:

1. Ask each group to remind themselves of i) their community vision; ii) potential future scenarios; and iii) the adaptive capacity they believe the community possesses.
2. Talk about the need to develop strategies or actions that a community can take to enable them to achieve their community vision given potential future scenarios.
3. Ask each group to identify the three most important strategies that would enable them to adapt to each driver of change, get each group to write this down and describe the strategy.
4. Ask each group to identify what strengths and weaknesses the community has to support them in implementing the strategy (E.g., what does a community have, what does a community need?).
5. Ask each group to consider if a strategy will be beneficial based on the range of potential futures the community may witness. If a strategy will not be beneficial, ask a group to describe why they believe this.
6. Ask participants to present the results to the group.

**Use an example table to help describe the tasks to be completed during this session*.

**During this session note down the discussions that are being had and any additional information that is not recorded by the group on the strategies table*.

Session 6: What are the decisions, actions and support needed to implement adaptation strategies?

Setup: Give each group their adaptation strategies table and a butchers paper sheet for writing adaptation pathways.

Tasks:

1. Ask each group to identify the steps that will be required to achieve each adaptation strategy (this should be sequential e.g., step 1 leads to step 2 etc.,). **Start with the most important strategy for each driver of change*.
2. Ask what action is needed, who will implement this action, what is needed to implement this action? Ask the community what they already have and what support they will need to achieve each step.
3. Ask each group to identify what type of training or support they would need to obtain funding/support to achieve these actions.

11.3 Appendix 3: Facilitation Training Manual

Facilitation Training Manual

Claire Holland

Mediators Beyond Borders Oceania (MBBO)

James Cook University (JCU)

2024

Mediators Beyond Borders Oceania

Web: www.mbbo.com.au

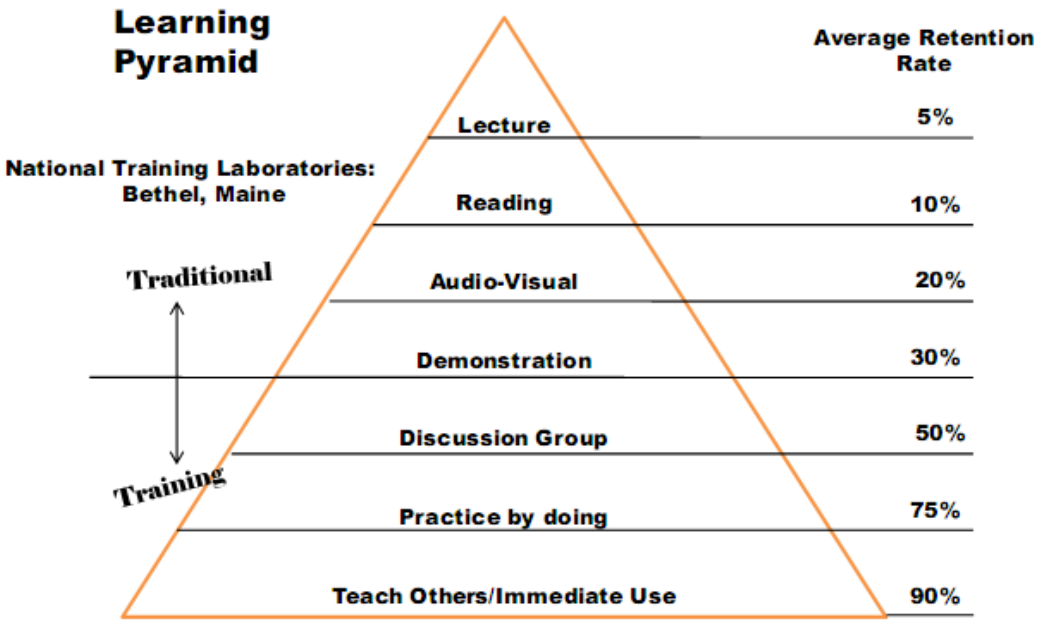
Contents

Facilitation Training Manual

This training manual is developed in collaboration with ESSI, highlighting the local context of designing and delivering workshops.

Facilitation Methods

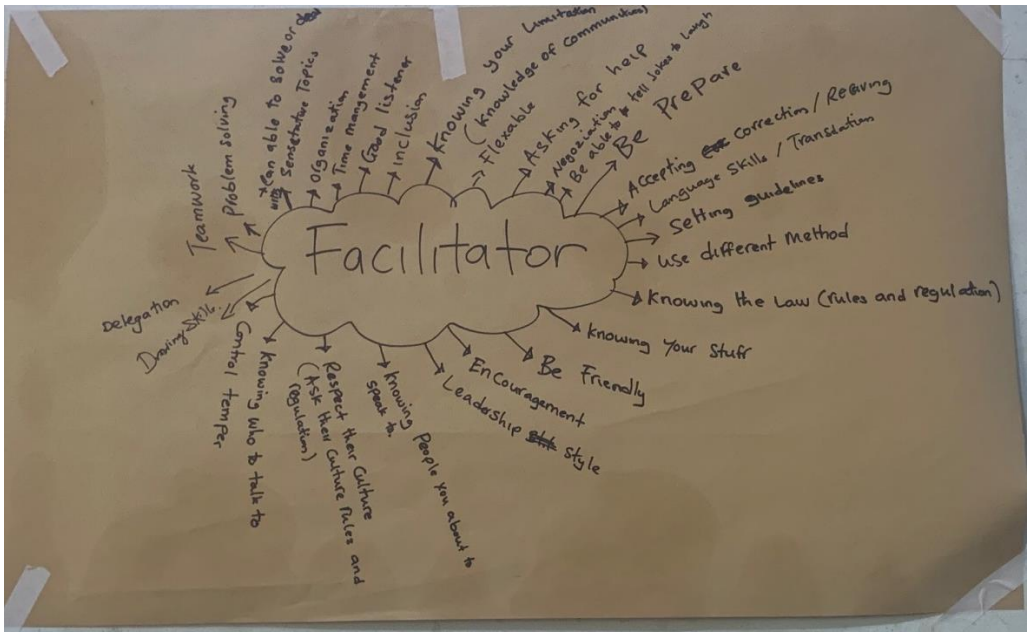
There are different methods for facilitation and many benefits of using interactive facilitation methods. Research suggests that the most effective methods for facilitation and providing information are interactive, based on active participation, and focus on the participants, rather than the facilitator. These techniques help people to learn faster and remember more than if they are taught using traditional methods, like a lecture or speech.



Skills to be an effective facilitator

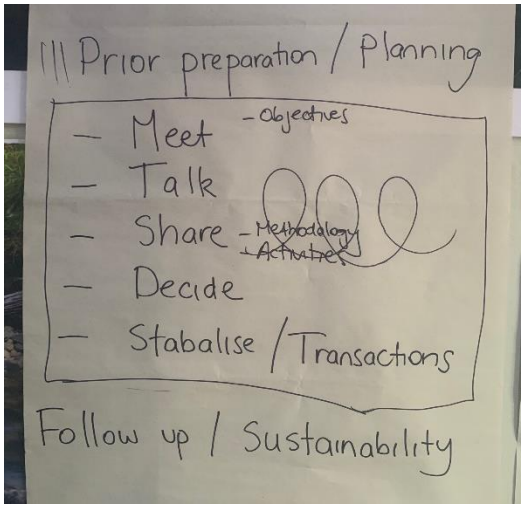
Individual facilitators gather their skills and knowledge overtime with different training, experience, and observation of other facilitators. Facilitators gather skills and knowledge in a toolkit or **'basket of knowledge'.** A facilitators basket may include skills such as:

- Being prepared.
- Setting guidelines.
- Know your limitations (i.e., knowledge of communities).
- Asking for help.
- Drawing skills.
- Knowledge of local law.
- Knowledge of rules and regulations.
- Knowing 'your stuff' (i.e., what you need to know in a given context).
- Being friendly.
- Encouragement.
- Leadership style.
- Delegation.
- Supporting empowerment.
- Good listener.
- Managing sensitive topics.
- Dealing with high emotions.
- Knowing your audience.
- Negotiation.
- Personal language skills.
- Humour.
- Not making assumptions.
- Good questioning skills.
- Respect local culture (i.e., cultural rules).
- Treading gently.
- Knowing who to talk to (i.e., chief).
- Maintaining relationships.
- Controlling personal emotions.
- Knowing when to pause, adjust and adapt based on context.
- Accepting and receiving feedback.
- Teamwork.
- Delegation.
- Organisation.
- Time management.
- Inclusion.
- Flexibility.
- Knowledge of different methodologies.
- Analytical Skills.



Facilitation Model

A) **Prior Preparation & Planning**
B) **In the Room**
   1. **Meet**
   2. **Talk**
   3. **Share (Methodology & Activities)**
   4. **Decide**
   5. **Stabilise/Transactions**
C) **Follow Up/Sustainability**



Preparation

It is useful to consider issues that may affect how well a workshop or meeting will go when planning to facilitate a workshop or discussion. When thinking about who will be in attendance and what different individuals may expect from the meeting, workshop, or discussion you might consider:

What specific factors with the community or individuals might you need to consider and plan for ahead of time?	- Different agendas - Hierarchy - Payment - Structure of leadership - Different mindsets - Illiterate/education - Language - Law - Inclusion (women and youth) - Rapport (friendliness and trust) - Sustainability - Working with donors

As part of the planning stage, it is useful to consider the purpose of the meeting or workshop. Some reasons to hold a gathering may be:

What is the purpose of the meeting or workshop?	- To find out information/ask questions. - To seek approval. - To implement activities. - To complete an output. - To decide an outcome.

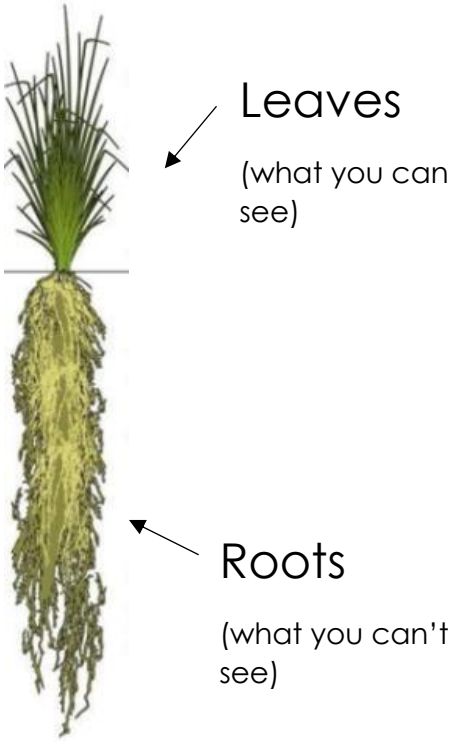
	- To explain a decision. - To provide awareness sessions. - To support behaviour change. - To gain consent. - To meet procedural guidelines and requirements. (e.g., ethics or export permits) - To solve a conflict.

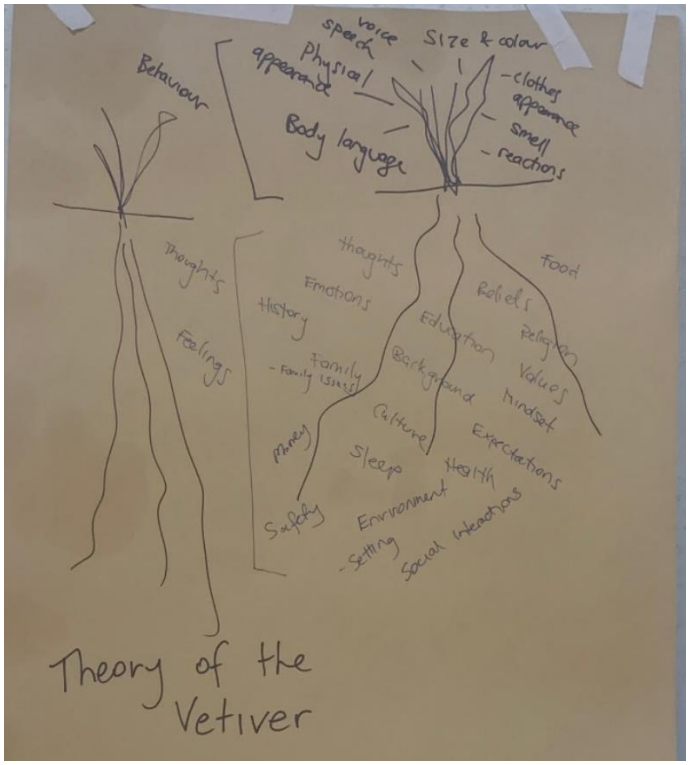
Remember, being clear to yourself and your audience as to the purpose of a facilitation can inform the planning and methods used for talking and sharing. There can be frustration when the purpose for the facilitation and the output of the process don't match.

For example, if we say we want to do consultation with a workplace and plan to listen to what staff are thinking and feeling to make policy changes, but actually the policy changes have been decided and the consultation won't influence the decision – then the facilitated meeting may lead to frustration and lack of trust in the facilitators in the future.

Try to ensure **alignment,** and that the purpose of you coming in, matches the expectations of the community or group.

Theory of the Vetiver Grass

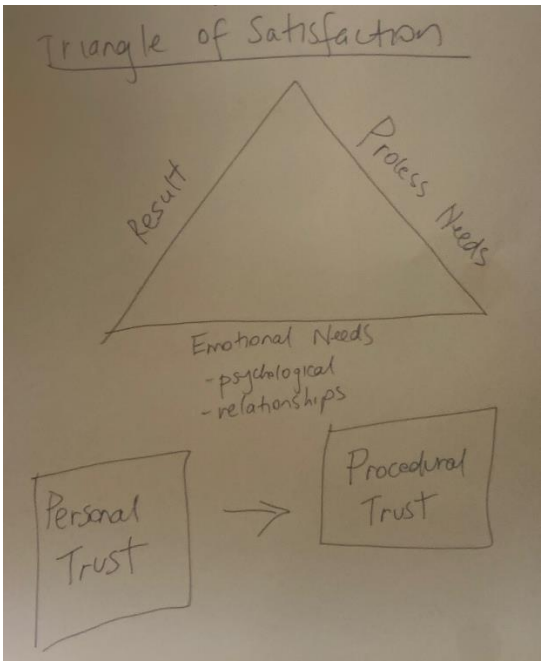




Leaves (what you can see and observe)	People and their behaviour represented above ground, e.g., - Physical appearance - Body language - Clothing - Smell - Voice and speech - Reactions (voice and body)
Roots (what you can't see)	People's thoughts, feelings and emotions that influence behaviour, e.g., - Thoughts - Emotions - Background - Education - Beliefs - Mindset - Religion - Values - Family - Culture - Expectations - Health - Sleep - Food - Income - Family Issues - History - Social Environment - Social Interactions - Environmental Setting - Safety

People justify their behaviours based on what's going on in their root system, this might be contradictory to the next person. Someone may see what behaviours are being expressed in another person and relate this to their own root system. This is often where conflicts occur as people are making judgements on people based on what they see without understanding their roots. Part of the job of the facilitator can be trying to unpack what's happening in different people's root systems and communicate this to negotiate through conflict etc. Ongoing awareness is required, that when conflict occurs it's not necessarily a bad thing, it might just be a misunderstanding of behaviours. If people knew a bit more about what was going on in the roots, it can help resolve conflict.

Triangle of Satisfaction



The triangle of satisfaction considers three key needs of parties participating in a workshop or meeting. Participants will be interested in meeting their:

- **Process needs:** How is the workshop being run? What type of participation will they have?
- **Result needs:** How will decisions be made? How will the participant be involved in any decision making? Will they get what they want?
- **Emotional needs:** What psychological needs do the participants have (such as need for security, stability, money, status, livelihood, emotional expression – hate, anger, fear, hope, excitement etc), maintaining relationships?

Facilitators can play an important role in how comfortable participants feel and therefore how much they **trust the process**. If you have developed relationships with key participants and they have **personal trust** in you, it may increase **procedural trust**.

Consider: What is the behaviour of the participants like? What might you need to prepare for in the meeting or workshop?

Examples	Working with a community, there was an experience where the team didn't meet community expectations. There was a big talk on trying to figure out how to overcome this and negotiate before the team could continue the work. People with different mindsets came by to pause the meeting. There can be a lot of issues around people being influenced by money. For example, in one community the chairman wanted to hire a meeting venue so that the meeting could be more 'private' but we did not have the project funds to cover the space. When we later spoke to the women in the community, they said they did not want that because they always hold the meetings there and they are always excluded, whilst if they are held in the village, they are able to participate and their voices are heard. Position: Change venue to resort. Try to understand why does the chairman want this? Thinking of the roots of the vetiver, reasons could include: - Privacy during meeting (cultivating relationships with people on committee)

	- Allowance received (if travel to different venue) - Expectation (from engagement with different industries) - Identity (chairman, chief, lead in other projects) - Opportunity to travel - Personality - Status By thinking about this and identifying the biggest influencing driver of behaviour, is there something you could address to enable him to get something he wants, without achieving his exact position (i.e., negotiation)? Negotiated examples could include: - If you can access other funds to gather an allowance whilst staying in the community? - Consulting with other community and family members involved? - See if we can find a venue where the whole community can go including the women, or at least include a consultation to be in the village so women can participate.
Strategies	- Consult with others in the community and family. - Involve key community members in solutions. - Provide multiple options to choose from. - Agree to new arrangements if … If they agree to A, you can agree to B (package options). - Give multiple options that will work for ESSI and ask the decision maker to select one of the approved options. **Reality Testing -** If someone says they want something you say: - Best case scenario you get…, worst case scenario is that… What do you think, can you work on the best case scenario or should we work on a backup option? - What would happen if you didn't get the money… What would happen if….? Asking questions to get the person thinking holistically about the situation. Reality testing is a powerful tool for your basket of knowledge.

Facilitation planning

Analysis	- Who are the parties? What is the relationship like between the parties? - What is the history? Particularly consider if there's any history based on past/current relationships that is positive or negative. - What is the context? Local, provincial, ministry, international, ecological? - What is going on? - Who has the power, resources, and ability to influence the process?

	- What is the aim of the facilitation / project? - What is your strategy?
Make important prior decisions	- Who is in the room? (who's looking after the children if the women are in the room, or is support provided to bring children and still be able to participate) - Who are the decision makers? - Logistics to coordinate who and how
Methodology / facilitation style	- Community members all together / small groups
Who is the best facilitator for this context?	- Woman or man? - Language? - Keynote speakers?
List of considerations:	- Payments - Structure of leadership - Language - Hierarchy - Culture - Inclusion (women and youth) - Rapport / Friendship / Trust - Working with donors - Ongoing consent - Safety preparations (time of meetings, where people need to travel based on time of day, cultural sensitivities, religious cultural days etc.,). - Remote fieldwork: satellite phone, first aid kit.

Important Considerations for Prior Preparation and Planning

☐ **Budget plan**: Looking at expenses of what the project will require. Budget plan is very important when doing practical preparation, e.g., space venue, boat hire accommodation costs, catering, etc. ☐ **Risk management:** Identify the risks associated with the project, if you don't do prior risk management it will cost you. You will face lots of threats in the project, being able to plan to minimise these threats is key. ☐ **Levels of Management and Responsibilities**: Ensuring all management roles are captured, makes it	☐ **Prepare any visual aids:** Take copies of any handouts or instructions for group activities. ☐ **Always have a plan B**: Sometimes in communities' things don't go the way you plan. You need a plan B, even plan z. ☐ **Plan activities:** Prepare your activities before you go to the communities. ☐ **Organise your thinking:** Sometimes you might get distracted or be too shy or didn't have confidence, need to organise your thinking so you don't lose track on what you're supposed to do during workshops.

easier to know who's responsible for planning and reporting.

- ☐ **Workforce:** Plan number of employees required and can budget for this.
- ☐ **Capabilities and Skillsets of Workforce:** Who will play what role in different aspects of the project.
- ☐ **Logistics planning & preparation:** Accommodation, Meals, Allowances, Fuel costs, project gear list and equipment list.
- ☐ **Project planning:** Developing methods, and gathering knowledge that is required to implement them before the project takes place.
- ☐ **Mentoring:** Seek room for capacity building within the project.
- ☐ **Gathering initial information from communities:** Thinking about livelihoods; initial research for possible communities you intend to work with. This would be different than conducting detailed surveys etc.; understand community structure and assets and physical and social environment.
- ☐ **Know your community:** What's the setting of the community, what information do you need to know?
- ☐ **Information:** Make sure letters are sent to community so information is distributed. Ensure communities are aware of the meeting date, time, venue, catering etc.,
- ☐ **Review connection or transfers when travelling:** If someone is arriving at the airport and needs to make a transfer this is considered.
- ☐ **Prepare agenda for the meeting:** Send agendas and invitations so participants are aware of what is going on.
- ☐ **Prepare itinerary:** Send to any person who will be travelling for the meeting.
- ☐ **Prepare the outline for the workshop:** Know who are the keynote speakers and the structure for them for the talk (e.g., pastor, village elder, minister) maybe they will do an introduction, prayer, or conclusion.
- ☐ **Identify your weakness:** Sometimes people struggle when things don't go the way we want and can struggle with that. Plan for support if needed.
- ☐ **Community consent:** Make sure you have prior consent.
- ☐ **Know how to resolve issues:** Sometimes during a community meeting there might be an argument between the communities (e.g., money. leadership, resources), know how to resolve issues when things arise.
- ☐ **Communication skills:** Sometimes people don't get what they want during workshops, this can lead to conflict with chiefs, community leaders, elderly people; you need to know how to communicate with a range of people.
- ☐ **Familiar with different culture:** When you go to a different cultural community you can adapt to that culture.
- ☐ **Reflect on your actions and behaviours:** Know this before you go and don't let it affect our relationship with the communities. E.g., difference between professional identity and private identity. It might affect how the community sees us.
- ☐ **Community relationship:** Consider needs for maintaining relationships, even if the project is completed.
- ☐ **Outcomes:** What benefit will the community have? Identifying this at the start and working towards the outcome with relevant stakeholders.
- ☐ **Seek prior approvals:** Submit all of the required requests for approval, if approval takes place then you can advance forward with the project.
- ☐ **In house training**: Consider connections when you're travelling.
- ☐ **Check for infrastructure or projects that are already occurring**: (e.g., sanitation project).

1. MEET

The first stage of the facilitation process is 'meet'. Once arriving at the venue, or in the village, you can consider the elements below. The meet stage is important to getting off to a good start. The key objectives in this stage are to set a clear agenda and ensure 'buy in' from the participants – do you have the right people in the room and is everyone clear on why they are here and what is hoping to be achieved? You can set up clear signposts for the different sections of the agenda, and ensure you clearly state what you're doing in each section and for what purpose.

Arrival in community

- ☐ **Be friendly:** you are a visitor in the village.
- ☐ **Meet key personnel**: Ask to meet the chairperson, or elder, also enquire if there's any initial work that's been done to understand the progress made here. Or in some trips that are impromptu (to conduct interviews for example, just ask where the chief/community leader resides and then go and ask if you can do interviews).
- ☐ **Advise team has arrived:** Use time if the meeting is the next day to organise workshop materials, get to know the community and leadership structure.
- ☐ **Settle in accommodation:** Organise yourself, know where the rest room, water, shower room is located.
- ☐ **Catering**: Check in about food and catering options, and payment for food. Where places don't have shops and we're there for a short time, we buy the food in the town and bring it with us and just ask it to be supplemented with veg, greens and fish if they are able.
- ☐ **Give cash:** Organise costs and providing cash to communities that will be exchanging hands during the workshop (sometimes done at conclusion of workshop). *Organise before going – pre planning as this needs to be within the budget.*
- ☐ **Check expenses:** Ask about other expenses (e.g., travel, number of people that will join, check if initial planning from budget changed e.g., number of staff).
- ☐ **Ask about project site**: Sometimes it might not be at the village where you meet the committee.
- ☐ **Observe:** Important to have your observational skills (e.g., how is the community setup) take note for yourself and future reference.
- ☐ **Connect with keynote speakers:** Prior to the beginning of the workshop, speak with other presenters, leaders, pastors (for prayer), cultural ceremony, dancers, etc. Ensure everyone knows about the agenda and timing of their section.
- ☐ **Touch base:** Conduct a brief meeting with the community or village committee to identity weaknesses and strengths before the actual workshop occurs to allow for adjustment.
- ☐ **Consent:** Ensure that you have agreement to proceed.



Arrival at the workshop / meeting

- ☐ **Arrival**: Greet people, smile on your face. Positive appearance when committee sees you, they will be happy and know you mean business. Arrive and receive greetings from the community (normally receive green coconuts).
- ☐ **Welcome speeches:** Introduce the project. Plan for an introduction of key personnel and agenda for people to speak, e.g., chairman opens up the meeting then we go from there.
- ☐ **The opening prayer:** Prepare who is giving the opening prayer.
- ☐ **Cultural ceremony:** May occur depending on context (understand cultural practice for this). To abide by cultural rules and regulations (e.g., in some contexts girls have to wear skirts, they couldn't wear shorts). Consider additional obligations such as conducting sacrificial ceremonies in some areas.
- ☐ **Introduce yourself**, who you are, where you are from.
- ☐ **Introduce the team:** Including interpreters (if using), where everyone is from, and what languages they speak.
- ☐ **Introduce the agenda** and objectives for the meeting. Write a clear agenda that can be stuck on the wall.
- ☐ **Introduce the project** and its purpose and objectives.
- ☐ **Introduce ground rules:** Set out any expectations for communication protocols (e.g., who is speaking, who is included in discussions, when or how to ask questions, any points of clarification for the process to run smoothly).
- ☐ **Introduce your outcomes** of what you hope to achieve by the end of the meeting.
- ☐ **Community expectations**: Ask the community what their expectations are for the project, what is the benefit they want from the project. Maybe facilitate an activity to capture everyone's thoughts and expectations.
- ☐ **Question time:** Allow time for questions to be asked about the project and the agenda for the day
- ☐ **Ensure everyone has clarity:** On the agenda, on the expected outcomes, on the timing of the day.
- ☐ **Consent:** Check that everyone is happy to proceed with the agenda for the day and ground rules you have set.

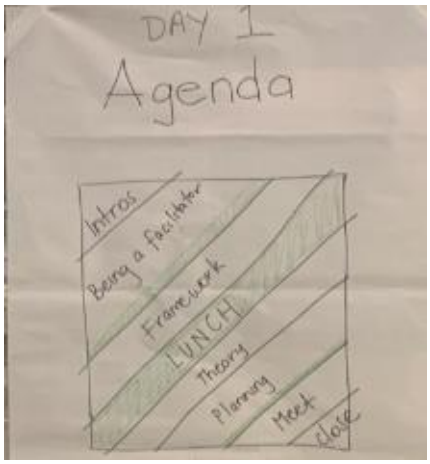
If it's a multiday workshop

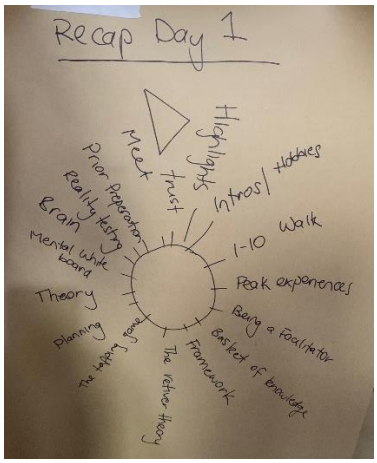
- ☐ **Repeat arrival; welcome; opening prayer; agenda; ground rules; outcomes for the day; question time; ensure clarity; consent.**
- ☐ **Recap day 1:** Ask participants to remember what was discussed yesterday. Provide an overview and link what was discussed yesterday to the purpose of what will be discussed today.

Remember:

- ☐ **Interpersonal skills:** You get to meet all different kinds of people, you need to have your emotions under control and be prepared to talk about different agendas and party interests (vetiver grass theory), that may be different from your purpose of being there.
- ☐ **Developing rapport:** Working with respect, friendliness, and being truthful so as to develop trust with the participants.
- ☐ **Triangle of satisfaction:** Can you meet the emotional needs of the participants, procedural needs (trust in the process), and outcome needs (expected results).

Examples:





Icebreakers

Guess the Song

Instructions:

- Pair up participants.
- Ask them to think of a song in their mind.
- One participant taps out the song on the palm of their partner. No words, humming or sound can be made – only tapping.
- The other participant tries to guess the song.
- After 1-2 minutes of trying, swap between the pairs and the other partner taps out a song.
- Ask how many people successfully guessed the song. They can now tell their partners what the song was.

Reflections:

- Ensuring the communication is occurring. Checking in for understanding.
- You don't know what's in the back of someone's mind.
- Having people in their comfort zone, they will speak a lot and you will learn a lot more than taking someone outside of their comfort zone.
- Communication can be more effective when you're thinking about the environment and the comfort of all your participants.

- Getting a community to agree to an engagement project with our own objective, it's important to ensure this aligns with community goals/we integrate community goals into our own objectives.

Scaling walk (1- 10)

Instructions:

- Put numbered pieces of paper with 1 to 10 in a line on the floor.
- Ask all participants to stand at 1.
- Ask a question:
  - On a scale of 1 – 10 how confident are you to…
    - Sing a song in church?
    - Cook a meal for 10 people?
    - Drive a boat?
    - Hike in the mountains?
    - Climb a coconut tree?
  - On a scale of 1 – 10 how much do you know about…
    - Repairing a roof?
    - Building a sea wall?
    - Digging a well?
- Questions can be individualised for the group.

Reflections:

- To get participants laughing and comparing different skills and knowledge.
- That it's OK to not know how to do something or have much knowledge on a topic. Knowledge and skills can be learned.
- To be able to check in at the end of a workshop if there is a difference in skills or knowledge gained by the participants.



True or false

Instructions:

- Have a list of true or false questions.
- Tell participants it is to check in on their knowledge – and have some fun!
- Ask participants to stand in a circle or move around so everyone has some individual space and can see each other.
- When you ask the question, instruct the participants to remain standing if they think the answer is true, and sit down if they think the answer is false.

- You might have some fun questions and some technical questions that are relevant to the content of the workshop. For example:
  - Fiji has a larger land size than the Solomon Islands – True or False? (Answer: False)
  - A shark has zero bones – True or False? (Answer: True)
  - The human body is made up of over 60% water – True or False? (Answer: True)
  - Humans can survive without oxygen for up to an hour – True or False? (Answer: False)

Reflections:

- To get participants laughing and comparing different skills and knowledge.
- Moving up and down to get some energy in people's bodies.
- That it's OK to not know how to do something or have much knowledge on a topic. Knowledge and skills can be learned.
- To be able to check in at the end of a workshop if some technical questions that you want everyone to know the answer to is true or false, and that the group is certain of the correct answer and why.

Myth busters

Instructions:

- Similar to true or false instructions. A myth is a belief about something. For example, if you're pregnant don't eat pineapples because something will happen to the baby.
- Share the myth. Then present facts or a personal antidote to 'bust the myth'.

Energisers

Games to get energy in the room in the morning or after a break.

Toss the coin (heads or tails)

Instructions:

- Ask participants to stand in a circle or spread out.
- You will toss a coin. If they think the coin will be heads to put their hands on their heads. If they think the coin will be tails to put their hands on their bottoms (tails).
- Toss the coin. Everyone who guessed correctly stays standing. Everyone who guessed wrong sits down.
- The game continues until there is one person left standing.

Spell your name with your hips

Instructions:

- Ask participants to stand up.
- This is an activity to get people moving if they have been sitting down for a long time.
- Ask participants to put their hands on their hips and spell their name moving their bottom.

- Demonstrate by exaggerating the movements. Try to get people moving and laughing. Ask them to include their middle and family names so it goes on for longer.
- When finished, ask participants to shake out their body – move their arms and shake their legs to reset.
- You can then move them into the next session with an awake mind and body.

Resources for icebreakers:

There are lots of examples available online if you google 'icebreakers', for example:

- https://seedsforchange.org.uk/tools#games
- https://www.scienceofpeople.com/meeting-icebreakers/
- https://www.mindtools.com/a2dl2jd/ice-breakers

2. TALK

Talking = ONE WAY COMMUNICATION

The 'talk' stage is an opportunity to deliver information. It may be useful to present information prior to a group discussion, or to provide details about the methodology for group discussion. The 'talk' stage is usually delivered by the facilitator or a guest presenter. It might include sharing slides, showing pictures, explaining history or background to a project, and instructions to transition into sharing.

Thinking about the timing of any 'talk' session and how long the participants will stay engaged and able to concentrate. A useful guide is to speak for 10 – 15 minutes maximum, and then have some 'share' and group engagement activities. If the 'talk' is going to take longer, consider breaking up the presentation of information into short 10-minute segments and having a quick check in with participants for questions or check in for understanding. Even switching facilitators or presenters is useful in keeping participants attention.

Remember, you can cycle between 'talk' and 'share' in your methodology.

When engaging in 'talk' you might:

- Present research that's been gathered.
- Present information that's been gathered from prior meetings.
- Present information on the methodology of how research or information was gathered so the participants have trust in the process.
- Present case studies of similar issues, topics of concern, outcomes, or processes in other communities.
- Present examples of success stories and lessons learned.

Methodologies:

- Use posters, brochures, pamphlets, maps.
- Use handouts for participants with references to information being presented
- Use visual aids (such as videos, PowerPoints, Facebooks)
- Show role play or drama.
- Refer to minutes of previous minutes, existing contracts, laws, supporting documents
- Introduce storytelling, metaphors, or narratives that can help with knowledge transfer. Develop a story about the training and continue with the story throughout the workshop. Stories can be easy for participants to remember and be an anchor for memory after the training has finished.
- There may be previous research conducted (questionnaires, surveys, personal interviews, focus groups)
- Pre and post survey. Deliver pre survey to get a baseline of understanding / where you are now. At the end of the workshop deliver a post survey to see if understanding or attitudes have changed.

Some points to consider:

How have you prepared the information you need to present to the group?	- Do you have understanding for any technical explanations? - Do you have notes prepared for any information you need to deliver? - Have you got visual aids to share with the group?
If you are using an expert who does not speak the local language to deliver information -	- What type of translation is required? - Have you met with the expert to discuss what type of translation they would like? Are you summarising the information or translating word-for-word? - Have you agreed on the timing of their presentation?
If members of the community are presenting to the group -	- Have you met and pre-planned with the presenter what they will discuss? - Do they have a set timeframe for how long they will have to present? - Do you have permission to summarise or draw links between the presentation and the key objectives for the workshop / meeting at the end of their speech?

Skills to include	- **Good interpersonal skills:** If someone opposes you, you have to be able to maintain composure and temper in public. - **Communication skills:** Ability to communicate sensitive topics; use appropriate language; help with clear understanding. - **Use of different methods of communication:** Keep the delivery of information interesting and engaging for the participants. - **Ability to manage the process:** May need to interrupt to manage time and remind participants of the process - **Ensure good information is delivered:** Sometimes you might need to interpret for donors, researchers, or ministers to ensure the communication is very clear. There can be huge differences in how scientists and community members speak. - **Show respect and friendliness:** Participants may get scared and not want to be involved. Your skills in developing rapport can help participants feel more secure. - **Sense of humour:** Sometimes you can make jokes that relate to your topic of awareness - **Flexible:** Able to pivot to different methodologies and topics if the planned approach is not working - **Good knowledge:** Prepare for topics and able to share knowledge and correct information with participants. - **Use of repetition to deliver information:** Example: In a project, there were 5 key priorities. These were delivered using different media. The same information was captured on a poster, in drama, in songs, on the radio.

If the context is official, such as officers from ministry of environment:

- Establish ground rules for communication
- Establish agreement on the facts/information that you will rely on prior to the meeting / workshop.
- Try to ensure the information or research you are presenting is agreed upon within the community and with ministers (e.g. which information will we use as the basis of our discussion).

Example: Previous experience with a mining company and community that signed an agreement. When the team came to do EIA and SIA the community said they didn't agree with it because only the chief had signed it on behalf of the community. This was raised as an alarm in the social assessment.

Explaining a decision:

- If a procedure was followed, reiterate what the process was, how it was followed, explain how we got to 'here', and where to from now.
- If appropriate - Remind the people that they were part of the process and how they were included. Reiterate that the process was legitimate and aim to maintain trust in the process.
- Remind them of any process for problem solving used in the project so far.
- If someone else made the decision, talk to the community leaders first before the community to see if they have buy-in and support the decision. If yes, explaining the decision to the community may be easier. If no, consider a methodology for explaining the decision if it's not likely to be well received, maybe engaging a mediator. If a decision is made by community leaders, seek approval to share the decision with the community.
- Consider using experts to speak, maybe a lawyer to explain a court process or outcome.
- Illustration of similar cases of decision making

Giving instructions to move into the share stage:

- Provide clear instructions for the 'share' methodology.
    - What will participants DO
    - HOW will they work through the process
    - WHO is involved (in small groups; large group; pairs; individual)
    - HOW LONG will the process go for (and who will be timing)
    - What OUTCOMES are expected (written output, drawing, sharing stories)
- Highlight different people's role (will there be group leaders, facilitators moving between groups, specific people who will answer questions?)
- Share how information will be gathered, and how it will be used in the future. If asking for participants to draw or write, how will that information be collected and used in future decision making?

3. SHARE

Sharing = GROUP DIALOGUE

The 'share' stage is an opportunity for participants to engage with activities, dialogue, group work, etc. There may be different reasons to engage in a 'share' session. Are you seeking to gather information, raise awareness of group attitudes or behaviours, or develop engagement in decision making processes. Remember to link your 'talk' and 'share' activities to the purpose of your meeting or workshop:

- To find out information/ask questions.
- To seek approval.
- To implement activities.
- To complete an output.
- To decide an outcome.
- To explain a decision.
- To provide awareness sessions.
- To support behaviour change.
- To gain consent.
- To meet procedural guidelines and requirements. (e.g., ethics or export permits)
- To solve a conflict.

Timing depends on the topic. For a small topic or short discussion, you may have a share session of 10 – 15 minutes. For an in-depth topic, you may allow up to 1 hour. Timeliness is an important consideration. You want to keep moving through the agenda so you can cover all topics, keep the activities engaging for the participants, and ensure enough time for participants to share appropriately. You also want to ensure that sessions finish at appropriate times for morning tea, lunch, and afternoon tea – or breaks as needed.

Before moving into 'share' if participants haven't had an opportunity to say anything yet, you might allow some time for chitchat about how things are going in the community and some informal questions with facilitators. This might help participants to feel comfortable with group members and build rapport with facilitators.

Remember, you can cycle between 'talk' and 'share' in your methodology. When planning for your presentation it is important that you set clear time frames of each topic, and allocate who will introduce each new topic (talk), provide information (talk), and give direction on the next group activity (talk). Participants might then break into activities (share), engage in dialogue with the facilitators (share), and group discussion (share). There are many methodologies for engaging in share activities.

Protected area consultation example	
Examples of talk: - **Provide direct information to** participants about what protected areas are, and giving information. May include a prepared speech, or prepared slides. - **Expert presentations:** Experts or invited speakers may talk directly to participants, sharing information or giving direction. - **Decision makers:** A person in authority or with relevant knowledge may explain a decision that has been made.	Examples of share: - After giving information, have an **interactive style discussion** to ensure everyone understands. Dialogue will occur through questioning and answering. Following the 'talk' awareness session, may include activities to collect information. - Break the tribe up into **different groups** (male, female, elder, youths). Each group presents back to the large group.

Methodologies:

- Uncovering the interests and positions of what the participants want. Asking questions to understand the underlying interests (such as why do they want that particular outcome? How does this process meet the needs of the participants today?)
- Buy in from the participants: Are they invested in the outcome of the session? How much do people care about the issues?
- Address concerns: Allow a session for participants to share their concerns. Through a discussion, address ways their concerns can be met by the process or outcomes. Maybe share what consequences or future concerns may be if they are not engaged.
- Consider the DESC approach: Describe the situation; Express your concerns; Suggest options; Consequences are discussed.
- Use of case studies: Share an example and then ask participants to share their own experiences.
- Mapping exercises: Small groups drawing and sharing an explanation of the map with the larger group

- Capturing observations: What is the community like now? How will the project meet expectations of the community?
- Templates: Prepared questions for group discussion
- Interactive discussions: Facilitator led small group discussions.
- Focus groups: Discussion on specific topics captured by group leaders / facilitators to analyse
- Behavioural change: Awareness of current behaviour and community needs in order to change behaviour.
- Making a decision: Describing the process (democracy, majority rules, decision make by one individual after hearing input from the group etc) and leading the group through the process.




Things to consider:

Thinking about where the participants are sitting: Do they care? Do they feel comfortable and able to talk freely? Based on your knowledge of the community or group, it might be useful to consider splitting groups up by certain demographics (gender, age, seniority, position in the community etc) or allowing participants to choose their own groups.

Thinking about how to capture views from different sections of the community: women, men, youth, elders, working, unemployed, different faiths, different backgrounds, different cultures – fair gathering of views from across the community.

Observing cultural obligations: Check in about and follow any cultural obligations throughout the day.

Access and inclusion of people with disabilities: Check if there is any need for sign language, disability access to the venue and ability to engage in 'share' methodologies (such as sitting on the ground), or support for any other disabilities.

Strategies to break participants into groups:	Strategies to keep participants on task:
☐ Count off numbers (up to how many groups you want), all the one's go to group one, all the two's go to group two etc. ☐ Separate based on demographic information ☐ Ask people to line up according to a variable, for example height, order of your birthday. Count off numbers required for each group. ☐ Sometimes you might split groups depending on what information you want to get e.g., if you want to compare and contrast status or genders etc, then it's clear separation of groups. ☐ Ask groups to self-select ☐ Direct participants to where you want them.	☐ Always check on groups, make sure facilitators are walking around and checking on progress and discussions. ☐ When you have a facilitation team they can have different roles, e.g., someone keeps time, someone keeps notes, someone leads discussion, someone answers questions. ☐ Your topic must be interesting so that people want to stay engaged. If the 'share' methodology is not keeping people engaged, is there another option that you can use? Maybe ask some members to work individually, offer paper and pens to write or draw instead of talk, offer for a disrupting or disengaged individual to talk one-on-one with a facilitator.

Prepare strategies for engaging with:

Accepting criticisms from the community: Be prepared for participants who may be unhappy and voice their dissatisfaction. Have a plan for how you will engage with criticism.

If someone asks a question you don't know the answer to: Plan how you will acknowledge the question and talk about options for finding out the information. How can you maintain personal integrity and maintain trust in the process?

Managing questions that aren't on topic: Plan for how you will acknowledge questions and areas of interest of participants that are not on topic for the workshop or you don't have time to address during the meeting or workshop. For example, can you write down questions on a 'parking lot' sheet and return to them at the end of the session if there is time? Or take the question on notice and return to it at another time in the workshop or future meeting? 'Maybe we can come back later to address that question?' Have you set up instructions for what will happen with questions and answers at the end, keeping within boundaries of discussion? Plan for how to respond and divert questions that are outside the boundaries of the topic being discussed.

Managing time: If you're out of time to answer questions in depth, sometimes you'll have to push questions. Could you refer participants to come speak to you at a later time? 'Come to me after dinner tonight and we will have a chat.' Can you wrap up the share session respectfully and check that everyone feels they had a chance to express themselves. This point links to your facilitation guide. It's important you don't plan for too many activities so you run out of time for in-depth discussion and question and answer time.

Know and prepare for the topics that might arise: Do your homework for questions that might come up. If you know the answers you can share the information with the participants. In other instances, invite an expert, government official, or representative, to come along who can answer questions on topics that will be explored in the workshop or training.

Key facilitation skills:

- **Listening skills:** Listening attentively to capture information.
- **Note taking:** Taking notes to ensure accuracy of information captured.
- **Observation skills:** Note taking of observations of the session.
- **Discussion skills:** Sharing examples and encouraging participants to talk.
- **Giving directions**: Providing clear instructions
- **Awareness of power and the impact of power on discussions**

Power

In group facilitation, various types of power can influence dynamics and outcomes. Types of power can include:

Structural power	(e.g., power given by the structure of an organisation, such as co-directors, management, finance, project staff)
Personal power	(e.g., experience in the scope of work that they do and seen as personally persuasive; personal charisma)
Formal power	(e.g., representing ESSI in your role)
Knowledge power	(e.g., in having greater knowledge on a topic)
Social power	(e.g., networks across Solomon's and in communities)
Informal power	(e.g., local networks and personal connections)
Individual power	(e.g., personal characteristics and position in the community)
Reward power	(e.g., by doing the project a community will get a cash injection plus project outputs)
Sanction power	(e.g., ability to punish or take away rewards, such as withholding donor money or project materials)
Legitimate power	(e.g., have the authority by an official title)

Facilitators can effectively manage different types of power being utilized by participants by first being keenly aware of the power dynamics. Facilitators can aim to balance participation by setting clear ground rules, actively soliciting input from quieter members, and intervening when necessary to prevent any single individual from dominating the conversation. Consider ways to create an inclusive environment

where all voices can be heard and all participants feel valued, so the atmosphere is as conducive as possible to achieving the workshop or meeting objectives.

Example: Rangers have sanction powers. They can take anyone who breaks rules of a protected area and inspectors would have formal powers to report them, write formal letters etc.

Consider issues of corruption: What can you do when you know there's been corruption? Consider key persons involved and types of power involved. You can try and work with the realities of who they are and what powers they have. Are there any structural powers, or personal powers you can use to intercede? Dealing with issues of corruption are extremely complex and it is useful to have additional training and support to safely and effectively manage corruption.

4. DECIDE

The 'decide' stage is useful for summarising 'what has happened so far' and 'where to from here'. It may be that a decision needs to be made about how to use information from the workshop or meeting for the next stage of a large process, or agreement needs to be reached about how to focus budget or project topics. In this stage you can also provide clarity on what the community has committed to and what they are going to do next, and what you (the facilitators / researchers / donors) have committed to and are going to do next.

There are lots of different ways to arrive at a decision.

- **One person makes a decision:** Someone in authority or with decision making power.
- **A small group of representatives make a decision:** May be an elected or appointed group. It is important for procedural trust that it is explained why this group has been tasked with making the decision.
- **Group decision:** Participants of the workshop or meeting can arrive at a decision
- **Community decision:** Every member of the community is given the opportunity to participate in the decision-making process.

Methodologies for decisions that are made by group members who have turned up to a meeting or workshop:

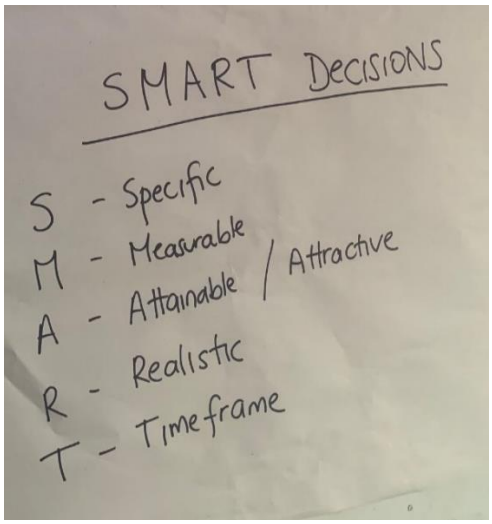
- Majority rules (draw dots on paper with different options; paper with most dots 'wins')
- Thumb up thumb down (count the thumbs and majority rules)
- Show of hands (if agree, put your hand up; count hands and majority rules)
- Post it note / individual paper voting (participants write down their personal preference; paper collected and votes are arranged in groups to show which decision is preferred).

Consider if any voting or show of preference is done confidentially or publicly. If it's an important decision, it's necessary to consider if members of the group may feel influenced by peer pressure to vote by the preference of other members of the group.

Authenticity: If you know that one person is going to make a decision at a later stage (for example a government official or donor) then don't tell people they will have an input into the decision. It can lead to disappointment and distrust in the process.

Prepare strategies for:

- Respecting all opinions
- Managing personal bias
- Reality testing – helping the participants to consider the pros and cons of different choices



If any decisions are discussed, consider framing them using the SMART model for decision making.

- **Specific**: What is specifically committed to? Who is responsible for what?
- **Measurable**: How will you know when the decision has been implemented / action has been taken?
- **Attainable**: Is the decision likely attainable? Are actions to be taken achievable by persons who are committed?
- **Realistic**: Is the decision realistic? Is it likely the actions can be achieved?
- **Timeframe**: When exactly do you want the decision to be accomplished? Set timeframes for actions to be taken.

5. STABILISE

The final stage is to consider if any other steps need to be taken to stabilise or transition from what has been discussed in the meeting/workshop. The meeting or workshop may be part of a larger project. In some contexts, it may be important to think of a way to demonstrate commitment to decisions – for example does there need to be a public acknowledgement, a ceremony, or a media release, for example.

Consider what might need to happen next, such as agreement on:

- **Going back to the community and communicating results:** Consider how this is applicable to the community and will achieve sustainability for the project in the long term.
- **If the project is coming to the end**: What final 'wrap up' activities need to occur? Cutting of a ribbon, opening of new infrastructure, celebration of project achievement.
- **Is media important for the project?** Would there be benefit for local grassroot magazine article, publishing of project work, producing a documentary asking how the community members found the project and how it benefited them, content for donors, or the internet for the public.

If there is any tension in the group due to the discussion, it might be necessary to engage in some conflict resolution before participants go home. If there is likely to be heightened emotions, it is important to consider if you can do an activity or have a discussion that will reduce the tension before participants leave. The safety of participants, their families, and community members after a meeting or workshop is an extremely important consideration. The safety of the facilitators is also extremely important. Managing conflict appropriately, deescalating high emotions, and preventing future conflict or violence is a key skill for facilitators, and can be developed with specialised training and experience.

Follow up / Sustainability

Effective follow-up after a workshop is essential to ensure that participants feel heard, their questions are answered, and the overall process was considered satisfactory.

Facilitators may be responsible for:

- Reviewing all notes, flip charts, and written information from the workshop.
- Ensuring all key points, decisions, action items, and questions are documented.
- Identify questions that were not addressed during the workshop and providing appropriate follow up
- Respond with any necessary information that was promised the community or stakeholders would receive.
- Check in with community leaders and key persons if there was overall satisfaction with the workshop. This can be valuable feedback for the facilitators in maintaining good relationships with the community.

Long-term sustainability and project success can benefit from ongoing engagement. Effective follow up allows facilitators to:

- Provide additional information
- Clarify any uncertainties
- Gather feedback to inform future activities.

Ongoing and open communication fosters personal trust, which can influence procedural trust. By keeping participants informed and involved, facilitators help to build a sense of ownership and commitment to the project, which is crucial for sustained success and ongoing positive impact in the community.

11.4 Appendix 4: Facilitation Training Report

JAMES COOK UNIVERSITY AUSTRALIA

MBBO

ESSI

Facilitation Training Report

Contents

1. Overview

In February 2023 a two-day facilitation training was conducted with members of ESSI, JCU in-country partner in supporting diverse livelihoods project (the project) in Western Province, Solomon Islands. The training was designed and delivered by Claire Holland, Director of the JCU Conflict Management and Resolution Program, and Director of Mediators Beyond Borders Oceania (MBBO). The training was designed to facilitate a knowledge sharing and learning opportunity for ESSI staff on facilitation planning and techniques for workshops and meetings between government officials and communities. The training provided a professional development opportunity for ESSI staff with the aim to support the development of facilitation skills and knowledge, and to benefit the work being done to achieve the project objectives.

The training took place in the ESSI offices in Gizo, Solomon Islands. The training was conducted in English, with some break out groups engaging in local languages. A strong emphasis was placed on consolidating and sharing knowledge among the participants, as well as deepening understanding through group discussions. A range of action-orientated activities were planned to provide experiential learning and exemplars of facilitation techniques. At the conclusion of the training participants were presented with a certificate of attendance for two-days of professional development training in group facilitation on behalf of MBBO.

This report will provide background to the development of the training and overview of the workshop.

2. List of participants

ESSI Staff
Ikuo Gumo Tigulu
Reuben Peni Jagilly
Emmie Beto
Aubrey Vavu
Relna Taporiko Peter
Hensllyn Pwe'a Boseto
Stanton Mosa

Figure 1: Facilitation training conducted in the ESSI offices, Gizo

3. Background

3.1 What is group facilitation?

Facilitation is a distinct discipline area focused on the processes of leading groups and promoting collaboration, creativity, and consensus-building. Individuals can acquire and grow personal facilitation skills through the development of process awareness, facilitation knowledge, and personal attributes.

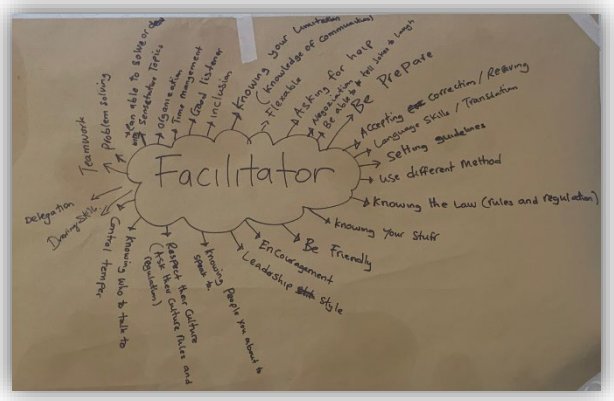


Figure 2: What are the skills required to be a good facilitator

Facilitators are aware of the dynamics of group behaviour and take on a role of leadership in group settings. Facilitators may plan for activities and processes to build group trust, develop rapport, and management energy levels (such as energizer activities at strategic times during a meeting). Facilitators will often be responsible for planning a group meeting (or event involving multiple parties). Planning often involves:

- Deciding the purpose for the meeting. This may include:
    - To gather information
    - To seek approval
    - To complete an output
    - To decide an outcome
    - To explain a decision
    - Awareness session / training
    - Seeking behaviour change
    - Consultation
    - To gain consent
    - To meet procedural requirements
    - To solve a conflict
- Designing a methodology to suit the purpose
- Preparation for the meeting

Facilitators may then work as a single facilitator or part of a facilitation team on the day of a meeting to achieve the desired purposes. Facilitators are often involved in follow-up after a meeting or event, and may provide additional services such as:

- Writing up and distributing notes of the session
- Sharing outcomes from the meeting
- Following up with individuals about action items agreed to in the meeting
- Debriefing with group participants

The process design for facilitated session is usually adapted to meet the needs of each group, and an effective design and delivery can be essential to a meetings success.

3.2 Why was group facilitation training provided?

Offering professional development training to JCU in-country partners was part of the JCU project design. The topic of the training was negotiated with ESSI, and group facilitation was determined to be a highly relevant and useful topic for participants.

3.3 How was the training designed?

The International Association of Facilitators (IAF) set out six core competency areas that are considered the basic skills, knowledge, and behaviours that facilitators must have in order to facilitate successfully in a wide variety of environments. These competencies are:

A. Create Collaborative Client Relationships
B. Plan Appropriate Group Processes
C. Create and Sustain a Participatory Environment
D. Guide Groups to Appropriate and Useful Outcomes
E. Build and Maintain Professional Knowledge
F. Model Positive Professional Attitude as a Process Facilitator

Drawing on experience and prior delivery of facilitation training to diverse workplaces in Thailand and the Philippines and facilitation training designed by *Mediators Beyond Borders Oceania*, Claire presented an overarching facilitation model that incorporates the values of the IAF, is easy to remember, and easy to comprehend.

The facilitation model presented incorporates 5 stages:

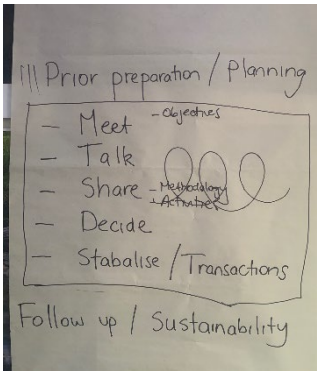


Figure 3: 5-stage model presented during the workshop

Each of the states of the process were introduced across the two-day training. Considerations relevant to the working context of ESSI, and suggestions for facilitation knowledge, skills, and behaviour in each of the stages was discussed and captured. An outcome of the workshop will be a training manual that incorporates the discussion points for each stage of the facilitation process and can be used as a guide for future meeting planning and engagement.

3.4 Context for training from participant stories

In order to ensure the training was tailored to the context and needs of the participants, each of the participants were interviewed prior to the delivery of the training and asked to describe

examples of challenges they had encountered in their experience as facilitators and key topics they would like to be addressed in the training. The stories were collated and coded according to the 5-stage model. This allowed the examples and topics to be raised throughout the two-day training during the different stage discussions.

Stage	Key Topic*	Story
Meet	Hierarchy	Working with dynamic groups of people who are at different levels of government and community leadership. As a young person, I can feel nervous about standing in front of the room as one of a team of facilitators when there are older people and people from higher levels of government in the meeting. How can I gain confidence?
	Different mindsets	Communities have different backgrounds. Some have experience with logging and mining. They then have different expectations. When we're facilitating in those communities, for example logging communities, they have experience where they ask the logging community for money to go to Honiara or for something and they get the money. The community then has that expectation that they will get money from the conservation projects too. But we can't pay the same way as the loggers do.
	Payment	In one example, the Chief wanted to increase the sitting allowance from 100 to 200 for the management committee. I had to think fast. I asked the committee leader to speak in their language with the group and explain that we had to stick to the payment of 100 because that is what is budgeted. They said, 'if we don't get the increase then we won't come to the meetings'. We had to negotiate, but in the end they did turn up to the meeting.
	Structure of leadership	Community leadership structures can be challenging for community facilitation. There may be a Council of Chiefs and a Tribal Leader. The Council of Chiefs will also have one paramount Chief. If we hold an introductory meeting and there are representatives from different tribes on the council and they want to go ahead with the project but the paramount chief does not, he can override the council decision. So even if the other Chiefs want to engage in our project we cannot if the paramount Chief does not agree.
	Language	When engaging in consultation in the islands it is important to speak the local language. Even the Prime Minister of the Solomon Islands will sometimes speak in English and it's not a common language for many communities. There are so many languages, so it's important for facilitators to look at what language is most appropriate for the meeting.
	Youth involvement	Youth are the tribes future. We sometimes have to advocate for youth to be given some space in leadership in the tribal structure. There are sometimes issues of youth drinking and smoking and doing unsocial behaviour. It can be because they are left out and not involved in tribal leadership. When tribal leaders have been convinced to include youth in meetings and decision making they are often happy they were convinced.
	Strategies	Going to Honiara face-to-face is often required to get things done. If you send them an email they may not reply. But when you're there face-to-face and they search their emails and see the ones from you that they have not replied to they will do it then because you're there in person.
Talk	Language	Language is important if you're teaching people who are illiterate. You may be telling them things that are right and valuable information, but if they don't understand they will not follow the advice. They may interpret things differently because they don't understand and then do the wrong thing.
	Rapport	It is important to have tools to develop friendships before going out to do a community facilitation. There needs to be time to introduce the facilitators, where we come from, explain who we are, what the project is we are doing, and be friendly with them.
Share	Different agendas	Working in the community on conservation ideas, some people from the community will object. The majority of the community may want to go ahead with a project. However, if the ones that object have teamed up with loggers or miners then they have different agendas and different power.
	Different mindsets	In community consultation, some communities have difference mindsets and they can be a tough nut to crack. For example, logging minded people already have

		experience with loggers so when we have conservation ideas or resource management, they have a different mindset so the consultations can be difficult.
	Payment	In some community facilitations the community are talking about labour costing being too small. They are used to getting royalties from logging. So now with conservation projects they feel they should be paid more. It is a challenge to talk about labour costs and we need strategies to help them understand. In conceptual meetings with donors, we now ask them to specify in the MOU what the labour costs budget can be so when we are talking with the community they will see what cash is available and what is budgeted where.
	Participation	There may be different levels of engagement from members of the community. Some are illiterate, others may have only little reading and writing skills. And some community members have different experiences that give them confidence to speak up in meetings. Some community members may have a personality of being shy and not engage much. It can be difficult to manage meetings where some confident people are pushing their own agenda.
	Participation	It would be good to have more tools to facilitate meetings where the participants are illiterate. Maybe how to show them pictures so they can understand what we're talking about. Teaching only through talking does not always work.
	Facilitator tools	If there are too many slides, then the participants get bored and sleepy and do not pay attention. There needs to be more photos and pictures. Maybe they are engaged with some jokes.
Share / Decide	Inclusion	It is important to think about ways that everyone in the community can feel a part of the workshops, feel protected, and part of the project. There needs to be involvement from all genders, and involve non-committee members, like the youth. Trying to think of ways that people can join in the conversation to share their own thoughts and develop some ideas.
Decide	Different mindsets	It can be difficult to talk with people who have different mindsets. For example, in a sanitation project the community may say they want a certain design that is going to cost more money, and we will explain why a different design with actually be more suitable and useful for the community. But they will argue. So we will ask from an engineer to draw up the two designs and then consult with the community about which design will be best. They will see once the designs are drawn up that one is more practical and will go with that design.
	Payment	It can be difficult to manage people with different views and reactions. They can cause disruptions in the facilitation. For example, if we need to negotiate to reduce the budget of costs from materials on a sanitation project, we ask to work on a design and have the materials purchased according to the design. The community want to get the money straight, and say they will purchase the materials. But this is donor money and has to come to us and we can't give it straight to the community. We have to be the ones to buy the materials.
	Law	The Solomon Islands is rich in natural resources. It is challenging for us to manage them. People can sometimes do what they like. The law is very weak. For example, no one is arrested for catching smaller fish or cutting down trees. There are many organisations that are now trying to help with conservation of the environment, but they can only rely on the community trying to control their own resources.
	Culture – Women and Youth	There is a lot of patriarchal culture where community and lands discussions are considered men's agendas. Talking about the land is often only considered a man's issue. The culture plays a big part in who can participate and in what way they can be apart of decision making. How do women's voices get in there? How can facilitators ensure that women and youth are included in decisions that affect the land? We try to push for women and youth participation in management committees. We're often asked by men – why do you recommend having women and youth in that committee? We have to convince them and advocate for the inclusion of women and youth in decision making. It can sometimes be hard to convince a tribal leader that there should be women's and youth's voices in making decisions about land.
Stabilise	Sustainability	When a project ends, what's next for the community. How can we ensure there are positive and long-term benefits?
	Working with donors	It can be challenging to work with donors and all their reporting requirements. There is a difference in how you have to work with donors depending on where they are from.
*The key topic headings were determined by the trainer.		

4. Workshop Summary

Session	Process
Welcome and Orientation to the workshop	Welcome Introductions Setting the scene for the workshop (purpose and approach) Discussion: Outcome - Meeting guide, toolbox/basket of knowledge as a facilitator Activity: Scaling walk - Years of experience facilitating Activity: Scaling walk - How confident are you in your skills, knowledge and abilities to facilitate large groups? Establish group rules / norms
Facilitation Preparation	Discussion: What are important facilitator skills, knowledge, and behaviour? Introduction to the 5-step facilitation model – Meet, Talk, Share, Decide, Stabilise Background on facilitation theory: - Theory of the vetiver grass (understanding behaviour) - Neuroscience and emotions (understanding stress responses in self and participants) - Triangle of satisfaction (balancing process needs, outcome needs, and emotional needs of participants) - Personal trust and procedural trust - Communication theory - Conflict styles - Basic needs theory (survival, belonging, power, freedom, fun)
Meet	Specific tools for starting the meeting, for example facilitating the start of the meeting between government officials and community members. Discussion: Risk management, awareness of relationships between parties, history and context of the topics for discussion, knowing current situation (what's going on), strategic planning of facilitation. Discussion: Preparation considerations, determining the purpose of the meeting, choosing appropriate methodologies to run the session to achieve the desired outcome.
Talk	Discussion: How to deliver information to the group Explore topics: - How to establish good communication - How to present information to participants (sharing slides, guest speakers, facilitator presentation of information, using translators) - Storytelling
Share	Techniques for supporting conversations that further the agenda and purpose of the meeting Discussion: How to engage participants in dialogue and sharing - Increasing participation - Exploring complex issues - Controlled dialogue - Managing emotions
Facilitator knowledge	Training on further theory and knowledge sharing among participants: - Approaches to engaging with difficult groups (DESC approach: Describe the situation, Express your concerns, Suggest options, Consequences discussed) - Types of power and power management (structural, personal, formal, informal, reward, sanction, individual, social legitimate, illegitimate, knowledge, nuisance)
Decide	Facilitation approaches to support decision making: - Democracy - Majority rules - Council decision making - Advocacy and negotiation Discussion of activities that can be run with large groups to support decision making
Stabilise	Awareness of group needs to finalise agreements and discuss plans to ensure compliance with the meeting outcomes Discussion: Rituals that may follow a session to demonstrate commitment to group decisions (public acknowledgement, ceremony, media release)

	Plan for the end product (agreements, contracts, notes of the meeting, photo books)
Close	Wrap up Check in with group goals for the workshop

Figure 4: Participant facilitated discussion and sharing for each stage of the model

4.1 Feedback from participants

The workshop was extremely well received. Overall, the participants indicated great interest and enthusiasm for the training. There was high energy across the two days, excellent group engagement, sharing of personal stories of experience and questioning on how to manage situations in the future. Participants were asked in the first session of the training how they would rate themselves on a scale of 1-10 in terms of confidence to conduct group facilitations. Participants were asked to rate themselves on the same scale in the last session of the training, and all participants ranked themselves higher. The discussion included comments on how the training gave them knowledge that increased their confidence to be a facilitator. Also, the discussion of what to do in different situations and examples of facilitator skills helped them to feel like they could try new techniques in the future.

Participants commented on the appropriateness of the training, and how useful they found it. The following day, three participants travelled to a community to run a facilitated community meeting and they were able to put into practice methodology, skills, and energisers that they had learnt in the workshop. Claire was also present during the community meeting and was able to make suggestions on the methodology and facilitator team approach during the session, which the facilitators tried out immediately. It was a useful application of the skills, knowledge, and behaviour with support from Claire on the day. Future opportunities for Claire or other trainers to observe facilitation-in-action, support facilitator training in practice, and engage in professional debrief could further strengthen participants facilitation skills.

5. Future training

To support ongoing development of knowledge and skills, the options for individual coaching and progressive professional development days that supports reflection-on-action are options to include in future project plans. Facilitated reflection days to check in with research partners over the life-cycle of the project can assist the team with planning, engagement, and reflection-on-action (learning to be applied for future engagement).

Participants also suggested options for future training on topics including:

How to have difficult conversations
Developing Negotiation Skills
Communicating with diverse stakeholders
Conflict Management Training
Additional Facilitation Training

Figure 5: Certificates of attendance on behalf of Mediators Beyond Borders Oceania and signed by Claire Holland were presented to all participants

6. References

International Association of Facilitators (2018) *IAF Core Competencies* https://www.iaf-world.org/site/professional/core-competencies

Rixon, A & Holland, C (2023) *Group Facilitation.* Conflict Management and Resolution Professional Development Training. LearnJCU Org Site.

11.5 Appendix 5: ESSI QGIS Workshop presentation


ESSI
QGIS Workshop
May 2024
Training on the use of QGIS software to support project activities.
Funded by:
Crawford Fund
Livelihoods Lab
JAMES COOK UNIVERSITY AUSTRALIA
Prepared by: Bethany Smith (https://www.linkedin.com/in/bethanyrsmith/)
For further information please contact: Bethany.smith1@my.jcu.edu.au

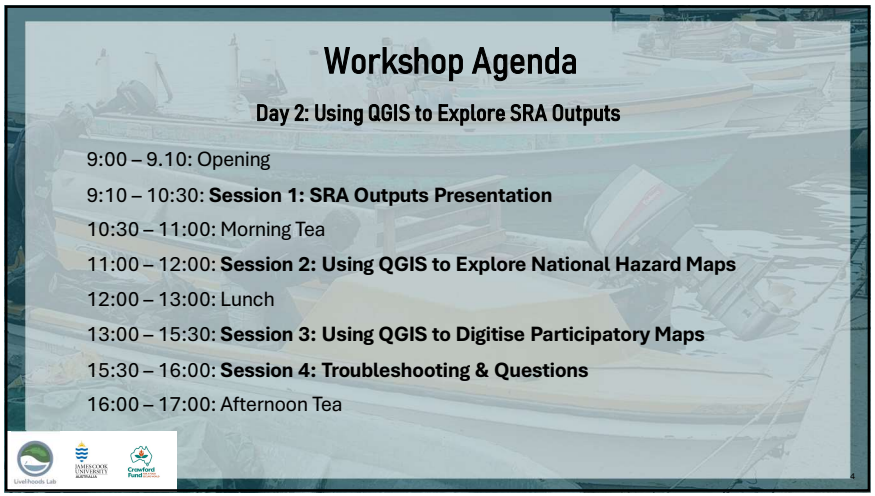
1


Opening & Workshop Overview

2


Workshop Agenda
Day 1: Installation, Introduction & Overview of QGIS
9:00 – 9:15: Opening and Workshop Overview
9:15 – 10:00: Session 1 Installing QGIS
10:00 – 10:30: Session 2: Getting Started with QGIS
10:30 – 11:00: Tea Break
11:00 – 12:00: Session 3: Introduction to Spatial Data
12:00 – 13:00: Lunch Break
13:00 – 14:30: Session 4: How to Create a Map in QGIS
14:30 – 16:00: Session 5: Creating Your Own Map
16:00 – 17:00: Afternoon Tea

3


Workshop Agenda
Day 2: Using QGIS to Explore SRA Outputs
9:00 – 9.10: Opening
9:10 – 10:30: Session 1: SRA Outputs Presentation
10:30 – 11:00: Morning Tea
11:00 – 12:00: Session 2: Using QGIS to Explore National Hazard Maps
12:00 – 13:00: Lunch
13:00 – 15:30: Session 3: Using QGIS to Digitise Participatory Maps
15:30 – 16:00: Session 4: Troubleshooting & Questions
16:00 – 17:00: Afternoon Tea

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Workshop Agenda

Day 3: SRA Final Trip: Community & Provincial Government Workshops

9:00 – 9.10: Opening
9:10 – 10:30: **Session 1: Community Workshop Facilitator Training**
11:30 – 11:00: Morning Tea
11:00 – 12:00: **Session 2: Community Workshop/Gov Workshop Planning**
12:00 – 13:00: Lunch
13:00 – 16:00: **Session 3: Provincial Workshop Facilitator Training**
15:30 – 16:00: **Session 4: Question Time**
16:00 – 17:00: Afternoon Tea

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DAY 1

Installation, Introduction & Overview of QGIS

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Workshop Agenda

Day 1: Installation, Introduction & Overview of QGIS

9:00 – 9:15: Opening and Workshop Overview
9:15 – 10:00: **Session 1 Installing QGIS**
10:00 – 10:30: **Session 2: Getting Started with QGIS**
10:30 – 11:00: Tea Break
11:00 – 12:00: **Session 3: Introduction to Spatial Data**
12:00 – 13:00: Lunch Break
13:00 – 14:30: **Session 4: How to Create a Map in QGIS**
14:30 – 16:00: **Session 5: Creating Your Own Map**
16:00 – 17:00: Afternoon Tea

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Session 1

Installing QGIS

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Session 1: Installing QGIS

Objectives: Install the most recent stable version of QGIS to your computer.

** QGIS 3.28 is the latest stable version of the QGIS software in October 2023.*

Step 1: Go to the **ESSI QGIS Workshop** folder on the USB stick.

Step 2: Double click on the **QGIS Setup** folder to open it.

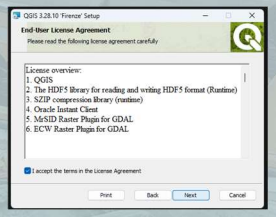
Step 3: Double click on QGIS installer.

Step 4: The QGIS setup wizard will pop up. **Click Next.**

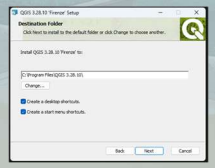
9

Session 1: Installing QGIS

Step 5: Click **I Accept the Terms and Conditions in the Licence Agreement,** then click **Next.**



Step 6: Click **Next.**



Step 7: Click **Install.**

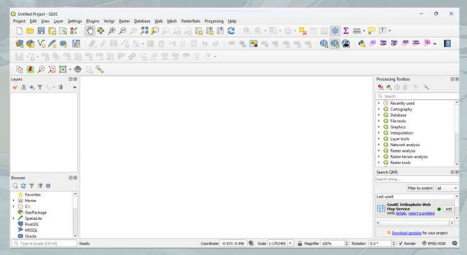
10

Session 1: Installing QGIS

Step 8: Wait for the installation to complete.

Step 9: Once the installation is complete click **Finish.**

Step 10: Search QGIS and open the programme on your computer.



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Session 2

Getting Started with QGIS

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Session 2: Getting Started with QGIS

Objectives:

- Get to know the QGIS interface.
- Using map navigation tools.
- Learn the basics about QGIS projects.
- Add layer into QGIS.

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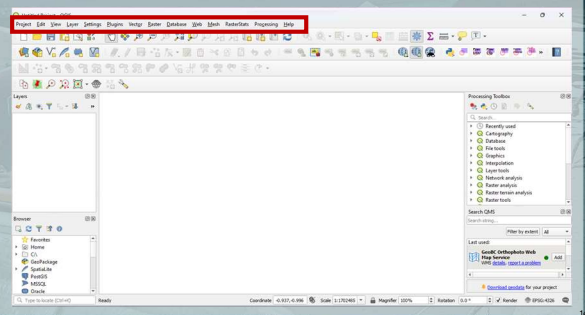
Session 2: Getting Started with QGIS

Objective: Get to know the QGIS interface.

The QGIS interface is composed of 6 main parts:

1

Menu Options: location of the main functions found in QGIS that can be used for project management, data management and analysis. Some of these functions and tools can also be found in toolbars.



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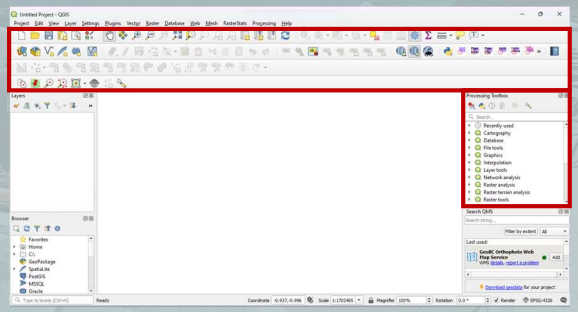
Session 2: Getting Started with QGIS

Objective: Get to know the QGIS interface.

The QGIS interface is composed of 6 main parts:

2

Toolbars: The toolbar provides access to most of the same functions as the menu and uses the same icons. You can change the tools that you can see by going to **Settings > Toolbar Menu.**



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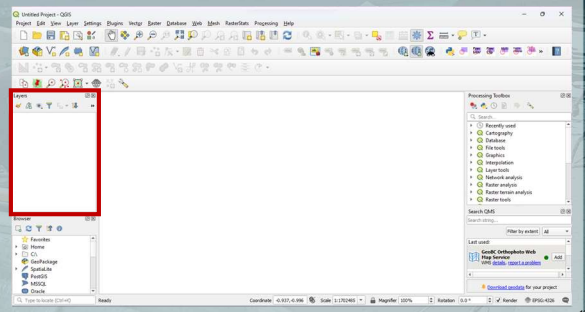
Session 2: Getting Started with QGIS

Objective: Get to know the QGIS interface.

The QGIS interface is composed of 6 main parts:

3

The Layer Panel: The ***Layers*** panel shows you a list of all the spatial data available to you. To learn more about a layer, click the arrow or + beside it. Hovering over a layer will give you some basic information. Right clicking on a layer will give you a menu with options to view, select and edit the data.



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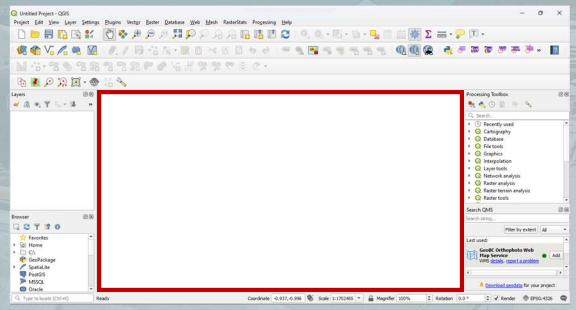
Session 2: Getting Started with QGIS

Objective: Get to know the QGIS interface.

The QGIS interface is composed of 6 main parts:

4

The Map Canvas: This is where the map is displayed and where any layers will be loaded. In the map canvas you can explore layers by moving the map (e.g. zooming in and out) and selecting features etc.



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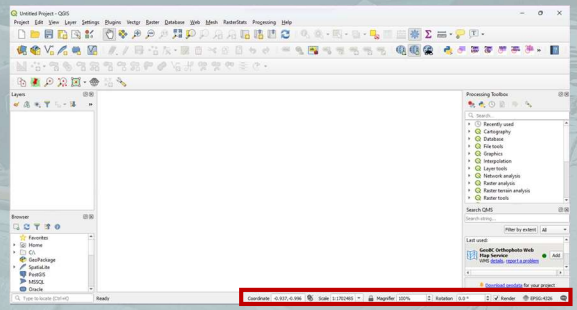
Session 2: Getting Started with QGIS

Objective: Get to know the QGIS interface.

The QGIS interface is composed of 6 main parts:

5

The Status Bar: The status bar gives you information about your map, and allows you to change the scale, rotation and see the coordinates of the mouse cursor when positioned on the map.



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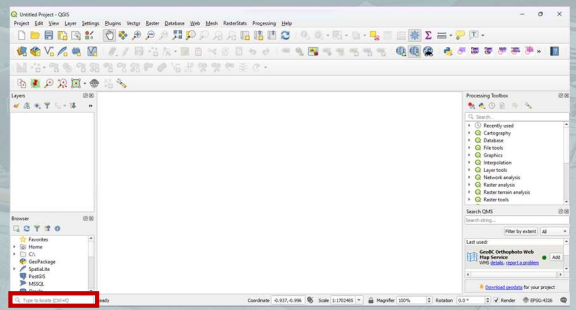
Session 2: Getting Started with QGIS

Objective: Get to know the QGIS interface.

The QGIS interface is composed of 6 main parts:

6

The Locater Bar: Within this bar you can quickly search for and access features in QGIS.



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Session 2: Getting Started with QGIS

Objective: Get to know the QGIS interface.

The QGIS interface is composed of 6 main parts:

6

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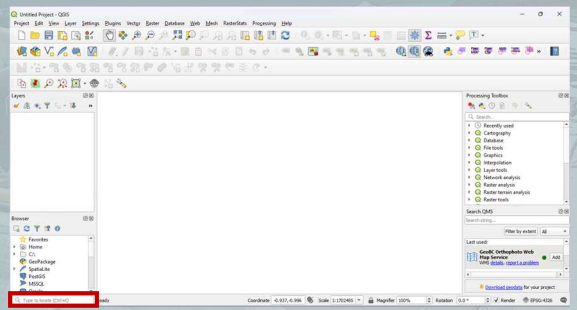
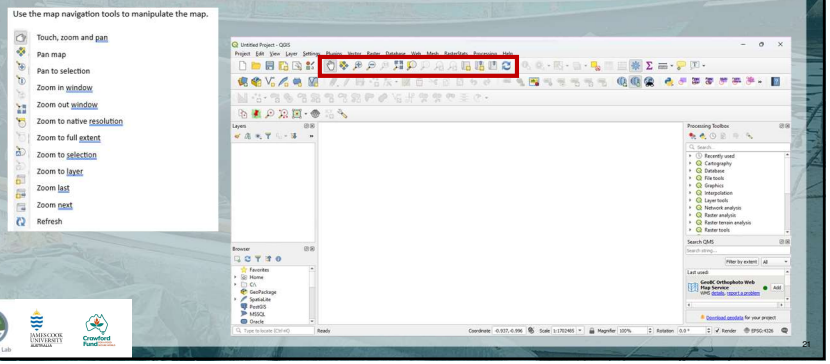


20

Session 2: Getting Started with QGIS

Objective: Use map navigation tools.



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Session 2: Getting Started with QGIS

Objective: Learn the basics about QGIS projects.

QGIS sessions are called projects. Projects allow a user to store maps within a specific file format.

To **OPEN** a **NEW** project in QGIS, click

To **SAVE** a project, click and select the location you would like to store your project.

To **OPEN** a **SAVED** project, click find the project location and click **open.**

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Session 2: Getting Started with QGIS

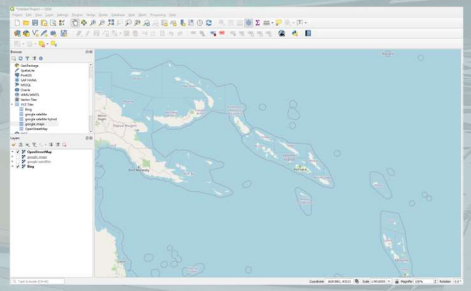
Objective: Install a QGIS Basemap.

What is a Basemap?

A Basemap is a basic background map that provides essential geographic information that additional data can be added to.

Basemaps typically include basic features such as:

- Rivers
- Landforms
- Roads



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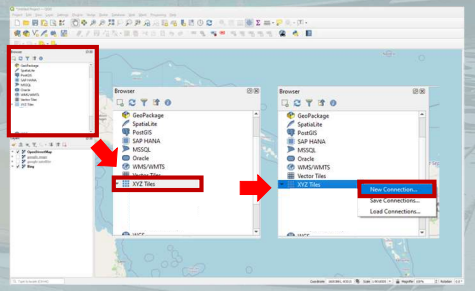
Session 2: Getting Started with QGIS

Objective: Install a QGIS Basemap.

Installing a Basemap

To install a Basemap:

1. Go to the **QGIS Browser** and find the **XYZ tiles** folder.
2. Right Click and Select '**Add New**'.



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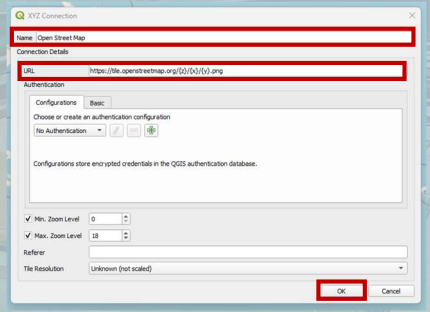
Session 2: Getting Started with QGIS

Objective: Install a QGIS Basemap.

To install a Basemap:

3. Name the Basemap that you are installing (e.g., Open Street Map) and input the Basemap tile server link into the **URL** box.
4. Click **OK** and allow time for the Basemap to load within QGIS.

*Once you have installed a Basemap, you will be able to access this file whenever you open QGIS by going to **XY Tiles** and **double clicking** on the Basemap name.*



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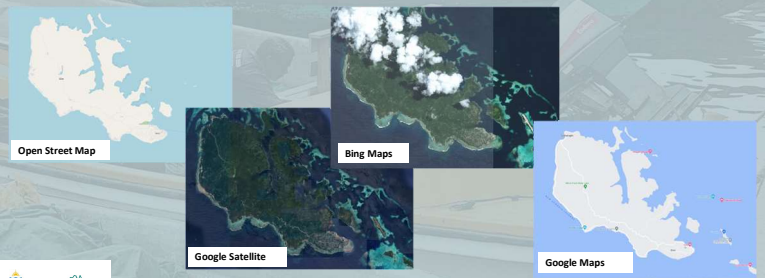
Session 2: Getting Started with QGIS

Objective: Install a QGIS Basemap.

Different Basemaps have different visual representations of spatial data. For example:



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Session 2: Getting Started with QGIS

! TASK !

1. Open a NEW PROJECT and save this to your computer under ESSI_QGIS Training

2. Install a range of Basemaps within QGIS using the following links:

Open Street Map: https://tile.openstreetmap.org/{z}/{x}/{y}.png

Bing: http://ecn.t3.tiles.virtualearth.net/tiles/a{q}.jpeg?g=1

Google Maps: https://mt1.google.com/vt/lyrs=r&x={x}&y={y}&z={z}

Google Satellite: https://www.google.cn/maps/vt?lyrs=s@189&gl=cn&x={x}&y={y}&z={z}

TEA BREAK

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Session 3

Introduction to Spatial Data

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Session 2: Getting Started with QGIS

Objectives:

- Understand the basics of spatial data.
- Understand the differences between raster and vector data.
- Learn how to import vector data into QGIS.
- Learn how to import raster data into QGIS.

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Session 3: Introduction to Spatial Data

Objective: Understand the basics of spatial data.

Spatial data (also known as geospatial data) is information that identifies the geographic location, shape, size and characteristics of objects, features and phenomena on the Earths' surface.

GIS systems use geographic coordinates of latitude and longitude to show a location on the Earth's surface.

- Latitudes are horizontal lines that measure the distance north or south of the equator.
- Longitudes are vertical lines that measure east or west of the meridian (i.e., middle) line located in Greenwich, England.

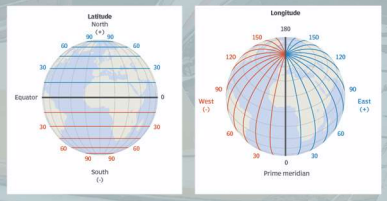

Image Reference: https://www.techtarget.com/whatis/definition/latitude-and-longitude

30

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Session 3: Introduction to Spatial Data

Objective: Understand the basics of spatial data.

Gizo is located at the following coordinates: 8°6'10.91"S, 156°50'30.7"E.

This means that Gizo is 560 miles south of the Equator, and 10488 miles East of the meridian line in England.

Image Reference: https://latitudelongitude.org/sb/gizo/

31

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Session 3: Introduction to Spatial Data

Objective: Understand the basics of spatial data.

There are two types of spatial data that can be used in QGIS:

Vector Data

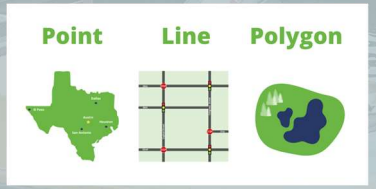
The real world is represented as points, lines and polygons.

For Example:

Towns are represented as point features.

Roads are represented as line features.

Large areas such as lakes are represented as polygon features.



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Session 3: Introduction to Spatial Data

Objective: Begin to understand spatial data and how it is used in QGIS.

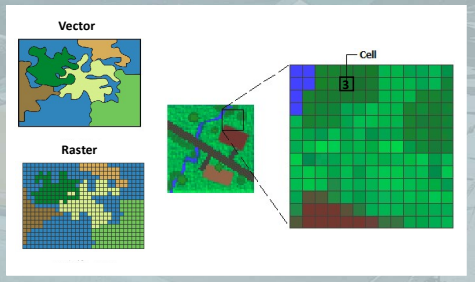
There are two types of spatial data that can be used in QGIS:

Raster Data

The real world is represented as an image that is made up of small cells.

Cells are organised into columns and rows. Each cell has a value which represents information.

For example, a dark green cell has a value of 3 which represents vegetation.



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Session 3: Introduction to Spatial Data

Objective: Understand the basics of spatial data.

! ACTIVITY !

Look at the items on the table in front of you.

1. Sort these items into raster and vector data types.
2. Identify what type of vector data is being represented (i.e., point, polygon, line).
3. Identify what type of data is being represented by the raster file.

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Session 3: Introduction to Spatial Data

Objective: Downloading & Installing Spatial Data

Spatial data of Solomon Islands is available in several online repositories that can be downloaded from the internet.

https://pacificdata.org/

PACIFIC ENVIRONMENT DATA PORTAL
Environmental Information for Decision Making

https://pacific-data.sprep.org/dataset/pacgeoV

SOLOMON ISLANDS ENVIRONMENT DATA PORTAL
Environmental Information for Decision Making

https://solomonislands-data.sprep.org/data-dashboard/gis-spatial-data-dashboard

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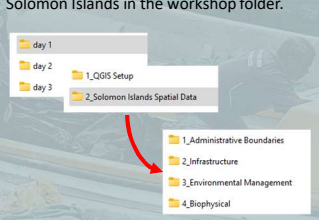
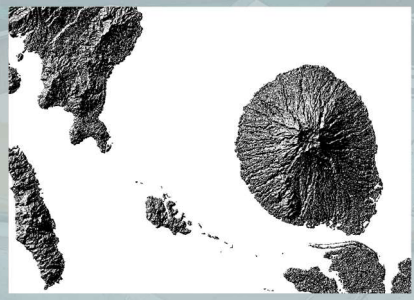
Session 3: Introduction to Spatial Data

Objective: Downloading & Installing Spatial Data

Spatial data often requires high internet speeds to download, we have provided some basic spatial data for Solomon Islands in the workshop folder.





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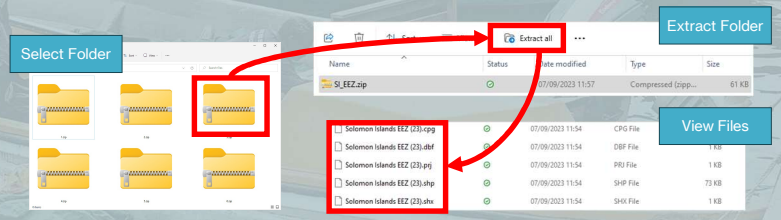
Session 3: Introduction to Spatial Data

Objective: Downloading & Installing Spatial Data

Spatial data is normally downloaded and saved on your computer as a '**zip file**'. This reduces the amount of space the file takes up on your computer. The zip file needs to be extracted to be bought into QGIS.



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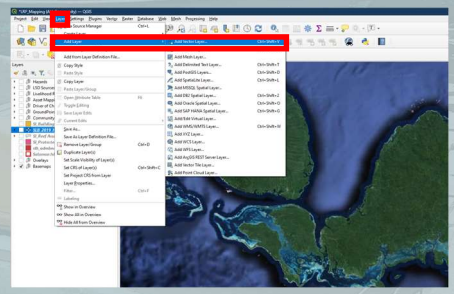
Session 3: Introduction to Spatial Data

Objective: Importing vector data into QGIS.

The following steps can be used to import **vector** data into QGIS.

1) Go to **Layer**
2) Go to **Add Layer**
3) Go to **Add Vector Layer**



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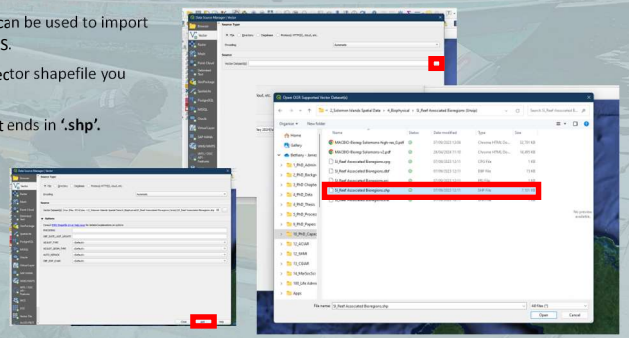
Session 3: Introduction to Spatial Data

Objective: Importing vector data into QGIS.

The following steps can be used to import **vector** data into QGIS.

4) Navigate to the vector shapefile you want to load.
5) Select the file that ends in '**.shp**'.
6) Click '**Add**'.



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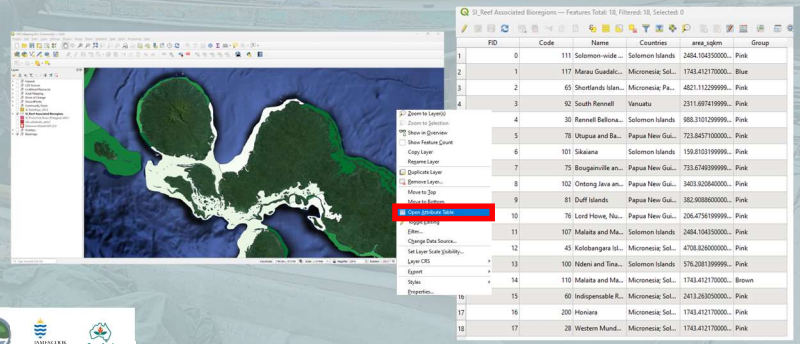
Session 3: Introduction to Spatial Data

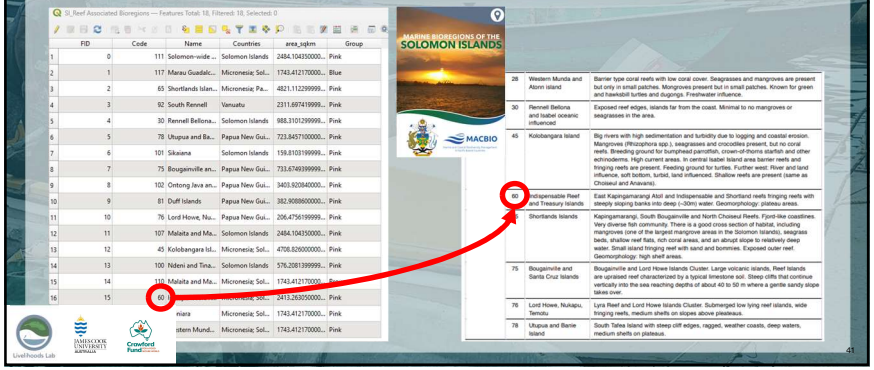
Objective: Understanding attribute tables.



40

Session 3: Introduction to Spatial Data

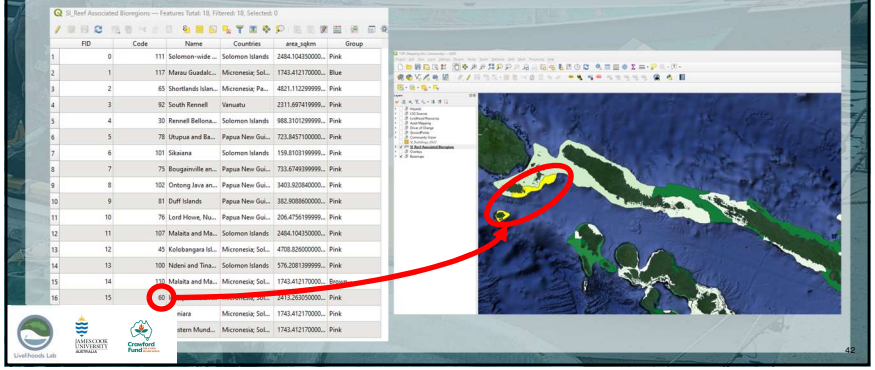
Objective: Understanding attribute tables.



41

Session 3: Introduction to Spatial Data

Objective: Understanding attribute tables.



42

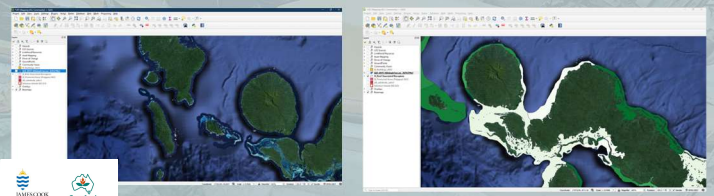
Session 3: Introduction to Spatial Data

Objective: Importing Data into QGIS.

! TASK !

Choose a spatial data zip file and import it into QGIS.

By the end of this task, you should have:



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LUNCH BREAK

After Lunch: How to Create a Map in QGIS

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Session 4

How to Create a Map in QGIS

45

Session 3: How to Create a Map in QGIS

Objectives:

- Identify the essential elements that should be included within maps.
- Learn how to use the QGIS mapping tool.
- Learn how to customise maps in QGIS.
- Learn how to export maps as images from QGIS.

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Session 4: Creating a Map in QGIS

Objective: Identify the essential elements that should be included within maps.

! ACTIVITY !

Look at the map on the table in front of you....

Use the pens provided to draw any additional elements that should be included within this map to enable someone to understand the information it is presenting.

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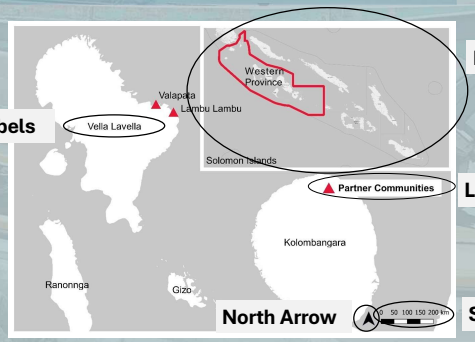
Session 4: Creating a Map in QGIS

Objective: Identify the essential elements that should be included within maps.



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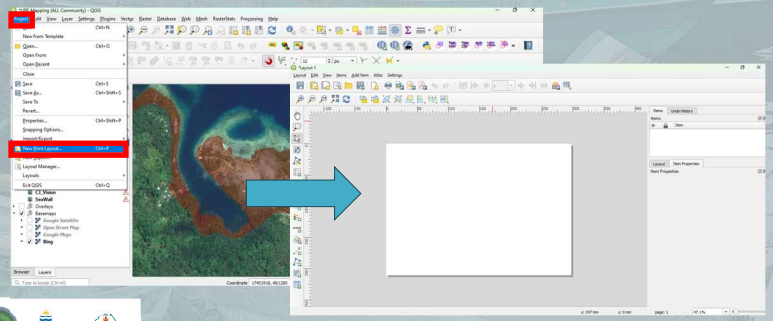
Session 4: Creating a Map in QGIS

Objective: Learn how to use the QGIS mapping tool.



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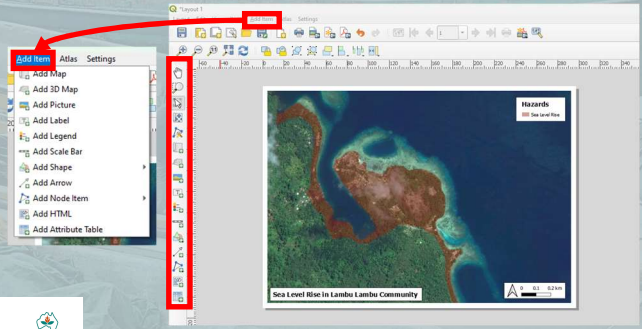
Session 4: Creating a Map in QGIS

Objective: Learn how to use the QGIS mapping tool.



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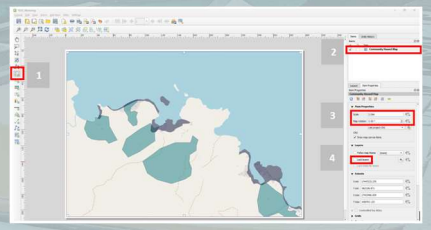
Session 4: Creating a Map in QGIS

Step 1: Add a Map

1. Use the 'Add Map' tool to add a map to the print layout, you can choose the size of this map by drawing different size rectangles.
2. The map will be displayed in the 'items' column in the top right, you can rename the map by double clicking on that item (E.g., community hazard map).
3. You can resize or rotate your map using the scale item property function.
4. Once you are happy with your map, you can 'lock the layer' to make sure it doesn't change in the future.



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Session 4: Creating a Map in QGIS

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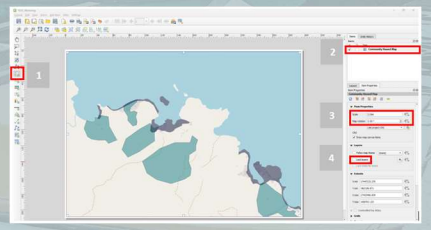

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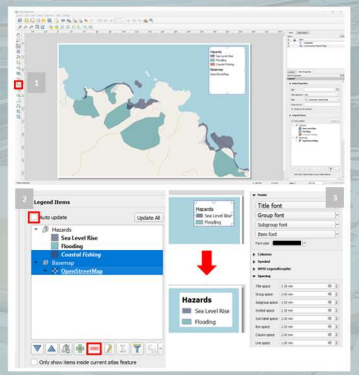
Session 4: Creating a Map in QGIS

Step 2: Add a Legend

1. Use the 'Add Legend' tool to add a legend to the map, draw the shape and size of the legend where you would like it to be displayed.
2. Initially the legend will display all of the layers in the QGIS interface, you can customise this to just show the layers you want to see in the print layout in the item properties section.
3. Go to legend items and unselect the 'Auto update' box, highlight the parts of the legend that you would like to get rid of and use the '-' button to remove them.



53

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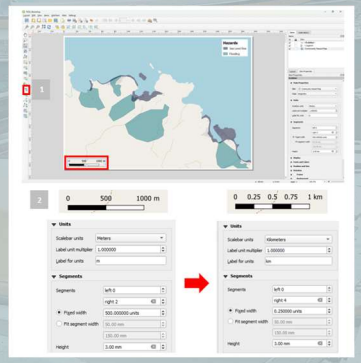
Session 4: Creating a Map in QGIS

Step 3: Add a Scalebar

1. Use the 'Add Scalebar' tool to add a scalebar to the print layout, select the location and size of the scalebar when drawing the item.
2. Edit the scalebar in the item properties column. For example, you can change the unit used (from metres to km), the number of segments on the scalebar, and the font etc.,



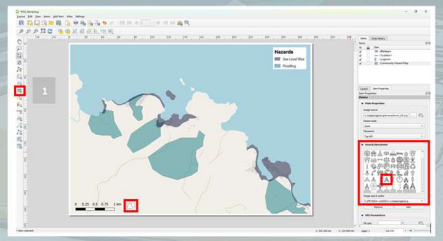
54

54

Session 4: Creating a Map in QGIS

Step 4: Add a North Arrow

1. Use the 'Add Picture' function and draw the location where you would like the north arrow to be displayed.
2. Go to the item properties column on the right, and expand the 'Search Directory' this will display a range of icons, select an arrow icon from this list.



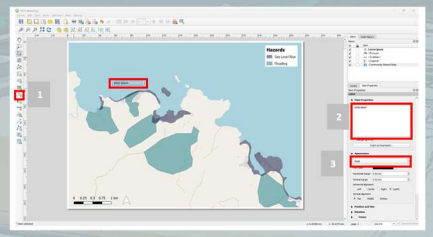
55

55

Session 4: Creating a Map in QGIS

Step 5: Add Labels/Map Title

1. Use the 'Add Text' button to add text to the print layout, this can be used to create a map title or add labels. Draw on the map where you would like the label to be.
2. Go to the item properties column on the write and change the text.
3. Change the appearance of the text to the size and font you would like to use.



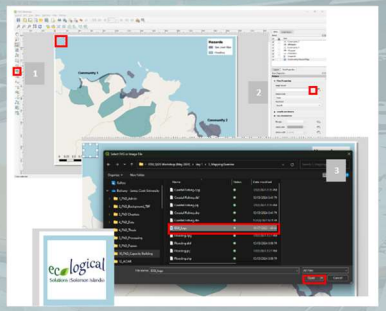
56

56

Session 4: Creating a Map in QGIS

Step 5: Add a Logo

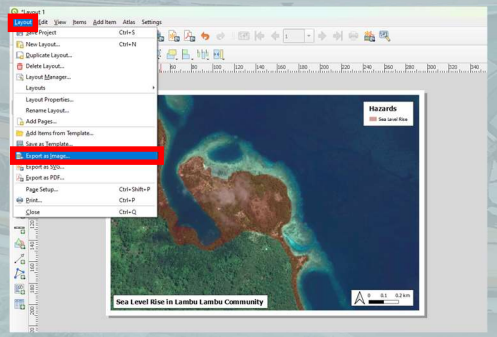
1. To add a logo (or another picture) to the print layout select the 'Add picture' tool and draw where you would like the logo to be displayed.
2. Go to the item properties and click the… button next to 'image source'.
3. Navigate to the image you would like to use and click add, the image will now be displayed in the print layout. .



57

Session 4: Creating a Map in QGIS

Objective: Learn how to export a basic map as an image from QGIS.



58

Session 5: Creating Your Own Map

59

Session 5: Creating Your Own Map in QGIS

Objective: Create and export a map within QGIS.

! TASK !

Use the different spatial layers provided to create and export a map within QGIS using the essential elements we discussed in the previous session.

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Troubleshooting, Questions & Closing

A chance to ask any questions....

- What does this function do?
- Why isn't this working?
- How can I learn more?

For more support feel free to contact:

Bethany.smith1@my.jcu.edu.au

Online Resources

The following links refer to online resources that offer comprehensive support in QGIS:

- https://qgis.org/en/docs/index.html
- https://www.qgistutorials.com/en/
- https://opensourceoptions.com/blog/qgis-tutorial-for-beginners/

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DAY 2

Using QGIS to Explore SRA Outputs

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Workshop Agenda

Day 2: Using QGIS to Explore SRA Outputs

9:00 – 9.10: Opening

9:10 – 10:30: **Session 1: SRA Outputs Presentation**

10:30 – 11:00: Morning Tea

11:00 – 12:00: **Session 2: Using QGIS to Explore National Hazard Maps**

12:00 – 13:00: Lunch

13:00 – 16:00: **Session 3: Using QGIS to Digitise Hand-Drawn Maps**

15:30 – 16:00: **Session 4: Troubleshooting & Questions**

16:00 – 17:00: Afternoon Tea

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Session 1

SRA Outputs Presentation

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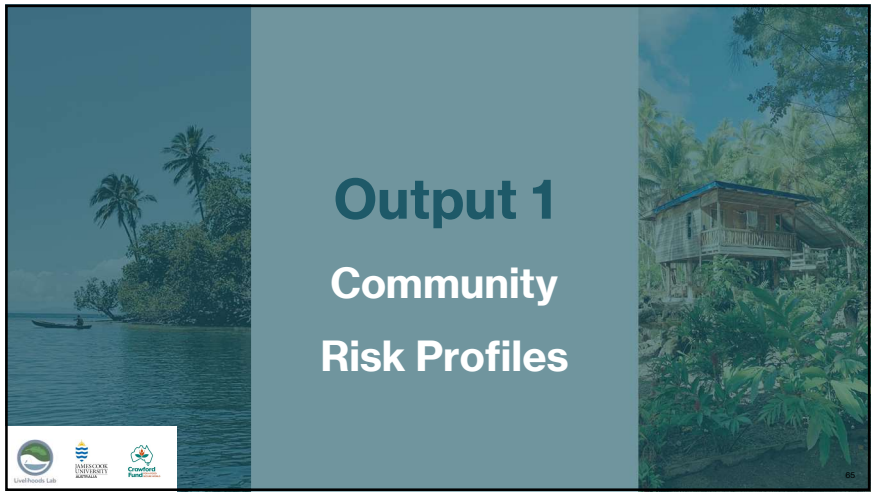
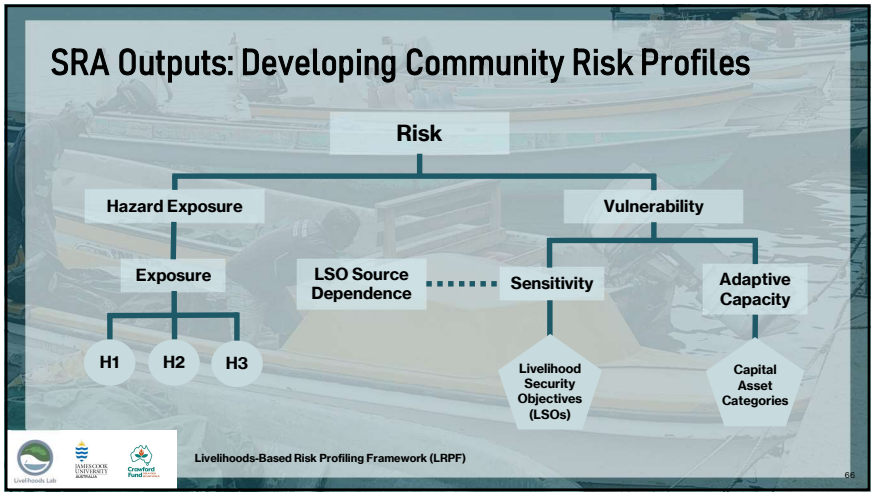
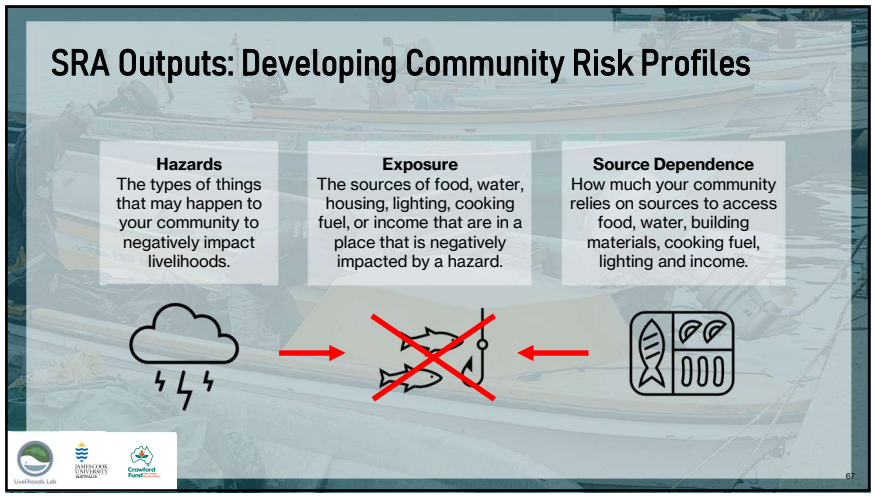

Output 1
Community
Risk Profiles

65


SRA Outputs: Developing Community Risk Profiles
Risk
Hazard Exposure
Vulnerability
Exposure
LSO Source Dependence
Sensitivity
Adaptive Capacity
H1
H2
H3
Livelihood Security Objectives (LSOs)
Capital Asset Categories
Livelihoods-Based Risk Profiling Framework (LRPF)

66


SRA Outputs: Developing Community Risk Profiles
Hazards
The types of things that may happen to your community to negatively impact livelihoods.
Exposure
The sources of food, water, housing, lighting, cooking fuel, or income that are in a place that is negatively impacted by a hazard.
Source Dependence
How much your community relies on sources to access food, water, building materials, cooking fuel, lighting and income.

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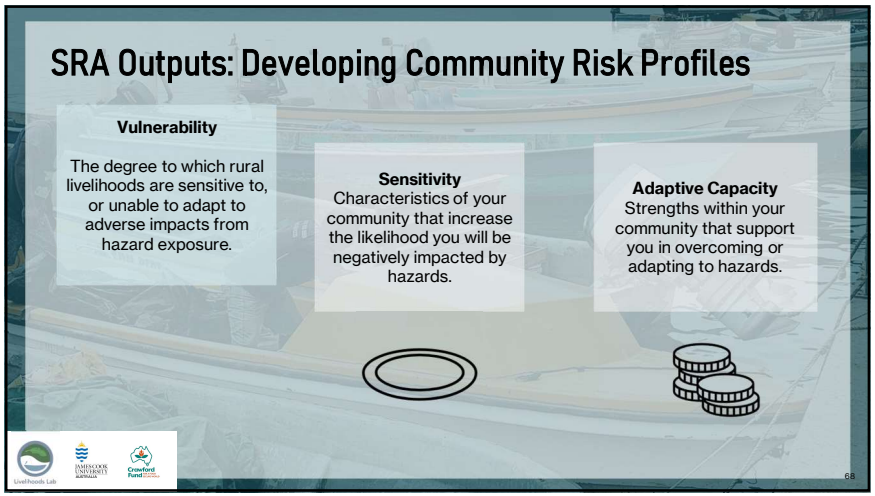
SRA Outputs: Developing Community Risk Profiles
Vulnerability
The degree to which rural livelihoods are sensitive to, or unable to adapt to adverse impacts from hazard exposure.
Sensitivity
Characteristics of your community that increase the likelihood you will be negatively impacted by hazards.
Adaptive Capacity
Strengths within your community that support you in overcoming or adapting to hazards.

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SRA Outputs: Developing Community Risk Profiles

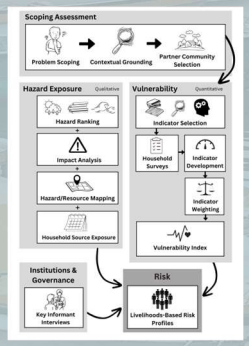
Method

Sept 2021. Initial Consultation & Invitation to Partner

May 2022. Focus Groups
- Identify community goals in relation to livelihood opportunities
- Identify obstacles and challenges

Sept – Oct 2022. Data Collection
- Household Surveys
- Key Informant Interviews
- Participatory Mapping Workshops

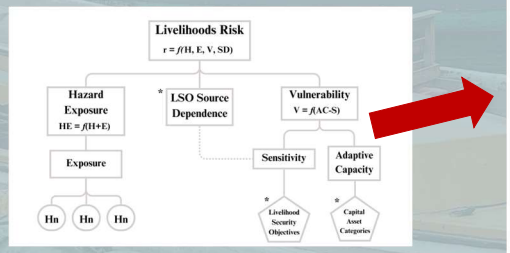
Feb 2023. Community Adaptation Pathways Workshops

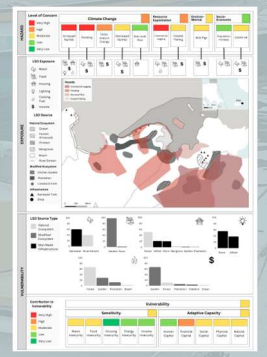


69

SRA Outputs: Developing Community Risk Profiles

Results: Livelihood Risk Profiles





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SRA Outputs: Developing Community Risk Profiles

Results: Hazards

The types of things that may happen to your community to negatively impact livelihoods.

Climate Change
- Temperature Change
- Sea Level Rise
- Flooding
- Increased Rainfall
- Decreased Rainfall

Resource Exploitation
- Commercial Logging
- Coastal Fishing

Environmental
- Wild Pigs

Socio-Economic
- Population Increase
- COVID-19

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SRA Outputs: Developing Community Risk Profiles

Results: Exposure

The sources of food, water, housing, lighting, cooking fuel, or income that are in a place that is negatively impacted by a hazard.

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SRA Outputs: Developing Community Risk Profiles

Results: LSO Source Dependence

How much your community relies on sources to access food, water, building materials, cooking fuel, lighting and income.

Water	Food	Housing	Energy	Income
• Rainwater Tanks • Streams • Rivers • Water Supply System • Wells	• Kitchen Garden • Shops • Ocean • Swamp • Market	• Shops • Forest • Gifted • Mangroves • Swamp • Gardens	• Forest • Garden • Plantation • Gifted • Shops • Beach	• Ocean • Garden • Forest • Livestock • Shop • Tourism Resort • Plantation

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SRA Outputs: Developing Community Risk Profiles

Results: Sensitivity

Characteristics of your community that increase the likelihood you will be negatively impacted by hazards.

Water Insecurity | Food Insecurity | Housing Insecurity | Energy Insecurity | Income Insecurity

Very High — Very Low

74

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SRA Outputs: Developing Community Risk Profiles

Results: Capacity

Strengths within your community that support you in overcoming or adapting to hazards.

Human Capital | Financial Capital | Social Capital | Physical Capital | Natural Capital

Very Low — Very High

75

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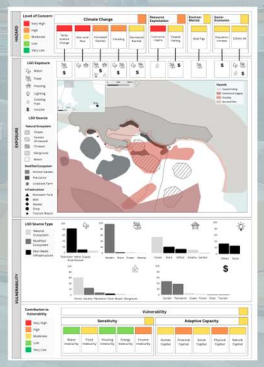
SRA Outputs: Using LRPs to Identity Priority Adaptation



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SRA Outputs: Using LRPs to Identity Priority Adaptation

Introduction of Farming Practices that Can Cope with Climate Change

1

Access to Different Income Making Activities

2

Introduction of Coastal Defences to Cope with Sea Level Rise

3

77

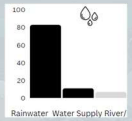
SRA Outputs: Applying LRPs to Support Local Visions

Resource Access

Access to Drinking Water

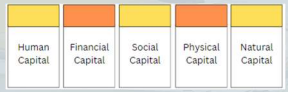
Hazard Exposure

Source Dependence



Sensitivity

Adaptive Capacity



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Output 2

National Hazard Maps

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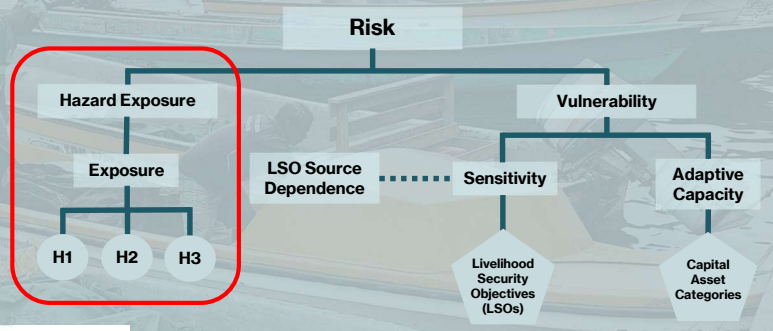
SRA Outputs: National Level Hazard Maps



Livelihoods-Based Risk Profiling Framework (LRPF)

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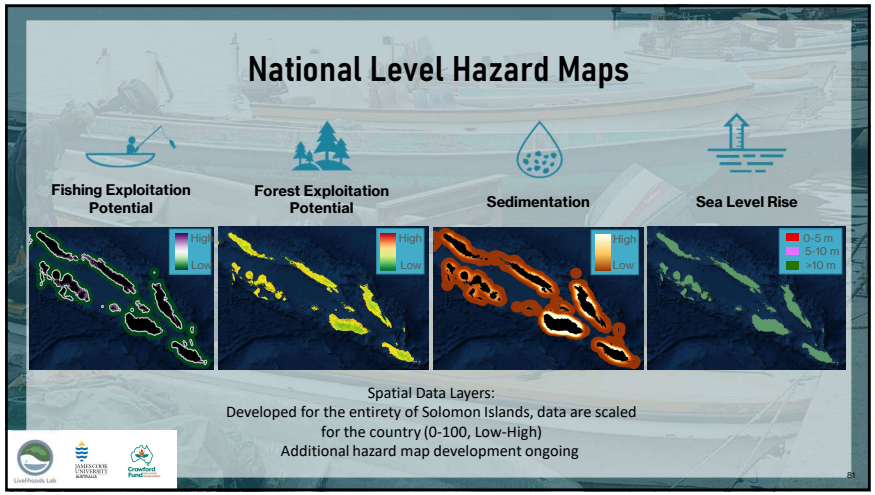
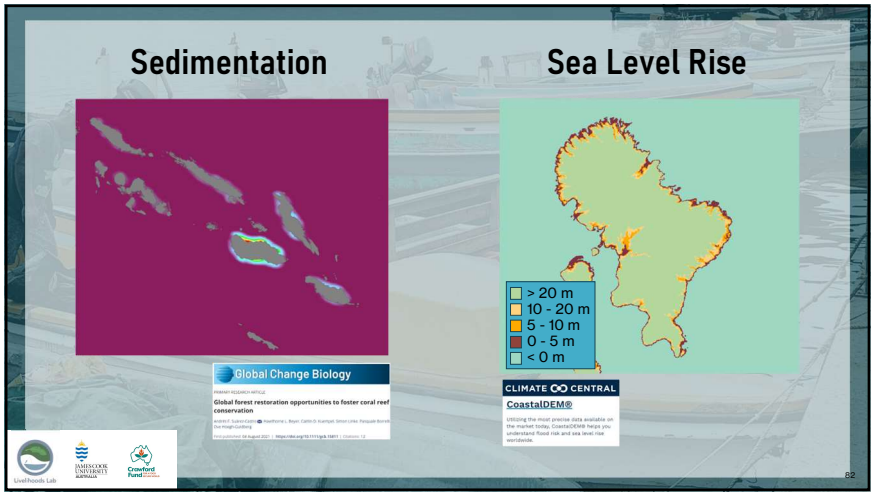

National Level Hazard Maps
Fishing Exploitation Potential
Forest Exploitation Potential
Sedimentation
Sea Level Rise
High
Low
0-5 m
5-10 m
>10 m
Spatial Data Layers:
Developed for the entirety of Solomon Islands, data are scaled for the country (0-100, Low-High)
Additional hazard map development ongoing

81


Sedimentation
Sea Level Rise
Global Change Biology
> 20 m
10 - 20 m
5 - 10 m
0 - 5 m
< 0 m
CLIMATE CENTRAL
CoastalDEM®

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Resource + Access = Potential Exploitation
Resource
A particular ecological resource used by communities and organisations for subsistence, livelihoods, and commercial needs.
For example:
Fish & Forest
Access
The access by humans to that resource that would result in the potential modification, extraction, or use of said resource
For example:
Distance from roads

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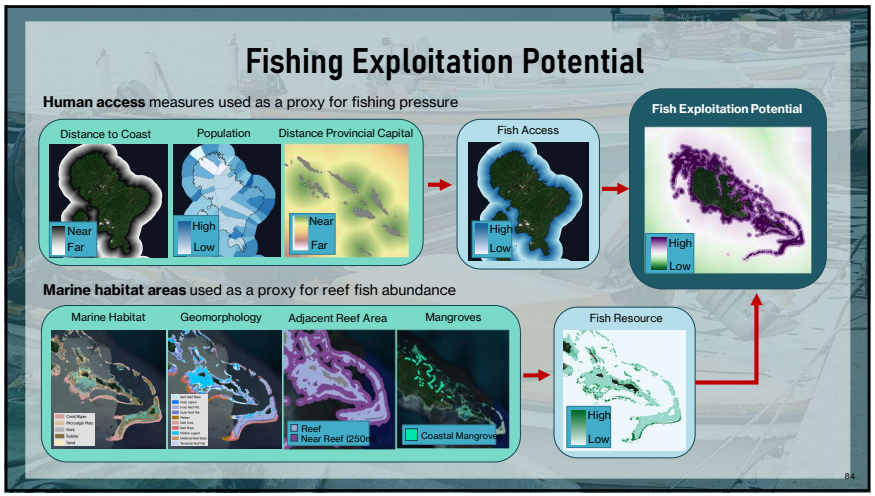
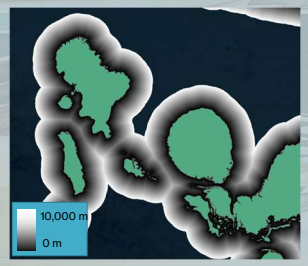

Fishing Exploitation Potential
Human access measures used as a proxy for fishing pressure
Distance to Coast
Population
Distance Provincial Capital
Near
Far
High
Low
Fish Access
Fish Exploitation Potential
Marine habitat areas used as a proxy for reef fish abundance
Marine Habitat
Geomorphology
Adjacent Reef Area
Mangroves
Reef
Near Reef (250m)
Coastal Mangroves
Fish Resource

84

Fishing Exploitation Potential: Access

Layer: Distance from Coastline

- Measures the potential for humans to use an areas.
- Locations far from land, far offshore have a lower potential for fishing. Areas close to shore are likely to experience higher pressure from fishing.
- This layer measures distance from coast out to 10km.



Scaling Equation:
$\text{abs}((\frac{Distance - 0}{100 - 0} * 100) - 100$

85

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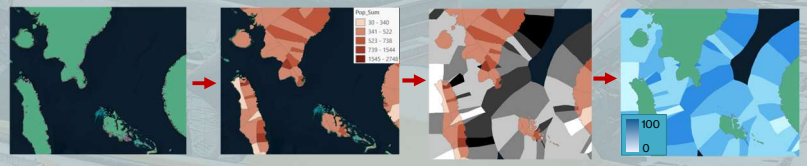
Fishing Exploitation Potential: Access

Layer: Population

- Measures the number of individuals from coastal suburbs that would use ocean areas



2020 Census Population | Total Population within Enumeration Areas | Coastal Population | Scaled Coastal Population

86

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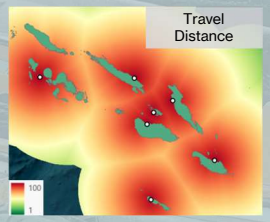
Fishing Exploitation Potential: Access

Layer: Distance from Provincial Capitals



- Adapted from Cinner et al.2018. Gravity of human impacts mediates coral reef conservation gains
- Where distance from major capital cities (and fish markets) have a significant effect on fish biomass and creates a gradient of human impact.

87

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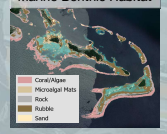
Fishing Exploitation Potential: Resource

Layer: Marine and Benthic Geomorphology

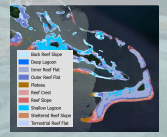
Marine Benthic Habitat



Coral/Algae = 3
Microalgal Mats = 2
Rock = 1
Rubble = 1
Sand = 1
Seagrass = 2

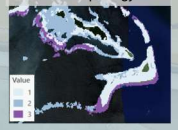
Classified Benthic Habitat

Marine Geomorphology



Back Reef Slope = 2
Deep Lagoon = 2
Inner Reef Flat = 1
Outer Reef Flat = 1
Plateau = 2
Reef Crest = 3
Reef Slope = 3
Shallow Lagoon = 2
Sheltered Reef Slope = 3
Terrestrial Reef Flat = 1

Classified Geomorphology



- Data downloaded from: Allen Coral Atlas: https://allencoralatlas.org
- Habitat is used as a proxy for fish biomass and abundance
- Reclassify Marine Benthic Habitat or Geomorphology based on the likelihood of that habitat having high reef fish biomass.

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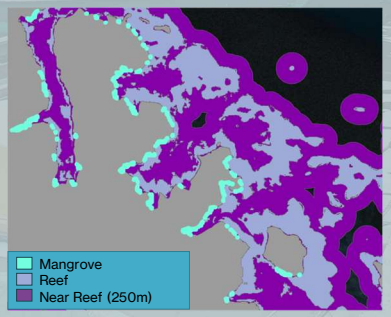
Fishing Exploitation Potential: Resource

Layer: Areas Adjacent to Reef Habitat

- Fish travel beyond reef habitat areas.
- To capture this, we create a 250 buffer around all benthic habitat and geomorphology areas.
- Additionally, coastal mangrove areas are included (acquired from the Land Cover* data layer)



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Fishing Exploitation Potential

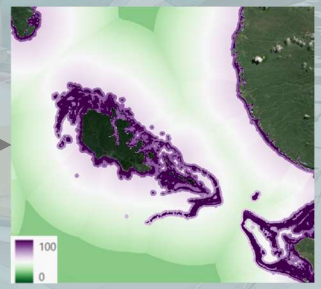
Fish Resource + Fish Access = Fish Potential Exploitation
Add together layers, and then scale again to get 0-100 value for exploitation potential

Fish Resource

Fish Access

+

Fish Exploitation Potential



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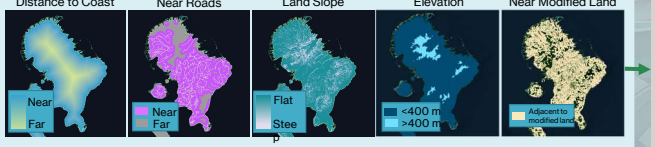
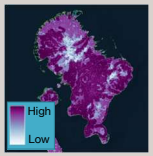
Forest Exploitation Potential

Human access measures used as a proxy for forest use

Distance to Coast | Near Roads | Land Slope | Elevation | Near Modified Land



Forest Access

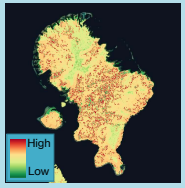


Forest Areas

Land Cover

Forest Resource

Forest Exploitation Potential



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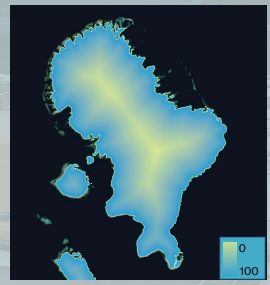
Forest Exploitation Potential: Access

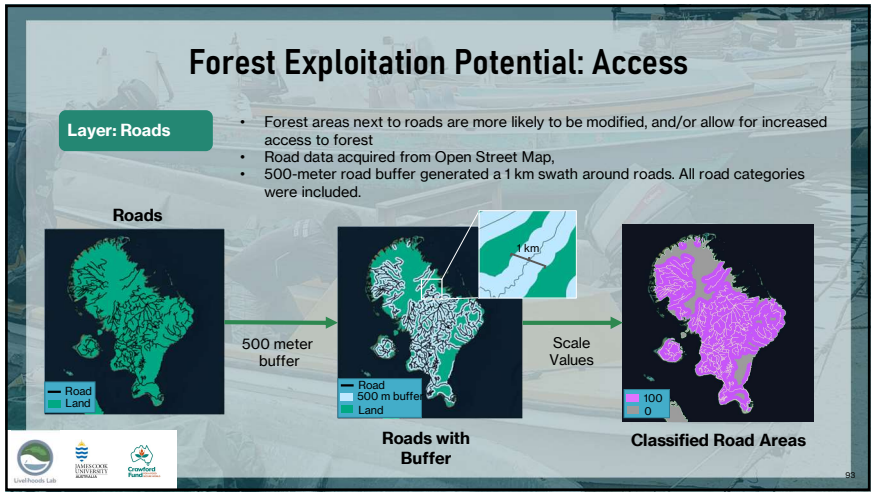
Layer: Distance from Coast

- Distance from coast is a measure of access for resource extractive practices such as logging who commonly access areas by ships, creating coastal logging areas.
- High Values = High Potential for Resource Use (e.g. close to shore).
- Low Values = Low potential (e.g., far from shore)

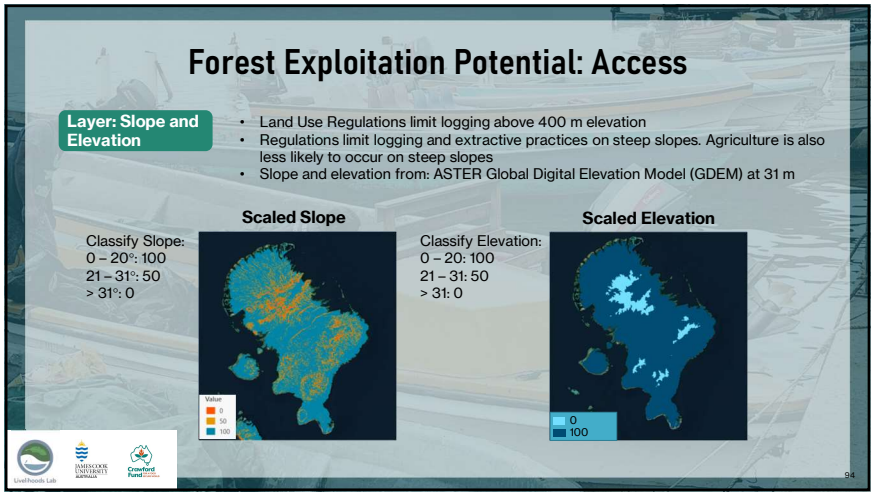
Scaled (0-100) Distance from Coast



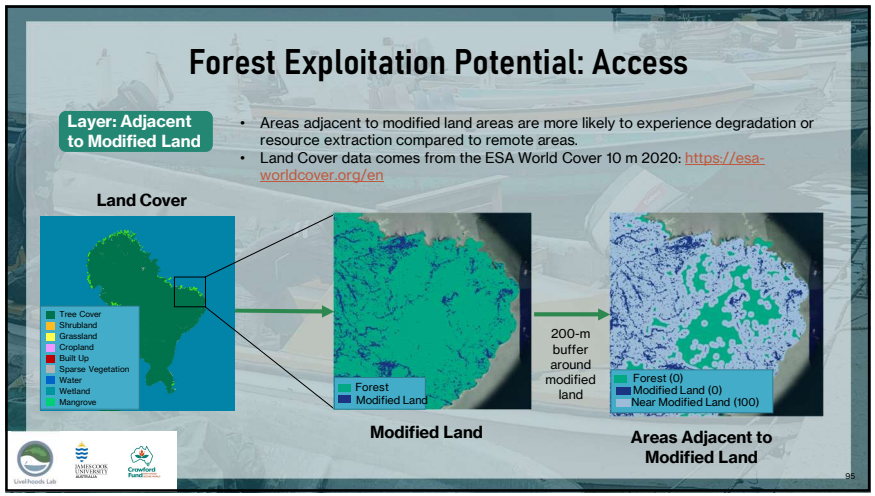
92


Forest Exploitation Potential: Access
Layer: Roads
Forest areas next to roads are more likely to be modified, and/or allow for increased access to forest
Road data acquired from Open Street Map,
500-meter road buffer generated a 1 km swath around roads. All road categories were included.
Roads
Road
Land
500 meter buffer
1 km
Road
500 m buffer
Land
Roads with Buffer
Scale Values
100
0
Classified Road Areas
93

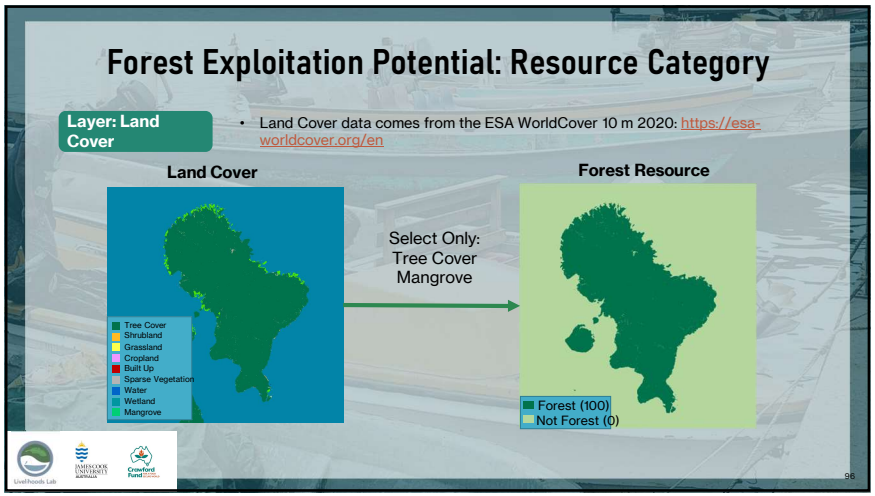
93


Forest Exploitation Potential: Access
Layer: Slope and Elevation
Land Use Regulations limit logging above 400 m elevation
Regulations limit logging and extractive practices on steep slopes. Agriculture is also less likely to occur on steep slopes
Slope and elevation from: ASTER Global Digital Elevation Model (GDEM) at 31 m
Scaled Slope
Classify Slope:
0 – 20°: 100
21 – 31°: 50
> 31°: 0
Value
0
50
100
Classify Elevation:
0 – 20: 100
21 – 31: 50
> 31: 0
Scaled Elevation
0
100
94

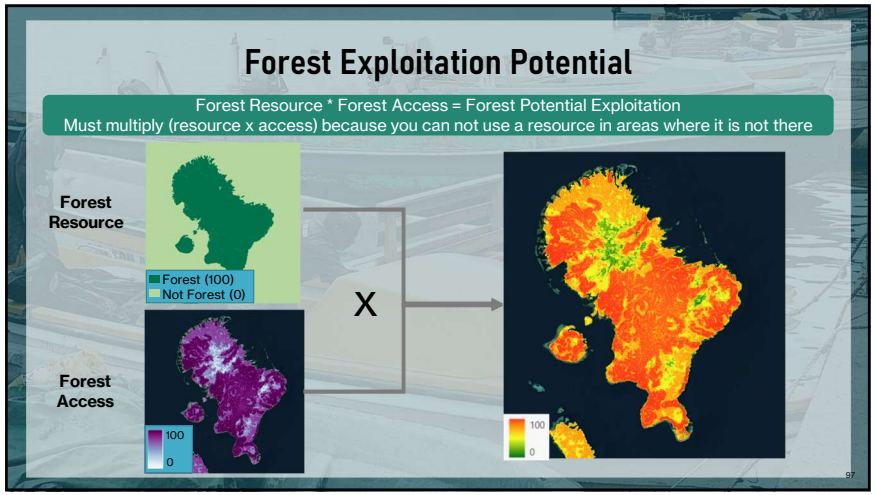
94


Forest Exploitation Potential: Access
Layer: Adjacent to Modified Land
Areas adjacent to modified land areas are more likely to experience degradation or resource extraction compared to remote areas.
Land Cover data comes from the ESA World Cover 10 m 2020: https://esa-worldcover.org/en
Land Cover
Tree Cover
Shrubland
Grassland
Cropland
Built Up
Sparse Vegetation
Water
Wetland
Mangrove
Forest
Modified Land
Modified Land
200-m buffer around modified land
Forest (0)
Modified Land (0)
Near Modified Land (100)
Areas Adjacent to Modified Land
95

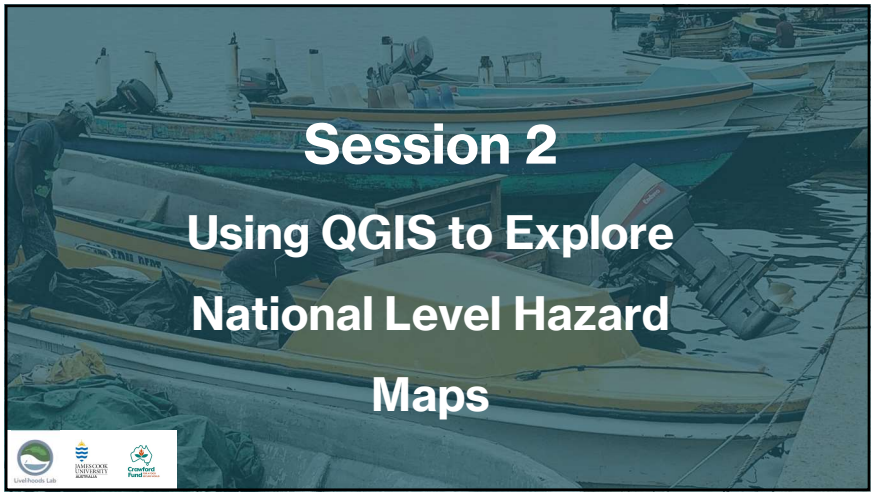
95


Forest Exploitation Potential: Resource Category
Layer: Land Cover
Land Cover data comes from the ESA WorldCover 10 m 2020: https://esa-worldcover.org/en
Land Cover
Tree Cover
Shrubland
Grassland
Cropland
Built Up
Sparse Vegetation
Water
Wetland
Mangrove
Select Only:
Tree Cover
Mangrove
Forest Resource
Forest (100)
Not Forest (0)
96

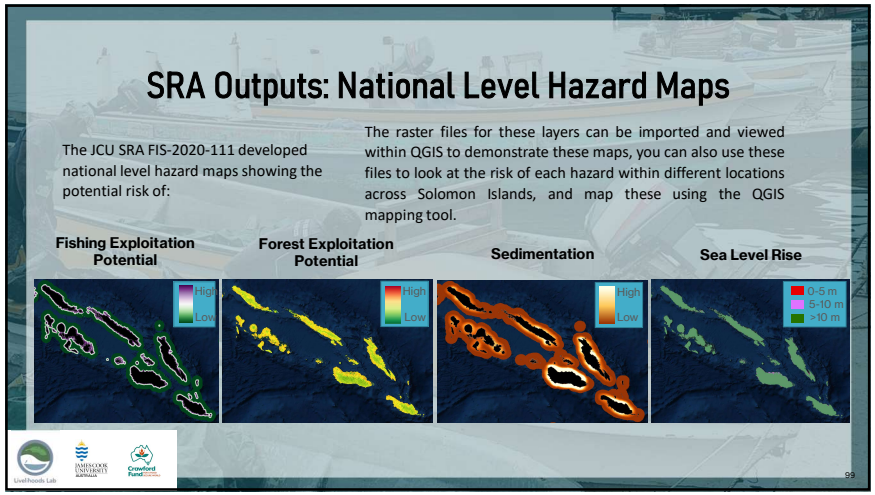
96


Forest Exploitation Potential
Forest Resource * Forest Access = Forest Potential Exploitation
Must multiply (resource x access) because you can not use a resource in areas where it is not there
Forest Resource
Forest (100)
Not Forest (0)
X
Forest Access
100
0
100
0
97

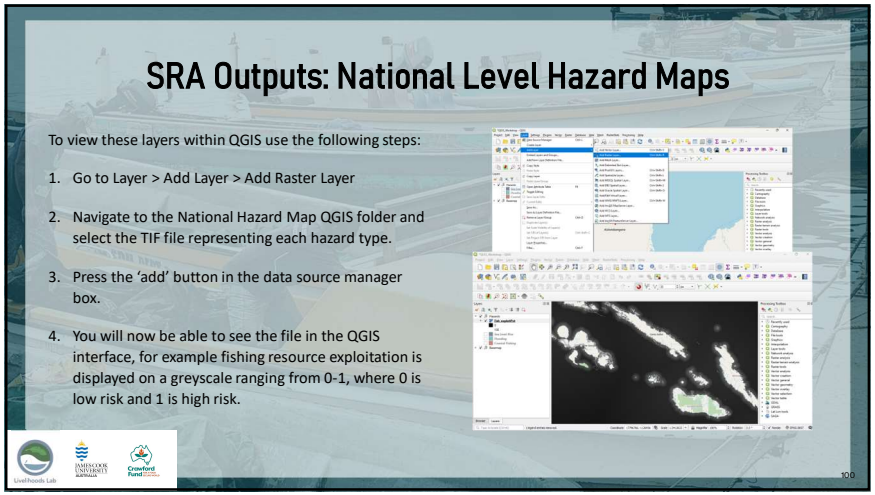
97


Session 2
Using QGIS to Explore National Level Hazard Maps

98


SRA Outputs: National Level Hazard Maps
The JCU SRA FIS-2020-111 developed national level hazard maps showing the potential risk of:
The raster files for these layers can be imported and viewed within QGIS to demonstrate these maps, you can also use these files to look at the risk of each hazard within different locations across Solomon Islands, and map these using the QGIS mapping tool.
Fishing Exploitation Potential
Forest Exploitation Potential
Sedimentation
Sea Level Rise
High
Low
0-5 m
5-10 m
>10 m
99

99

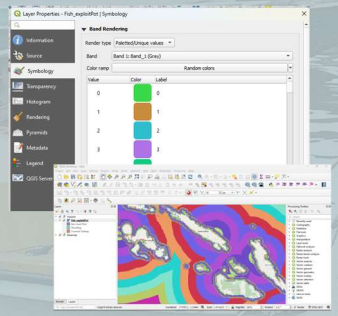

SRA Outputs: National Level Hazard Maps
To view these layers within QGIS use the following steps:
1. Go to Layer > Add Layer > Add Raster Layer
2. Navigate to the National Hazard Map QGIS folder and select the TIF file representing each hazard type.
3. Press the 'add' button in the data source manager box.
4. You will now be able to see the file in the QGIS interface, for example fishing resource exploitation is displayed on a greyscale ranging from 0-1, where 0 is low risk and 1 is high risk.
100

100

SRA Outputs: National Level Hazard Maps

To view these layers within QGIS use the following steps:

1. You can change the colour of the map by right clicking the layer and selecting the properties button.
2. Go to the 'Symbology' tab and you will be able to select from different render types.
3. Select 'Paletted/Unique values' and press the classify button.
4. Select 'Apply' and 'OK' to change the colour of the map.

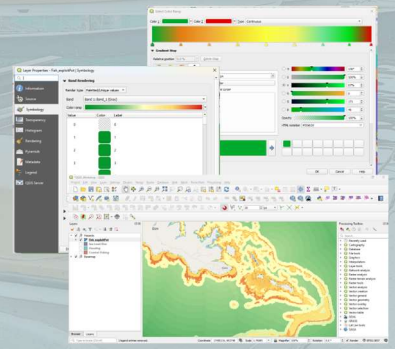


101

SRA Outputs: National Level Hazard Maps

To view these layers within QGIS use the following steps:

1. You can further customize the colours by going back into the Symbology tab and selecting different colour ramps, play around until you have a colour ramp you are happy with.
2. Click 'Apply' and 'Ok'.
3. View the map within the QGIS interface.



102

Session 3

Using QGIS to Digitise Hand-Drawn Maps

103

Session 1: Participatory Mapping & QGIS

Objectives:

- Learn how to ready participatory mapping outputs for digitisation.
- Learn how to georeference JPEG files within QGIS.
- Learn how to digitise hand drawn data.
- Learn how to save digitised data as spatial layers.

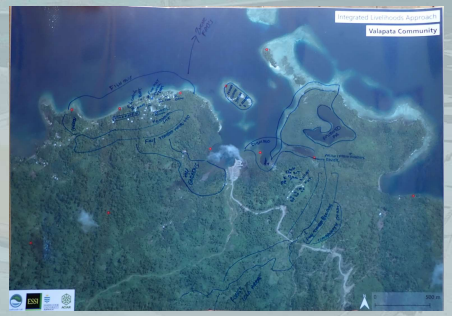
104

Session 1: Participatory Mapping & QGIS

Objective: Learn how to ready participatory mapping outputs for digitisation.

DIGITISATION is the process of converting data into a digital format.

In terms of participatory mapping, this refers to the process of converting hand drawn maps into spatial files (e.g., vector or raster). This enables data to be stored, processed and presented in a digital format.



105

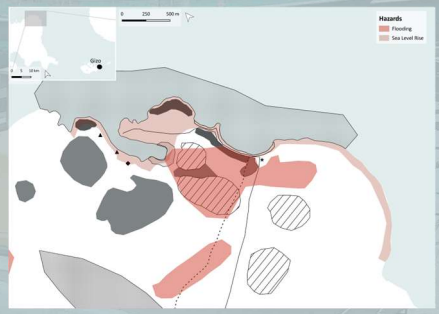
105

Session 1: Participatory Mapping & QGIS

Objective: Learn how to ready participatory mapping outputs for digitisation.

DIGITISATION is the process of converting data into a digital format.

In terms of participatory mapping, this refers to the process of converting hand drawn maps into spatial files (e.g., vector or raster). This enables data to be stored, processed and presented in a digital format.



106

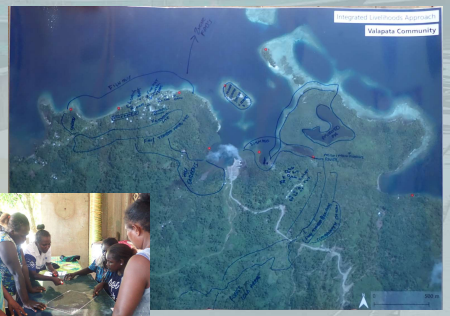
106

Session 1: Participatory Mapping & QGIS

Objective: Learn how to ready participatory mapping outputs for digitisation.

To prepare hand drawn maps for digitisation:

1. A clear image of the map must be taken from an overhead position.
2. This image must be uploaded as a JPEG file on your computer.



107

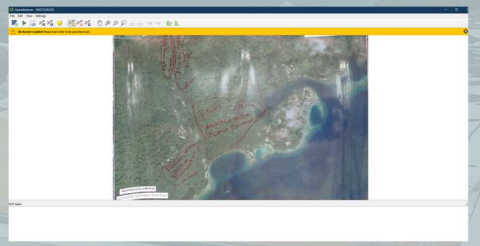
107

Session 1: Participatory Mapping & QGIS

Objective: Learn how to georeference JPEG files within QGIS.

To digitise hand drawn maps, the map must first be **georeferenced.**

GEOREFERENCING is the process of associating a spatial location with a dataset. This enables hand drawn maps to be tied to a geographical location within QGIS.



108

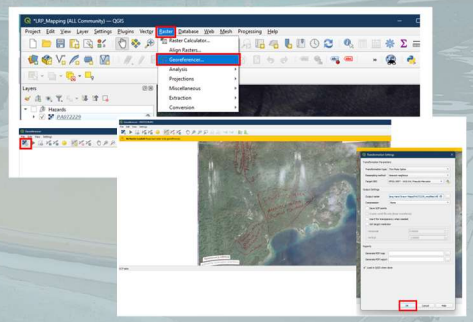
108

Session 1: Participatory Mapping & QGIS

Objective: Learn how to georeference JPEG files within QGIS.

To georeference your hand drawn map follow these steps:

1. Go to raster > Georeferencer.
2. When the georeferencer tool opens go to top left 'open raster button' and navigate to the jpeg file of the hand drawn map
3. Accept the transformation settings.



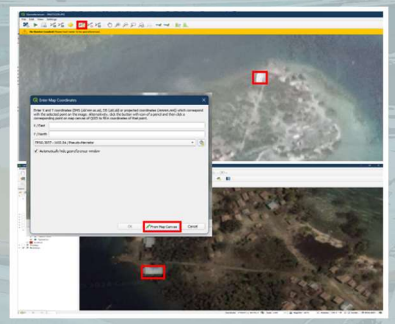
109

Session 1: Participatory Mapping & QGIS

Objective: Learn how to georeference JPEG files within QGIS.

To georeference your hand drawn map follow these steps:

1. On the image of your map select 'Add Point' and click on a point of interest that stands out on your image.
2. In the 'Enter Map Coordinates' box select 'choose from map canvas'.
3. Navigate to the same point on the map in the QGIS main interface and click.
4. Repeat this process until you have georeferencing points evenly spaced throughout the map.



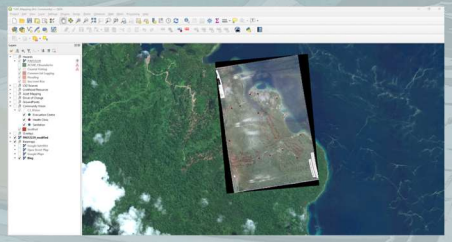
110

Session 1: Participatory Mapping & QGIS

Objective: Learn how to georeference JPEG files within QGIS.

To georeference your hand drawn map follow these steps:

1. Click 'start georeferencing'.
2. Your map should now show up in QGIS interface overlayed onto the correct location.



111

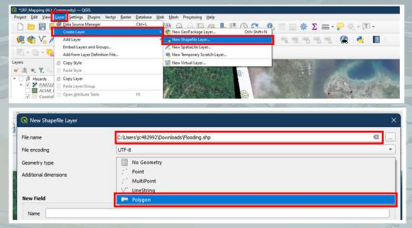
Session 1: Participatory Mapping & QGIS

Objective: Learn how to digitise hand drawn maps as spatial layers.

Once you have georeferenced your map, you can digitise the information within the map into spatial layers.

Use the following steps to do this:

1. Navigate to the 'layer' tab and select 'create layer' > 'new shapefile layer'.
2. Give a name to the shapefile and choose the folder you would like to save it in.
3. Select the type of shapefile you will be creating (E.g., point, polygon, line).



112

Session 1: Participatory Mapping & QGIS

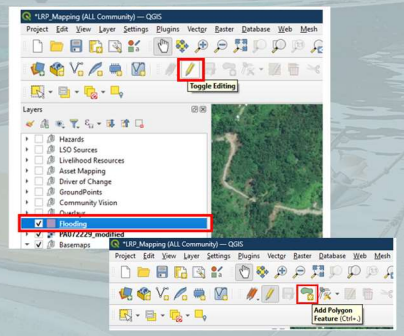
Objective: Learn how to digitise hand drawn maps as spatial layers.

Once you have georeferenced your map, you can digitise the information within the map into spatial layers.

Use the following steps to do this:

1. Click on the layer in the layers box and select 'toggle editing'.
2. Select 'add feature'.
3. Begin to draw over your hand drawn map to create a digital feature (e.g., drawn around the forest area).
4. Right click to save the feature.

Repeat this process until all features have been drawn.



113

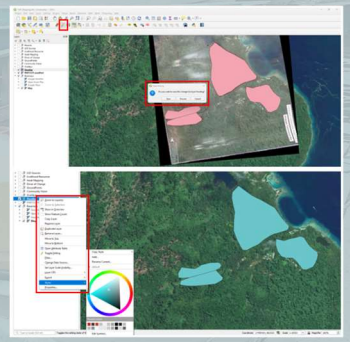
Session 1: Participatory Mapping & QGIS

Objective: Learn how to digitise hand drawn maps as spatial layers.

Once you have georeferenced your map, you can digitise the information within the map into spatial layers.

Use the following steps to do this:

1. Reclick on the 'toggle editing' button and select 'save changes'.
2. You will see a digitised version of the features in your hand drawn map.
3. You can adjust these features by right clicking on the layer and selecting the properties, style or attribute table buttons. For example, by going to the styles button you can change the colour of the features in the layer.



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Session 4

Troubleshooting & Questions

115

Session 4: Troubleshooting, Questions & Closing

A chance to ask any questions….

- What does this function do?
- Why isn't this working?
- How can I learn more?

For more support feel free to contact:

Bethany.smith1@my.jcu.edu.au

Online Resources

The following links refer to online resources that offer comprehensive support in QGIS:

- https://qgis.org/en/docs/index.html
- https://www.qgistutorials.com/en/
- https://opensourceoptions.com/blog/qgis-tutorial-for-beginners/

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DAY 3

SRA Final Trip Facilitator Training

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Workshop Agenda

Day 3: SRA Final Trip: Community & Provincial Government Workshops

9:00 – 9.10: Opening

9:10 – 10:30: **Session 1: Community Workshop Facilitator Training**

11:30 – 11:00: Morning Tea

11:00 – 12:00: **Session 2: Community Workshop/Gov Workshop Planning**

12:00 – 13:00: Lunch

13:00 – 16:00: **Session 3: Provincial Workshop Facilitator Training**

15:30 – 16:00: **Session 4: Question Time**

16:00 – 17:00: Afternoon Tea

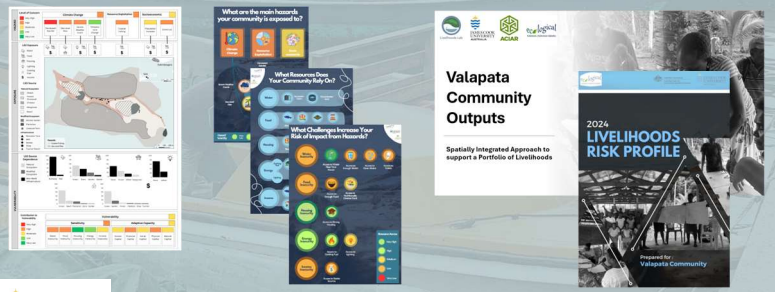
118

Session 1 Community Workshop Facilitator Training

119

Community Workshop Facilitator Training

Objective: Overview community outputs and run through community workshop.



120

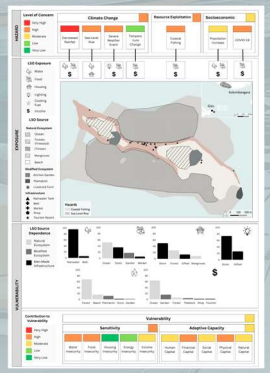
Community Workshop Facilitator Training

Objective: Overview community outputs

1

Community Risk Profile Posters:

- Provided to communities to help summarise risk within their community.
- This information will be discussed during the community workshop presentation.



121

121

Community Workshop Facilitator Training

Objective: Overview community outputs

2

Community Risk Component Posters:

- Provided to communities to help summarise risk within their community.
- Each poster focuses on a specific component of risk.
- This information will be discussed during the community workshop presentation.

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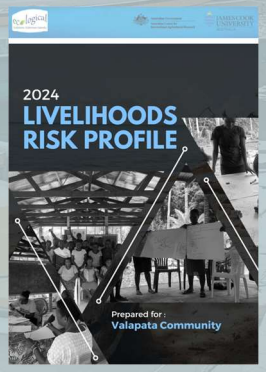
Community Workshop Facilitator Training

Objective: Overview community outputs

3

Community Risk Profile Reports:

- Provided to communities to help summarise risk within their community.
- Aim to support communities during adaptation planning projects and be used as evidence to support funding applications.
- This information will be discussed during the community workshop presentation.



123

123

Community Workshop Facilitator Training

Objective: Overview community workshops

124

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Session 2

Workshop Planning & Logistics

125

Community Workshop Planning Itinerary

- Friday May 10th: Babanga Workshop
- Monday May 13th: Pusiju Workshop
- Tuesday May 14th: Pusiju Workshop

Workshop Itinerary (3 hours)

- **Introduction** (Amy) – *10 minutes*
- **Prayer** (led by designated community member)
- **Presentation of Results** (Aubrey/Relna) – *30 minutes*
- **Presentation of Funding Opportunities** (Hensllyn) – *30 minutes*
- **Feedback Session** (Aubrey/Relna) – *45 minutes*
- **Conclusions** (Amy) – *10 minutes (space for closing prayer).*
- **Presentation of Outputs** (Bethany/Amy) *Book boxes, posters, reports etc.,*

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Community Workshop Planning Logistics

- Money owed (C1, C2, C3, boat trip etc.,)
- Water supply?
- Any other logistics to organise?

127

127

Provincial Workshop Planning Itinerary

- Thursday May 9th:

Workshop Itinerary

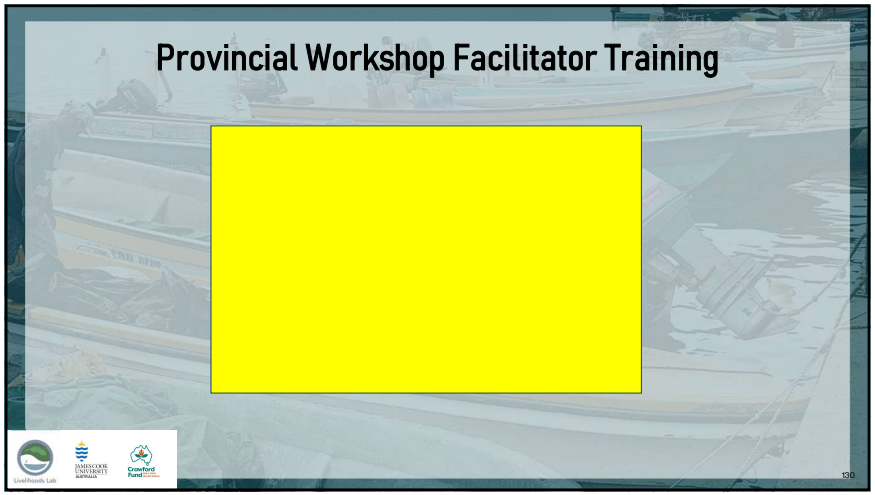
TBC

128

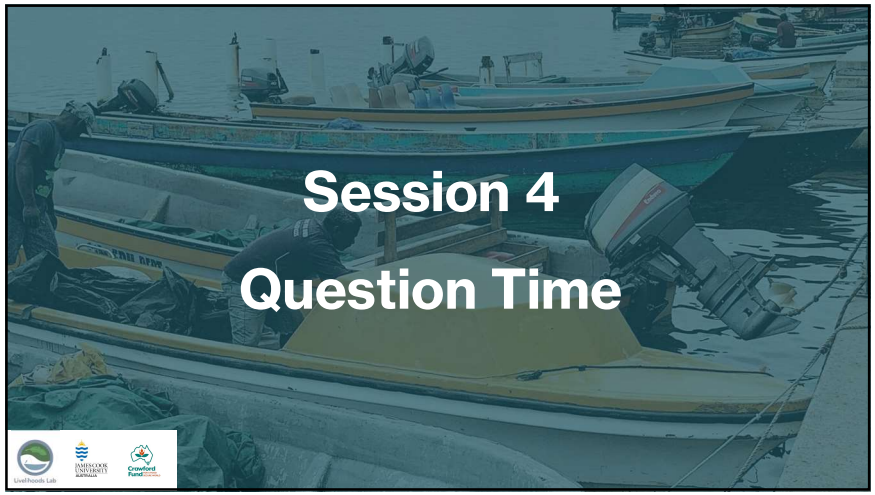
128


Session 3
Provincial Workshop
Facilitator Training

129


Provincial Workshop Facilitator Training
130

130


Session 4
Question Time

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11.6 Appendix 6: QGIS Training report, 'Spatially Integrated Approach to Support a Portfolio of Livelihoods'

Crawford Fund Student Award

Final Report

on

‘Spatially Integrated Approach to Support a Portfolio of Livelihoods’

(ACIAR funded project SRA FIS/2020/111)

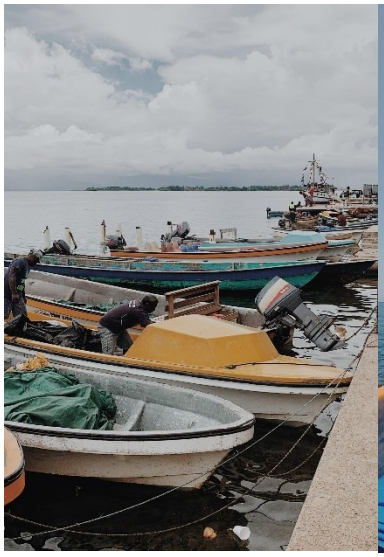
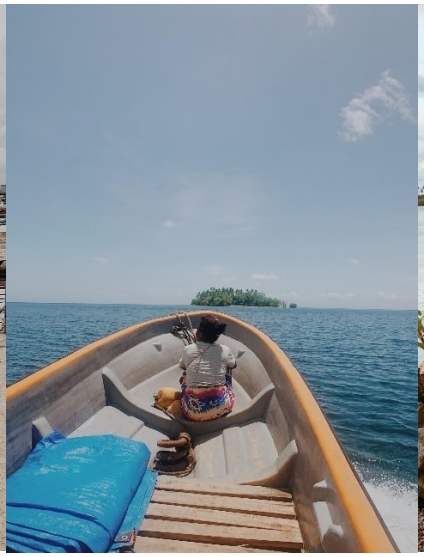
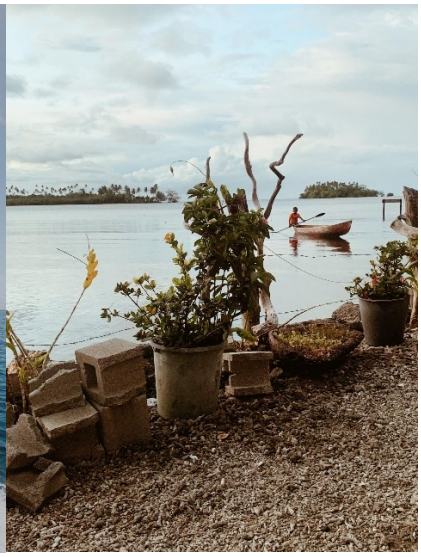
By

Bethany Smith

QLD-1025-2022

3rd – 17th May 2024

Western Province, Solomon Islands

Livelihoods Lab

JAMES COOK UNIVERSITY AUSTRALIA

Crawford Fund FOR A FOOD SECURE WORLD

Executive Summary

Coastal areas in Solomon Islands, like many Pacific locations, face a complex array of challenges arising from the impacts of global changes, including climate change, and other non-climatic challenges such as resource exploitation. Despite efforts to support local livelihoods, projects often fall short due to single-sector approaches, and external stakeholder driven-agendas that overlook the intricate realities of coastal communities. Recognising the need for a holistic multi-sectoral approach to livelihoods planning, the Australian Centre for International Agricultural Research (ACIAR) funded the 'Spatially Integrated Approach to Support a Portfolio of Livelihoods' in Western Province, Solomon Islands.

The project was guided by four main objectives: 1) to develop an integrated risk-based approach to livelihoods planning, 2) foster governance processes and partnerships to sustain this approach, 3) build scientific capacity among local stakeholders, and 4) provide capacity development to support partner communities. These objectives aimed to guide the development of the Integrated Livelihoods Approach (ILA), with particular focus on promoting fair societies, sustainable natural resource use, and resilient livelihoods in coastal communities.

Supported by the Crawford Fund grant, I participated in knowledge sharing and dissemination related to the project's risk-based participatory approach to integrated livelihoods planning. Activities conducted during this process included: i) governance stakeholder workshops, ii) training sessions with local partners, and iii) partner community workshops. These activities enabled results to be presented to multiple stakeholder groups. Results centred around a Livelihoods-Based Risk Profiling Framework (LRPF) which identified local risk factors in coastal communities (comprising my PhD thesis), and national open-access spatial layers of key risks related to resource exploitation and climate change. These outputs aimed to support the identification of major risk drivers to coastal communities and identify priority areas for livelihoods planning from an integrated perspective.

Insights gained from the ILA shed light on the interconnected nature of climatic and non-climatic challenges affecting rural livelihoods in Solomon Islands. Social and economic factors emerged as crucial elements in addressing these challenges. By providing a comprehensive understanding of the multi-faceted nature of risk in coastal areas, ILA activities contributed significantly to livelihood planning in Solomon Islands, supporting the development of informed and integrated strategies that effectively capture the local context.

The benefits of ILA knowledge sharing and dissemination activities were numerous, ranging from effective communication of results to stakeholders, to empowering local partners through capacity building in spatial analysis and risk assessment. The activities also facilitated community-led livelihood

planning by equipping partner communities with the tools and knowledge to articulate their needs and priorities. Beyond the Solomon Islands, the project's findings and methodologies could also benefit Queensland, helping rural communities plan for resilient and adaptable livelihoods amidst global change.

Background

In the Solomon Islands and other Pacific locations, coastal areas are characterised by diverse and interacting activities and actors. This includes fishing, farming, aquaculture, logging, palm oil, tourism etc., which all compete for limited natural resources. Such activities are threatened by the rate, scale, and interconnectivity of global change processes (such as climate change), and further influenced by factors both external (such as global market trends, and national trading interests) and internal to local communities (such as local resource use, customs, and practices) (Young et al. 2006). In response to these processes, there has been a rise in projects that aim to enhance, diversify, and/or supplement local livelihoods for small-scale fishing communities, however, these projects have had inconsistent outcomes (Roscher et al. 2022). This is partly due to the prevalence of single sector initiatives, and/or a focus on small spatial scales (Diedrich et al. 2022), which fail to acknowledge the local realities and diversities of coastal people's livelihoods and the complex context that they operate within. Additionally, projects are often driven by external stakeholders, with activities reflecting external interests rather than community realities, needs, interests, and capacities (Govan et al. 2019; Narayan et al. 2020). As a result, many projects struggle to effectively support local livelihoods (Msimanga and Mukwada 2022).

The need for inter-sectoral, multi-scale approaches is widely recognised in the natural resource management literature but has not been systematically applied to livelihoods planning projects, especially in the coastal tropics (Diedrich et al. 2022). However, there is a collective call to develop and implement more integrated approaches to climate change and disaster risk management in the Pacific (SPC et al. 2016), including Solomon Islands (Ministry of Environment 2023). In response to this need, the Australian Centre for International Agricultural Research (ACIAR) funded a small-research activity in Solomon Islands entitled 'Spatially Integrated Approach to Support a Portfolio of Livelihoods' (FIS/2020/111). The Integrated Livelihoods Approach (ILA) developed by this project seeks to guide scientists, practitioners, and decision-makers engaged in livelihood project planning and assessment to achieve three desired outcomes in Pacific coastal communities (1) a fair and just society, (2) sustainable natural resource use and (3) resilient livelihoods.

The integrated approach to livelihoods was driven by four overarching objectives:

(1) Develop a spatially explicit participatory and integrated planning approach that is adaptable to multiple scales.

(2) Foster and support the establishment of National and Provincial led governance processes and partnerships required to sustain the approach.

(3) Build the scientific capacity and leadership skills of local partners to implement and train others in the approach.

(4) Close the project 'implementation gap' by providing targeted capacity development to support communities to follow through on desired livelihood adaptation pathways identified through the assessment process.

The Crawford Fund grant supported my involvement in the delivery of project outputs to local practitioners and decision-makers across multiple levels of governance. Specifically, these activities conveyed the results of spatially explicit, risk-based, participatory assessments conducted in Western Province, Solomon Islands to support an integrated approach to livelihoods planning in small-scale fishing communities (Smith et al 2024; Smith et al. In Prep).

Activities

Activities funded by this grant (supplementing ACIAR funding) took place from the 3rd-17th May in Western Province, Solomon Islands. These activities delivered the Integrated Livelihood Approach (ILA) outputs to multiple stakeholders. Specifically, we:

i) Presented the results of a spatially explicit risk-based participatory livelihoods assessment framework to community, provincial and national stakeholders to encourage the adoption of integrated approaches to livelihoods planning.

ii) Led training workshops with our local partner, Ecological Solutions Solomon Islands (ESSI), to support future project implementation and delivery.

iii) Conducted community-level workshops to present results and support communities in achieving their desired livelihood pathways (Figure 1).

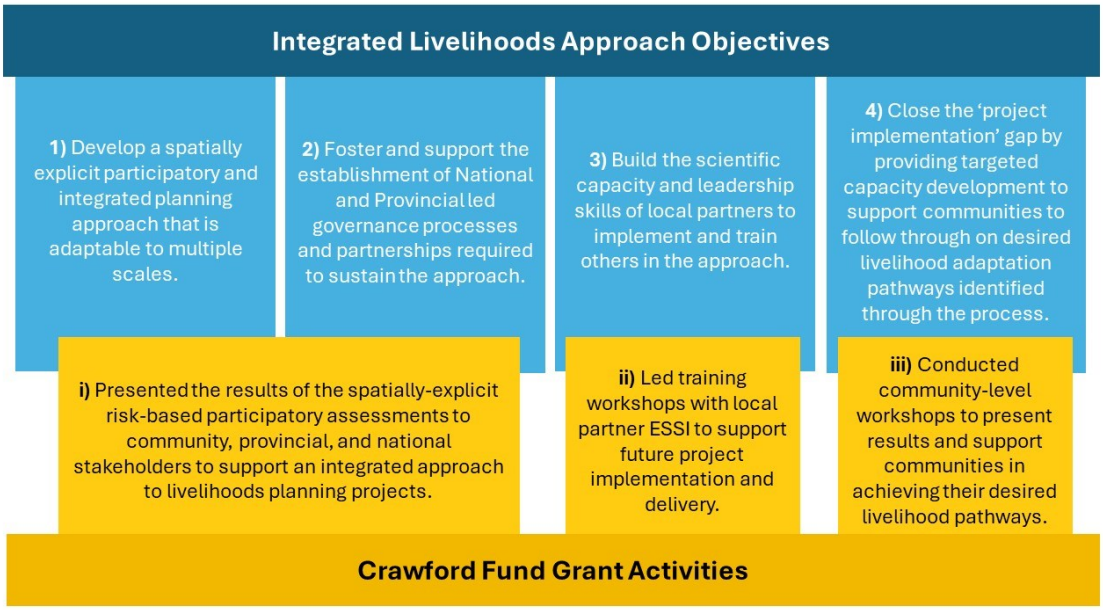


Figure 1: Crawford fund grant activities and their alignment with the primary objectives of the integrated livelihoods approach.

Project Conclusion Stakeholder Workshop

At the project conclusion workshop, we presented the overall outputs of the Integrated Livelihoods Approach to stakeholders from partner communities, and provincial and national government. The Crawford Fund grant supported my attendance, allowing me to present my PhD thesis results, comprising the Livelihoods-Based Risk Profiling Framework (LRPF) (Smith et al. In Prep). The LRPF was developed to aid livelihoods planning in rural communities by identifying major risk drivers through a holistic assessment of locally relevant social, economic, and environmental issues. I presented the method and results of the LRPF for workshop attendees and demonstrated the value of the approach as an integrated tool for livelihoods planning (Figure 2).

Figure 2: Outputs of the Livelihoods-Based Risk Profiling Framework (LRPF) developed to support livelihoods planning in Solomon Islands rural communities (Smith et al. In Prep).

Additionally, I showcased open access spatial data layers developed by the ACIAR project, depicting national projections of forest exploitation potential, fishing exploitation potential, sedimentation, and sea level rise. These layers were discussed in the context of identifying priority areas for risk management in Solomon Islands (Figure 3).

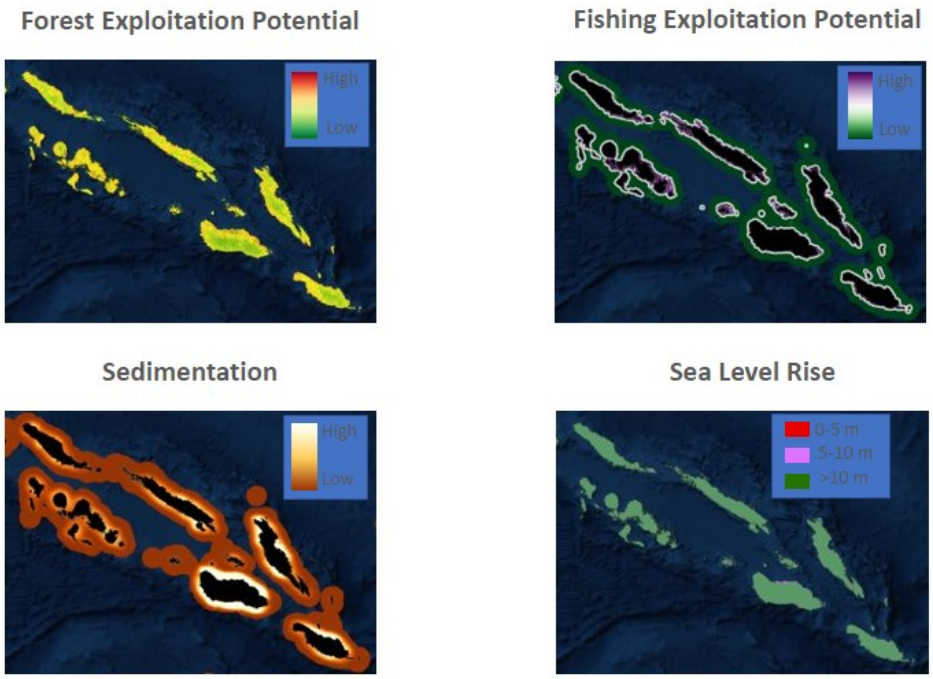


Figure 3: Spatial layers developed by the ACIAR project representing the risk of i) forest exploitation potential, ii) fishing exploitation potential, iii) sedimentation and iv) sea level risk across Solomon Islands.

After the results presentation, the workshop facilitated an opportunity for community, provincial, and national stakeholders to define and communicate their priority initiatives for livelihood development (Figure 4).

Figure 4: Workshop attendees presenting their priority livelihood initiatives.

ESSI Training Workshop

A training workshop was held with Ecological Solutions Solomon Islands (ESSI) following a 'train the trainer' format, supporting staff members in implementing and delivering outputs from the Integrated Livelihoods Approach. The workshop consisted of two main activities. The first activity focused on introducing ESSI staff to the spatial mapping software QGIS, and utilising it to produce project outputs. Specifically, staff were trained in i) digitising hand-drawn participatory maps of community-level risk, and ii) installing and exploring national level hazard maps to identify high risk areas across Solomon Islands (Figure 5). Following the QGIS training, a session was held to train staff members in effectively communicating risk-based participatory assessment results to partner communities. The Crawford Fund grant supported me in developing and delivering this training. While the focus was on project outputs, additional scientific capacity building was provided by introducing staff to QGIS, with training activities having broader applications beyond the ACIAR project.

Figure 5: QGIS training activities held with staff from local partner Ecological Solutions Solomon Islands.

Partner Community Workshops

The final activity supported by this grant involved communicating risk-based participatory assessments to our three partner communities in Western Province, Solomon Islands (Figure 6). The outputs of these assessments were presented as livelihoods risk profiles for each community, identifying the main social, economic, and environmental factors that drive risks to local livelihoods. These risk profiles were translated into educational posters in Solomon Island Pijin. Risk profile posters enabled community members to identify local risks and use this information to plan livelihood adaptation initiatives suited to their specific context (Figure 7). Each community was additionally provided with a detailed risk profile report. Local staff from ESSI facilitated community workshops.

The Crawford Fund grant supported my attendance at these workshops, where I presented results alongside ESSI staff (Figure 8).

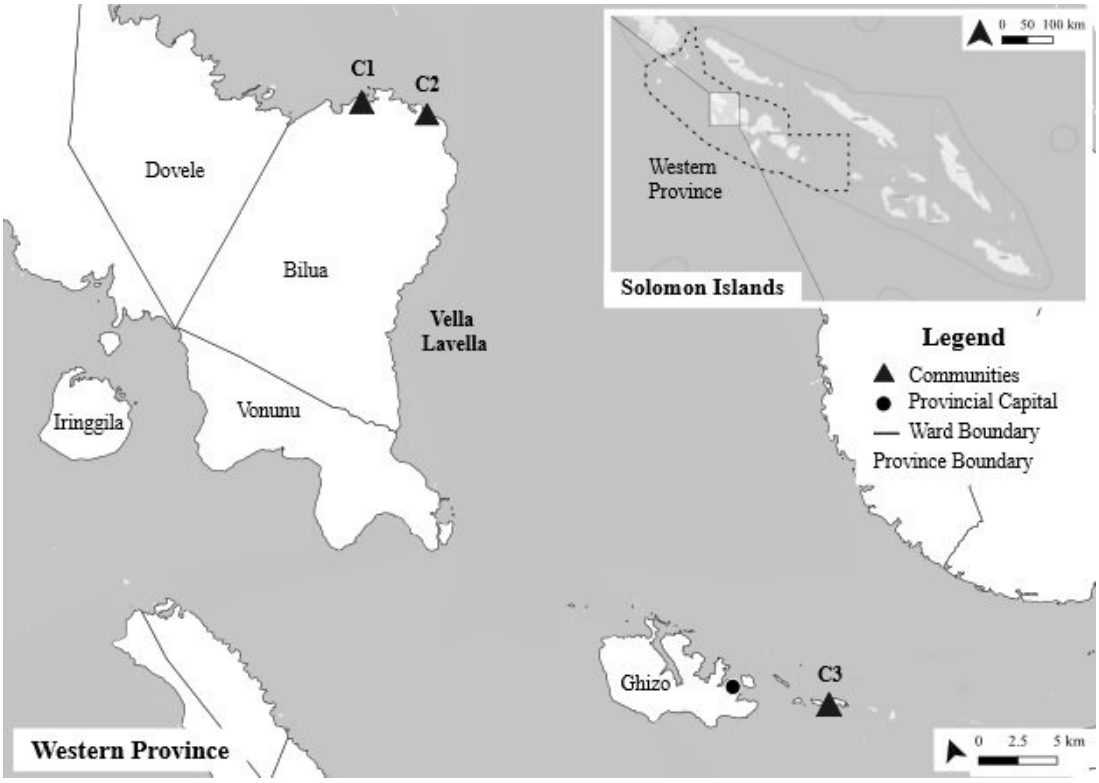


Figure 6: The location of project partner communities in Western Province, Solomon Islands.

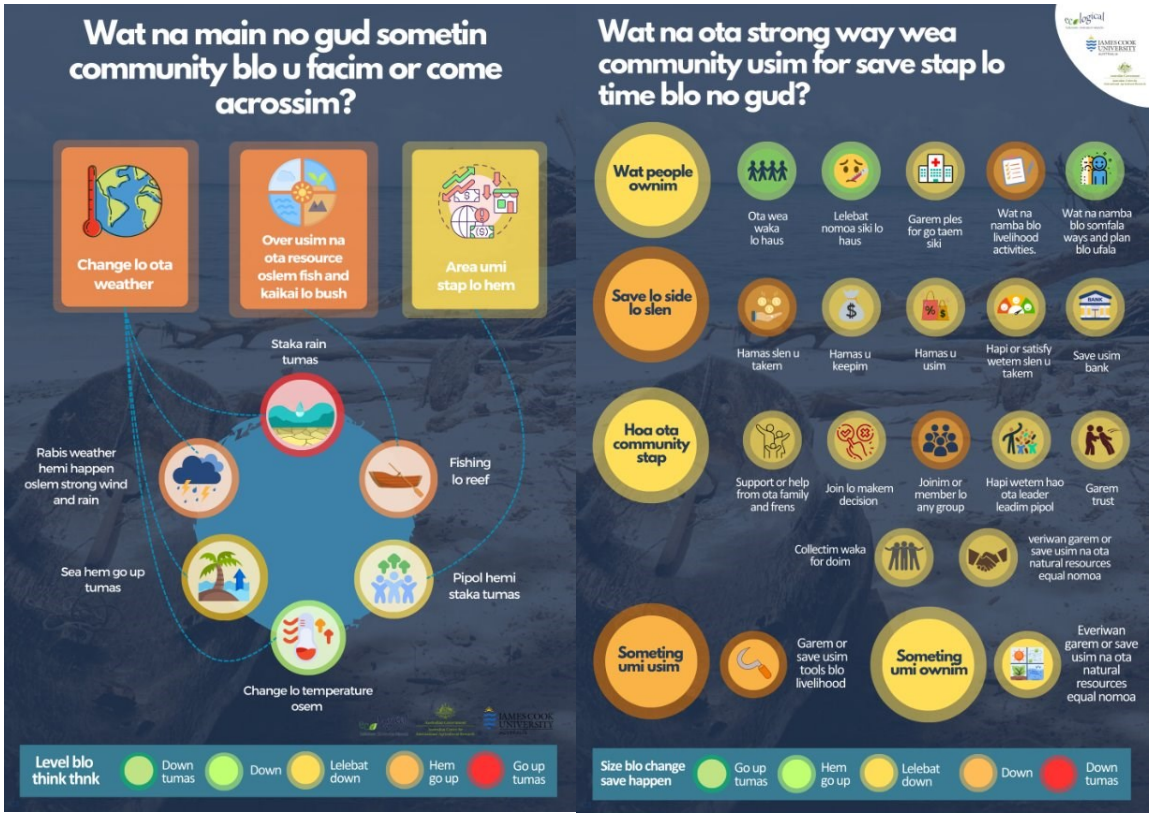


Figure 7: Examples of the posters developed to communicate risk profile outputs to partner communities.

Figure 8: Results dissemination workshops with partner communities on their livelihood risk profiles.

Learnings

The integrated livelihoods approach provided valuable insights into the risk drivers that influence rural livelihoods in Western Province, Solomon Islands. The approach brought to light the intricate interplay between climatic change (e.g., sea level rise, temperature change and rainfall variability), and non-climatic challenges (e.g., resource exploitation) which often compound to impact local livelihoods. This was particularly evident in rural coastal areas, where communities heavily depended on natural resources for essentials like water, food, shelter, energy, and income. The approach also highlighted the pivotal role of social and economic factors in addressing risk. For example, factors such as community cohesion, and economic opportunities emerged as crucial in adapting to the impacts of climate change. The insights gained from the integrated livelihoods approach can support livelihood planning projects in Solomon Islands. By identifying the intricate nature of risks impacting coastal livelihoods, the approach offers a nuanced perspective that is crucial for effective planning. By developing a comprehensive understanding of risk, livelihood planners in Solomon Islands can devise more informed and integrated adaptation strategies that address the divers needs and vulnerabilities of communities. Ultimately, this can contribute to the development of resilient livelihoods that are capable of thriving amidst changing local conditions.

Benefits

Benefits from Project Conclusion Workshop

The project conclusion workshop provided an opportunity to effectively communicate results of the integrated livelihood approach to numerous stakeholders. By providing stakeholders with a clear breakdown of the approach and its application in Solomon Islands, the project supported an understanding of the need for, and benefits of adopting an integrated approach to livelihoods, supporting the development of more effective and targeted livelihoods planning. The presentation and hand-over of national open access spatial data layers of key risk drivers (e.g., forest and fish resource exploitation potential, sea level rise and sedimentation) will likely have direct benefits for national and provincial level planning activities, as this information can be utilised by GIS staff located within government ministries.

The project conclusion workshop additionally created a platform for community, provincial, and national stakeholders to engage in dialogue, share insights, and collaboratively define and communicate their priority initiatives for livelihood development. This collaborative environment is crucial for aligning livelihoods planning efforts, fostering mutual understanding, and ensuring that

developed strategies are well-informed and widely supported across multiple levels of governance, whilst also effectively aligning with the needs, wants, and desires of all stakeholders.

Benefits from ESSI Training Workshop

Training workshops with ESSI staff supported future delivery of the integrated livelihoods approach within Solomon Islands. The workshop equipped ESSI staff with essential skills and knowledge in relation to project outputs, enabling them to take a leading role in applying the integrated livelihoods approach locally. By focusing on practical training in spatial mapping software like QGIS and the communication of risk-based participatory assessments, the workshops ensured that ESSI staff are well-placed to support communities in conducting future livelihood planning activities. By equipping ESSI staff with advanced spatial tools (i.e., QGIS) and knowledge, the training workshop additionally supported local staff in conducting future spatial analysis. Specifically, this includes developing comprehensive maps and reports, and enhancing community engagement through participatory mapping activities.

Benefits from Partner Community Workshops

The community workshops and associated resources (i.e., risk profile report and posters) were designed to serve as a resource for communities. These resources play a pivotal role in empowering local stakeholders to take the lead in livelihoods planning tailored to their specific contexts. Moreover, they serve as powerful tools for communities to articulate their needs and priorities when pursing funding opportunities. By equipping communities with the necessary tools, project outputs can support communities in fostering a sense of ownership and agency, ensuring that livelihood development projects are not only locally driven, but also aligned with the genuine needs and aspirations of the communities they aim to serve. In the context of Solomon Islands, reports have direct implications for guiding the allocation of resources from locally available Provincial Development Funds, which aim to support rural communities in developing resilient livelihoods.

Benefits to Queensland

The integrated livelihoods approach summarised in this report is capable of being utilised in a variety of contexts, including Queensland. For example, by applying the Livelihoods-Based Risk Profiling Framework (LRPF), Queensland's rural communities can identify major risk drivers through a comprehensive assessment of social, economic, and environmental issues relevant to their local context. The development of open access spatial data layers of locally relevant challenges (such as climate change) can additionally aid in identifying priority areas for risk management across Queensland. The 'train the trainer' format used in QGIS training workshops can also be applied to

build local capacity in spatial analysis and risk assessment. In combination, outputs of the integrated livelihoods approach can empower local stakeholders in Queensland to independently conduct risk-based participatory livelihoods assessments and apply these outputs to livelihoods planning. By embracing this approach, Queenslanders can proactively address evolving local challenges and uncertainties, and strategically plan for livelihoods resilience.

Acknowledgements

I would like to gratefully acknowledge A/Prof Amy Diedrich of James Cook University for leading the Integrated Livelihoods Approach project and supporting my PhD work as my primary supervisor. I also thank Dr. Katie Sievers (with support from Dr. Stephanie Duce, and Dr. Nicholas Murray) for developing national level hazard maps of fishing and forest resource exploitation, which were crucial for the project's final workshop and ESSI QGIS training sessions. Ecological Solutions Solomon Islands was fundamental in supporting all project activities, with special thanks to Hensllyn Boseto, Aubrey Vavu, and Relna Peter for their community-based work and intellectual contributions. Additional thanks goes to David Boseto for support in establishing connections with provincial and national government. I would like to acknowledge all in-country stakeholders that contributed to the project, and the hospitality of our partner communities in hosting project activities. I would also like to thank ACIAR for funding the small research activity that is the focus of this report. Finally, I would like to express my thanks and gratitude to the Crawford Fund for enabling me to take up this opportunity. The grant has given me the opportunity to translate my PhD research into practical outputs and communicate this information with the communities it aims to support.

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Project Related Outputs

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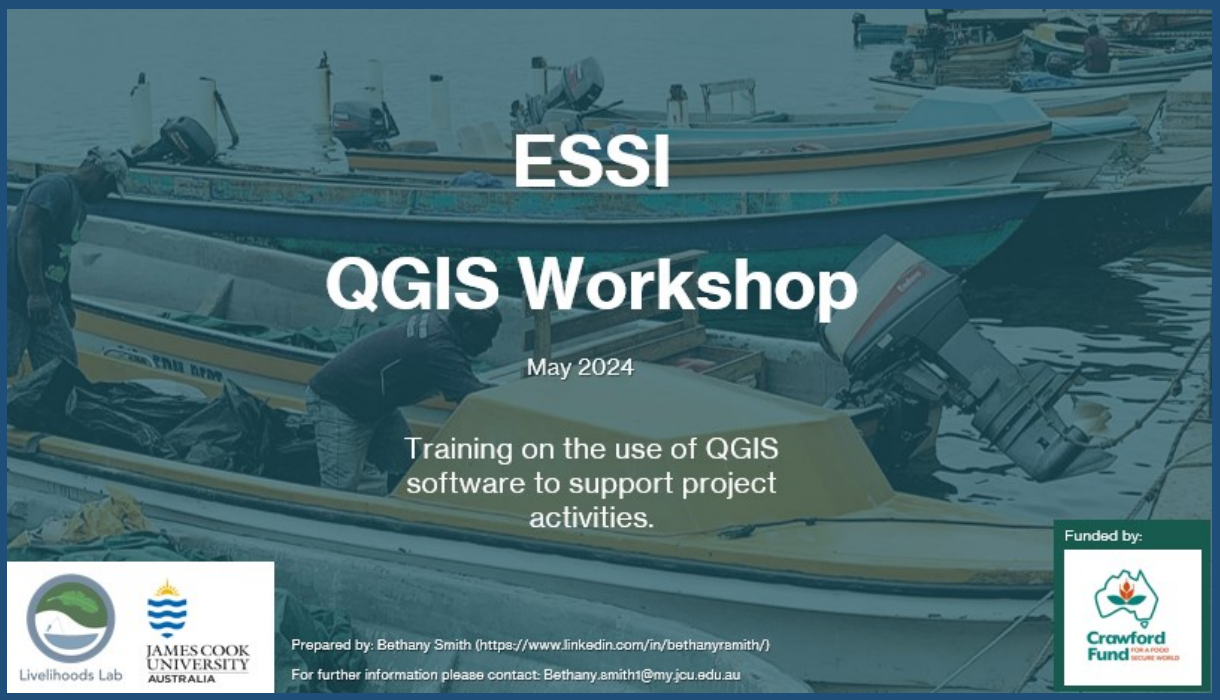
Photos

11.7 Appendix 7: ESSI QGIS Workshop Guide


ESSI
QGIS Workshop
May 2024
Training on the use of QGIS software to support project activities.
Livelihoods Lab
JAMES COOK UNIVERSITY AUSTRALIA
Prepared by: Bethany Smith (https://www.linkedin.com/in/bethanyrsmith/)
For further information please contact: Bethany.smith1@my.jcu.edu.au
Funded by:
Crawford Fund

Contents

Session 1: Installing QGIS 3.28

Objectives: Install the most recent stable version of QGIS to your computer.

**QGIS 3.28 is the latest stable version of the QGIS software in October 2023.*

Installing QGIS

Step 1: Go to the **ESSI QGIS Workshop** folder on the USB stick.

Step 2: Double click on the **QGIS Setup** folder to open it.

Step 3: Double click on QGIS installer.

Step 4: The QGIS setup wizard will pop up. **Click Next.**

Step 5: Click **I Accept the Terms and Conditions in the Licence Agreement,** then click **Next.**

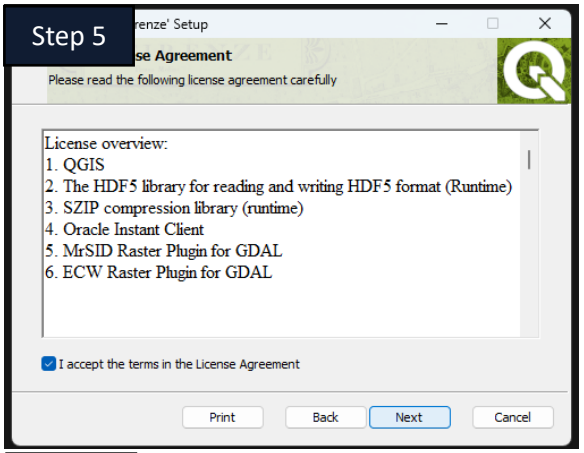
Step 6: Click **Next.**

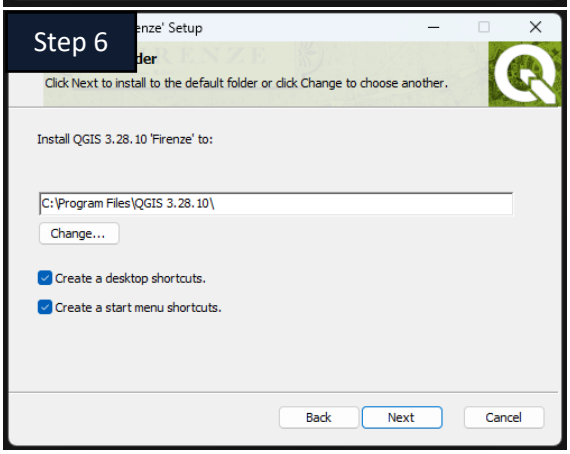
Step 7: Click **Install.**

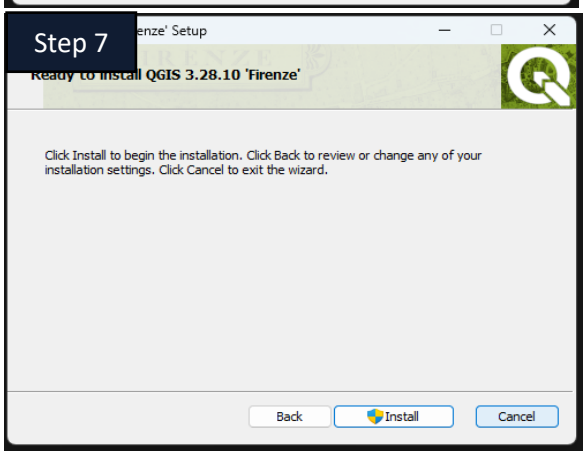
Step 8: Wait for the installation to complete.

Step 9: Once the installation is complete click **Finish.**

Step 10: Search QGIS and open the programme on your computer.







Session 2: Getting Started with QGIS

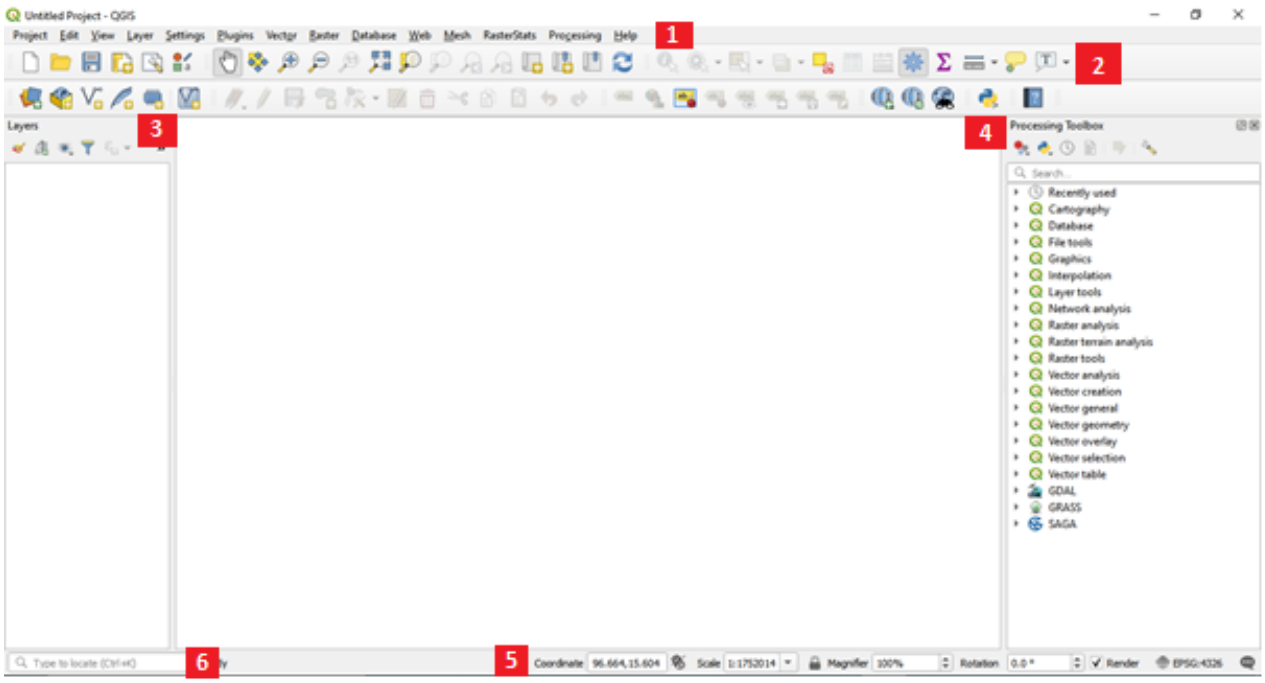
Objectives:

- Get to know the QGIS interface.
- Use map navigation tools.
- Learn the basic about QGIS projects.
- Install Basemaps into QGIS

2.1. Getting to Know the QGIS Interface

The QGIS interface is composed of 6 main parts:

1. **Menu Options:** location of the main functions found in QGIS that can be used for project management, data management and analysis. Some of these functions and tools can also be found in toolbars.
2. **Toolbars:** The toolbar provides access to most of the same functions as the menu and uses the same icons. You can change the tools that you can see by going to **Settings > Toolbar Menu.**
3. **The Layer Panel:** The ***Layers*** panel shows you a list of all the spatial data available to you. To learn more about a layer, click the arrow or + beside it. Hovering over a layer will give you some basic information including the layer name, type of geometry and ***Coordinate Reference System*** etc. Right clicking on a layer will give you a menu with options to view, select and edit the data.
4. **The Map Canvas:** This is where the map is displayed and where any layers will be loaded. In the map canvas you can explore layers by moving the map (e.g. zooming in and out) and selecting features etc.
5. **The Status Bar:** The status bar gives you information about your map, and allows you to change the scale, rotation and see the coordinates of the mouse cursor when positioned on the map.
6. **The Locater Bar:** Within this bar you can quickly search for and access features in QGIS.



2.2. Using Map Navigation Tools

Use the map navigation tools to manipulate the map.

Touch, zoom and pan

Pan map

Pan to selection

Zoom in window

Zoom out window

Zoom to native resolution

Zoom to full extent

Zoom to selection

Zoom to layer

Zoom last

Zoom next

Refresh

2.3. Learning the Basics About QGIS Projects

QGIS sessions are called projects. Projects allow the users to store maps within a specific file format.

Opening and Saving a Project

To **OPEN** a **NEW** blank project, click: 

To **SAVE** a project, click on  and select the location you would like to store your project.

To **OPEN** a **SAVED** project, click on  , find the project location and click on **open.**

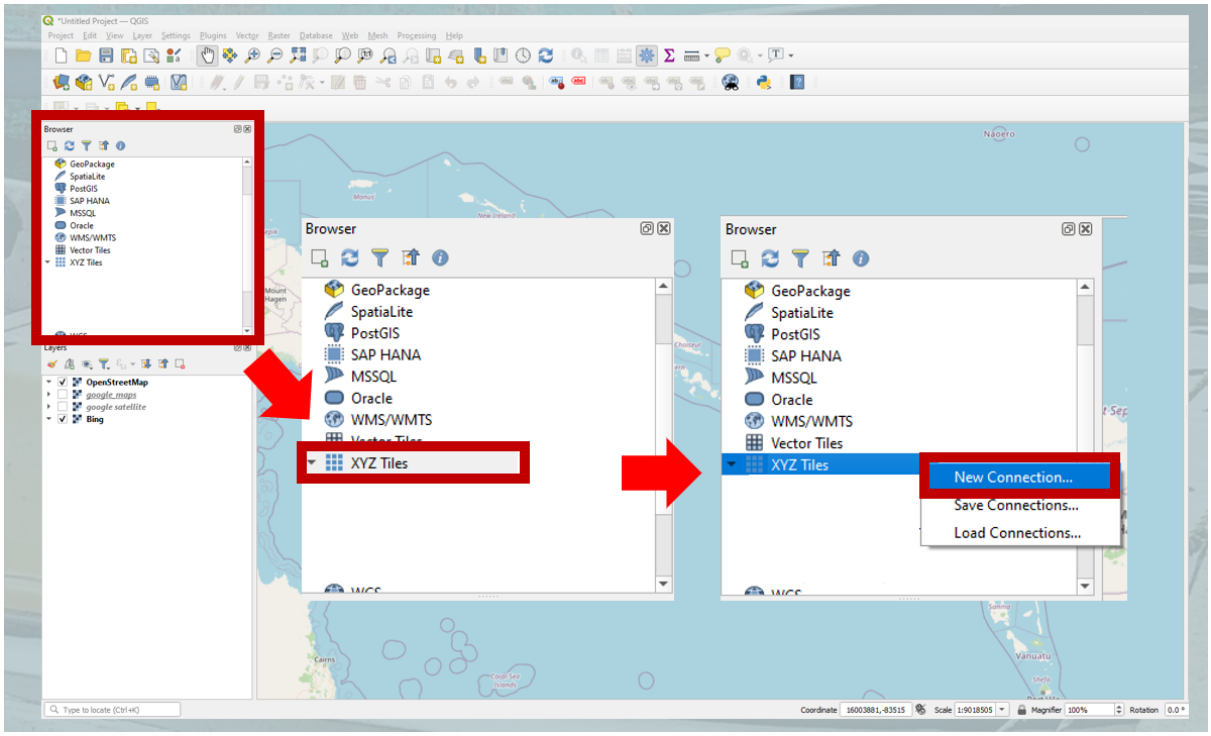
2.4. Installing QGIS Basemaps

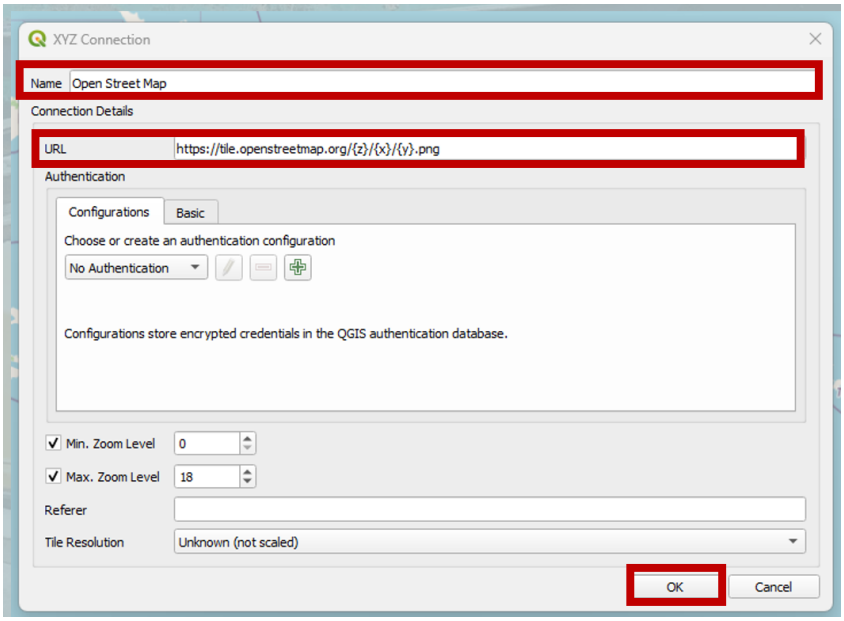
Basemaps are basic background maps that provide essential geographic information that additional data can be added to.

Basemaps typically include basic features such as rivers, landforms or roads.

Installing Basemaps

1. Go to the QGIS Browser and find the **XYZ** tiles.
2. Right click and select **Add New**.
3. Name the basemap that you are installing (e.g., Open Street Map) and input the basemap tile server link into the **URL** box.
4. Click **OK** and allow time for the basemap to load within QGIS.





Once you have installed a basemap, you will be able to access this file whenever your open QGIS by going to the XY Tiles and double clicking on the basemap name.

Different Basemaps have different visual representations of spatial data. By adding a number of different Basemaps into your QGIS interface you are able to develop a range of different maps to meet your needs. For example, the Bing Basemap uses satellite imagery, whilst Google Maps uses a basic outline map and incorporates place name labels (Figure 1).

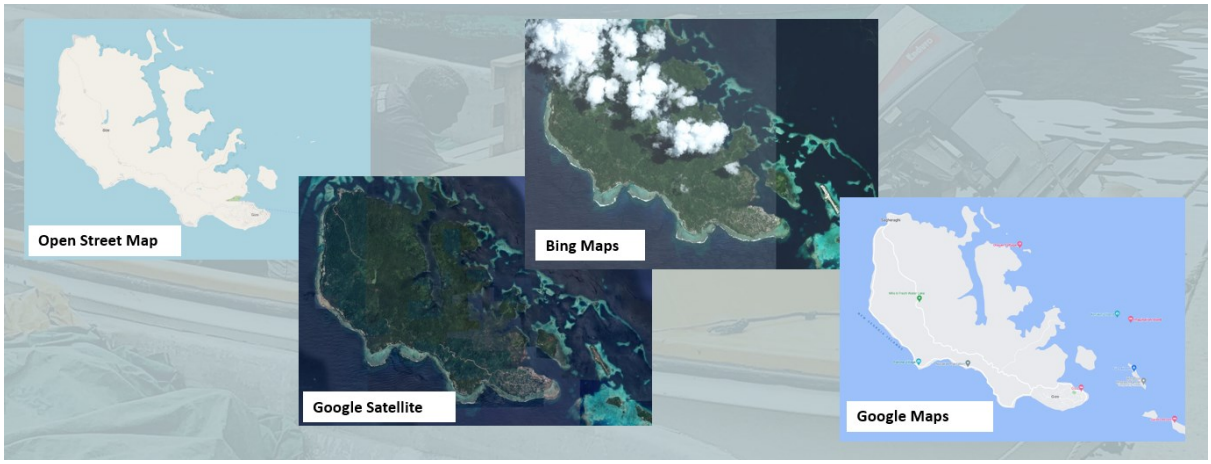


Figure 1: Differences between basemap imagery comprising (L-3): i) Open Street Map; ii) Google Satellite; iii) Bing Maps and iv) Google Earth.

Use the following URL codes to add the Basemaps represented in Figure 1 to QGIS.

- **Open Street Map:** https://tile.openstreetmap.org/{z}/{x}/{y}.png
- **Bing:** http://ecn.t3.tiles.virtualearth.net/tiles/a{q}.jpeg?g=1
- **Google Maps:** https://mt1.google.com/vt/lyrs=r&x={x}&y={y}&z={z}
- **Google Satellite:**

  https://www.google.cn/maps/vt?lyrs=s@189&gl=cn&x={x}&y={y}&z={z}

Session 3: Introduction to Spatial Data

3.1. Understand the basics of spatial data.

Spatial data (also known as geospatial data) is information that identifies the geographic location, shape, size and characteristics of objects, features and phenomena on the Earths' surface.

GIS systems use geographic coordinates of latitude and longitude to show a location on the Earth's surface.

- Latitudes are horizontal lines that measure the distance north or south of the equator.
- Longitudes are vertical lines that measure east or west of the meridian (i.e., middle) line located in Greenwich, England.

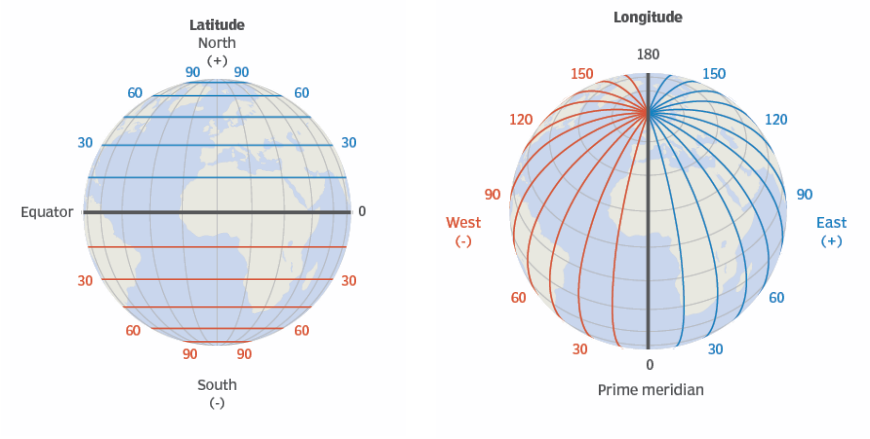


Image Reference: https://www.techtarget.com/whatis/definition/latitude-and-longitude

Gizo is located at the following coordinates: 8°6'10.91"S, 156°50'30.7"E.

This means that Gizo is 560 miles south of the Equator, and 10488 miles East of the meridian line in England.

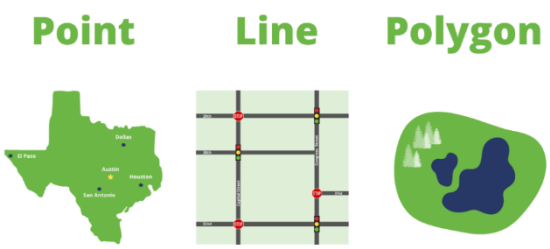
There are two types of spatial data that can be used in QGIS:

Vector Data

The real world is represented as points, lines and polygons.

For Example:

Towns are represented as point features. Roads are represented as line features. Large areas such as lakes are represented as polygon features.



Raster Data

The real world is represented as an image that is made up of small cells.

Cells are organised into columns and rows. Each cell has a value which represents information.

For example, a dark green cell has a value of 3 which represents vegetation.

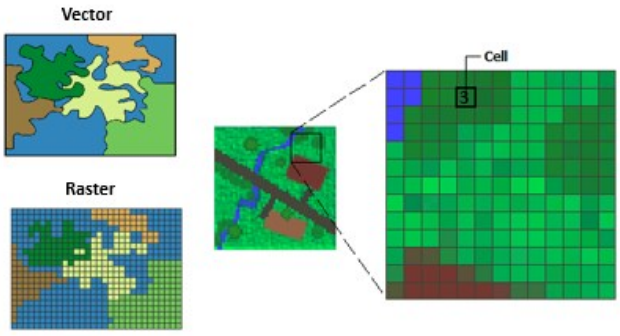


Image Reference: (1) https://desktop.arcgis.com/en/arcmap/latest/manage-data/raster-and-images/what-is-raster-data.html (2) https://www.researchgate.net/publication/338491161_DYNAMIC_MAPS_OF_TARTOUS_PORT_BASED_ON_REMOTE_SENSING_and_GIS/figures?lo=1&utm_source=google&utm_medium=organic

3.2. Downloading and Installing Spatial Data

Online Data Repository Examples:

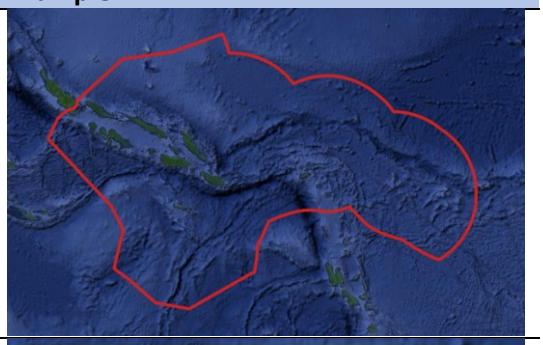
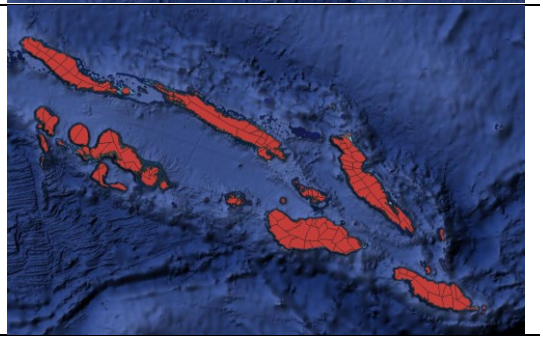
Spatial data of Solomon Islands is available in several online repositories that can be downloaded from the internet. We have provided some examples below:

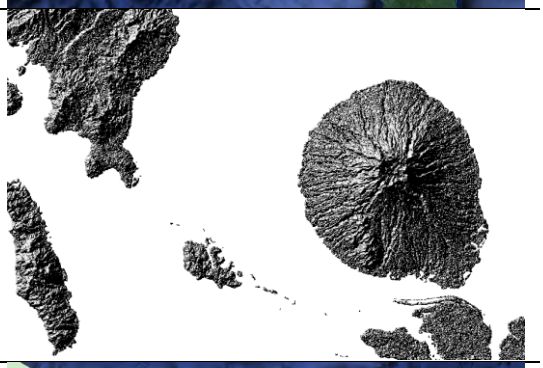
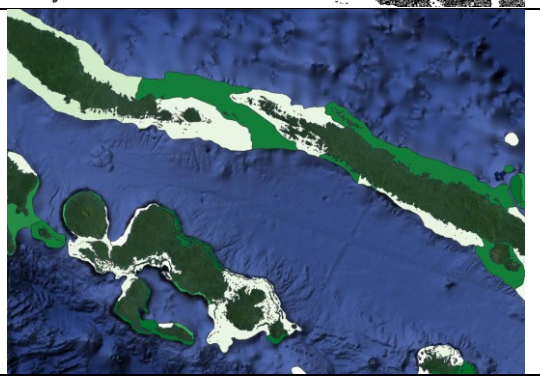
Repository Name	Description	Link
Pacific Data Hub	Indicator based dataset exploring the 132 Pacific Sustainable Development Indicators.	https://pacificdata.org/
PacificMap	The PacificMap provides easy access to spatial data.	https://map.pacificdata.org/
OpenStreetMap Data Pacific	OpenStreetMap data is available for 14 Pacific Island Countries, in a GIS-friendly format. The OSM data has been split into layers based on themes (buildings, roads, points of interest, etc), and comes bundled with a QGIS project to help you get started with using the data.	https://solomonislands-data.sprep.org/dataset/opens treetmap-data-solomon-islands

Allen Coral Atlas	The Allen Coral Atlas aims to provide a high-resolution, up-to-date global image of the world's coral reefs, and detailed maps showing the composition and structure of important reefs located throughout the world.	https://allencoralatlas.org/
Protected Seas	Open dataset of boundaries and regulations that apply to marine protected areas (MPAs) and fishery management areas in international marine waters.	https://protectedseas.net/
GEOSS Portal	The GEOSS Portal is an online map-based user interface which allows users to discover and access Earth observation data and resources from different providers from all over the world.	https://www.geoportal.org/?m:activeLayerTileId=osm&f:dataSource=dab
UN Biodiversity Lab	The UN Biodiversity Lab is an online platform that allows policymakers and other partners to access global data layers, upload and manipulate their own datasets, and query multiple datasets to provide key information on the Aichi Biodiversity Targets and nature-based Sustainable Development Goals.	https://unbiodiversitylab.org/en/
Mapping Ocean Wealth	The Mapping Ocean Wealth data viewer is a live online resource for sharing understanding of the value of marine and coastal ecosystems to people.	https://oceanwealth.org/

Workshop Spatial Data Examples:

We have provided some spatial data in the workbook folder to work with today that we downloaded from the Solomon Islands Open Street Map data portal:

Folder Name	Description	Example
SI_EEZ	The exclusive economic zone surrounding Solomon Islands	
Slb_admbnda_1 (2,3)	The boundaries of administrative boundaries in Solomon Islands (1) national; (2) provincial; (3) ward.	

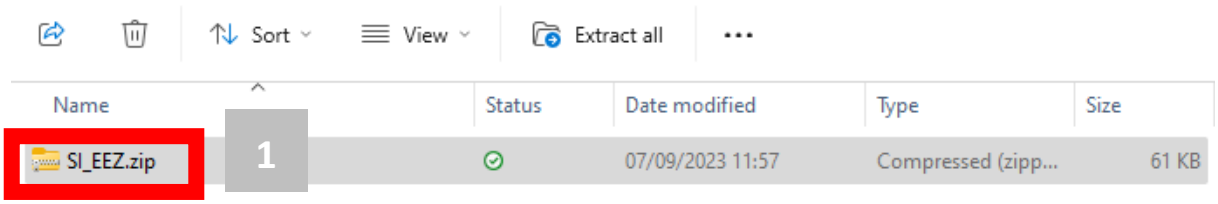
SI_Buildings	The locations of buildings within Solomon Islands.	
SI_Protected Areas (Points, Polygons)	The location of protected areas within Solomon Islands	
SI_Global Digital Elevation Model		
SI_Reef Associated Bioregions		

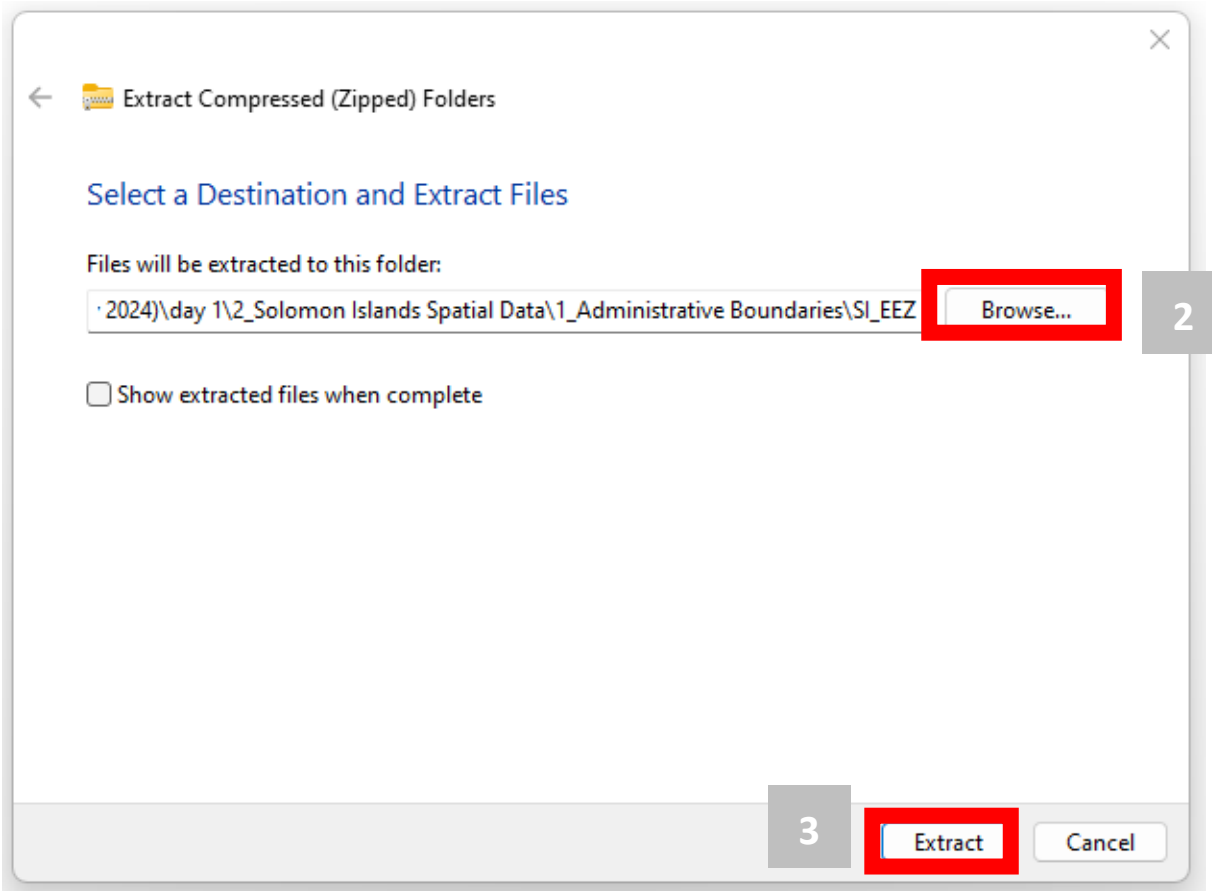
3.3. Unzipping Files

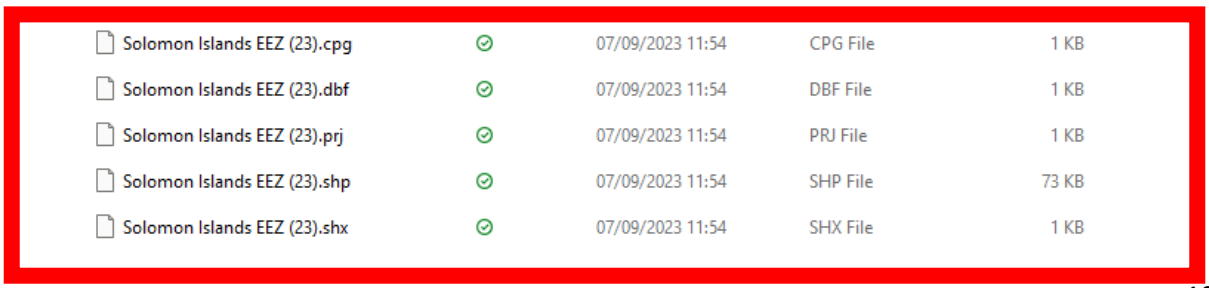
Spatial files will be downloaded to your computer as '**zip files**'. This file storage system saves space on your computer. You need to 'unzip' these files before you can view them in QGIS.

To unzip files:

1. Select the zip folder you would like to extract.
2. Click the 'extract all' button and select the folder where you would like the files to be stored.
3. Run the extraction.
4. Go to the folder you selected to view the extracted files.



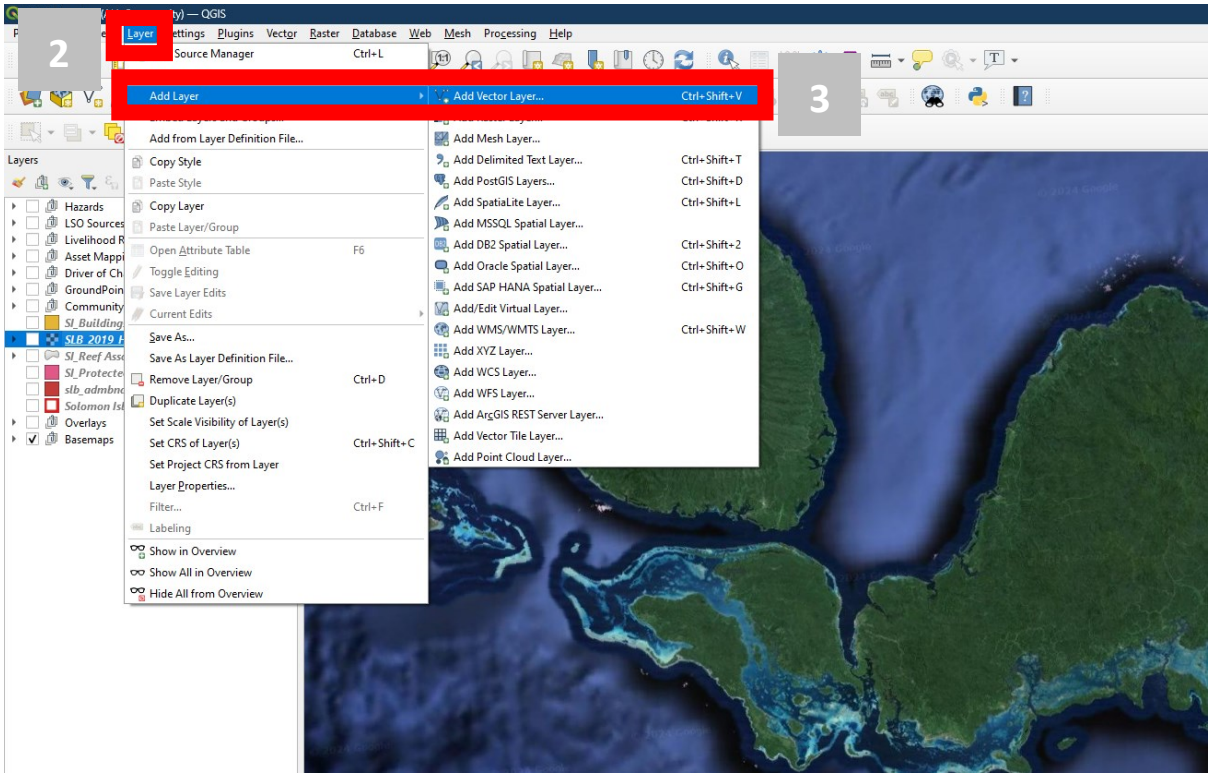


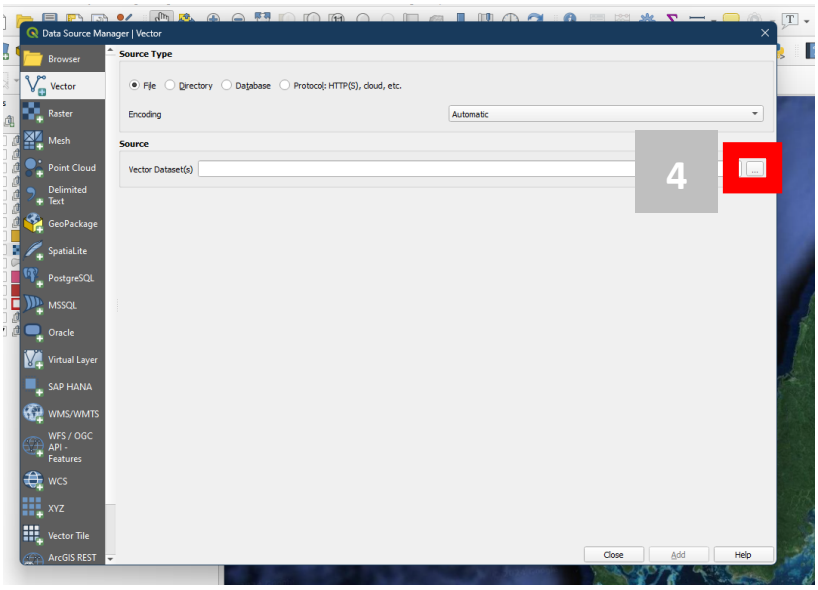


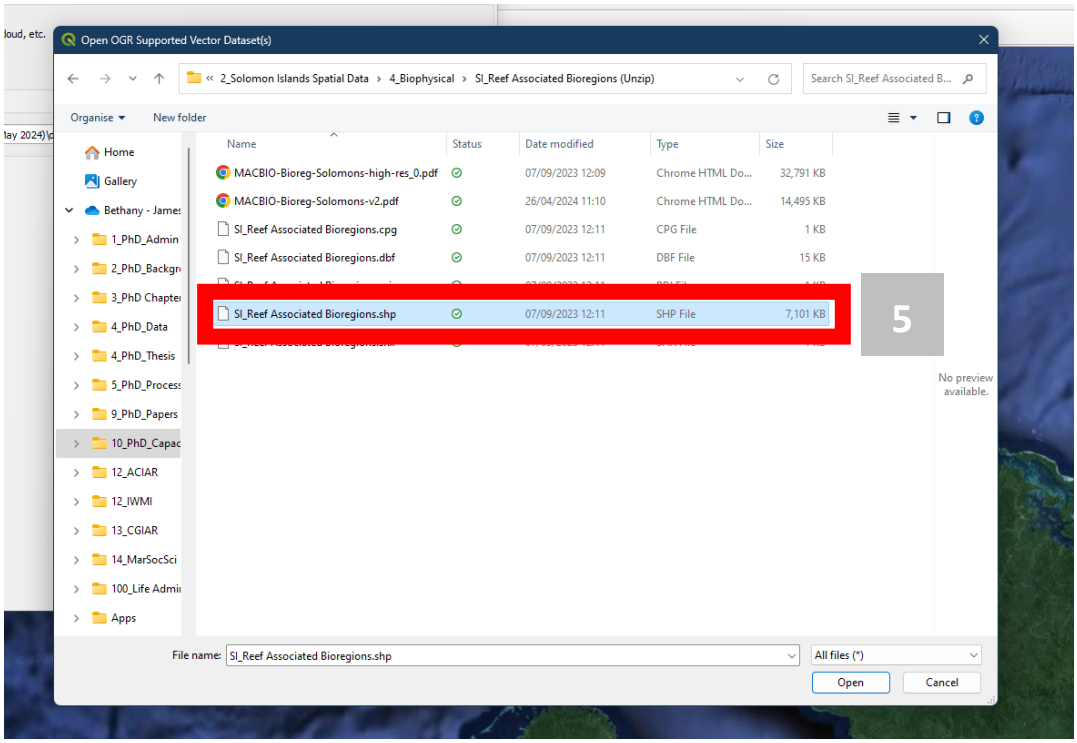
3.4. Importing Vector Data into QGIS

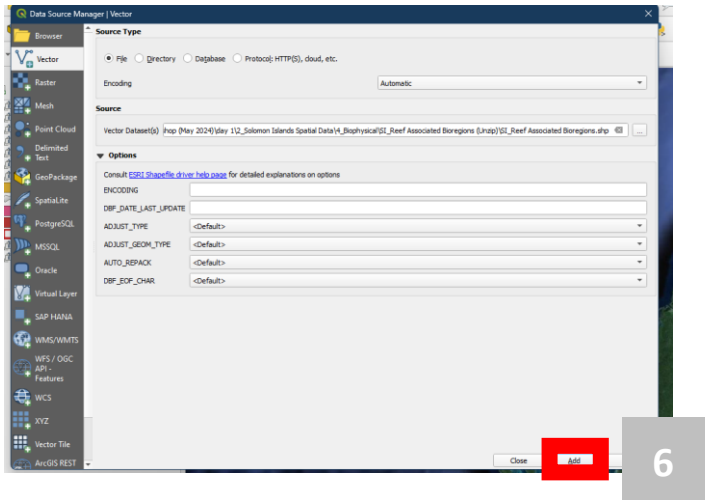
Once you have unzipped your data, the following steps can be used to import this into QGIS.

1. Go into the QGIS programme.
2. Select layer in the toolbar.
3. Go to ‘Add layer’ and then ‘Add vector layer’.
4. Navigate to the folder where your shapefile is.
5. Select the file that ends with ‘.shp’.
6. Click ‘Add’.







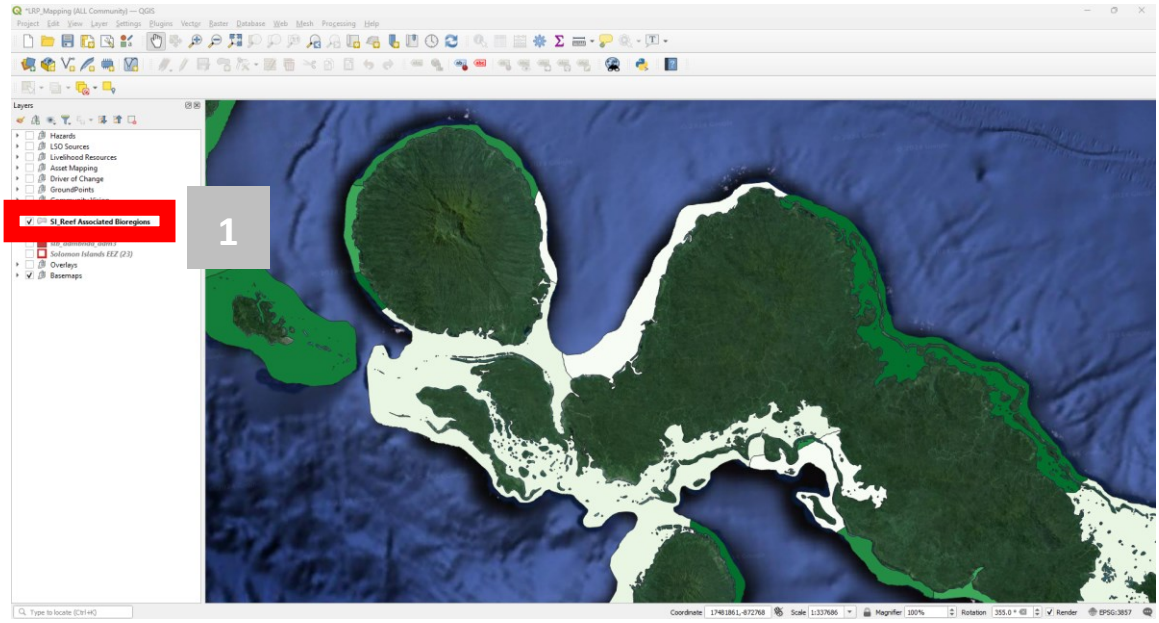


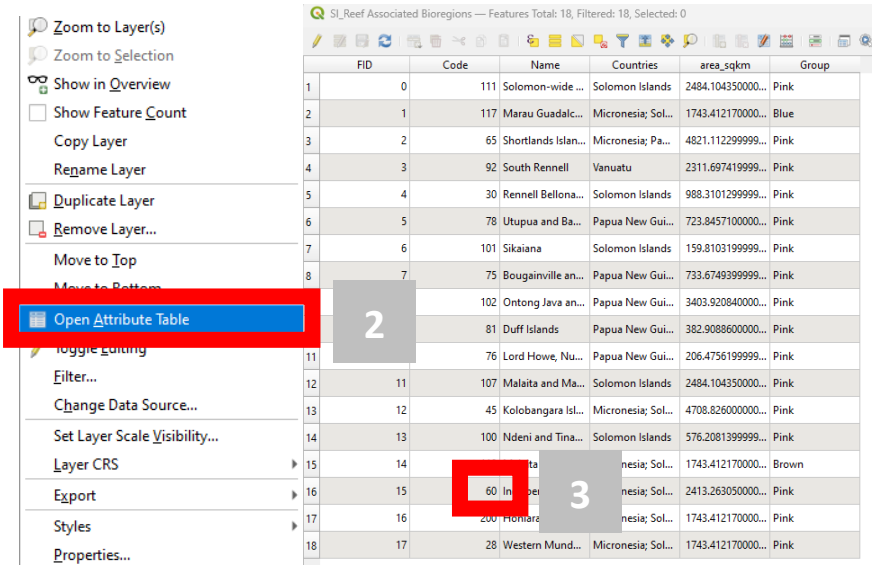
3.5. Understanding Attribute Tables

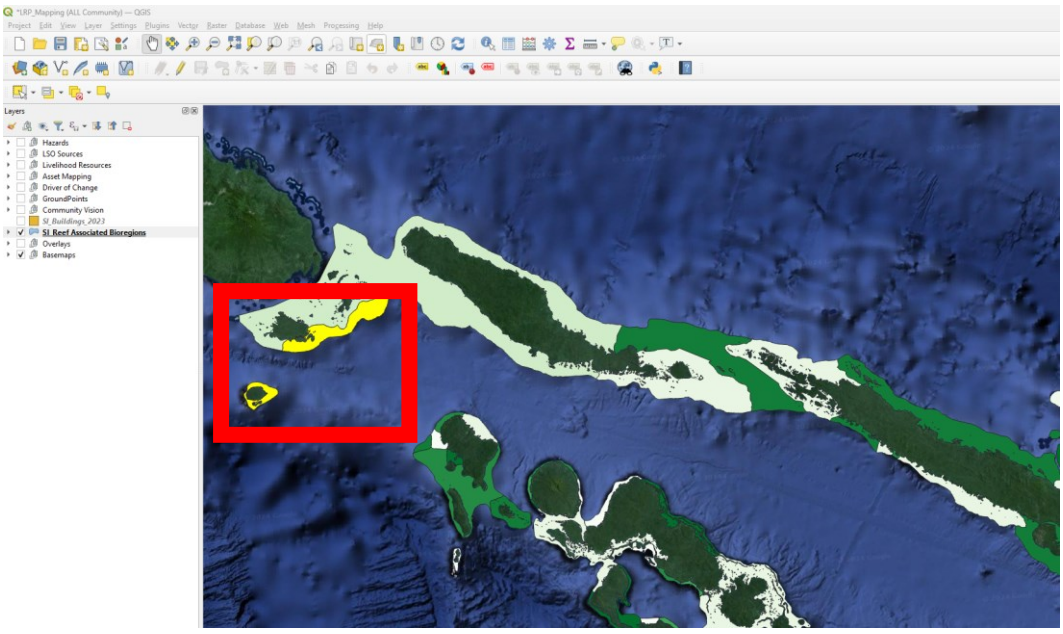
To get more information on the information that is shown in a vector file, you can open it's attribute table.

To do this apply the following steps:

1. Right click on the vector file in the layers column in QGIS.
2. Select 'Open Attribute Table', this will display information on each feature of the shapefile.
3. To see which feature each line is referring to click on that feature and navigate to the map where the feature will be highlighted in yellow.


1


Zoom to Layer(s)
Zoom to Selection
Show in Overview
Show Feature Count
Copy Layer
Rename Layer
Duplicate Layer
Remove Layer...
Move to Top
Open Attribute Table
Filter...
Change Data Source...
Set Layer Scale Visibility...
Layer CRS
Export
Styles
Properties...
2
3
SI_Reef Associated Bioregions — Features Total: 18, Filtered: 18, Selected: 0
FID Code Name Countries area_sqkm Group
1 0 111 Solomon-wide ... Solomon Islands 2484.104350000... Pink
2 1 117 Marau Guadalc... Micronesia; Sol... 1743.412170000... Blue
3 2 65 Shortlands Islan... Micronesia; Pa... 4821.112299999... Pink
4 3 92 South Rennell Vanuatu 2311.697419999... Pink
5 4 30 Rennell Bellona... Solomon Islands 988.3101299999... Pink
6 5 78 Utupua and Ba... Papua New Gui... 723.8457100000... Pink
7 6 101 Sikaiana Solomon Islands 159.8103199999... Pink
8 7 75 Bougainville an... Papua New Gui... 733.6749399999... Pink
102 Ontong Java an... Papua New Gui... 3403.920840000... Pink
81 Duff Islands Papua New Gui... 382.9088600000... Pink
11 76 Lord Howe, Nu... Papua New Gui... 206.4756199999... Pink
12 11 107 Malaita and Ma... Solomon Islands 2484.104350000... Pink
13 12 45 Kolobangara Isl... Micronesia; Sol... 4708.826000000... Pink
14 13 100 Ndeni and Tina... Solomon Islands 576.2081399999... Pink
15 14 nesia; Sol... 1743.412170000... Brown
16 15 60 nesia; Sol... 2413.263050000... Pink
17 16 nesia; Sol... 1743.412170000... Pink
18 17 28 Western Mund... Micronesia; Sol... 1743.412170000... Pink



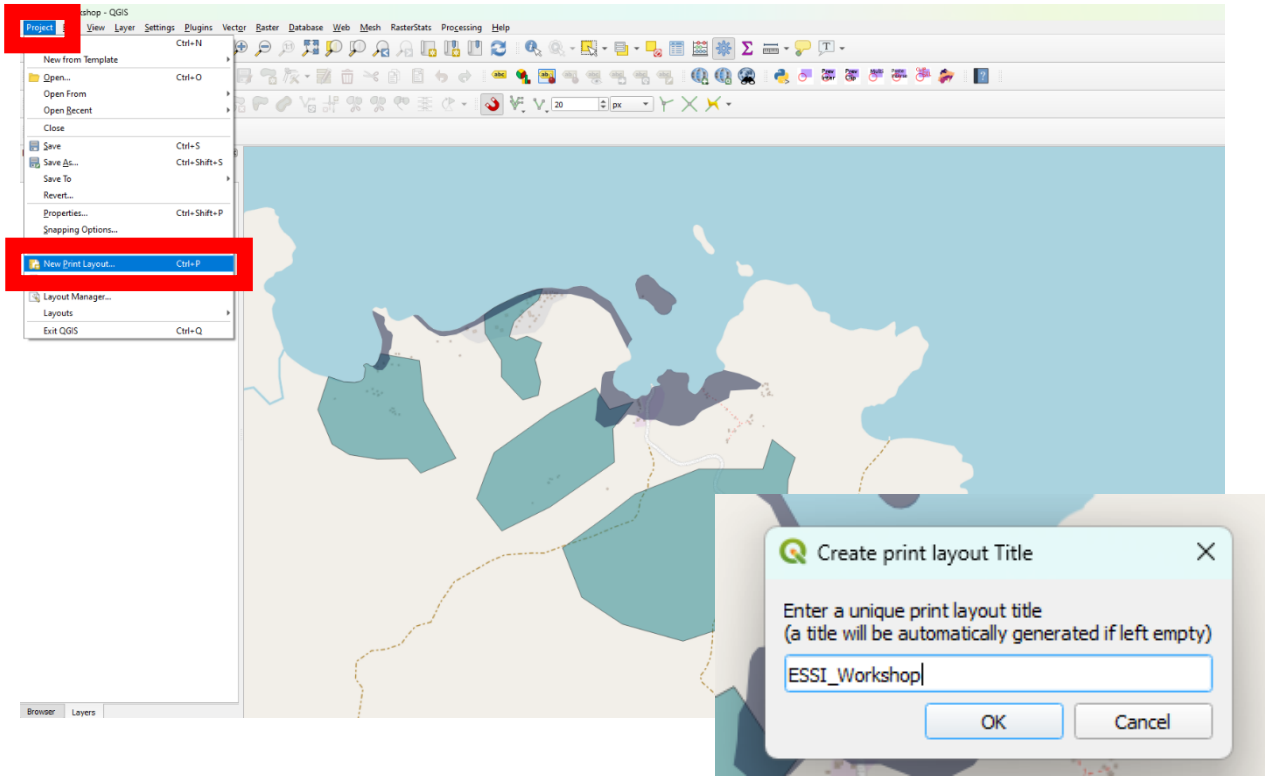
Session 4: How to Create a Map in QGIS.

During this session you will learn how to create and save a map in the print layout function.

4.1. Opening the Print Layout

In QGIS the map layout function enables you to design and arrange elements on a map which you can then export or print for presentation or sharing. The following steps describe how to move from the main QGIS interface, to develop and export maps from the map layout function.

1. Open the map layout function in the main QGIS interface by navigating to > Project > New Print Layout.
2. Give a name to your print layout and click OK.



You will be provided with a blank page that you can create your map with. The following tools are the main things that you will need to create your map.

Tool	Description
	**Zoom:** Use this tool to zoom in on your print layout whilst you are creating it.
	**Select/Move Item:** This tool allows you to select and move item tools (e.g., if you've added a legend to the print layout, you can use this tool to reposition it.
	**Move Item Content:** This tool allows you to move the location of the map, for example you can zoom out to show a bigger area, or move to a different area.

Add Map: Clicking on this tool enables you to add a map to your print layout. You can click and drag to define the area where the map will be. The map will show whatever layers you have selected in the main QGIS interface.

Add Picture: This tool allows you to add a picture or image to your print layout. For example, you could add the ESSI logo. You will also use this tool to add a north arrow.

Add Text: Clicking on this tool allows you to add text to your map. You may use this to add labels or a title to the print layout. You can customise, the size, font, and style of the text.

Add Legend: This tool allows you to add a legend to your print layout, which provides a visual explanation of the symbols and colours used in your map.

Add Scalebar: This tool enables you to add a scalebar to your print layout. You can customise this to change the units, style and size of the scalebar.

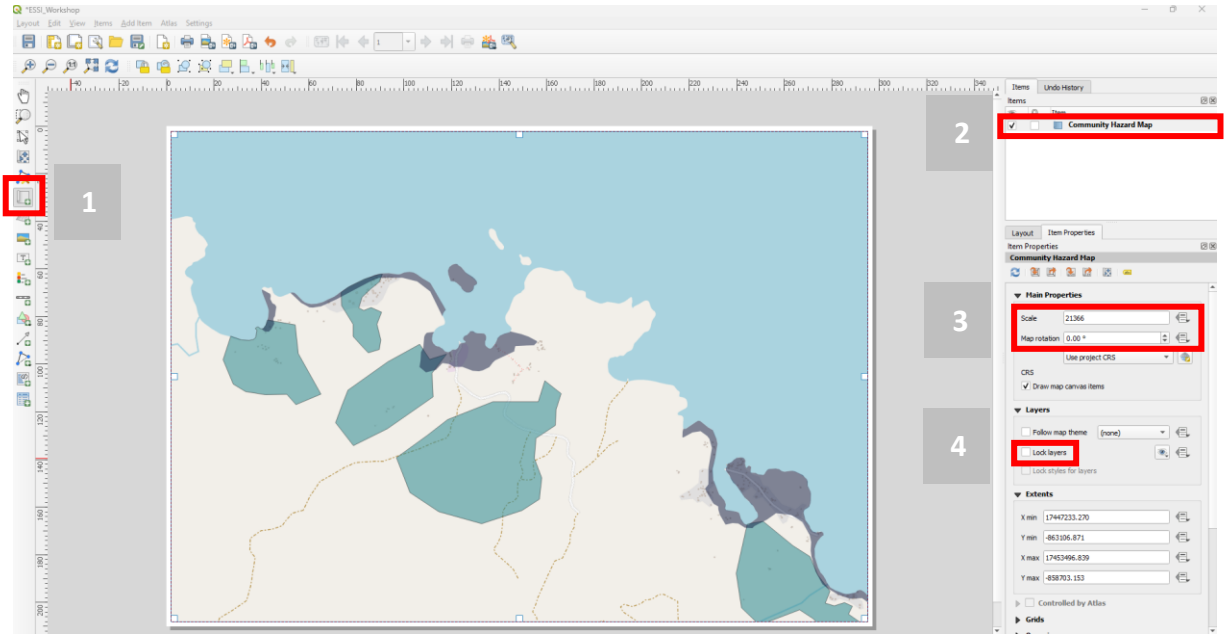
Add Shape: This allows you to add shapes such as circles, squares or polygons to your print layout. You may want to add this to highlight a particular feature on your map.

Creating A Map Layout: Example

EXAMPLE: Let's make a map of the hazards of flooding and sea level rise within some of our partner communities.

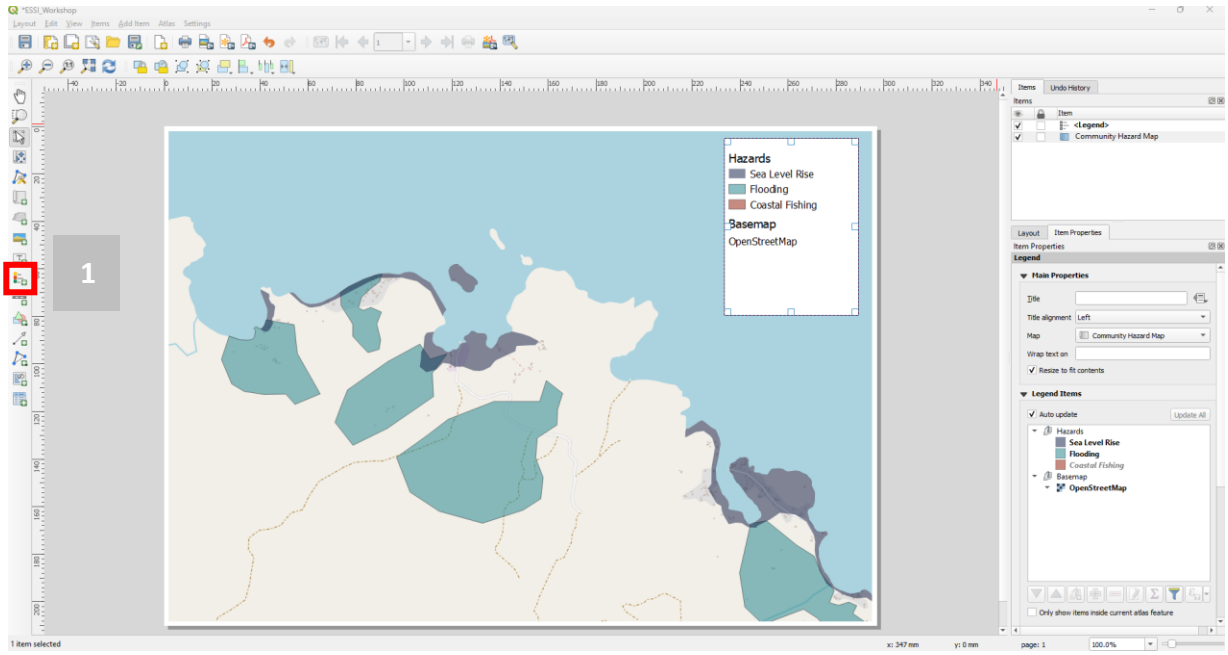
4.2. Step 1: Add A Map

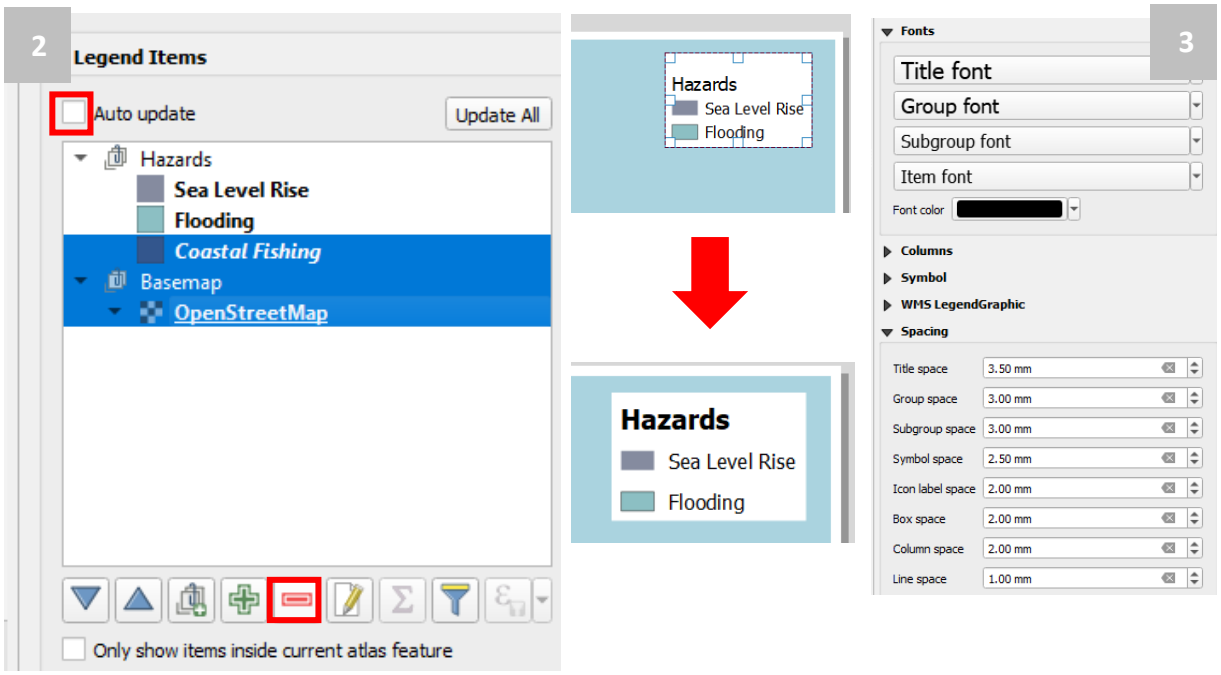
1. Use the 'Add Map' tool to add a map to the print layout, you can choose the size of this map by drawing different size rectangles. The map will display the layers you have in your main QGIS interface, if you don't want a layer to be shown in the map you need to unselect it within the main interface.
2. The map will be displayed in the 'items' column in the top right, you can rename the map by double clicking on that item (E.g., community hazard map).
3. You can resize or rotate your map using the scale item property function.
4. Once you are happy with your map, you can 'lock the layer' to make sure it doesn't change in the future.



4.3. Step 2: Add a Legend

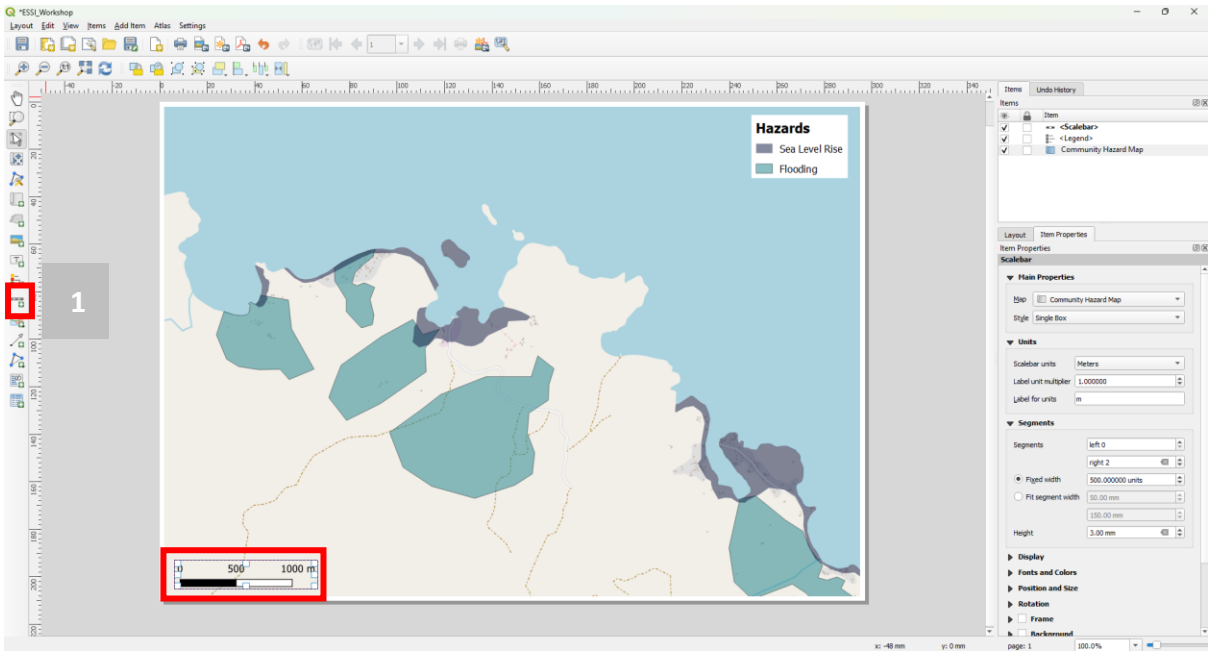
1. Use the 'Add Legend' tool to add a legend to the map, draw the shape and size of the legend where you would like it to be displayed.
2. Initially the legend will display all of the layers in the QGIS interface, you can customise this to just show the layers you want to see in the print layout in the item properties section.
3. Go to legend items and unselect the 'Auto update' box, highlight the parts of the legend that you would like to get rid of and use the '-' button to remove them.
4. You can also change the font and the spacing of the items using these sections of the item properties tab.



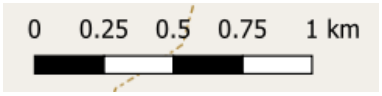


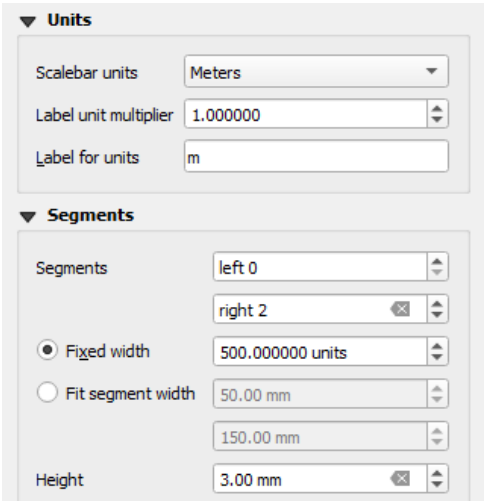
4.4. Step 3: Add a Scalebar

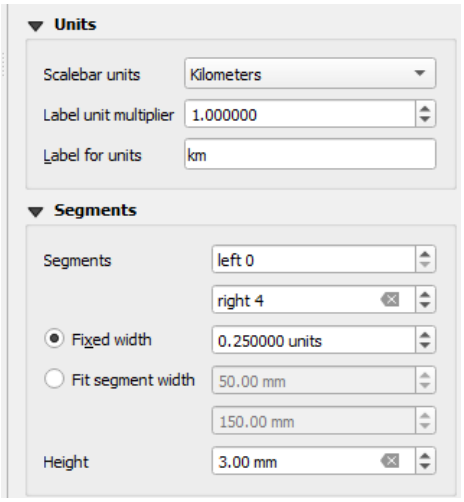
1. Use the ‘Add Scalebar’ tool to add a scalebar to the print layout, select the location and size of the scalebar when drawing the item.
2. Edit the scalebar in the item properties column. For example, you can change the unit used (from metres to km), the number of segments on the scalebar, and the font etc.,



2

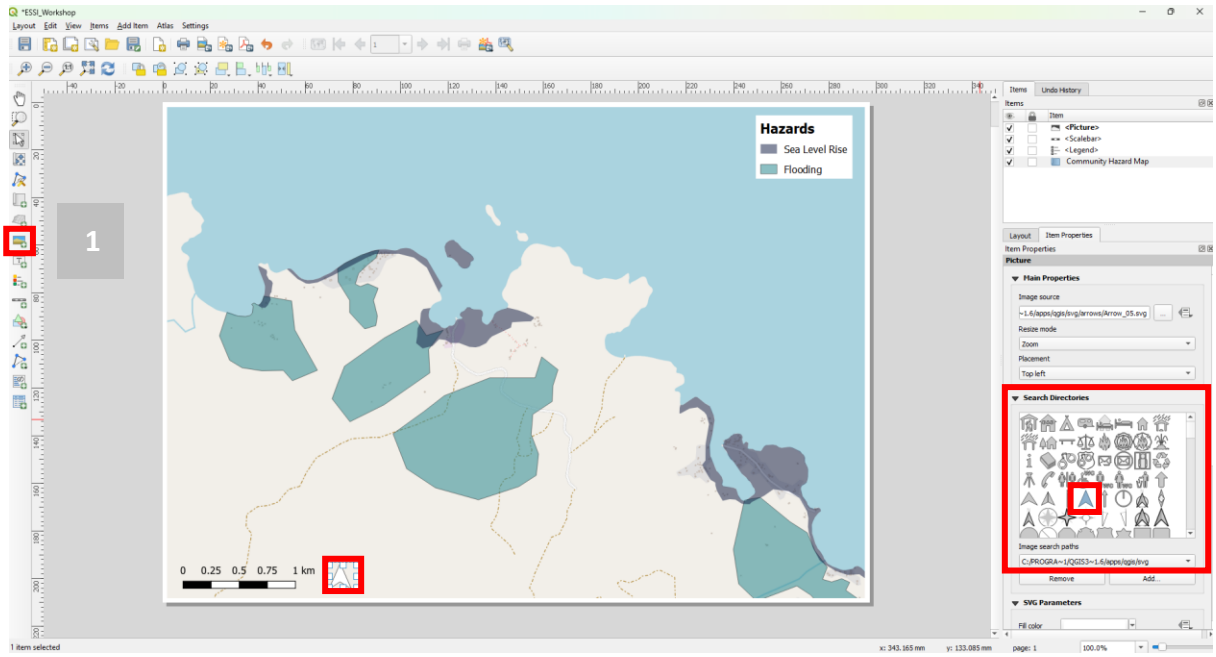






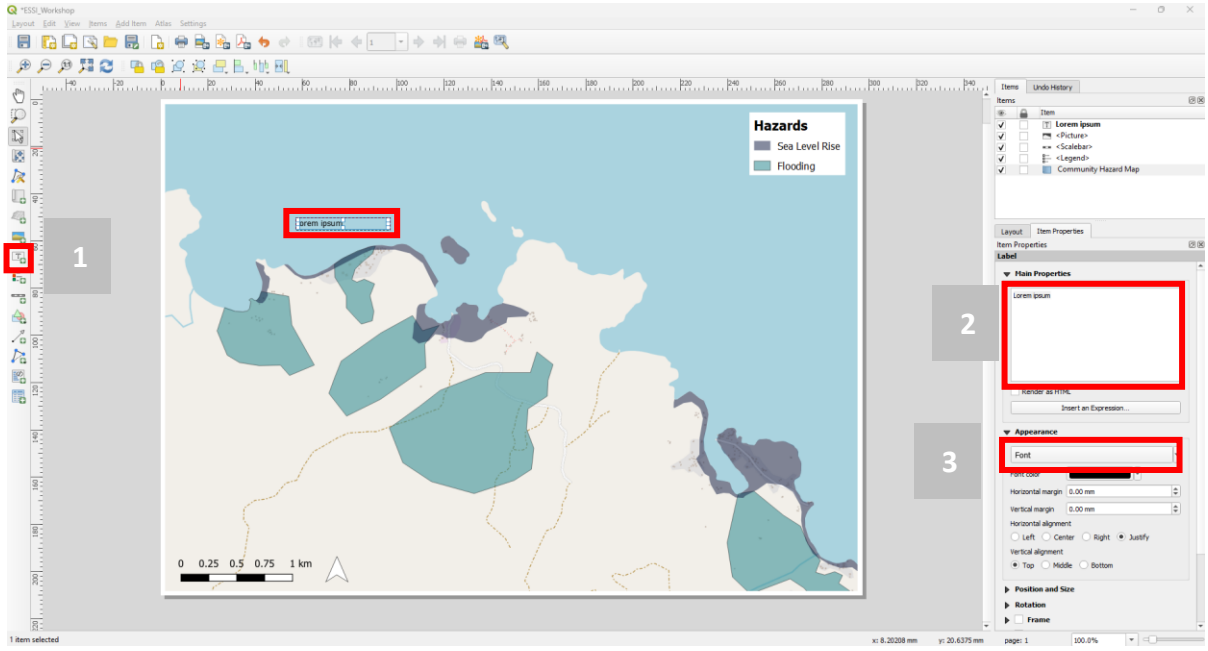
4.5. Step 4: Add a North Arrow

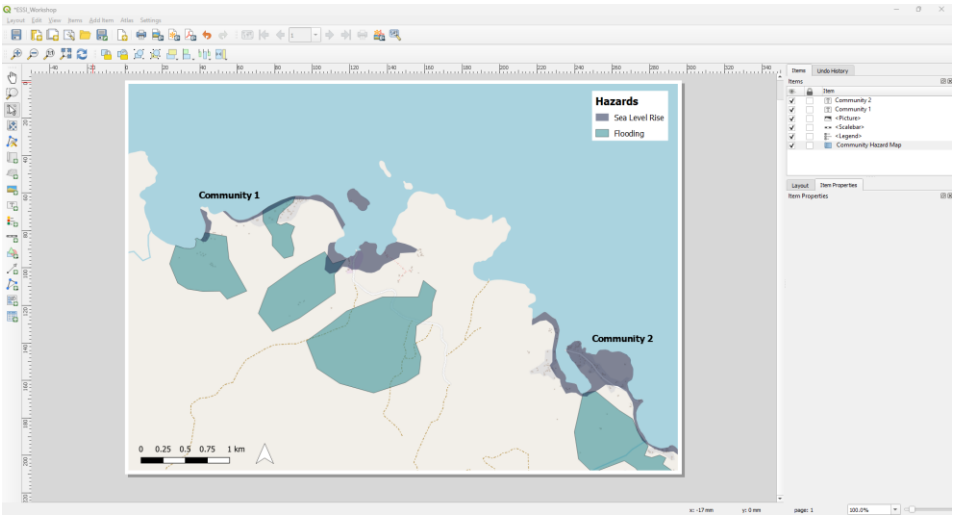
1. Use the ‘Add Picture’ function and draw the location where you would like the north arrow to be displayed.
2. Go to the item properties column on the right, and expand the ‘Search Directory’ this will display a range of icons, select an arrow icon from this list.



4.6. Step 5: Add Labels/Map Title

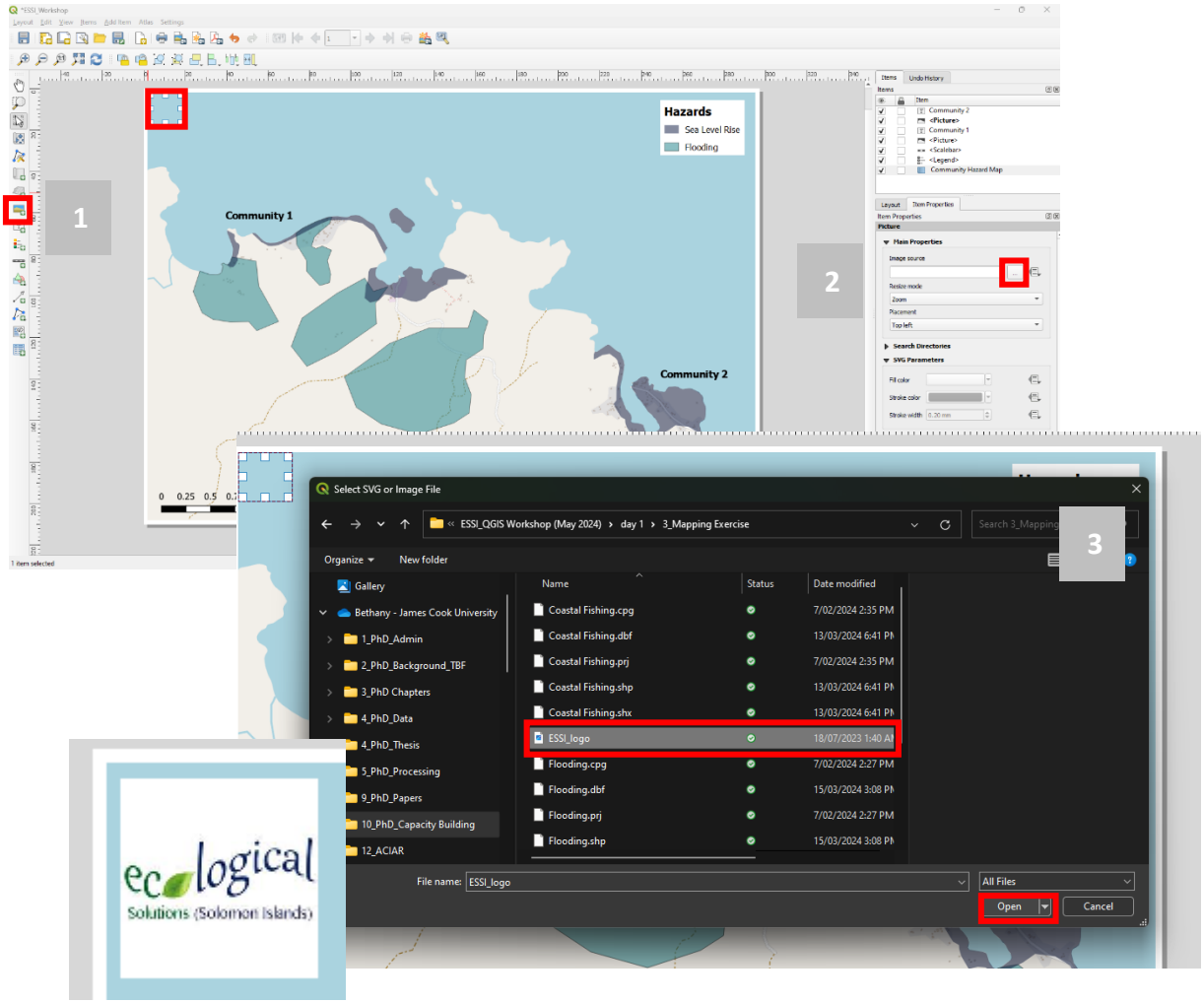
1. Use the ‘Add Text’ button to add text to the print layout, this can be used to create a map title or add labels. Draw on the map where you would like the label to be.
2. Go to the item properties column on the write and change the text.
3. Change the appearance of the text to the size and font you would like to use.





4.7. Step 6: Add A Logo

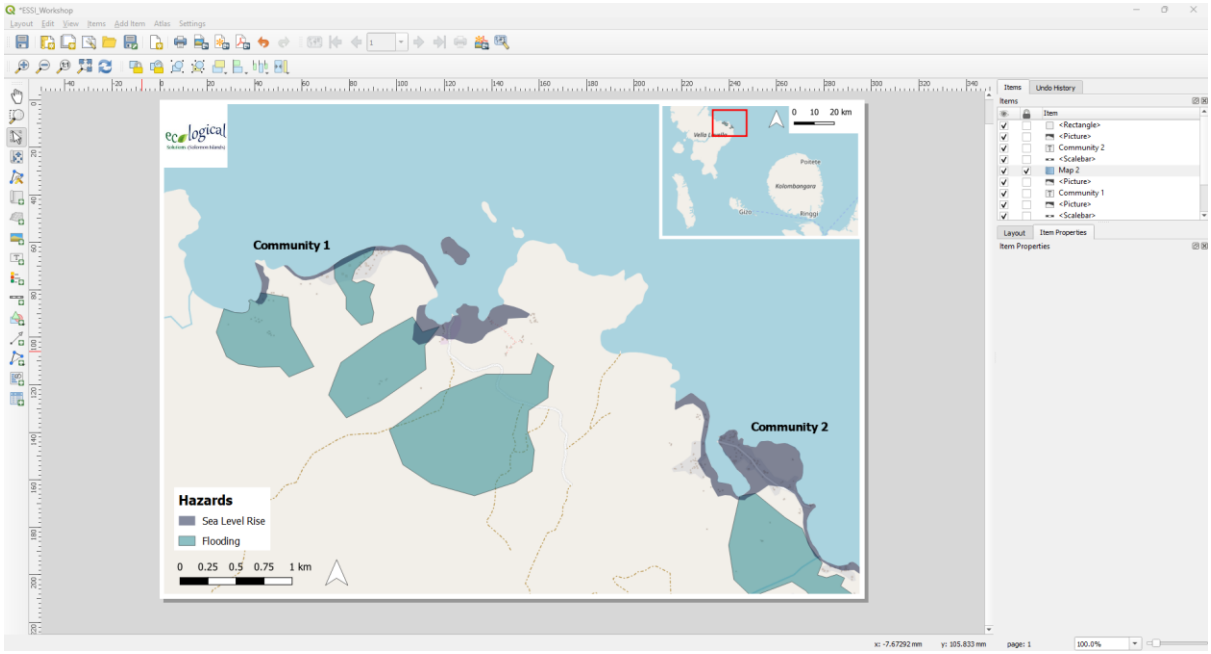
1. To add a logo (or another picture) to the print layout select the ‘Add picture’ tool and draw where you would like the logo to be displayed.
2. Go to the item properties and click the … button next to ‘image source’.
3. Navigate to the image you would like to use and click add, the image will now be displayed in the print layout.



4.8. Additional Steps

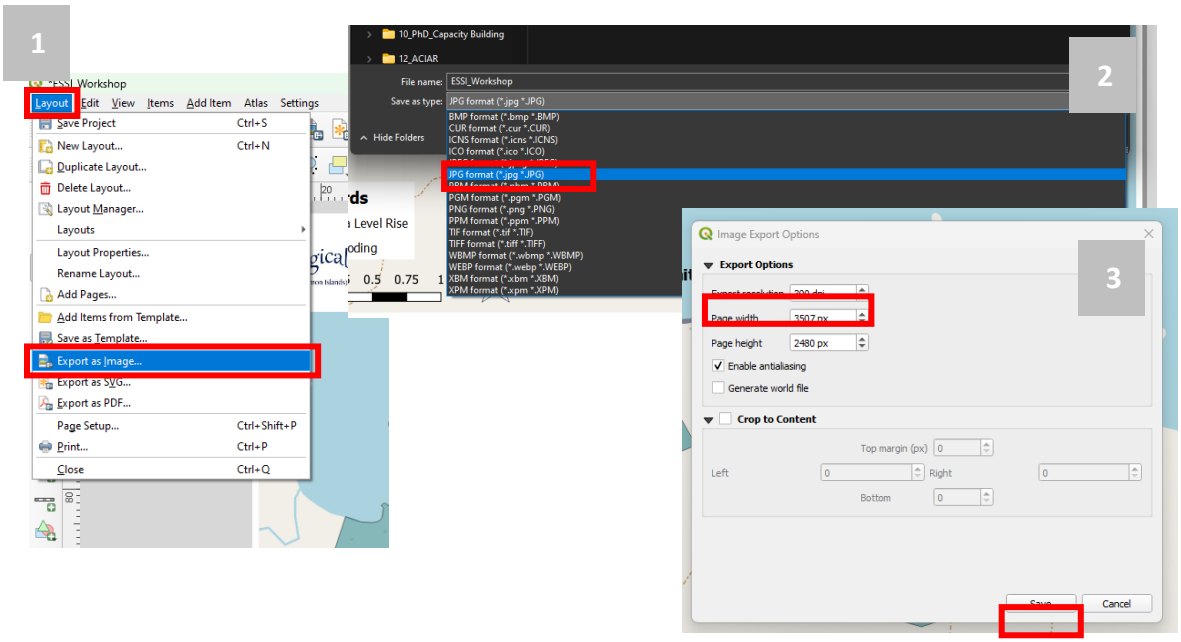
You can continue to edit the print layout. One example is using the tools we have describe to add an inset map, showing the location of the communities in Western Province. The image below provides an example of this.

Remember, you will need to add another legend and north arrow for inset maps.



4.9. Exporting and Saving your Map as an Image

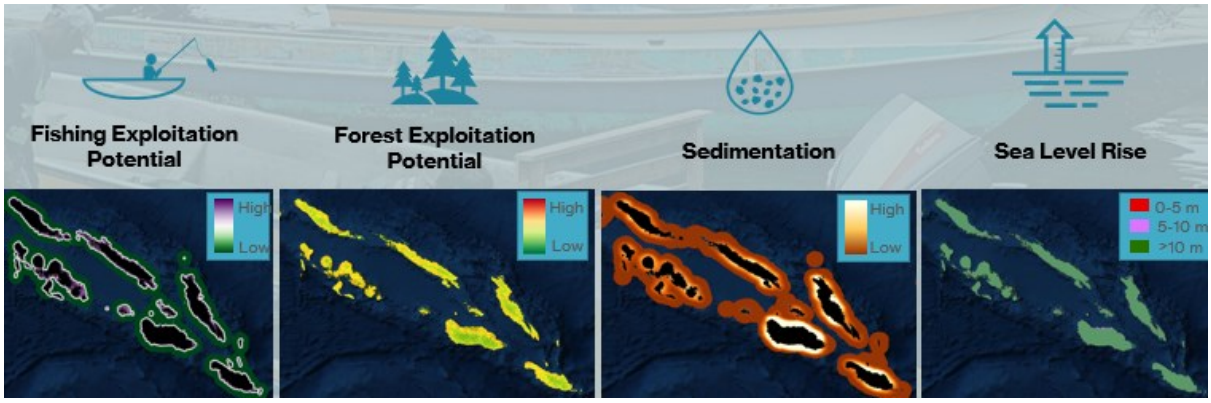
1. To save your map as an image go to Layout in the top toolbar, then select ‘save as image’.
2. Select the folder where you would like to save your map. Name your map and select the file type you would like the image to be saved in (E.g., .JPG).
3. Select your export option, the higher the dpi value the higher the quality of the map.
4. Click save and your map will be exported to the folder you selected.



Session 5: Using QGIS to View National Hazard Maps

The JCU SRA FIS-2020-111 developed national level hazard maps showing the potential risk of:

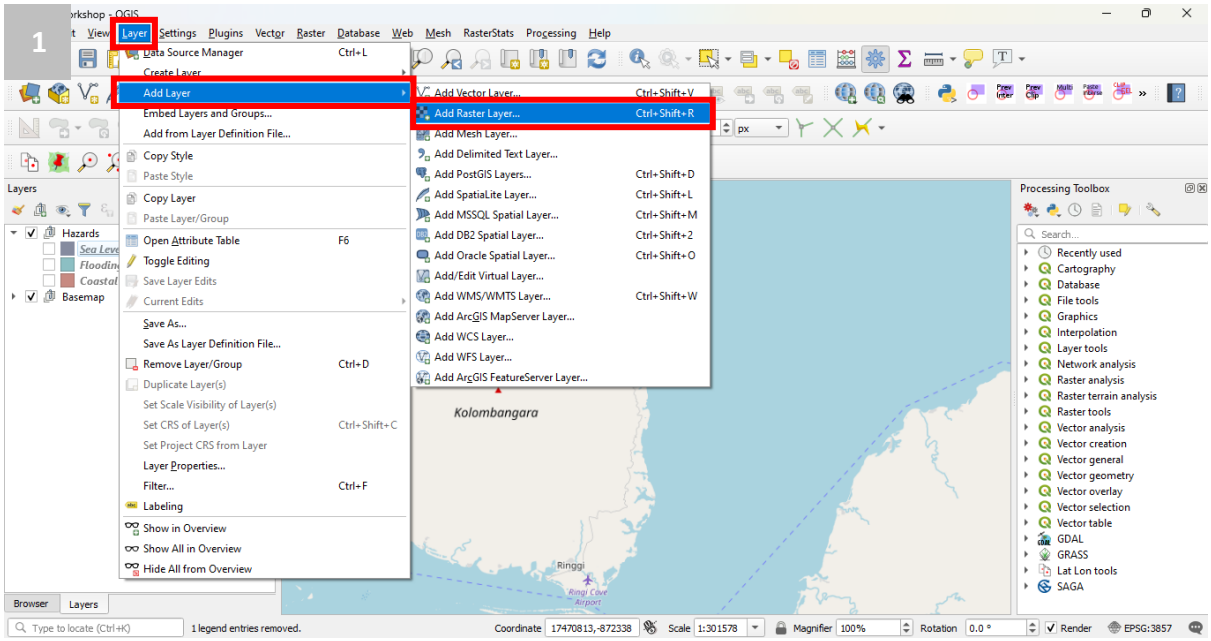
i) sea level rise
ii) sedimentation
iii) fishing resource exploitation
iv) forest resource exploitation

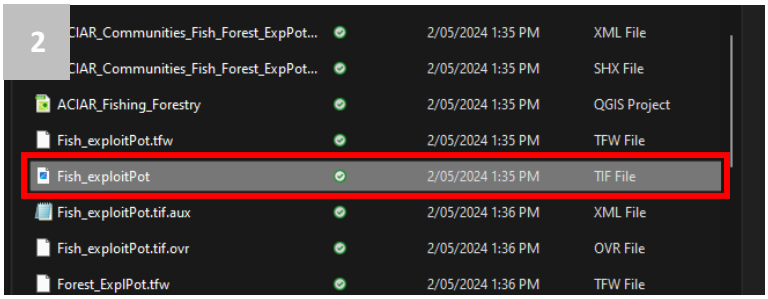


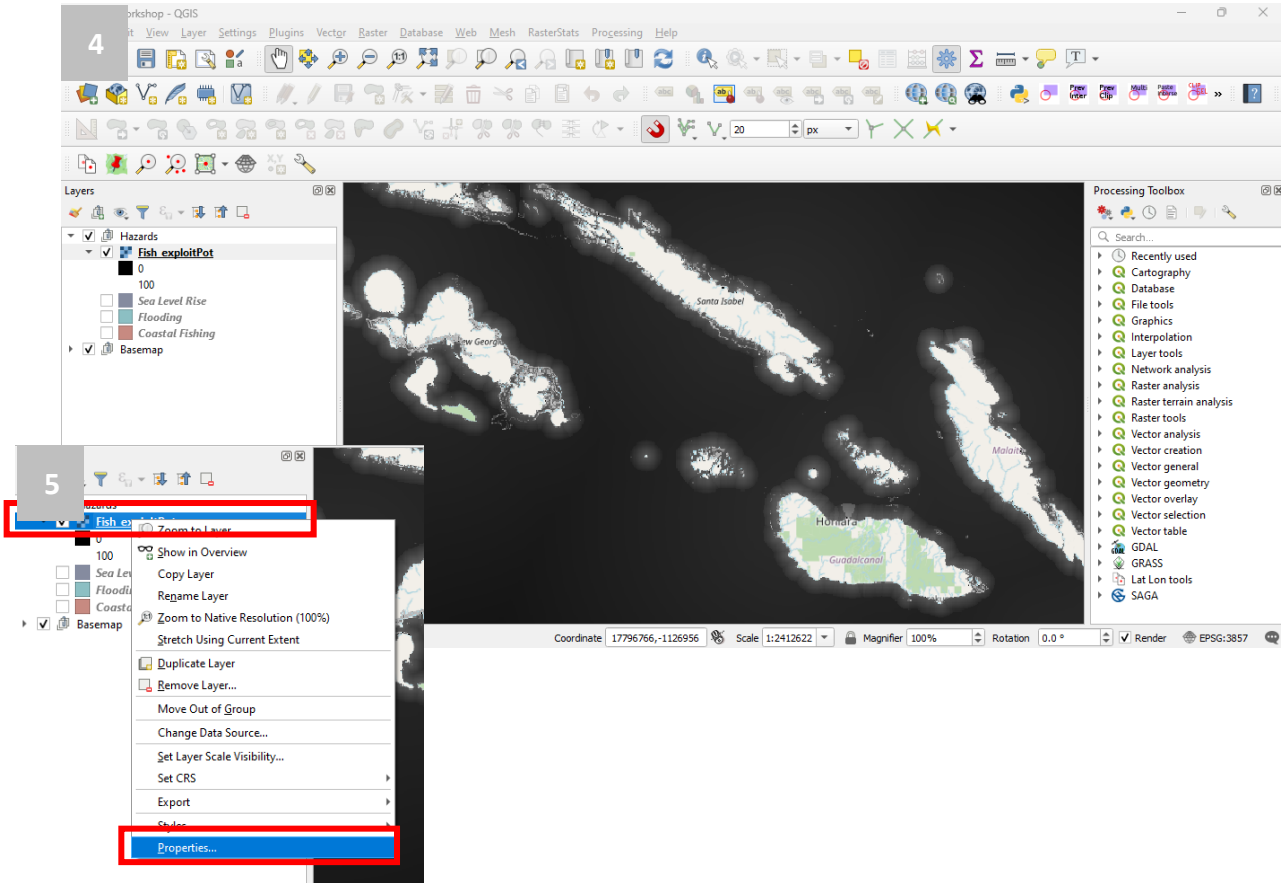
The raster files for these layers can be imported and viewed within QGIS to demonstrate these maps, you can also use these files to look at the risk of each hazard within different locations across Solomon Islands, and map these using the QGIS mapping tool.

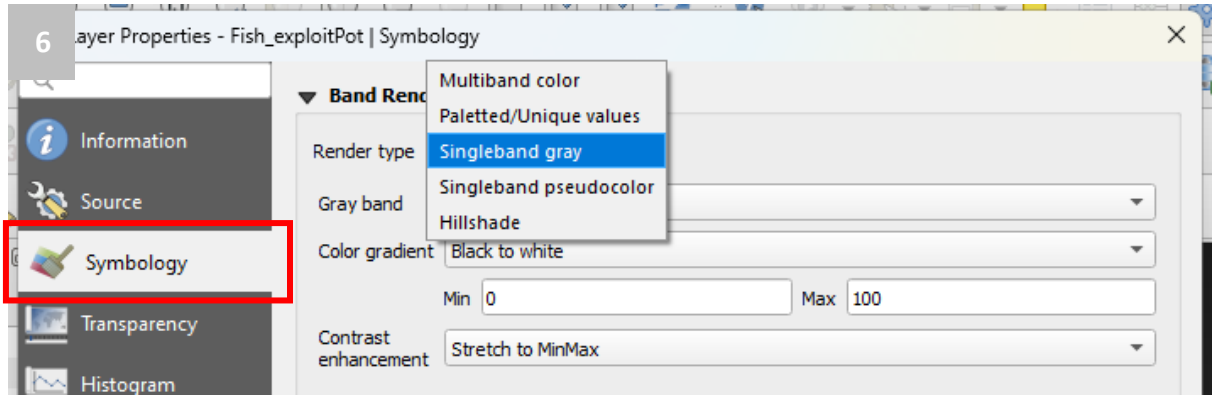
To view these layers within QGIS use the following steps:

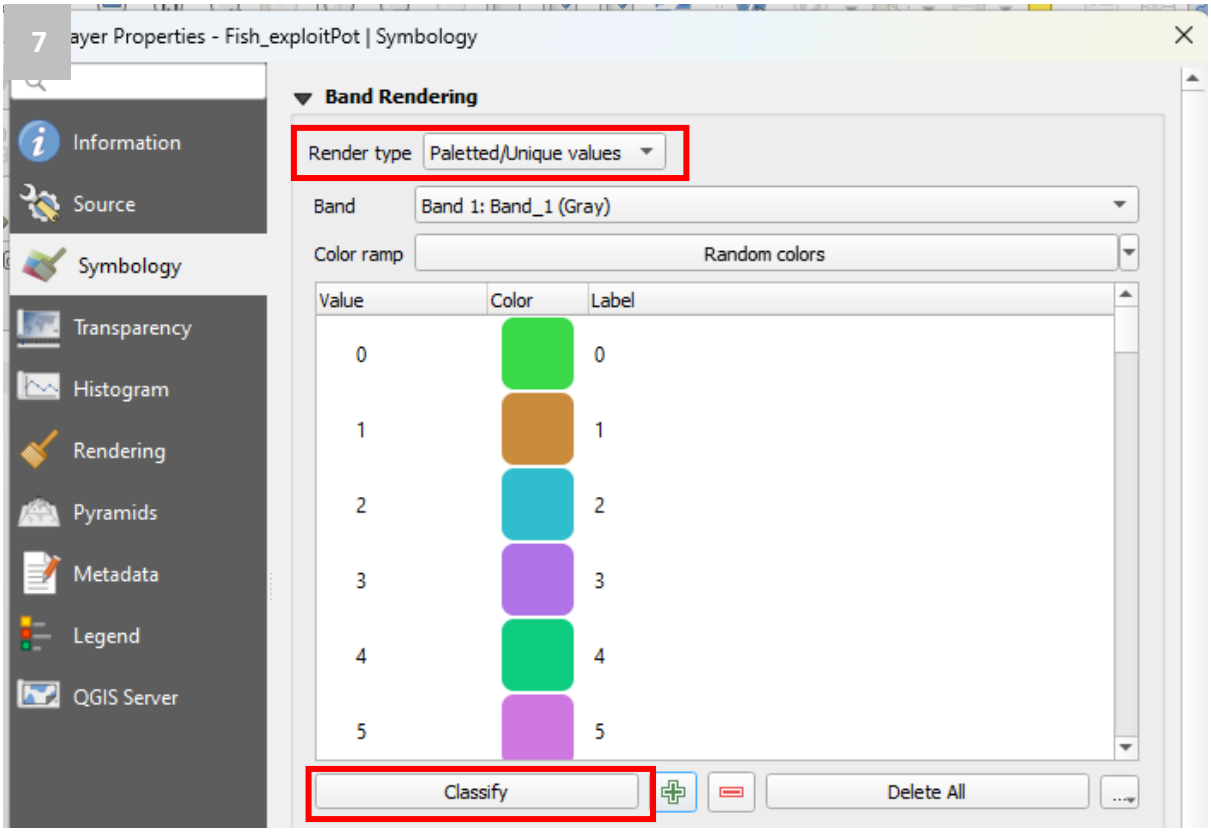
1. Go to Layer > Add Layer > Add Raster Layer
2. Navigate to the National Hazard Map QGIS folder and select the TIF file representing each hazard type.
3. Press the 'add' button in the data source manager box.
4. You will now be able to see the file in the QGIS interface, for example fishing resource exploitation is displayed on a greyscale ranging from 0-1, where 0 is low risk and 1 is high risk.
5. You can change the colour of the map by right clicking the layer and selecting the properties button.
6. Go to the 'Symbology' tab and you will be able to select from different render types.
7. Select 'Paletted/Unique values' and press the classify button.
8. Select 'Apply' and 'OK' to change the colour of the map.
9. You can further customize the colours by going back into the Symbology tab and selecting different colour ramps, play around until you have a colour ramp you are happy with.
10. Click 'Apply' and 'Ok'.
11. View the map within the QGIS interface.

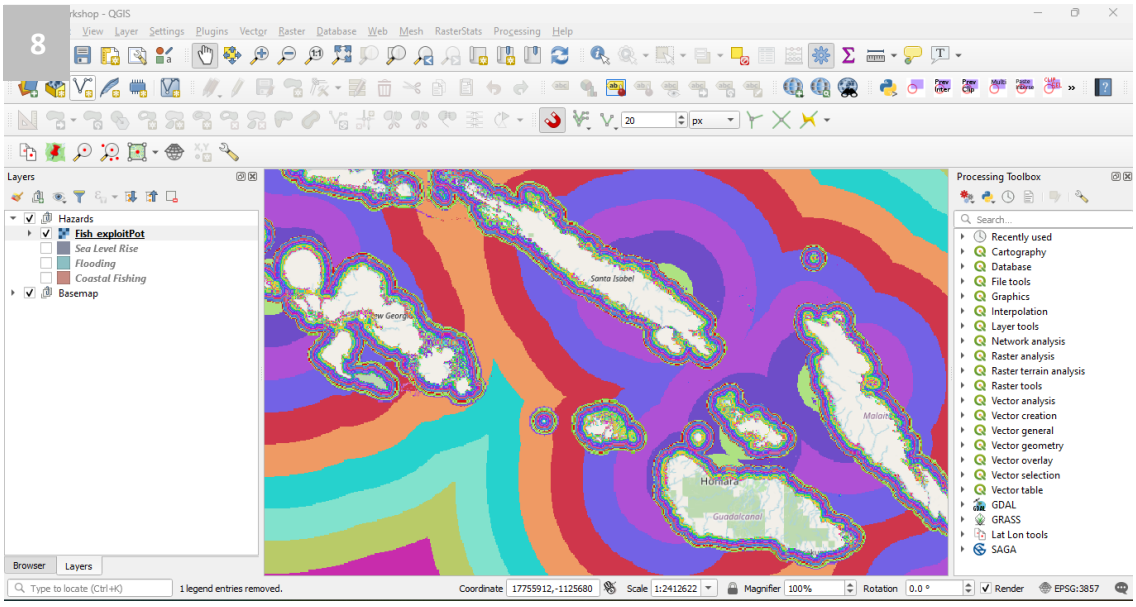

1
Layer
Settings
Plugins
Vector
Raster
Database
Web
Mesh
RasterStats
Processing
Help
Data Source Manager Ctrl+L
Create Layer
Add Layer
Embed Layers and Groups...
Add from Layer Definition File...
Copy Style
Paste Style
Copy Layer
Paste Layer/Group
Open Attribute Table F6
Toggle Editing
Save Layer Edits
Current Edits
Save As...
Save As Layer Definition File...
Remove Layer/Group Ctrl+D
Duplicate Layer(s)
Set Scale Visibility of Layer(s)
Set CRS of Layer(s) Ctrl+Shift+C
Set Project CRS from Layer
Layer Properties...
Filter... Ctrl+F
Labeling
Show in Overview
Show All in Overview
Hide All from Overview
Add Vector Layer... Ctrl+Shift+V
Add Raster Layer... Ctrl+Shift+R
Add Mesh Layer...
Add Delimited Text Layer...
Add PostGIS Layers... Ctrl+Shift+D
Add SpatiaLite Layer... Ctrl+Shift+L
Add MSSQL Spatial Layer... Ctrl+Shift+M
Add DB2 Spatial Layer... Ctrl+Shift+2
Add Oracle Spatial Layer... Ctrl+Shift+O
Add/Edit Virtual Layer...
Add WMS/WMTS Layer... Ctrl+Shift+W
Add ArcGIS MapServer Layer...
Add WCS Layer...
Add WFS Layer...
Add ArcGIS FeatureServer Layer...
Layers
Hazards
Basemap
Kolombangara
Ringgi
Processing Toolbox
Recently used
Cartography
Database
File tools
Graphics
Interpolation
Layer tools
Network analysis
Raster analysis
Raster terrain analysis
Raster tools
Vector analysis
Vector creation
Vector general
Vector geometry
Vector overlay
Vector selection
Vector table
GDAL
GRASS
Lat Lon tools
SAGA
Browser
Layers
1 legend entries removed.
Coordinate 17470813,-872338
Scale 1:301578
Magnifier 100%
Rotation 0.0 °
Render
EPSG:3857

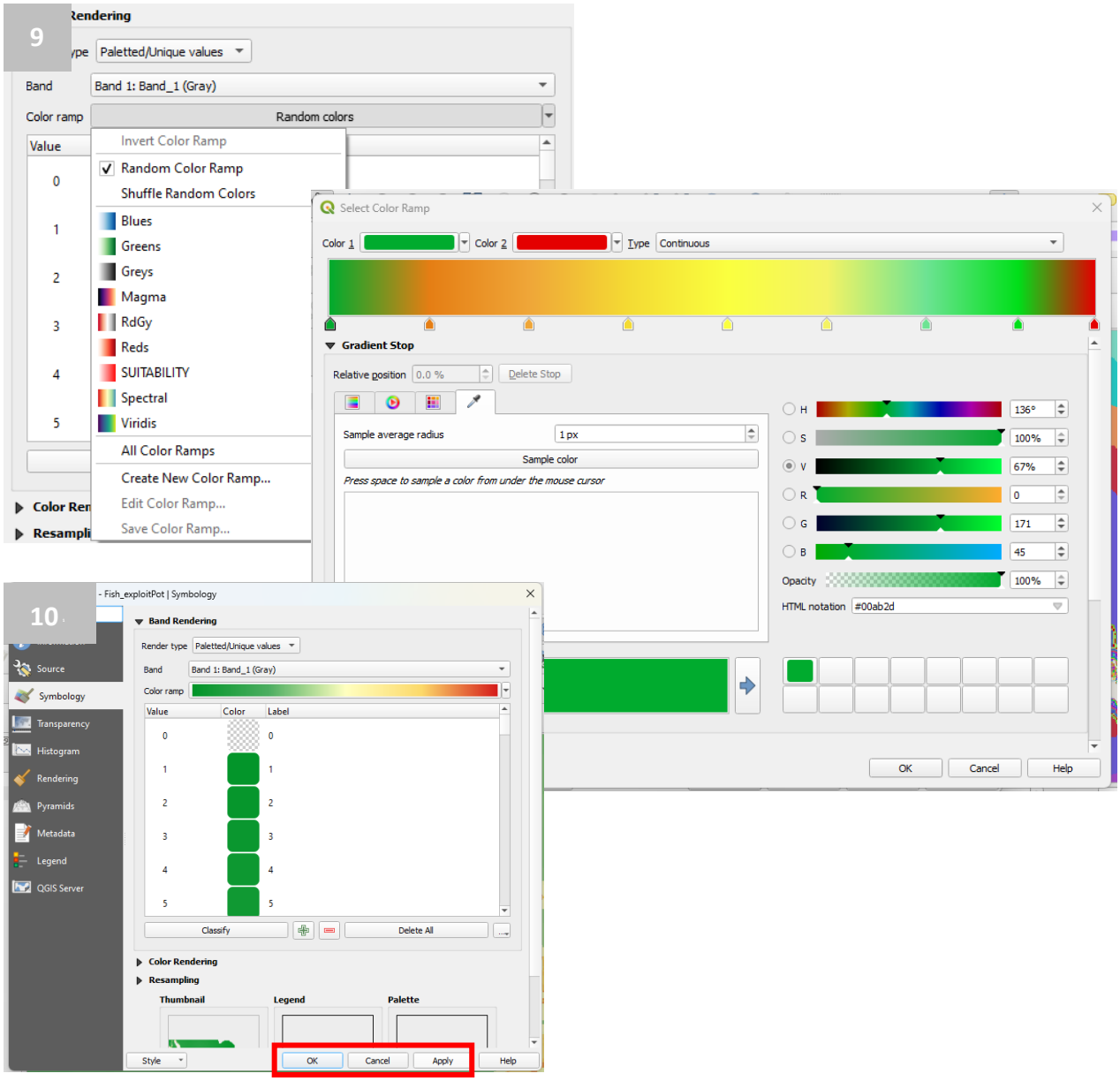

2
CIAR_Communities_Fish_Forest_ExpPot... 2/05/2024 1:35 PM XML File
CIAR_Communities_Fish_Forest_ExpPot... 2/05/2024 1:35 PM SHX File
ACIAR_Fishing_Forestry 2/05/2024 1:35 PM QGIS Project
Fish_exploitPot.tfw 2/05/2024 1:35 PM TFW File
Fish_exploitPot 2/05/2024 1:35 PM TIF File
Fish_exploitPot.tif.aux 2/05/2024 1:36 PM XML File
Fish_exploitPot.tif.ovr 2/05/2024 1:36 PM OVR File
Forest_ExplPot.tfw 2/05/2024 1:36 PM TFW File


4
Layers
Hazards
Fish_exploitPot
0
100
Sea Level Rise
Flooding
Coastal Fishing
Basemap
Santa Isabel
Honiara
Guadalcanal
Processing Toolbox
Recently used
Cartography
Database
File tools
Graphics
Interpolation
Layer tools
Network analysis
Raster analysis
Raster terrain analysis
Raster tools
Vector analysis
Vector creation
Vector general
Vector geometry
Vector overlay
Vector selection
Vector table
GDAL
GRASS
Lat Lon tools
SAGA
Coordinate 17796766,-1126956
Scale 1:2412622
Magnifier 100%
Rotation 0.0 °
Render
EPSG:3857
5
Zoom to Layer
Show in Overview
Copy Layer
Rename Layer
Zoom to Native Resolution (100%)
Stretch Using Current Extent
Duplicate Layer
Remove Layer...
Move Out of Group
Change Data Source...
Set Layer Scale Visibility...
Set CRS
Export
Properties...


6
ayer Properties - Fish_exploitPot | Symbology
Information
Source
Symbology
Transparency
Histogram
Band Rend
Multiband color
Paletted/Unique values
Singleband gray
Singleband pseudocolor
Hillshade
Render type
Gray band
Color gradient
Black to white
Min
0
Max
100
Contrast enhancement
Stretch to MinMax


7
ayer Properties - Fish_exploitPot | Symbology
Information
Source
Symbology
Transparency
Histogram
Rendering
Pyramids
Metadata
Legend
QGIS Server
Band Rendering
Render type
Paletted/Unique values
Band
Band 1: Band_1 (Gray)
Color ramp
Random colors
Value
Color
Label
0
1
2
3
4
5
Classify
Delete All


8
Layers
Hazards
Fish exploitPot
Sea Level Rise
Flooding
Coastal Fishing
Basemap
Processing Toolbox
Recently used
Cartography
Database
File tools
Graphics
Interpolation
Layer tools
Network analysis
Raster analysis
Raster terrain analysis
Raster tools
Vector analysis
Vector creation
Vector general
Vector geometry
Vector overlay
Vector selection
Vector table
GDAL
GRASS
Lat Lon tools
SAGA
Browser
Layers

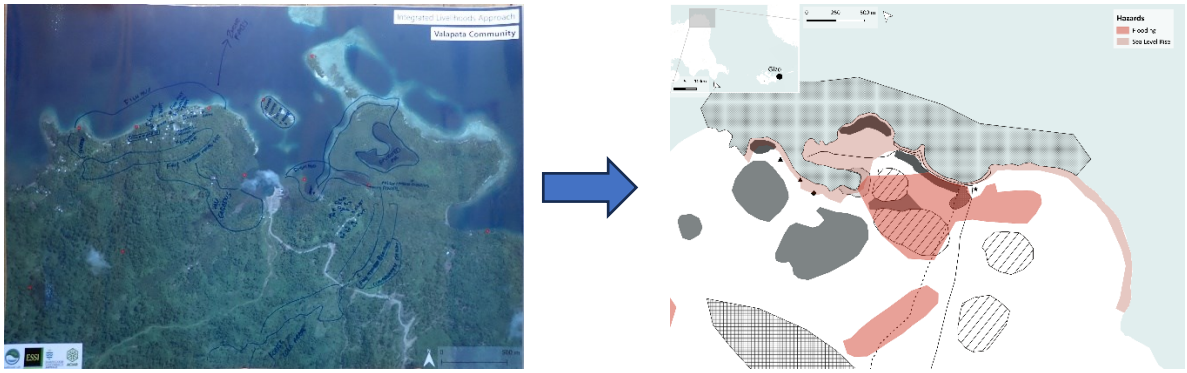

9
Rendering
Paletted/Unique values
Band
Band 1: Band_1 (Gray)
Color ramp
Random colors
Value
Invert Color Ramp
Random Color Ramp
Shuffle Random Colors
Blues
Greens
Greys
Magma
RdGy
Reds
SUITABILITY
Spectral
Viridis
All Color Ramps
Create New Color Ramp...
Edit Color Ramp...
Save Color Ramp...
Select Color Ramp
Color 1
Color 2
Type
Continuous
Gradient Stop
Relative position
Delete Stop
Sample average radius
Sample color
Press space to sample a color from under the mouse cursor
H
S
V
R
G
B
Opacity
HTML notation
#00ab2d
OK
Cancel
Help
10
Fish_exploitPot | Symbology
Band Rendering
Render type
Paletted/Unique values
Band
Band 1: Band_1 (Gray)
Color ramp
Value
Color
Label
Classify
Delete All
Color Rendering
Resampling
Thumbnail
Legend
Palette
Style
OK
Cancel
Apply
Help
11
QGIS
Layers
Hazards
Fish_exploitPot
Sea Level Rise
Flooding
Coastal Fishing
Basemap
Gizo
Processing Toolbox
Recently used
Cartography
Database
File tools
Graphics
Interpolation
Layer tools
Network analysis
Raster analysis
Raster terrain analysis
Raster tools
Vector analysis
Vector creation
Vector general
Vector geometry
Vector overlay
Vector selection
Vector table
GDAL
GRASS
Lat Lon tools
SAGA
Browser
Layers
1 legend entries removed.
Coordinate
Scale
Magnifier
Rotation
Render
EPSG:3857

Session 6: Using QGIS to Digitise Hand Drawn Maps

6.1. Readying Hand Drawn Maps for Digitisation

Digitisation is the process of converting data into a digital format.

In terms of participatory mapping this refers to the process of converting hand drawn maps into spatial files (e.g., vector or raster). This enables data to be stored and processes and presented in a digital format.



To prepare hand drawn maps for digitisation:

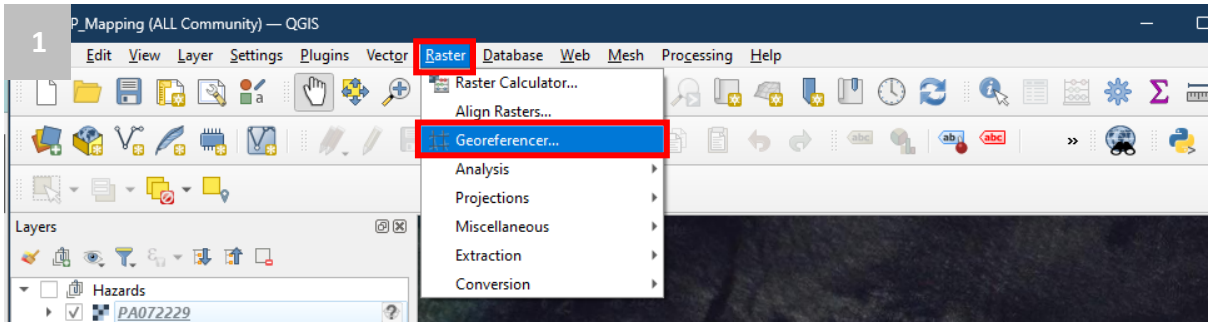
1. Take a clear image of the map from an overhead position.
2. Upload this image as a jpg file onto your computer.

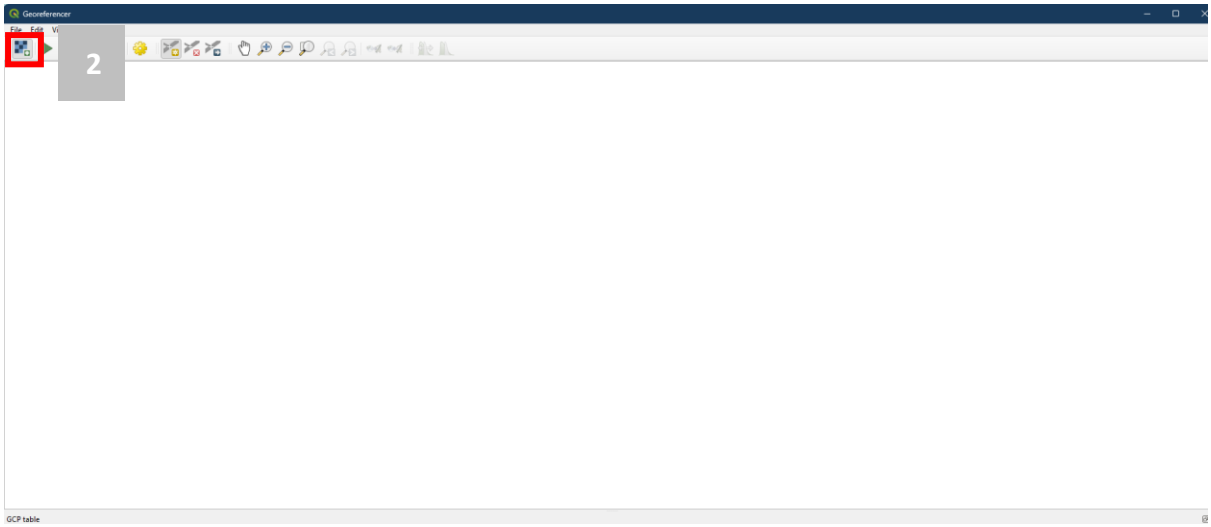
6.2. Importing Hand Drawn Maps into QGIS

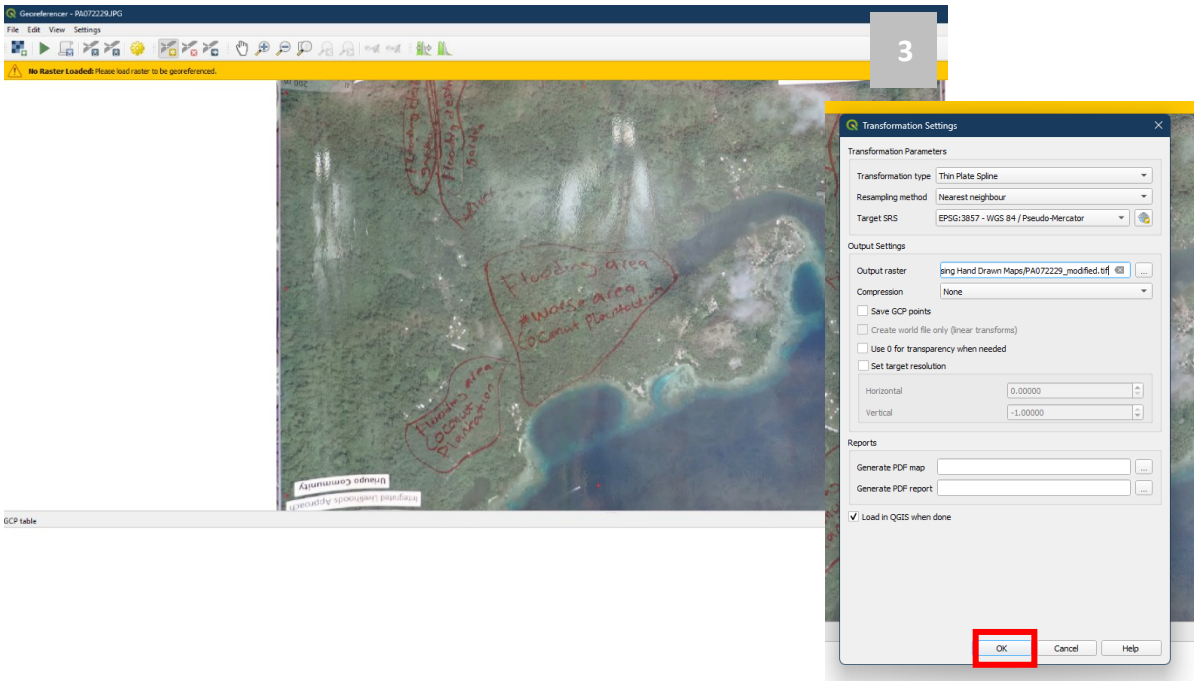
To digitise hand drawn maps, the map must first be be georeferenced. Georeferencing is the process of associating a spatial location with a hand drawn map.

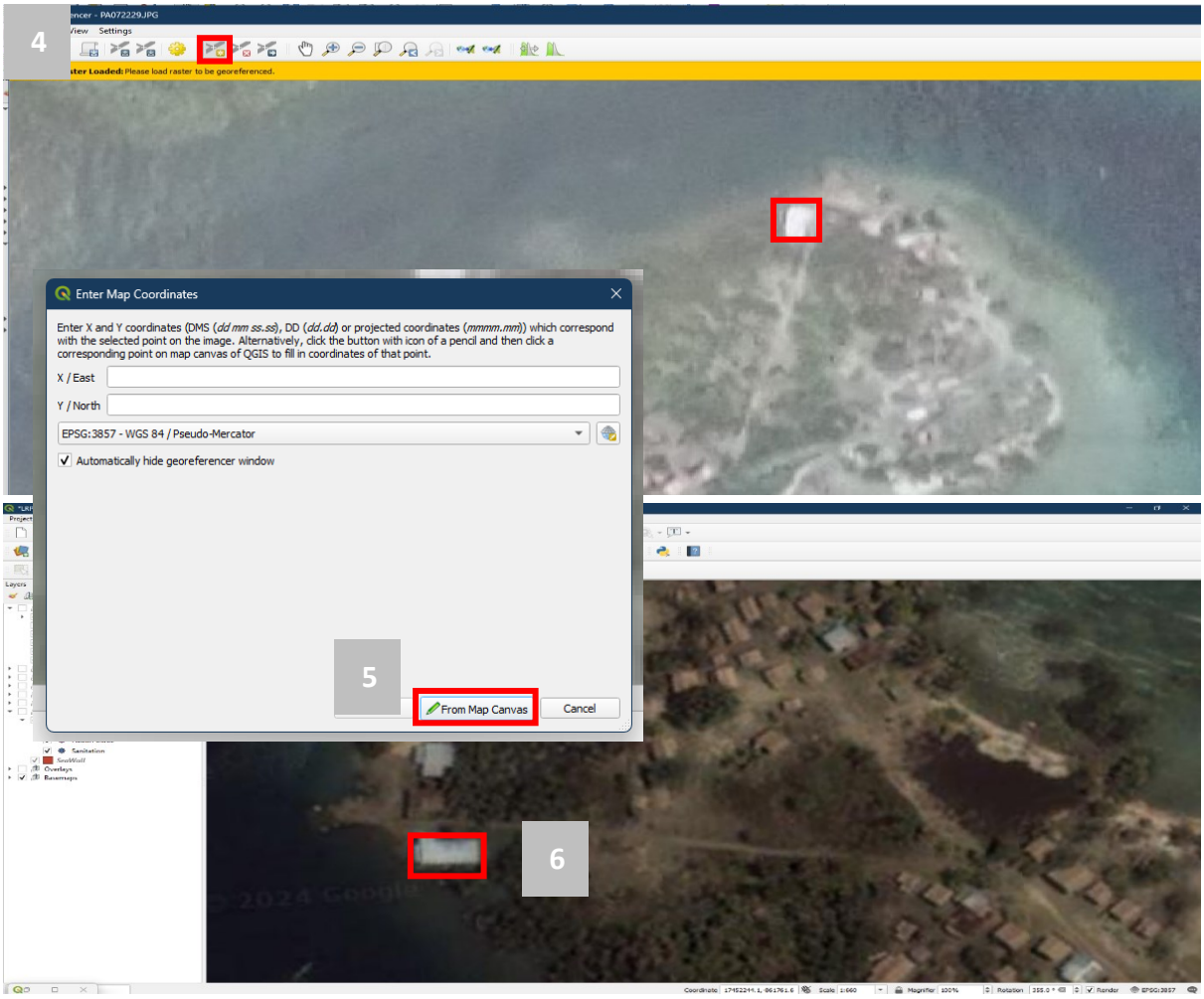
To georeference your hand drawn map:

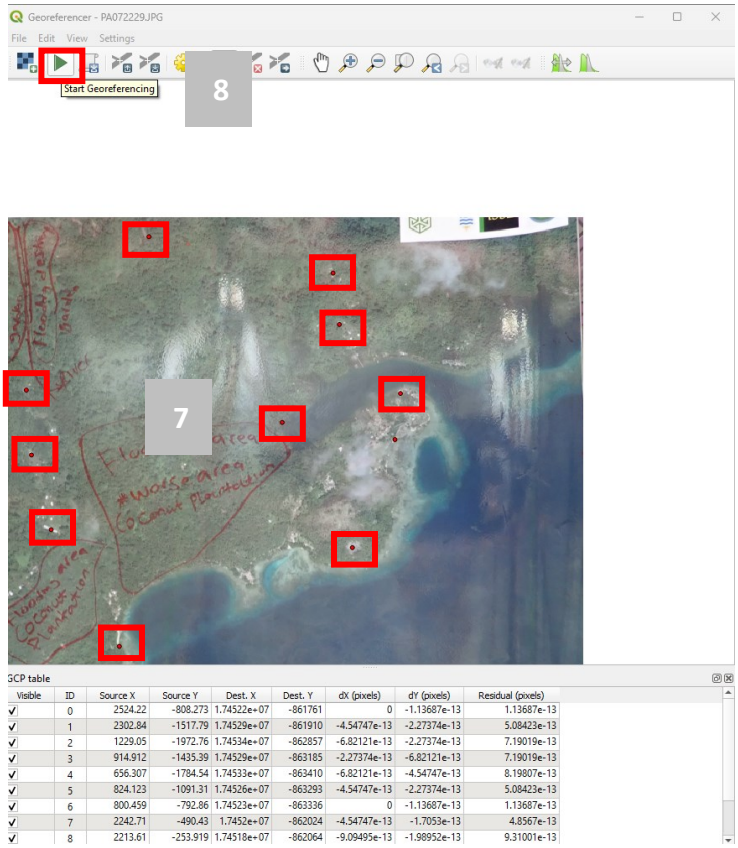
1. Go to raster > Georeferencer.
2. When the georeferencer tool opens go to top left ‘open raster button’ and navigate to the jpeg file of the hand drawn map
3. Accept the transformation settings.
4. On the image of your map select ‘Add Point’ and click on a point of interest that stands out on your image.
5. In the ‘Enter Map Coordinates’ box select ‘choose from map canvas’.
6. Navigate to the same point on the map in the QGIS main interface and click.
7. Repeat this process until you have georeferencing points evenly spaced throughout the map.
8. Click ‘start georeferencing’.
9. Your map should now show up in QGIS interface overlayed onto the correct location.


1
P_Mapping (ALL Community) — QGIS
Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Raster Calculator...
Align Rasters...
Georeferencer...
Analysis
Projections
Miscellaneous
Extraction
Conversion
Layers
Hazards
PA072229

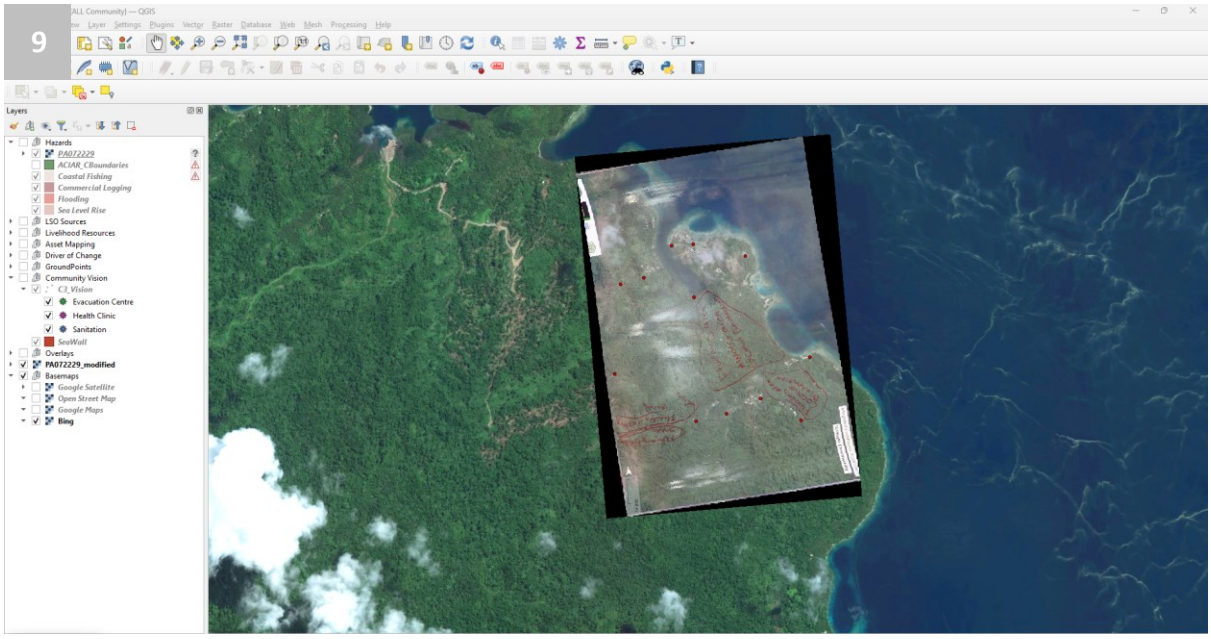

2
Georeferencer
GCP table


3
Georeferencer - PA072229.JPG
File Edit View Settings
No Raster Loaded: Please load raster to be georeferenced.
Transformation Settings
Transformation Parameters
Transformation type
Thin Plate Spline
Resampling method
Nearest neighbour
Target SRS
EPSG:3857 - WGS 84 / Pseudo-Mercator
Output Settings
Output raster
Compression
None
Save GCP points
Create world file only (linear transforms)
Use 0 for transparency when needed
Set target resolution
Horizontal
Vertical
Reports
Generate PDF map
Generate PDF report
Load in QGIS when done
OK
Cancel
Help
GCP table





Visible	ID	Source X	Source Y	Dest. X	Dest. Y	dX (pixels)	dY (pixels)	Residual (pixels)
✓	0	2524.22	-808.273	1.74522e+07	-861761	0	-1.13687e-13	1.13687e-13
✓	1	2302.84	-1517.79	1.74529e+07	-861910	-4.54747e-13	-2.27374e-13	5.08423e-13
✓	2	1229.05	-1972.76	1.74534e+07	-862857	-6.82121e-13	-2.27374e-13	7.19019e-13
✓	3	914.912	-1435.39	1.74529e+07	-863185	-2.27374e-13	-6.82121e-13	7.19019e-13
✓	4	656.307	-1784.54	1.74533e+07	-863410	-6.82121e-13	-4.54747e-13	8.19807e-13
✓	5	824.123	-1091.31	1.74526e+07	-863293	-4.54747e-13	-2.27374e-13	5.08423e-13
✓	6	800.459	-792.86	1.74523e+07	-863336	0	-1.13687e-13	1.13687e-13
✓	7	2242.71	-490.43	1.7452e+07	-862024	-4.54747e-13	-1.7053e-13	4.8567e-13
✓	8	2213.61	-253.919	1.74518e+07	-862064	-9.09495e-13	-1.98952e-13	9.31001e-13

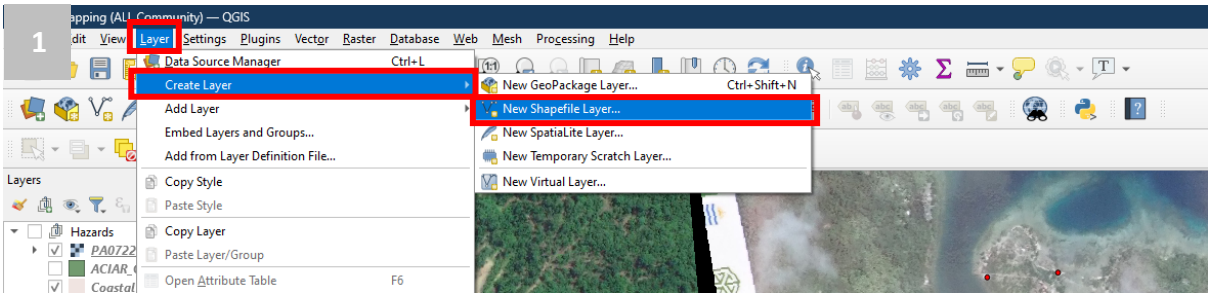


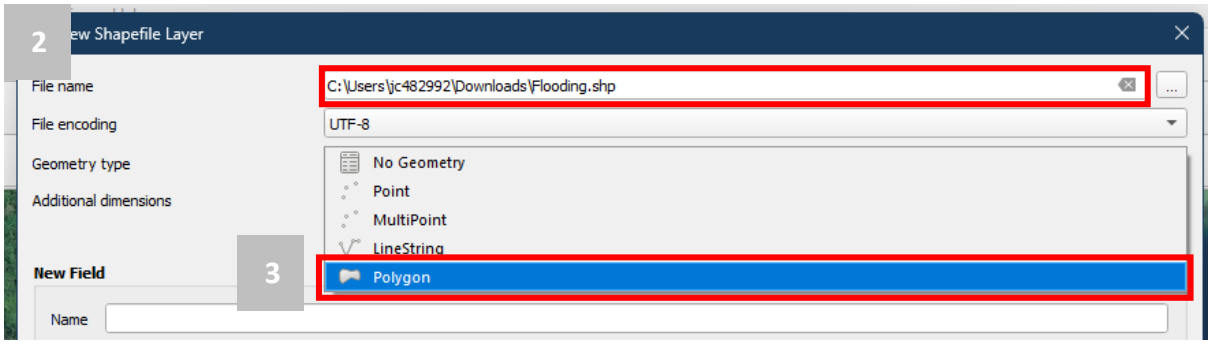
6.3. Digitising Your Georeferenced Map

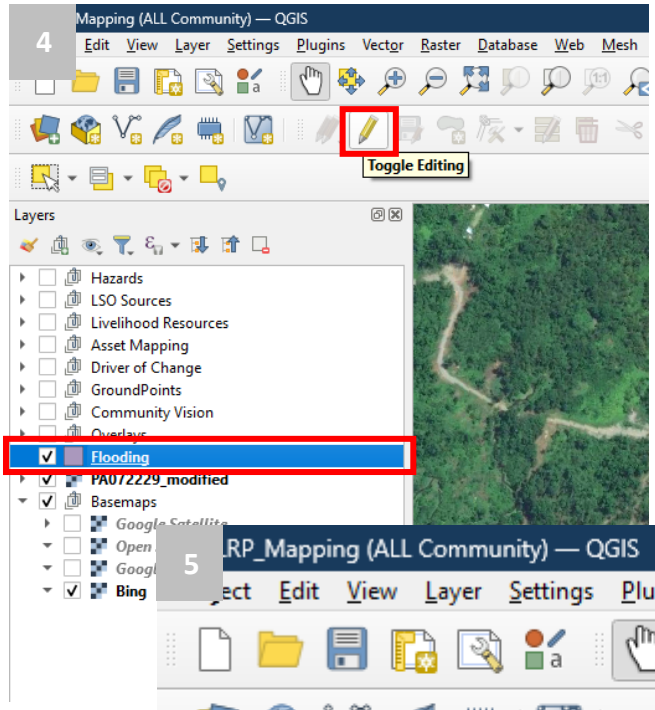
Once you have georeferenced your map, you can digitise the information within the map into spatial layers.

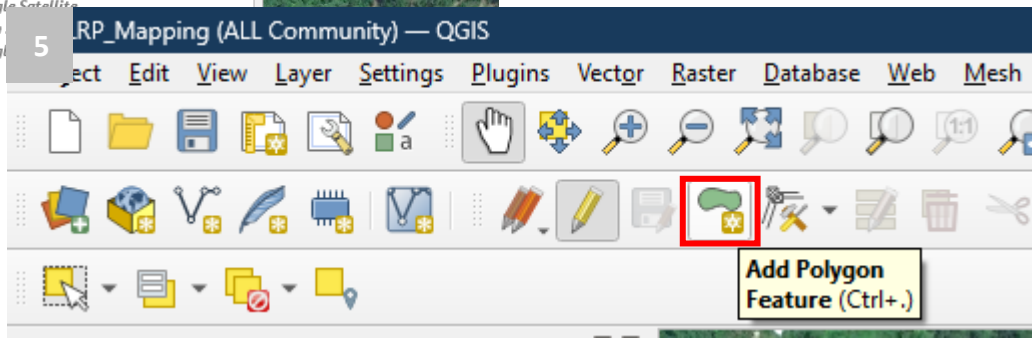
Use the following steps to do this:

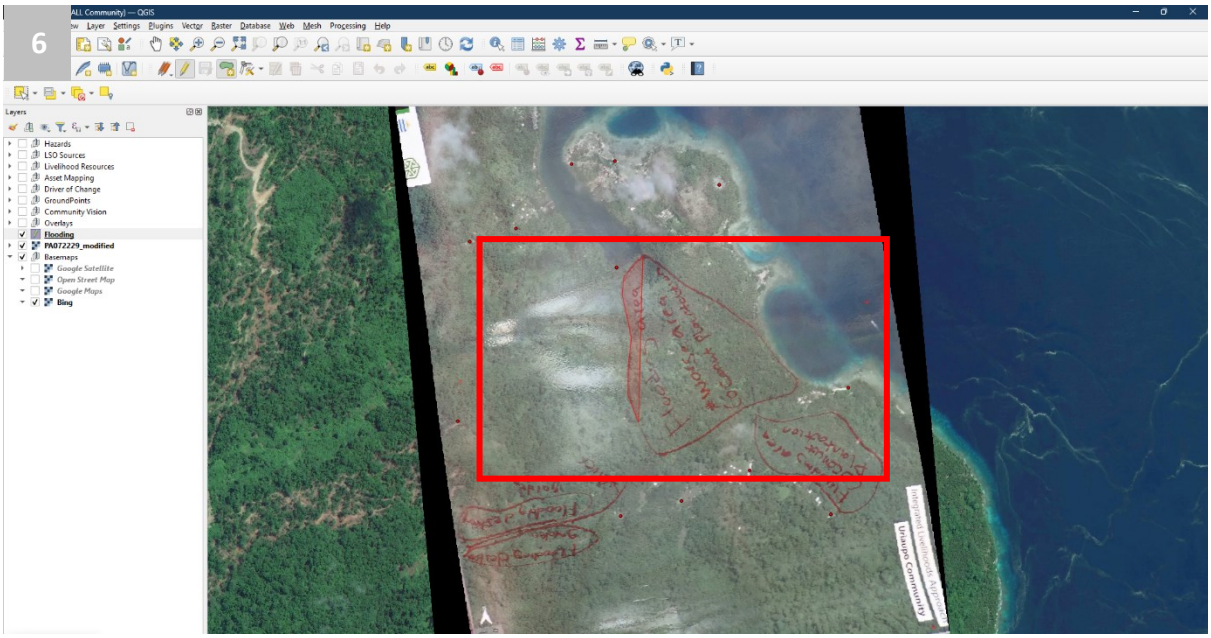
1. Navigate to the ‘layer’ tab and select ‘create layer’ > ‘new shapefile layer’.
2. Give a name to the shapefile and choose the folder you would like to save it in.
3. Select the type of shapefile you will be creating (E.g., point, polygon, line).
4. Click on the layer in the layers box and select ‘toggle editing’.
5. Select ‘add feature’.
6. Begin to draw over your hand drawn map to create a digital feature (e.g., drawn around the forest area).
7. Right click to save the feature.
8. Repeat this process until all features have been drawn.
9. Reclick on the ‘toggle editing’ button and select ‘save changes’.
10. You will see a digitised version of the features in your hand drawn map.
11. You can adjust these features by right clicking on the layer and selecting the properties, style or attribute table buttons. For example, by going to the styles button you can change the colour of the features in the layer.

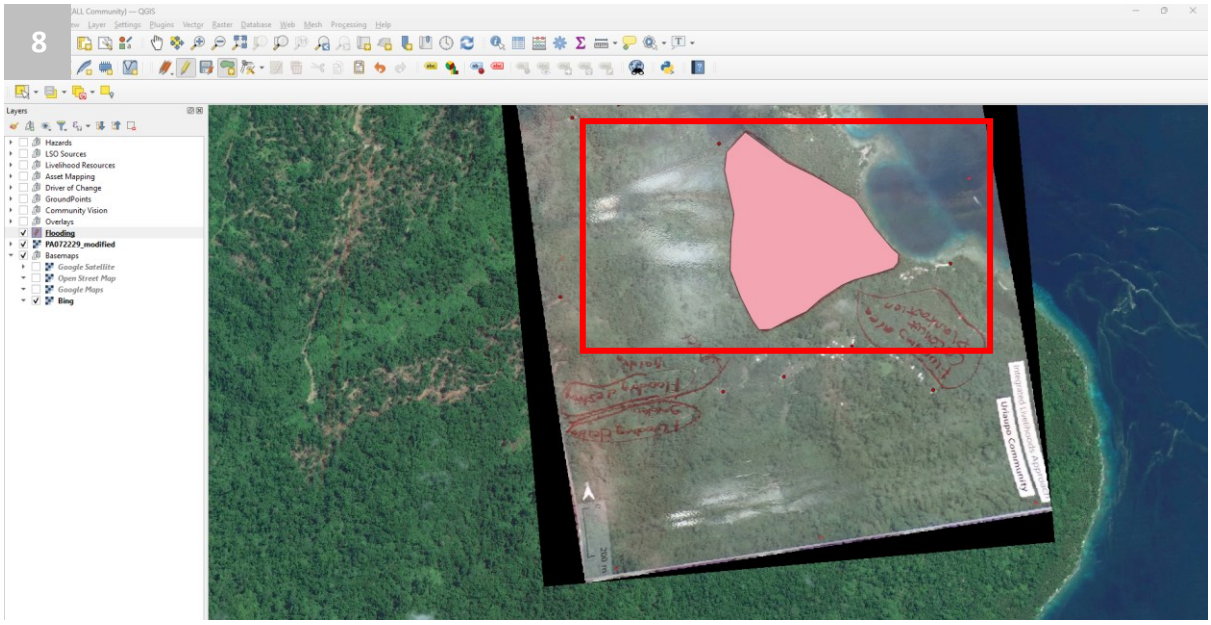


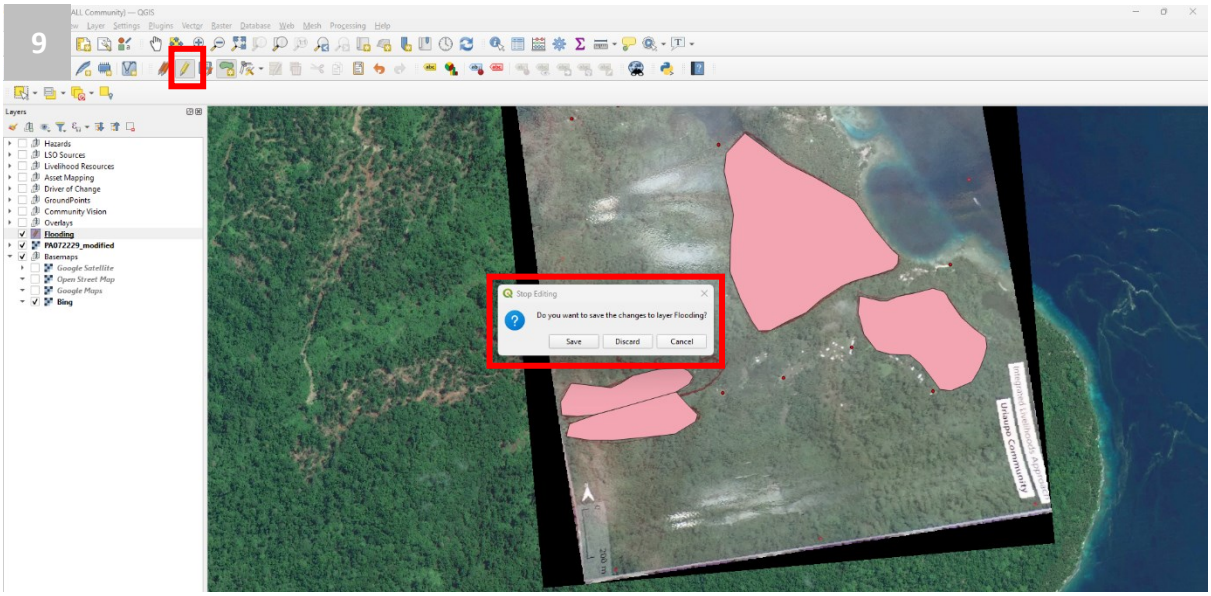

2
ew Shapefile Layer
File name
C:\Users\jc482992\Downloads\Flooding.shp
File encoding
UTF-8
Geometry type
No Geometry
Point
MultiPoint
LineString
Additional dimensions
3
Polygon
New Field
Name

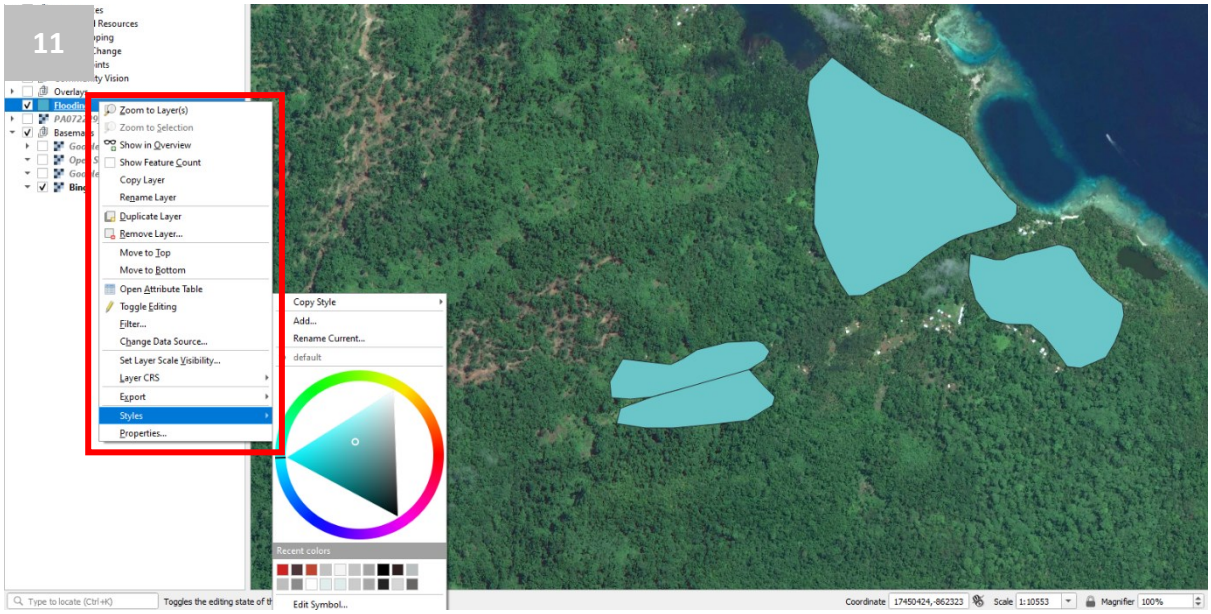

4
Mapping (ALL Community) — QGIS
Edit View Layer Settings Plugins Vector Raster Database Web Mesh
Toggle Editing
Layers
Hazards
LSO Sources
Livelihood Resources
Asset Mapping
Driver of Change
GroundPoints
Community Vision
Flooding
PA072229_modified
Basemaps
Bing


5
RP_Mapping (ALL Community) — QGIS
ect Edit View Layer Settings Plugins Vector Raster Database Web Mesh
Add Polygon Feature (Ctrl+.)


6


8


9
Stop Editing
Do you want to save the changes to layer Flooding?
Save
Discard
Cancel


11
Zoom to Layer(s)
Zoom to Selection
Show in Overview
Show Feature Count
Copy Layer
Rename Layer
Duplicate Layer
Remove Layer...
Move to Top
Move to Bottom
Open Attribute Table
Toggle Editing
Filter...
Change Data Source...
Set Layer Scale Visibility...
Layer CRS
Export
Styles
Properties...
Copy Style
Add...
Rename Current...
default
Recent colors
Edit Symbol...

Section 7: Additional Support

For more support feel free to contact: bethany.smith1@my.jcu.edu.au

Online Resources

The following links refer to online resources that offer comprehensive support in QGIS:

- https://qgis.org/en/docs/index.html
- https://www.qgistutorials.com/en/
- https://opensourceoptions.com/blog/qgis-tutorial-for-beginners/