

The Status of Integrated Coastal Zone Management (ICZM) and Mangroves in Solomon Islands

Workshop report

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SINU Kukum Campus Honiara



Mary Tahu Paia
marytahupaia@gmail.com



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Tagio Tumas

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1. Introduction: Context of the Workshop

1.1 Background & Overview

The Solomon Islands Community Based Coastal and Marine resources management strategy, spanning from 2021 to 2025, focuses on achieving healthy marine and coastal resources, contributing to socio-economic needs and food security. The policy targets 25% improvement in community-based resource management across coastal areas by 2025. It emphasizes scaling up of CBRM through awareness campaigns, training, and community engagement. The strategy integrates sustainable livelihoods, climate change adaptation, and monitoring systems to ensure effective coastal management.

Simultaneously government addresses climate change challenges by proposing an integrated Coastal zone management (ICZM) and mangrove policy framework. With a reliance on agriculture, forestry and fisheries the Solomon Islands aim to safeguard coastal ecosystems. The Climate Technology Centre and Network (CTN) supports this initiative, focusing on ICZM policies and mangrove protection. This assistance includes stakeholder mapping, legal framework analysis, consultations and awareness campaigns. The anticipated impact involves integrated coastal development, sustainable economic growth, conservation of resources and effective disaster risk reduction.

The ICZM and Mangrove Policy framework aims to:

- Promote integrated planning and coordination of coastal developments across the various sectors.
- Promote sustainable economic development to secure livelihoods of coastal communities.
- Conserve the coastal and marine resources and environment for sustainable development
- Manage environmental risks associated with changes in shoreline and climate
- Develop capacity in research and education and enhance stakeholder awareness and participation in sustainable resource management
- Establish effective institutional and legal frameworks for implementation of the ICZM policy and
- Protect the mangroves through Ecosystem based adaptation solutions.

1.2 Workshop Objectives

The objectives of the 5 days' workshop will be focused on:

- Defining the ICZM Mangrove Plan's vision and mission
- Defining the policy objectives
- Defining the guiding principles and
- Formulate a draft of framework policy

1.3 Significance of Mangrove in Solomon Islands

In the Solomon Islands mangrove cover a total area of – 47,100 hectares (Bhattari & Giri, 2011), almost 2% of the total land area. About 32 species of mangroves are documented, which represented 40% of the world's mangrove species (Albert *et al.* 2013). The most common mangrove genera in Solomon Islands include *Lumnitzera*, *Bruguiera*, *Rhizophora* and *Sonneratia*

including *Lumnitzera* which is usually restricted to the open landward edge of open mangrove forests found along coastal shores, lagoons, saltwater and freshwater swamps (Veitayaki *et al.* 2017). Mangrove forests are critical for food security and the livelihood of coastal communities in Solomon Islands. They are important for source of food (e.g., fish, mangrove fruit, shells and crabs) and timber (e.g., for firewood and building materials (Albert & Schwarz, 2013). Despite of their value, there is evidence to suggest that mangrove forests and the livelihoods of the communities that rely on these valuable ecosystems are under threat (Warren-Rhodes *et al.* 2011). To ensure the mangroves continue to contribute to the livelihoods and food security of such communities living in and relying upon mangroves forests, there is an urgent need to review and enable the management of mangroves in Solomon Islands at the national, provincial and community levels (Albert & Schwarz, 2013).

1.4 Outline of workshop report

A five-day workshop focusing on Integrated Coastal Zone Management (ICZM) and Mangrove Planning has facilitated engagement among government ministries, NGOs, academics, and various stakeholders. During the workshop, participants had the opportunity to present their initiatives related to mangrove conservation and management status, existing challenges, and collaboratively explore pathways forward.

This mangrove report will cover a detailed description of the workshop presentations and case studies, followed by an analysis of the workshop which includes the workshop outcomes with actionable recommendations generated during the workshop and field trip. This is to foster collective efforts towards effectively implementing ICZM and Mangrove Policy.

2. Detailed description of the workshop and analysis on ICZM and Mangroves

2.1 Day 1 – Overview of Workshop, ICZM and Mangroves Ecosystem Services

The first day of workshop was dedicated to the workshop aims and expected outcomes, including key findings of the Initial Analysis. This is followed by presentation on the mangrove status in

Solomon Islands, policies and plans, followed by group discussion on mangrove ecosystems and Services in Solomon Islands.

2.1.1. Presentation from Korean team

The workshop commenced with a presentation by Dr. Sang in Kang of the Korean Environment Institute (KEI), outlining the precise objectives and anticipated outcomes of the workshop. He emphasized the significance of the Integrated Coastal Zone Management (ICZM) Plan to safeguard mangroves through Ecosystem-Based Adaptation Solutions. This stems from the mounting environmental challenges over the past decade, including unsustainable harvesting of coastal fishery resources and degradation of coastal and marine ecosystems such as mangroves, coral reefs and seagrass. The presentation highlights that in Solomon Islands the aim of developing an Integrated Coastal Zone Management (ICZM) Framework is to safeguard mangroves through ecosystem-based adaptation solutions. The resulted strategy and framework policy from the project will serve as a map for a further detailed and actionable programme or project for the government and other stakeholders.

After the introduction, the Korean team shared their key findings from the Initial analysis. Dr Don Han, Director of ECO Korea from the Catholic University of Korea presented that the ICZM involves the integration of all pertinent policy domain, sectors and administrative levels, as well as the integration of terrestrial and marine components of the target territory. The framework aims to balance environment, socio-economic, cultural and recreational objectives: to reduce ecosystem degradation; conserve and maintain existing ecosystems; involve local communities or stakeholders in sustainable environmental management decisions. An overview of mangroves worldwide was given, highlighting the ongoing decline in mangrove coverage in the Solomon Islands.

Following this presentation, Dr Cholho Song Research Professor from Korea University, highlights the impacts of climate change on coastal zone with those who generally contributed least to climate change being the most vulnerable. The ICZM focused on the coastal zone, therefore important to understand hazard, exposure, vulnerability, and risk and gather data to be able to compare current status and future possible changes (scenarios) which will support policy development. This could also be applied to Malaita, Solomon Islands a study site so that level of

deterioration can be identified and determine which mangrove species will be affected in the short and long-term using satellite map.

Finally, Dr. Hyun-Ah Choi, Hanns Seidel Foundation Korea gave an insight into the Rapid Assessment of coastal wetland Ecosystem Services with an application to mangrove area. Coastal wetlands have multiple values and ecosystem services. The assessment is used as an indicator on how important or valuable each ecosystem services is and how benefits are delivered at the global, national and local level.

2.1.2. Presentation from Solomon Islands team

Following lunch break, Myknee Sirikolo, Solomon Islands Botanist employed at the Herbarium under the Ministry of Forestry and Research, provided an over view of mangroves in Solomon Islands, emphasizing the various types of mangrove species and their geographical distribution. He described mangroves as both a habitat and the vegetation that thrives within. He elaborated on the ongoing disagreement also known as the ‘tug of war’ between the Ministry of Forestry and research (MFMR) and the Ministry of Forestry (MFR) regarding the definition of mangrove forest. The Ministry of Forestry classified mangrove as one of the six types of forests. According to the 2001 mangrove report (Pillai & Sirikolo, 2011), 26 species were initially identified. In 2014, a total of 36 species had been discovered and documented. However, based on the progression, it can be inferred that there are 40 species of mangroves in the Solomon Islands. Among these species, only one (*Bruguiera gymnorrhiza*) is considered edible. Additionally, Solomon Islands harbors other mangrove-associated plants, including one mangrove palm and several shrubs. The project is very important to the government of Solomon Islands to ensure the sustainable management of the mangrove forest and ecosystem for future generations.

Finally, Luke Mae, from the ECD, MECDM gave an insight into the legislation, policies and national plans related to mangroves such as the Environment Act 1998, Wildlife Protection and Management Act 1998, Wildlife Protection and management Act 2017, Protected Areas Act 2010 and Protected Areas Regulation 2012. He highlighted the National Environment Management Strategy 2020-2023 (NEMS) which guide the coordination and collaboration amongst the stakeholders for the implementation of key policies, programme and actions to promote sustainable development and conservation. Theme 4 of NEMS specify coastal areas that need action which

includes mangroves forests, coral reefs and seagrass beds. Case studies on mangroves in the Solomon Islands include Carbon sequestration study in 2010 and mangrove Ecosystem for Climate Change and Livelihood (MESCAL) in 2011.



Figure 1. A) Myknee Sirikolo presentation on mangrove species in Solomon Islands, B) Myknee demonstrating mangrove leaves, fruits and propagules to the attendees.

Following the presentations, participants engaged in a plenary group discussion. To provide context, attendees were divided into four groups to deliberate on the topic Mangrove Ecosystem and Services in the Solomon Islands. The discussions were summarized and presented in the Table 1 below.

Table 1. Table outlining Ecosystem services, Local utilization, Challenges and future directions for mangrove ecosystems in Solomon Islands.

Ecosystem services/benefits	Local uses of mangrove	Issues/ challenges	Way Forward
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<ul style="list-style-type: none"> ➤ Cultural services ➤ Aesthetic services ➤ Nursery ground for fish 	<ul style="list-style-type: none"> ➤ Ideal spot for open defecation ➤ Coastal barrier ➤ Medicinal use ➤ Source of income ➤ Food source (mud crab, shellfish and fish) ➤ Building materials ➤ Mangrove shells for cultural ornaments 	<ul style="list-style-type: none"> ➤ Deforestation for building materials ➤ Development (expansion of villages, reclamation and for log points) ➤ Sea level rise, cyclones and storm surges ➤ Destruction of mangroves due to increase of population and population use ➤ Waste disposal ➤ Mangroves used for firewood ➤ Lack of complete understanding of mangroves on their importance and the implications of overharvesting ➤ Aquaculture farming (destroys mangrove forests for ponds) ➤ Lack of mangrove policies and or 	<ul style="list-style-type: none"> ➤ There should be mangrove management which integrate income generation and also conservation activity implemented. ➤ There needs to be alternative livelihoods in place for communities in order for them to conserve mangrove forests
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		<p>management.</p> <p>Currently there is no policy on mangrove in Solomon Islands.</p>		
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2.1.3 Q &A: Questions posed by participants and answered at the end of the group discussion.

Question 1. What are extensive regions of mangroves found in the Solomon Islands?

A: Choiseul (24-26 average species) followed by Isabel and Malaita (Maramasike)

Question 2. What is the mangrove distribution in Solomon Islands?

A: Mangrove distribution depends on different environmental preferences. For example, salinity, substrates, Patterns of distribution in habitats depends on the size of mangrove areas. On average,

Question 3. Is seagrass included in the ICZM and Mangrove policy or not?

A: we have yet to decide on that in terms of ICZM and Mangrove boundary or zone

Question 4. Can wetland include inland or coastal, which encompass mudflats?

A: There are some cases about wetlands that are not specific about estuaries and wetlands

Question 5. Do you have mangroves in Korea and how many species do you have?

A: There is no mangrove in Korea except for two species of semi-mangroves.

2.2 Day 2- Mapping of Ecosystem Services for Provinces in Solomon Islands

2.2.1. Presentations on Satellite Map Analysis

Day 2 started with a presentation from the Korean team. Discussion was based on the coastal protection boundary, mangrove species data and the actual analysis.

Following the presentation, Dr. Hyun-Ah Choi presented on the Rapid Ecosystem Services Assessment toolkit. Later a break up group discussions on mapping of Solomon Islands maps by provinces was conducted to identify key areas participants are familiar with and what they know of the area with regards to mangrove areas.

The discussion entailed:

- 1) Categorizing ecosystem services into provisioning, regulating, supporting and cultural services.
- 2) Initially classifying areas into those already degraded, requiring restoration, and those designated as conservation and protected areas, along with explanations for these classifications.
- 3) Identifying sites requiring intensive protection, such as those with significant patches of mangrove forests, high cultural values, and crucial habitats, along with justifications for their selection.

Participants were divided into six groups, each assigned an A4 size map of different provinces:

1. Makira Province
2. Isabel Province
3. Guadalcanal province
4. Malaita province
5. Western province
6. Choiseul province

Feedbacks from each province is summarized in table 2 below:

Table 2. Mapping ecosystem areas, services, threats and conservation sites for 6 provinces in the Solomon Islands

Province	Ecosystem areas (mangroves, corals and seagrass)	Ecosystem services	Threats to ecosystems	Conservation sites or practices
Makira	<p>Located in the east of Makira and southern western region around western areas. Mangroves patches spread across the islands.</p> <p>Reefs are located around the main islands, Waisisi Bay, and mostly on the eastern coastal lines of the Island.</p>		<p>Logging activities occur both on coastal low land and upland forest areas.</p>	<p>Marine Conservation area is located in the Northern regions for instance in Ugi and the three sister Islands.</p> <p>Activities include tourisms activity, birdwatching</p>
Isabel	<p>Mangrove forest common along the coastlines around the Island.</p> <p>Seagrass habitats and dugong areas</p> <p>Survey on species composition conducted in 2019 indicated 20 Hectares forests of Tubi species).</p>		<p>Mining development was reported on the San Jorge and main islands of Isabel.</p>	<p>The Arnavon Community Conservation site is located between Choiseul and Isabel Province.</p>
Guadalcanal	<p>Honiara city located. Marau Sound (eastern Guadalcanal) identified as the largest population of mangrove forests with 3 existing ongoing activities.</p> <p>Mangrove forests was also identified at Wandara Bay</p> <p>Mangrove in small patches were reported in the Weathercoast areas.</p>	<p>Provisioning – food, building materials, pharmaceutical (injuries)</p> <p>Regulating – purifies water, reduce coastal erosion, wind protection.</p> <p>Cultural services- beautiful islands good recreational sites, 1 resort (Tavanipupu)</p>	<p>Logging activities located in several parts of the islands.</p>	<p>Conservation sites are located in Maramasike Passage, including coastal communities.</p>

		<p>located in Marau, and good research opportunities</p> <p>Supporting services – buffer zones, capture sediments, carbon habitat for flora and faunas and capture nutrients and sediments.</p> <p>2011 survey on dugongs showed high population in East Guadalcanal. This is due to high seagrass cover.</p>		
Malaita	<p>Patches of mangroves evident starting at Suava Bay, down to Lau and Takoa area.</p> <p>LangaLanga Lagoon reported as the high mangrove cover, right down to West Are are.</p> <p>Maramasike Passage identified as a high mangrove forest cover area.</p> <p>Southern part of Malaita-small patches of mangroves including leeward side of the island, Walande Bay.</p> <p>The TNC (Nature Conservancy) study in 2004 showed that the largest seagrass bed in Solomon Islands is located in the Northern region in Lau Lagoon.</p>	<p>Supporting all for instance soil formation and major habitat.</p> <p>Supporting, Provisioning (food), Regulating and Cultural services are evident in most parts of Malaita.</p> <p>Food in which most people sell their mangrove in the main market for income and food.</p> <p>Mangrove species harvested are part of our culture thus they offer cultural services.</p> <p>Livelihood- such as honey production</p>	<p>Logging coming into these areas. huge mangroves are logged for log ponds.</p> <p>Threats to conservation sites.</p>	<p>Local conservation initiatives or tabu practices are still practiced.</p> <p>Community Based Resource Management (CBRM) sites are at Maramasike</p> <p>Conservation areas work with World Fish (Eliot community) which they conserve part of the mangroves.</p> <p>3 conservation sites.</p>

<p>Western</p>	<p>Marovo Lagoon is the largest saltwater lagoon in the world, has mangrove cover that stretches across coastal lines in both New Georgia and Vangunu Islands.</p> <p>Vella islands reported of patch mangroves forest cover located on the northern region. Also, coconut plantations are evident in the region.</p> <p>Ranogga Island.</p> <p>Gizo Islands- dominated by mangrove forests in the northern east end of the island as well as reefs.</p> <p>Kolombangara islands- Forestry Planation (KFPL) located in the island.</p>	<p>Provisional services. Firewood, food.</p> <p>Regulating services- conservation areas.</p> <p>Important species comes from conservation areas.</p> <p>Cultural services- cultural sites and also tourism sites where tourist visit.</p> <p>Tur for diving, visitation.</p> <p>Mostly provisional services people benefit from mangroves. Food.</p>	<p>Degradation is high relating to the copra production.</p> <p>Logging activities</p> <p>When they dry coconut, they cut mangroves leaves for drying coconuts that causes mangrove depletion.</p>	<p>Conservation areas – Zaira Community Conservation areas (Forest and Marine areas- local traditional management practice). Important iconic species include leatherback turtles, dugong species, popular nesting sites for leatherback.</p> <p>Tetepare Islands- largest uninhabited islands in the world – managed by descendants (people earlier settle from different parts of western).</p> <p>Seaweed farming, ICLAM sites at Nusa Tupe Island. Study of clam shells.</p> <p>Marine Protected area in Vella- reef.</p>
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<p>Choiseul</p>	<p>Largest mangrove forest is located on the South East of the Islands</p> <p>Mangrove patches located spread across the islands</p> <p>TNC conducted a rapid marine assessment 20 years ago in Solomon Islands, recorded highest fish abundance, (1,119 fish species second to Indonesia) due to high mangrove cover and species and also connecting to presence of mangrove forest.</p>	<p>Cultural services- for instance, different communities have designated areas or important cultural totem sites relating to mangroves for example crocodiles and sharks. Mangroves hold important sites to worship species based on people's beliefs.</p> <p>In terms of services, Provisional and supporting services. Fisheries and mangroves are inseparable.</p>		<p>Protected areas Act 2010 allow communities to declare Protected Areas. Choiseul has led the ridges to reef model (protection of inland forests and low land and coastlines. Carbon trade support the initiatives active in the province. This can also be compared to the Eastern Malaita-Ma'asina green belt- which linked ridges to reef conservation. Linking inland forest protection to coastal including mangroves.</p>

2.2.2 Q &A: Towards the conclusion of the discussion, various questions were posed and subsequently addressed.

Question 1. The yellow global datasets and red color is from AI based analysis classification test, what do you think about the boundary. Do you think the boundary is much larger? What do you think reflects the boundary exactly or which one is better? Since the color classification is based on Predictions?

A: Agreed with the red color with the most densely populated. Suggestion was that the green color is correct because there are passages in the mangroves areas that go through the land. We do not actually go inland to capture mangroves areas or sites.

Question 2. Do they have fish market in Auki? Curious of the size fish sold in markets

A: Auki have fish market just like the main market in Honiara. Part of the market house, one for vegetables and other part of the building for fish.

Question 3. Any protected areas?

Answer: One of the conservation areas (Eliote Community) protect mangroves. The community do not allow people to harvest or pick shells and also harvest of mud crabs. In other parts of Malaita, it was also agreed. The tribal land it is not documented. However, Chiefs just allowed or explained that this designated area is for people not to harvest shells and crabs over a year and later can reopen for harvest. There is also a small marine management area set up by the Ministry of Fisheries, which also include mangrove areas.

Question 4. Is the carbon Project already established project there in Choiseul?

Answer: Yes, there are community projects established. One of the communities out of the 6 tribes received benefits of 1.2 million dollars SBD yearly on a 30 years' agreement. This was perceived as different from logging.

Question 5. How about you mentioned dolphins and dugongs? Fisheries?

Answer: Yes, there are certain species sites for dolphins and turtles and dugongs. Areas where there are seagrass and mangroves you will find these species. There are also certain beaches for turtles of which there are 7 types of turtles for Solomon Islands.

2.2.3 Case study Presentations

The afternoon session started with few case study presentations from the Solomon Islands National University (SINU) staff.

Kevin Sese, a PhD Candidate at the University of the South Pacific, Fiji delivered a presentation on his research entitled: *Anthropogenic impact on Mangroves in Marau*. His study aimed to investigate how human activities influence mangrove forests, with a focus on comparing highly disturbed and less disturbed mangrove forest areas. A total of 11 mangrove species were identified in Marau, Eastern Guadalcanal. Foods resources obtained from mangroves include parrotfish, edible mangroves (mangrove beans) and, crustaceans.

Marvin Baekisapa a Soil Science Lecturer at the Solomon Islands National University, delivered a presented on the impacts of Climate Change on water resources within the Lower Lungga River Basin. The study investigates the ground and surface water quality and the environmental hazards that affects the well-being of communities followed by identifying the best practices for water resource management for the Solomon Islands. It was also highlighted that future researchers to use this study in other regions of the Solomon Islands.

2.3 Day 3- Discussion around work on mangroves from Government (Ministries), NGOs and Academics and Institutions (SINU).

Day 3 of the workshop started with an exercise led by SINU team based on work around Mangroves within the respective organizations (ministries, NGOs and Academics). The guiding questions are as follows:

Mangrove:

1. In your respective organizations or sectors, please state any current work your ministry has engaged in which relates to mangrove conservation/policies
2. What are the gaps and challenges that could possibly contribute to these challenges and
3. Way forward? Suggested solutions to address the problem/issues?

They prepared a short presentation for each of the questions on the status and work around mangroves, challenges to mangrove conservation and possible solutions.

2.3.1 Government Ministries

2.3.1.1 *Status*

Policies such as the National Environmental Management Strategy (NEMS), the National Biodiversity Action Plan (NBSAP), the Solomon Islands National Climate Change Policies (SINCCP), and the National Forest Policies are among the mentioned policies overseen by the Ministries of Forestry and Environment and pertain to mangroves. The NEMS highlight the importance of conserving mangrove, seagrass and coral ecosystems. The NBSAP highlights the general importance of existing terrestrial biodiversity. The Solomon Islands climate change policy promotes nature-based solution for ecosystem services and adaptation. It deals with projects that

relate to ecosystems particular when trying to adapt to climate change. The National Forestry Policy addresses the management and protection of forests, encompassing existing mangrove forests as well.

Acts and legislation includes the Protected Areas Act, Environment Act and the Wildlife Protection & Management Act. Work includes engaging with other ministries such as forestry fisheries and donor partners in working together to implement projects which relate to mangrove conservation for example few of these past projects are implemented in Maramasike, Malaita province.

2.3.1.2. Challenges

Lack of collaboration among government ministries, leading to coordination issues. There is often overlap in the responsibilities of these ministries, resulting in a tendency to assign tasks without working together. This lack of cooperation poses challenge in the development and implementation of laws and policies. Non decisive of who to take mangrove on board their ministries.

Lack of human resources pose a significant challenge. The Ministry of Forestry is currently grappling with a shortage of staff dedicated to mangrove forest management including other ministries like the MECDM.

Limited resources for implementation. The absence of necessary equipment's presents challenges that hinder the successful implementation of activities related to mangrove resource management.

2.3.1.3. Way Forward

Government and stakeholders must prioritize management and conservation of mangrove. There is a need to ensure that policies are put into practice rather than merely remaining as written documents. There is a need for increased educational awareness within the community and schools regarding the significance of mangroves, as well as the associated threats and implications. Emphasizing the sustainable management and utilization of mangroves is essential.

2.3.2 NGOs– Live & Learn

2.3.2.1 *Status*

The Non-governmental organization encompass diverse thematic areas within environmental protection unit, incorporating projects centered on conservation efforts such as mangrove preservation. Additional projects include the Forest Enhancement Program and Nature-based Solutions also known as climate resilience initiatives, which specifically emphasize mangrove conservation efforts. The primary project is on carbon finance forest conservation, targeting terrestrial area, with future plans to expand its scope to include mangroves. Live & Learn Organization has created a mangrove guide for children, accessible through their website. Suggested NGOs that can provide relevant information on mangroves include World Wildlife Fund (WWF), Save the Children (Malaita) and WFC.

2.3.2.2 *Challenges*

Logging is seen as a significant threat to mangrove forests, while another challenge stems from the complexities of the land tenure system in the Solomon Islands. Multiple land ownerships pose difficulties that necessitate extensive and inclusive community consultations for effective mangrove conservation. Weak enforcement and monitoring of legislation at the national level compound these challenges. For instance, insufficient collaboration with the government and a lack of coordinated efforts among line ministries contribute to the issue. Limited access to legislation and policies is a recurring concern, with NGOs often facing obstacles in obtaining comprehensive knowledge of existing national policies held by ministries.

2.3.2.3 *Way forward*

To encourage communities to protect and conserve mangrove areas, it is essential to offer alternative livelihood options. Developing a management plan, such as a land use plan specifically for mangrove areas, is crucial. Additionally, access to funding is vital for the implementation of projects aimed at mangrove conservation.

2.3.3 Academics

2.3.3.1 Status

Lecturers involve primarily in teaching and conducting research. Teaching responsibilities encompass courses that cover topics like Biodiversity & Ecology and Climate Adaptation, which may include content on mangroves. However, there are limited staff members actively involved in research related to mangroves yet the findings and conclusions from these studies could significantly contribute to policymaking.

2.3.3.2 Challenges

There is a disconnection between government ministries, NGOs and academics and other stakeholders. For example, while organizations such as the World Fish Organization conduct studies and produce reports on mangroves and coastal fisheries, there is a challenge in transferring their knowledge to academics to disseminate to students. Additionally, government ministries frequently organize workshops and trainings sessions without involving academics, resulting in a lack of access to research outcomes and information. Academics primarily prioritize teaching leaving limited time for research. Despite efforts to write proposals, availability of funding for research remains limited, with much of their time allocated to teaching responsibilities.

2.3.3.3 Way forward

Improving coordination and networks among SINU, government ministries and NGOs. Additionally, there is a need for sufficient staff recruitment to achieve balance between research and teaching. This entails assigning or allocating certain staff members to focus on mangrove research while others prioritize teaching.



Figure 2. Group discussion presentation from SINU Academics, Ministries and NGOs during the Workshop

2.3.4 Presentations on specific activities from marine and terrestrial sites in Solomon Islands

After group discussion, Fiona Meke, Lecturer at the department of fisheries in SINU presented on the fisheries sector highlighting the Solomon Islands Exclusive economic zone (EEZ) of 1.58 million square kilometers, outlining the MFMR structure which includes the offshore fisheries,

inshore fisheries, Provincial Fisheries and Aquaculture which feature mangrove related programs and activities. These includes mangrove, coral and forest replanting.

Day 2 concludes with a presentation from Bill Apusae, Live and Learn officer who presented on the Carbon Financed Forest Conservation project which focused on three sites in Padezaka Choiseul, Zaira, Vangunu and East Rennell. The project is financed through the creation and trade of carbon credits from forest conservation projects. This is so that landowners can be able to enjoy both economic benefits of carbon credits and environmental benefits.

2.4 Day 4- PEBACC+ Project Presentation

The final day of the workshop, Joanne Aihunu presented on the KIWA Initiative (Pacific Ecosystem-Based Adaptation to Climate change). Local issues identified include deforestation, coastal development leading to coastal nutrient and sediment runoff into coral reefs, seagrass beds, and removing of coastal vegetation e.g. mangroves, pollution, run-offs and waste including overfishing, resulting in reduced population of grazing fish. The SPREP has been promoting Ecosystem-based Adaptation to Climate Change (EbA) since 2007. The PEBACC+ is funded by the German International Climate Initiative.

2.5 Day 5- Mangrove Field visit

The workshop participants got the opportunity to visit a mangrove site at Naghotano community Buena Vesta of Ngella, Central Province. Most of its inhabitants are from Ngella and Isabel and live in the main island. They travel to the island mainly for children to attend school and for Sunday service.

The community supported the replanting of two (2) mangrove species which includes the edible mangroves the *Bruguiera gymnorrhiza* and the *Rhizophora* genera which was described as the mangrove trees that have many roots growing out towards the sea. They use two processes in replanting the mangroves;

- 1) *They plant mangroves further out in a sea in a straight line parallel to the shoreline*
- 2) *Planting mangroves in the coastal which constitute of sand beaches with evidence of seagrasses along the coastal area.*

The community were advised by the Ministry of Fisheries to engage in mangrove replanting. They did engage in the experiment and conduct a trial. At first it worked, which mangroves tend to grow and even have branches. However, mangroves were not able to survive due to the sponge like locally known as *Lum Lum* which washed ashore and entangle the mangroves which eventually leads to mangroves leave to fall leading to their death. However, it was suggested that research is required to understand other factors that could contribute to their low survival rate. A good example is people must rely on the traditional knowledge of people about mangroves and planting patterns which was considered important factors when replanting mangroves in the Philippines (Ellison *et al.* 2020).

Suggestions were made to consider to enhance mangrove survival. Mangrove species should be planted further out and protected with a shield like structure so that they can be protected from these white like sponges brought in by wind and waves. Location could also be considered because mangrove species do thrive in different conditions. The location could also contribute to low survival rate for these mangroves due to the exposure of the site to wind and waves. It was suggested that a combination of various mangrove species planted together might work supporting each other. Planting mangroves in more sheltered areas especially those with muddy sediments should be considered. The community are willing to replant mangroves again but needs financial assistance to support their activity.



Figure 3. Coastal area where mangrove species are replanted at Naghotano community, Ngella Island.



Figure 4. Workshop participants and the community elder during the field trip to Naghotano community, Ngella Island.

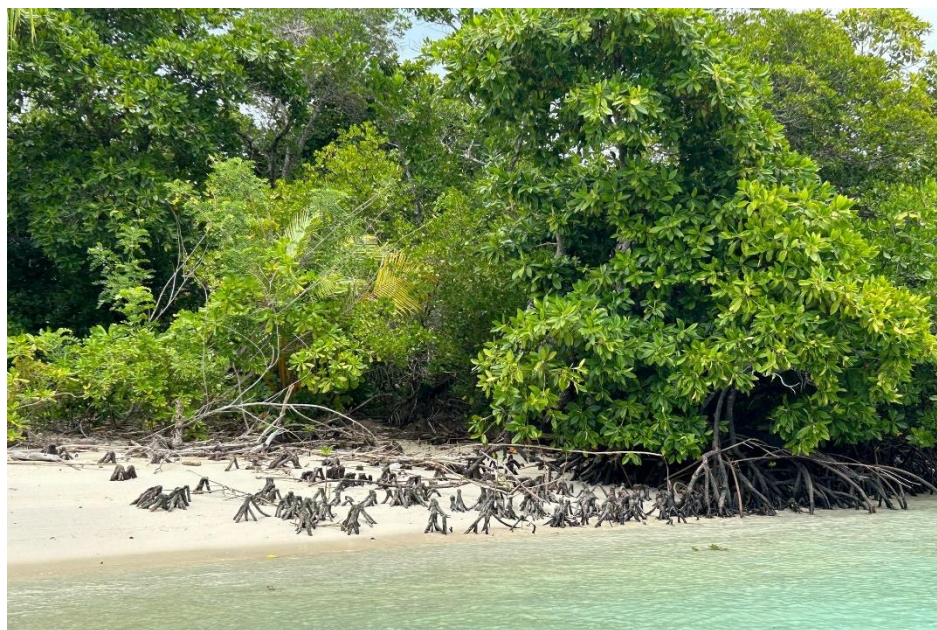


Figure 5. The Mangrove conservation site at Naghotano, Ngella Islands.

3. Analysis of the Workshop on ICZM and Mangroves

3.1 Workshop Outcome

3.1.1. Information and expertise sharing

The participants participated in group activities shared their work around mangroves within their respective Organizations, including major challenges and threats faced in managing mangroves. Challenges include deforestation of mangroves for building materials, firewood, and village expansion; destruction of mangroves due to increase population and population use, lack of understanding on the importance of mangroves and lack of mangrove policy. This helped the participants to map out these threats but also map out mangrove areas and other conservation activities in each of their provinces.

3.1.2 Enhance awareness regarding mangroves and assessment tools

At the end of the workshop participants were able to identify the different types of mangroves, their current status, importance, management and important tools to map mangroves, thanks to the input from various presentations from the Korean technical team and also from Solomon Island team. The field trip held at Naghotano community also enable participants to see for themselves the types of mangroves that are present on site, but also learn from the challenges of mangrove replanting. Following these awareness and potential solutions were suggested and explored.

3.1.3 Informing mangrove policy recommendation

At the end of the workshop, participants were able to identify a list of recommendations and way forward to better management of mangroves. This recommendation was based on what participants observed within their work place but also in the country (see section **2.3.1**).

3.2 Actionable Recommendations

Based on the workshop discussion and outcomes the following recommendations were suggested based on their importance and feasibility. They include

Improving coordination and networks among SINU, government ministries and NGOs but also among various Ministries (Ministry of Forestry, Ministry of Environment and Ministry of Fisheries) to avoid tug of war.

While communities are encouraged to protect and conserve mangrove areas, it is essential to offer alternative livelihood options.

Access to funding is vital for the implementation of projects aimed at mangrove conservation.

Government and stakeholders must prioritize management and conservation of mangrove.

Ensure that mangrove policies are put into practice rather than merely written documents.

Develop Mangrove management plans

Sustainable management and utilization of mangroves

Implement mangrove management which integrate income generation and conservation activities.

4. Conclusion

Mangrove ecosystems play a vital role in the Solomon Islands, serving multiple purposes such as providing food, materials for construction, safeguarding coastlines against sea level rise and erosion, and serving as cultural and sacred sites. The 5-days' workshop empowered participants to share information and expertise on mangroves, enhance awareness regarding mangroves and assessment tools, and contribute to informing policy recommendations for mangrove conservation and management.

The major threats to mangroves includes clearing of mangroves for log ponds, cutting mangroves for copra, complexity of land tenure systems, weak enforcement and monitoring of legislation at the national level compound these challenges, limited access to legislation and policies is a recurring concern, Lack of collaboration among government ministries, leading to coordination issues, limited resources for implementation, availability of funding for research remains limited.

These can be addressed by improved coordination between Government, NGOs and stakeholders, offer livelihood options, access to funding, Governments and stakeholders to prioritize mangrove management, ensure policies are practiced, develop mangrove management plans, sustainable management and utilization of mangroves and implement mangrove management which integrate income and conservation activities.

5. Appendices

5.1 Annex 1: Workshop Agenda Programme

Tuesday 27 February

Workshop day 1

Day 1, 27 February	
08:45- 09:00	Arrival of the Participants/Registration
09:30- 10:00	<p>Opening</p> <ul style="list-style-type: none"> • Introduction of workshop by KEI (Dr Sangin Kang, KEI) • Self-introduction of participants • Group photo
10:00- 10:20	Break
10:20- 13:00	<p>Session 1. Orientation (1)</p> <p style="text-align: center;">Moderator: Ms. Hyeseon Do</p> <ul style="list-style-type: none"> • Workshop aims and expected outcomes (Dr. Sangin Kang, KEI) • Key findings of Initial Analysis by Korean team <ul style="list-style-type: none"> • Key findings of the status review (Dr. Donguk Han) • Key findings of Geospatial data analysis and its relevant challenge (Dr. Cholho Song) • Suggestion of Rapid Ecosystem Service Assessment to define ICZM mangrove plan including indicator, cases (Dr. Hyun-Ah Choi) • Group discussion - all participants
13:00- 14:30	<ul style="list-style-type: none"> • Lunch
14:30- 15:30	<p>Session 2. Orientation (2)</p> <p style="text-align: center;">Moderator: Ms. Hyeseon Do</p> <ul style="list-style-type: none"> • The current status of Mangrove Species in Solomon Islands (Mr. Myknee Sirilolo, MESCAL Project) • Overview of Legislation, Policies & National Plans (Mr. Jeffery Mauriasi and Mr Luke Mae, MACBLUE)
15:30- 16:30	Presentation of Group discussion - all participants

16:30-17:30	Discussion of Day 1
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Wednesday 28 February

Workshop day 2

Day 2, 28 February	
08:45-09:00	Arrival of the Participants
09:30-12:30	<p>Session 1. Satellites maps Analysis</p> <p>Moderator: Ms. Hyeseon Do</p> <ul style="list-style-type: none"> • Suggestion of Spatial Data (GIS, RS) Analysis including method by Korean team (Dr Cholho Song) • Group Discussion • Coastal protection areas boundary, Mangrove, etc.
12:30-14:00	Lunch
14:00-16:30	<p>Moderator: Ms. Hyeseon Do</p> <p>Special Presentation (1)</p> <ul style="list-style-type: none"> • Anthropogenic impact on Mangroves area (Prof. Kevin Sese, SINU) <p>Special Presentation (2)</p> <ul style="list-style-type: none"> • The Effects of Climate Change and Water Resources at the Lower Lunga River Basin (Mr Marvin Baekisapa, SINU) <p>Session 2. Rapid Ecosystem Services Assessment (1)</p> <ul style="list-style-type: none"> • Assessment of over-arching issues, Solomon Islands (Dr Hyun-Ah Choi) • Group Discussion
16:30-17:30	Discussion of Day 2

Thursday 29 February

Workshop day 3

Day 3, 29 February	
08:45-09:00	Arrival of the Participants

09:30-11:00	<p>Moderator: Prof. Mary Tahu</p> <p>Session 1. Small Group Activity (Gov't, Academics, NGOs)</p> <ul style="list-style-type: none"> Group Discussion on Mangrove, Gender and Capacity Building (Prof. Mary Tahu, SINU)
11:00-11:15	Break
11:50-13:00	<p>Moderator: Ms. Hyeseon Do</p> <p>Session 2. GIS Mapping</p> <ul style="list-style-type: none"> Google Earth Community Mapping (Dr. Cholho Song)
13:00-14:30	Lunch
14:00-16:30	<p>Moderator: Ms. Hyeseon Do</p> <p>Special Presentation</p> <ul style="list-style-type: none"> Fisheries Status in Solomon Islands (Ms. Fiona Meke, SINU) Carbon Finance Forest Conservation Project (Live & Learn Solomon Islands) <p>Session 3. Rapid Ecosystem Services Assessment (2)</p> <ul style="list-style-type: none"> (Continued) Assessment of RAWES, Solomon Islands (Dr Hyun-Ah Choi) <p>Session 4. Group Discussion and Review of RAWES</p> <ul style="list-style-type: none"> Review of assessment – all participants
16:30-17:30	Discussion of Day 3

Friday 1 March

Workshop day 4

Day 4, 1 March	
08:45-09:30	Arrival of the Participants
09:30-10:00	<p>Moderator: Ms. Hyeseon Do</p> <p>Special Presentation</p> <ul style="list-style-type: none"> Gender issues in the mangrove protection (Joanna Aihunu, (PeBACC) SPREP)
10:00-11:30	Outside ICZM – SI (KEI)

	<p>Review the draft structure of the ICZM Framework Policy – all participants</p> <ul style="list-style-type: none"> • Define ICZM Mangrove plan’s vision and mission • Define the policy objectives • Define the Guiding principles • Formulating a Draft of Framework Policy
11:30-11:45	Break
11:45-13:00	<p>Closing</p> <ul style="list-style-type: none"> • Closing remarks by SI-MECDM • Closing remarks by KEI, CTCN
13:00-14:30	Lunch
14:30–18:00	Closed meeting

Saturday 2 March

Day 5, 2 March	
08:30-17:00	Field trip, Naghotano Island

5.2 Annex 2: List of Participants

No.	Name	Institution	Email
1	Carlos Hiro	SINU/FAFF/ Forestry	carlos.hiro@sinu.edu.sb
2	Moses Asitarau	SINU/FAFF/Environment	moses.asitarau@sinu.edu.sb
3	Markmaster Hamata	SINU/FAFF/ Agriculture	markmaster.hamata@sinu.edu.sb
4	Kevin Sese	SINU/FAFF	kevinsese@gmail.com
5	Lovelyn Otoiasi	SINU/FAFF/Environment	Lovelyn.Otoiasi@sinu.edu.sb
6	Marvin Baekisapa	SINU/FAFF/Agriculture	marvin.baekisapa@sinu.edu.sb
7	Claire Oiire	SINU/FAFF/Forestry	claireoiire@gmail.com
8	Mary Tahu Paia	SINU/FAFF/ Environment	marytahupaia@gmail.com
9	Alister Talua	Ministry of Agriculture /DAPLU	Alister.Talua@sig.gov.sb
10	Jeffery Kaikari	Ministry of Fisheries and Marine Resources	-
11	Pauline Ghiro	MECDM/CCD	PGhiro@medcdm.gov.sb
12	Fiona Meke	SINU/Fisheries Department	Fiona.meke@sinu.edu.sb
13	Joanne Aihunu	SPREP/MECDM	joannea@sprep.org
14	Thaddeus Siota	CCD/MECDM	TSiota@medcdm.gov.sb
15	Arnold Augwaroa	Ministry of Forestry and Research (MOFR)	aaugwaroa@mofr.gov.sb
16	Keith Moveni	Ministry of Forestry and Research (MOFR)	venieith@gmail.com
17	Myknee Sirikolo	Ministry of Forestry and Research (MOFR)	mykneesirikolo@gmail.com
18	Veira Pulekera	MECDM	v.t.pulekera@gmail.com

19	Luke Mae	MECDM	Lukemae12@gmail.com
20	Chris Teva	MECDM	pitapile@gmail.com
	Organization and facilitation team		
21	Sangin Kang	KEI	
22	Hoyoung Jo	CTCN	
23	Donguk Han	EcoKorea	
24	Hyeseon Do	Independent consultant	
25	Cholho Song	Korea University	
26	Hyun-Ah Choi	Hanns Seidel Foundation Korea	

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