



Planning for
**ecosystem-based
adaptation** in
Honiara
SOLOMON ISLANDS



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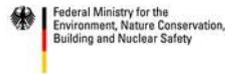
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Mouth of the Mataniko River. Photo | Stuart Chape

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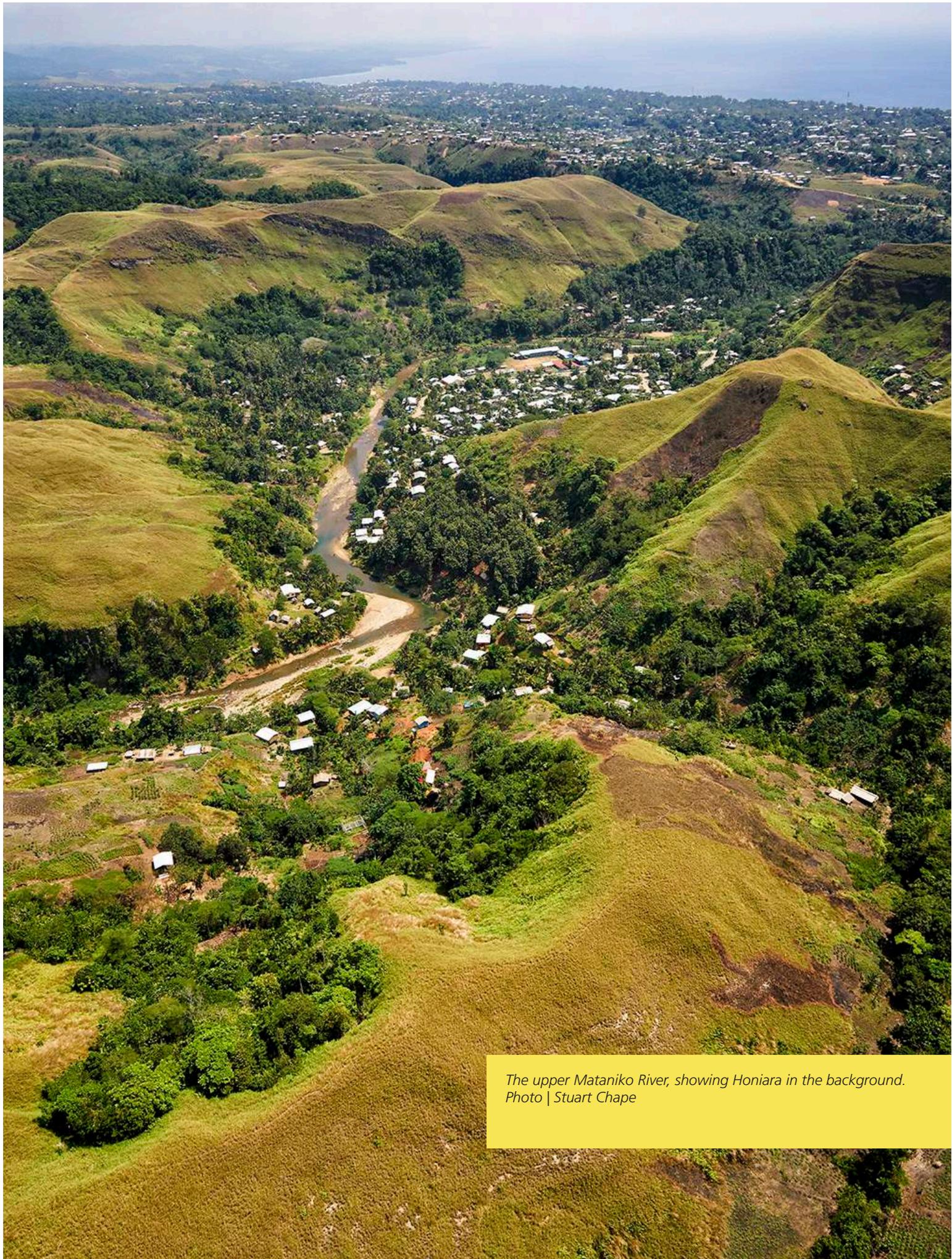


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The upper Lunnga River. Photo | Stuart Chape





*The upper Mataniko River, showing Honiara in the background.
Photo | Stuart Chape*

Adapting to climate change in the Pacific

Our Pacific island countries and territories are highly vulnerable to climate change. In the next few decades, our countries will face increasing threats to sustainable development from climate change impacts on: marine and terrestrial ecosystems, human health, infrastructure, coastal resources, fresh water availability, agriculture, fisheries, forestry, and tourism.

High levels of connectedness between our socioeconomic and biophysical environments make it important that adaptation strategies include a strong focus on the management of natural ecosystems. Ecosystem-based adaptation (EbA) is an approach for building community resilience to climate change by investing in the maintenance of the ecosystem functions and services that we depend on for our survival.

The Pacific Ecosystem-based Adaptation to Climate Change (PEBACC) project provides Pacific Island stakeholders with EbA policy, planning, and implementation support, and is funded by the German government.

Goals of this report

This synthesis report provides an overview of the first seven steps involved to identify, prioritise, and implement ecosystem-based adaptation (EbA) projects in Honiara, Solomon Islands, and is based on a detailed series of technical reports prepared for the PEBACC project by BMT WBM, in collaboration with Ecological Solutions Solomon Islands and the University of Queensland.

Local communities and stakeholders were engaged throughout the process to map ecosystem types; define key ecosystem functions and services; identify possible threats to these ecosystem services; identify and prioritise possible EbA projects to improve ecosystem health and increase community resilience; and develop an implementation plan for the selected EbA projects.

It is envisioned that this process provides a coordinated plan for EbA projects to be implemented, through the PEBACC project and other funding mechanisms. This EbA planning approach for the urban environment and surrounding community provides a test case and model for other Pacific islands. The overall goal is to support the organisation, planning, policy, capacity building, and actions that will build community resilience to the effects of climate change and other development related impacts on coastal and terrestrial ecosystems.

The steps used to plan and implement EbA in Honiara, Solomon Islands. This report provides an overview of the first seven steps of the project, from knowledge and synthesis, prioritisation, and implementation. Steps eight through ten are currently underway.

Process to plan and implement EbA





Ecosystem-based adaptation is "the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change."

CBD 2009

What is ecosystem-based adaptation (EbA)?

EbA is an approach for building the resilience of local communities to climate change through the protection or restoration of ecosystems. Sustainably-managed and intact ecosystems are critical for the future provision of ecosystem services to maintain the health, well-being, and livelihoods of island communities.

EbA often provides a primary protection goal, such as planting coastal vegetation to reduce wave impacts, or replanting stream or watershed areas to reduce soil erosion and reduce flooding; while also supporting secondary benefits including provision of food, shelter, water, medicine, or income. EbA approaches are particularly appropriate in areas such as Honiara which has a high poverty rate, with high reliance on the natural environment such as forests, rivers, wetlands, and coastal marine ecosystems for household supply of essential needs.

When implemented and managed effectively, EbA can be cost-effective, with low infrastructure requirements, and has the potential to be self-sustaining. One challenge is that communities may need outside investment to ensure they can undergo transitions in livelihood or management practices while maintaining essential daily needs, but once implemented EbA projects provide communities with more choices in the future through increased access to social, economic, and cultural benefits.

EBA OPPORTUNITY FOR HONIARA:

Honiara has high population growth, rapid urban expansion, and high reliance of households on the natural environment for food, water, shelter, income opportunities, and health and wellbeing. This makes remnant fragments of terrestrial, freshwater, and marine ecosystems highly valuable to Honiara's urban and peri-urban communities. Ecosystem-based approaches for adapting to climate change that will maintain and restore these remaining fragments can maximise community resilience by providing sustainable access to these important natural resources and reducing vulnerability to natural disasters.

Ensuring the resilience of coral reefs by reducing pollution (ecosystem based restoration) means that there are healthy fish populations (ecosystem function) which then provide food or income for people in this fishing village in Honiara (ecosystem services). Photo | Stuart Chape

About Honiara

Honiara, the capital of Solomon Islands, is also the major air and sea port, main hub of commercial operations, and location of national government. It encompasses a coastal strip approximately 2.7 km wide, and over 11.5 km along the coast. The low lying coastal area of Honiara comprises the lower downstream reaches of the large Kongulai, Mataniko, and Lungga rivers, as well as several smaller rivers and streams.

Honiara is a highly modified landscape with isolated patches of modified terrestrial and aquatic ecosystems. The population in 2015 was 87,000 (20% of national population) and is projected to be 180,000 (33% of national population) by 2050. Urban population growth was 4% between 1999 and 2009, with 33% of the current population under 15 years old. Unemployment rates are very high with 75% unemployment amongst 15–19 year olds. The poverty rate is 15%, and 35–40% of the population live in informal settlements with limited access to utilities and services such as treated drinking water and waste management. As a result, there is high subsistence dependence on remnant areas of aquatic and terrestrial ecosystems and urban greenspaces.

 Land area
23 km²

 Population
87,000

 Temperature
22.0–30.7°C

 Population growth
up to 4% per year

 Rainfall
2,000 mm/year

Governance structure

Honiara City Council is currently the only established local government within Solomon Islands. It has sole responsibility for trade, business licenses, and waste management within the municipal area. The Honiara City Council shares responsibility with provincial and central governments for environmental conservation, public roads and drainage maintenance, education, and health services. A Land Board determines land releases and zoning, with representation from Honiara City Council, Ministry of Land, Housing and Survey, as well as other relevant Ministries. There are 12 wards within the Honiara City Council, each with an elected councilor, additional council members include the premier of Guadalcanal province and four appointees. Each Ward has a Ward Advisory Council, however these have lacked sufficient policy guidance to fully respond to community needs. Within customary lands there is customary governance, although interaction for Honiara city is more complicated as customary lands are predominantly occupied by settlers from other provinces.



Top: Honiara Port. Photo | Stuart Chape

Middle: Downtown Honiara. Photo | Jilda Shem

Bottom: Many households in Honiara, particularly in peri-urban communities, are subsistence living with limited access to utilities such as treated drinking water. Photo | Jilda Shem



Stakeholder and community engagement

Honiara has a rapidly growing urban and peri-urban population with local, national and traditional governance structures, and a range of national, regional and international organisations that provide capacity support through multiple mechanisms. The range of stakeholders makes it essential to incorporate a thorough and effective community engagement process to identify and prioritise EbA options for successful implementation. Communities and other stakeholders were engaged through a participatory process, interactively using maps of local areas to maximise input of knowledge and experience. This approach was also intended to build capacity and knowledge in ecosystem based approaches, implementation, and potential for supporting ecosystem and community sustainability.



HONIARA WORKSHOPS

In addition to representation from Barana Village, Marble Street Community, Lord Howe Community, Renlau Community, Tuaroku Community, and Fijian Quarter Community, there was representation from Honiara City Council, seven ministries of national government, Guadalcanal Provincial Government, Choiseul Integrated Climate Change Programme, Solomon Islands National University, as well as key regional and international agencies, organisations, and programs.

Stakeholder type	Total	Male	Female
Government	48	67%	33%
Community	17	59%	41%
Agency/organisation	28	61%	39%



BARANA VILLAGE WORKSHOPS

To ensure input from a wide range of community perspectives, the village chief, teachers, church leaders, and youth leaders were included, and 28% of all participants were women.

Stakeholder type	Total	Male	Female
Government	9	56%	44%
Community	58	74%	26%
Agency/organisation	8	63%	37%

Top and middle: Community engagement during a workshop in Barana Village, 18 March 2017. Photos | Simon Albert

Bottom: Community engagement in Honiara, 24 August 2017. Photo | Jilda Shem

To maximise potential synergies and sustainability of implemented actions, additional active engagement was made with ongoing projects and collaborative mechanisms within Honiara.

Mapping key ecosystems

Ecosystem types were identified and mapped using existing information, and by engaging with key community stakeholders through a participatory workshop. The information gathered during the workshop was then validated and incorporated using: site inspections, remote sensing with high satellite imagery, validation with existing GIS data, and on-the-ground observations.

Ecosystem services were identified by community stakeholders for each ecosystem, and documented using interactive mapping exercises with a focus on high-use areas.

Ecosystem functions and ecosystem services

An ecosystem is a set of plant and animal communities, plus the physical environment that supports them. Ecosystem functions are natural processes within an ecosystem—for example, healthy coral reefs provide essential habitat for fish and many other species.

When ecosystem functions are actively used by communities they become ecosystem services that provide economic, social, or cultural benefits—for example, a biodiverse and plentiful fish population (ecosystem function) can support a sustainable artisanal or commercial fishery that provides food, generates income, and supports cultural values and societal well-being (ecosystem services).

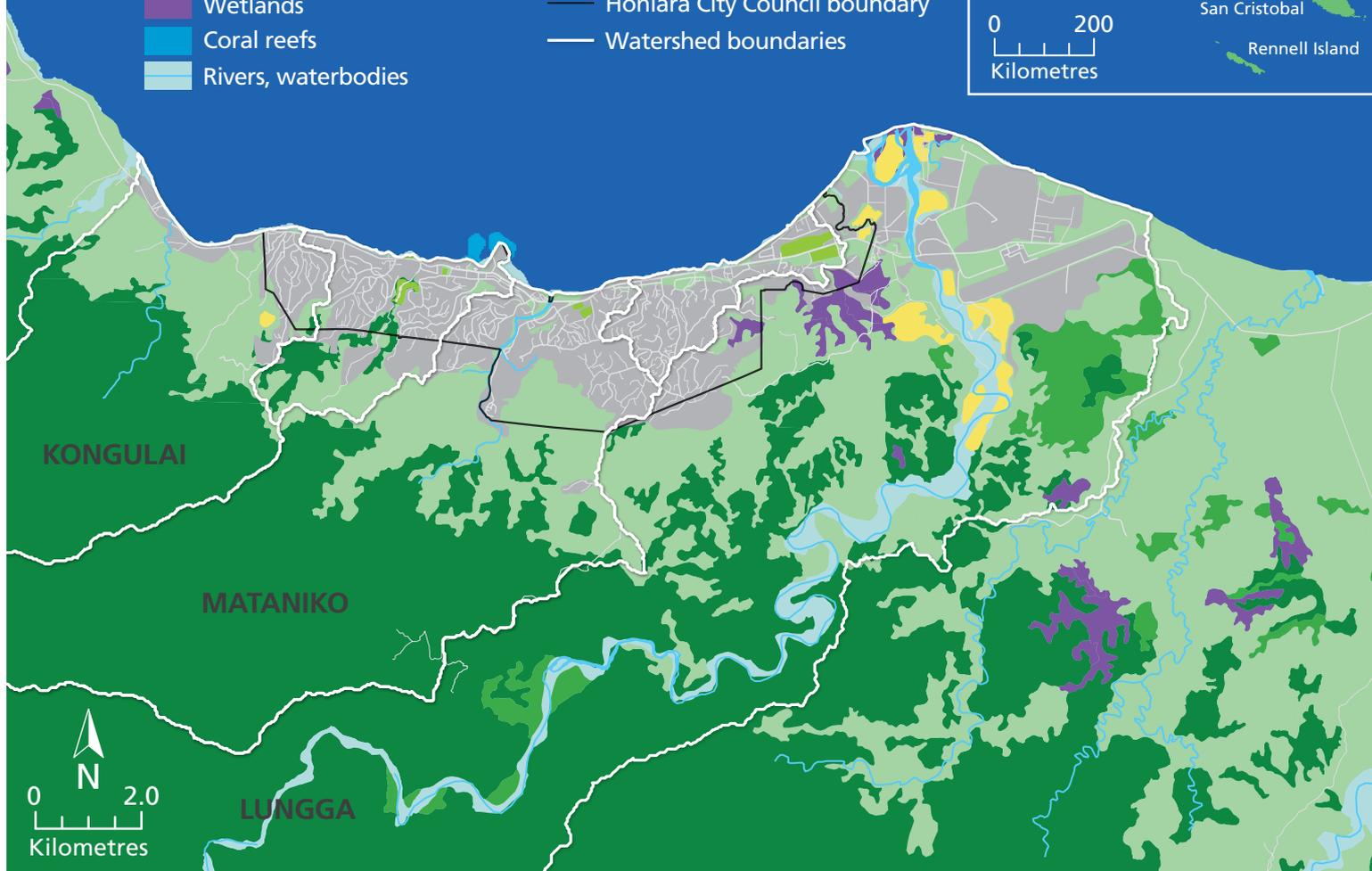
KEY ECOSYSTEMS AND LAND USE IN HONIARA

Ecosystems

-  Upland rainforest
-  Lowland rainforest
-  Logged & degraded rainforest
-  Wetlands
-  Coral reefs
-  Rivers, waterbodies

Land Use

-  Developed areas, roads
-  Food cultivation
-  Urban green space
-  Honiara City Council boundary
-  Watershed boundaries



Ecosystem functions and services from ridge to reef

Ecosystem functions and services identified by community stakeholders for each ecosystem type, except lakes and wetlands, which were identified at the national level.



FORESTS

- Raw materials for building, fuel, & commerce
- Erosion control and land stability protects communities
- Food (hunting; gathering nuts, fruit, & vegetables)
- Cultural values (traditional practices, handicrafts)
- Source of income (logging, agriculture, & tourism)
- Medicinal plants
- Regulates water & air quality
- Recreation & leisure
- Habitat provision & biodiversity

RIVERS & STREAMS

- Food (fish, crab, ura, water cress, aquaculture)
- Cultural & religious values
- Drinking water; water for irrigation & industry
- Recreation & leisure
- Flow regulation limits flooding of communities
- Raw materials (gravel, sand, motu stones)
- Waste disposal & dispersal
- Source of income (tourism, fisheries, and aquaculture)
- Transportation
- Habitat provision & biodiversity

LAKES & WETLANDS

- Food (swamp taro, sago, fish, aquaculture)
- Source of income (fisheries, and aquaculture)
- Drinking water
- Cultural & religious values
- Raw materials for building and weaving
- Flow regulation limits flooding of communities

URBAN LAND USE

- Land for development, businesses, and services
- Urban greenspace for shade, recreational use, tourism
- Food (subsistence and backyard gardens)
- Urban springs provide domestic drinking water
- Supports cultural identity
- Urban habitat and biodiversity
- High value commodity

COAST/BEACH

- Raw materials (sand, gravel, stones, timber, fuelwood)
- Cultural values (shells, ornaments, and decorations)
- Food
- Waste disposal & dispersal
- Coastal protection (shoreline stabilisation by mangroves at Lungga River delta)
- Recreation & leisure
- Source of income (tourism)
- Transportation

CORAL REEFS

- Raw materials (coral, lime)
- Cultural values (shells, ornaments, and decoration)
- Food
- Kastom medicine
- Source of income (tourism and fisheries)
- Recreation & leisure
- Coastal protection (coral reefs attenuate and buffer storm wave energy)
- Habitat provision & biodiversity
- Waste disposal & dispersal
- Transportation

Threats to ecosystem services

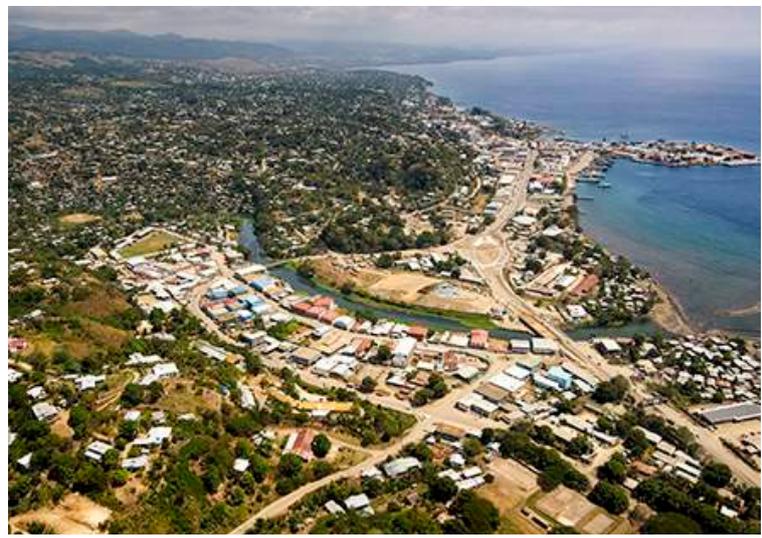
As the population continues to grow, human impacts threaten the health of Honiara's ecosystems, and therefore the ecosystem functions and services that they provide. Community stakeholders identified the following specific threats affecting the delivery of ecosystem services for Honiara:

-  Poor sanitation and solid waste practices pollutes waterways;
-  Rapid urban population growth, largely reliant upon primary resource use to meet household needs through subsistence living;
-  Land clearing for logging and cultivation threatens fresh water resources, increases soil erosion, and reduces land stability;
-  Unsustainable development resulting in habitat loss and coastal erosion;
-  Chemical pollution from industry and agriculture;
-  Overharvesting of coastal fisheries.

Climate change projections

Climate change will also influence the delivery of ecosystem functions and services, and further exacerbate the human impacts listed above. The following climate change projections for Solomon Islands were identified in the PACCSAP (2014) report:

-  **Sea level** is projected to rise 7–18 cm by 2030, and 40–89 cm by 2090 (very high confidence);
-  Annual mean **temperatures** and extremely high daily temperatures are projected to increase by up to 1.0°C by 2030, and up to 4.0°C by 2090 (very high confidence);
-  Mean annual **rainfall** will increase slightly (low confidence), with more extreme rain events (high confidence);
-  Decreased frequency but increased intensity of **tropical cyclones** (medium confidence);
-  Continued **ocean acidification** (very high confidence);
-  Increased **coral bleaching** (very high confidence).



Top: Rapid urban population growth is a key threat to Honiara's ecosystems. Photo | Stuart Chape

Middle: Many households are reliant upon primary resource use to meet their needs. Photo | Rob Maccoll, AusAID

Bottom: Overharvesting of coastal fisheries threatens the integrity of coral reef ecosystems. Photo | Irene Scott, AusAID



Identifying EbA options

After extensive input and engagement from communities and other stakeholders, 29 potential EbA options were identified within Honiara City, associated coastline and watershed. Participants were then included in a criteria-based prioritisation and evaluation process.

All options were first assessed to confirm that they were truly ecosystem-based adaptation options using the following criteria:

“Does the option involve the protection, restoration or enhancement of an ecosystem or biodiversity to help social and ecological systems adapt to the adverse effects of climate change?”



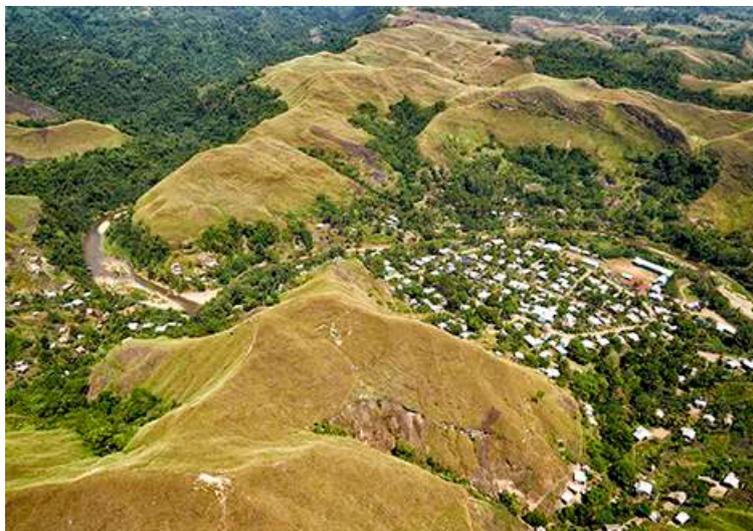
Prioritising EbA options

Each EbA option was prioritised using six selection criteria (see tables on page 9):

1. Benefits;
2. Cost;
3. Feasibility;
4. Sustainability;
5. Existing projects;
6. Cost effectiveness.

The final selection of EbA options for Honiara from the prioritised short list was based upon a cost effectiveness analysis. This was a replicable five step process:

1. Cost to implement;
2. Ecosystem services positively influenced;
3. Potential positive influence on ecosystem services (high, medium, or low);
4. Financial benefits per hectare or per person;
5. Discount future benefits to current value.



Top: Workshop at Barana Village. Photo | Jilda Shem

Middle: Workshop in Honiara. Photo | Fred Patison

Bottom: Mataniko River and its tributaries were selected for a rehabilitation and restoration project. Photo | Stuart Chape

Opposite page: Beautifying and creating green space for the Honiara CBD was one of the top five EbA options. Photo | Friedrich Stark



Descriptions and scoring matrix of the six selection criteria used to prioritise EbA options.

Criteria	Description	Scores			
 BENEFITS	Increasing social / ecological resilience through protection or enhancement of ecosystem functions/services, or provision of additional benefits	Very high (1)	High (2)	Medium (3)	Low (4)
 COST	Cost of implementation, including ongoing monitoring, management, and maintenance	Low <USD 10K (1)	Medium USD 10–50K (2)	High USD 50K+ (3)	-
 FEASIBILITY	Community support, land tenure and ownership, logistical requirements, partnership opportunities	Yes 1	Uncertain 2	No 3	-
 SUSTAINABILITY	Potential for long lasting benefits with minimal maintenance	Very high 1	High 2	Medium 3	-
 EXISTING PROJECTS	Current projects addressing this issue/ threat/opportunity	Nil 1	Few (1–2) 2	Several (3–5) 3	Many (6+) 4
 COST EFFECTIVENESS	This scoring process resulted in a shortlist of priority actions which were subjected to a separate cost effectiveness assessment.	Ranked 1st 1	Ranked 2nd 2	Ranked 3rd 3	Ranked 4th 4

Ranking of the top five EbA options for Honiara based on six selection criteria.

Honiara ecosystem-based adaptation options	 Benefits	 Cost	 Feasibility	 Sustainability	 Existing projects	 Cost effectiveness	SCORE
<i>Barana and Queen Elizabeth Park management plan</i>	2	3	1	2	1	2	11
<i>Support Botanical Gardens to be a formal protected area</i>	2	3	1	1	1	3	11
<i>Environmental compliance training for government staff and stakeholders</i>	2	3	1	2	2	1	11
<i>Mataniko River bank rehabilitation and information centre</i>	2	3	1	2	1	4	13
<i>Beautifying and creating green space for the Honiara CBD</i>	2	3	1	3	1	5	15

Developing an EbA implementation plan

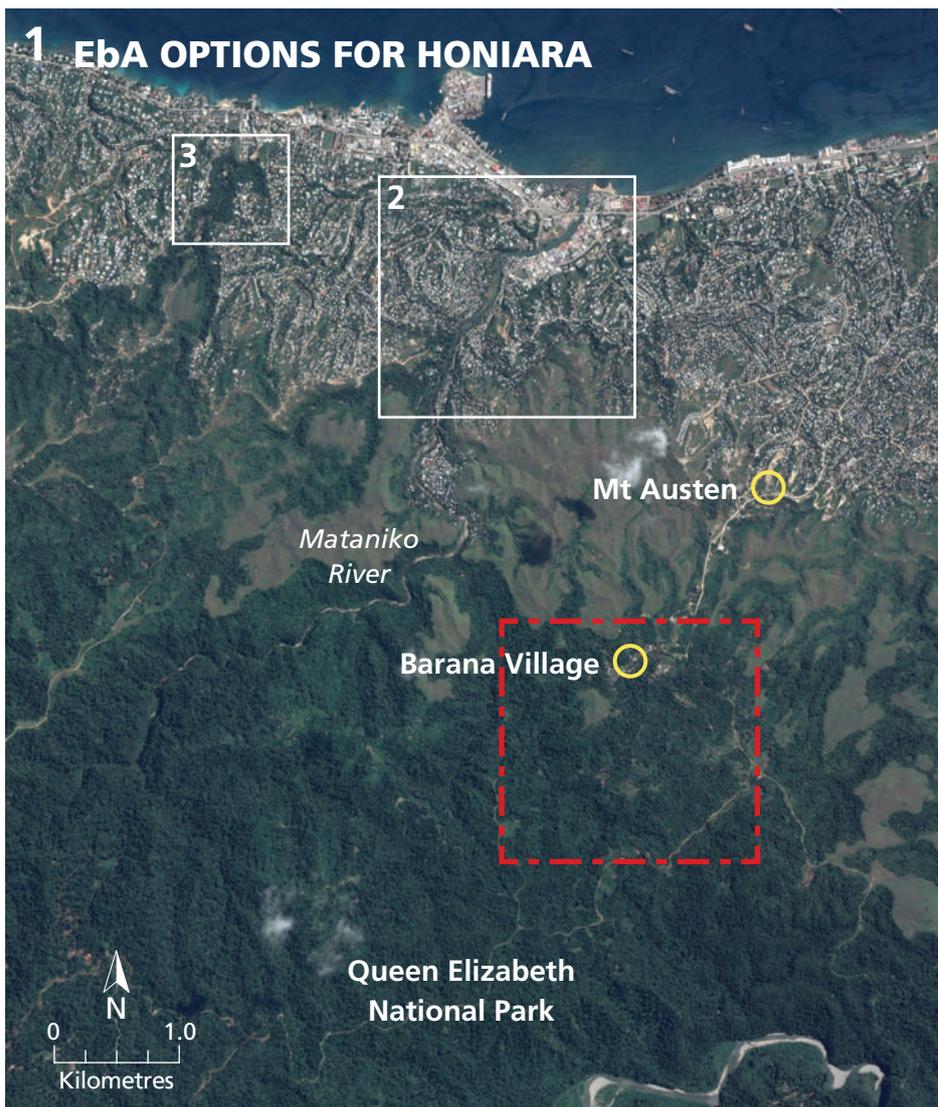
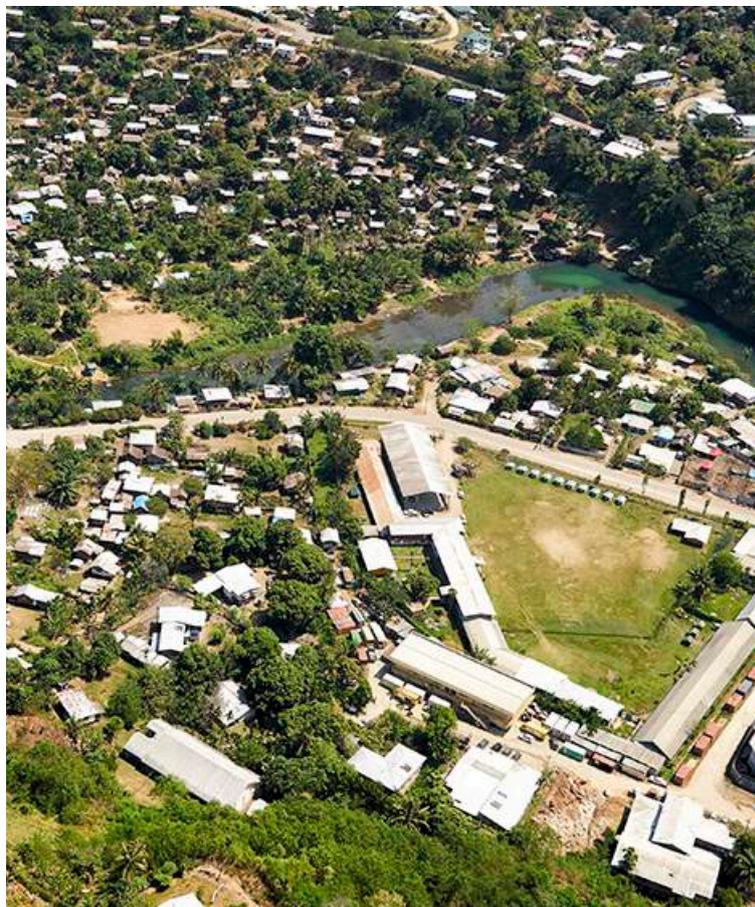
Following prioritisation of the twenty-nine EbA options, three demonstration projects were selected to develop an EbA implementation plan:

1. Barana & Queen Elizabeth Park management plan;
2. Mataniko River rehabilitation & information centre;
3. Support Botanical Gardens to be a formal protected area and formulate a management plan.

These demonstration projects for Honiara are highlighted in the following pages.

Right: Mataniko River and its tributaries were selected for a rehabilitation and restoration project. Photo | Stuart Chape

Below: Location of three EbA demonstration projects, showing the general location of Barana Village and nearby Queen Elizabeth Park (left panel), Mataniko River rehabilitation (A), and the Botanical Gardens (B). Coloured lines show the approximate project locations in each panel. Satellite images | Google Earth





Queen Elizabeth Park near
Barana village.
Photo | Jilda Shem

Barana and Queen Elizabeth Park management plan

DESCRIPTION

Develop a management plan for Barana and Queen Elizabeth Park to improve the upper Mataniko and Lungga catchment area's provision of fresh water supply and other ecosystem services.

LOCATION

Upper catchment of Mataniko and Lungga Rivers, the rivers themselves, and their downstream receiving environments.

TARGETED ECOSYSTEM SERVICES

- Intact watershed for provision of food, materials, income generation (tourism);
- Hazard reduction through stormwater regulation and flood control, reducing sedimentation into waterways;
- Support habitat and biodiversity provisions;
- Provision of freshwater and recreation;
- Water quality, land stability, erosion and sediment control;

SOCIO-ECOLOGICAL RESILIENCE BENEFITS

- Improved sustainability of watershed resources e.g., food, building materials, fuel;
- Improved security and quality of water supply for communities and biodiversity;
- Reduced human health risks associated with poor water supply and environmental hazards (e.g., flood regulation);
- Development of environmentally sustainable income generation sources;
- Provision of areas and opportunities for socialising, recreation, and reconnecting with traditional land-based cultural practices;
- Conservation benefits through promoting intact watershed vegetation and reducing sediment loads entering rivers;
- Building ecosystem resilience through restoring functionality of regulating services (e.g. water quality, carbon and nutrient cycling, maintaining air quality);
- Educational platform for community education and awareness, with long-term benefits to broader socio-ecological resilience issues.



Aerial of Mataniko River.
Photo | Stuart Chape

Mataniko River rehabilitation and information centre

DESCRIPTION

Implement river rehabilitation/restoration works on the Mataniko River and/or its tributaries, and develop information sharing opportunities for improving environmental awareness within the community (e.g. on issues such as waste management, waterway health, improving flood resilience).

LOCATION

Mataniko River and/or its tributaries

TARGETED ECOSYSTEM SERVICES

- Land stability (river banks)
- Provision of food
- Provision of freshwater for domestic and recreational use
- Income generation

SOCIO-ECOLOGICAL RESILIENCE BENEFITS

- Reduced contamination of local water supply and reduction in associated human health risks;
- Hazard reduction through stormwater regulation, flood control, and shade provision;
- Improved ecosystem health through waterway rehabilitation (e.g., reducing sediment load entering Mataniko River and water quality improvements);
- Sustaining biodiversity by providing habitat for terrestrial flora and fauna through riparian restoration;
- Creation of a community hub for environmental education, training, and awareness;
- Safeguarding food provision and income generation associated with the Mataniko River.



Entrance to Honiara Botanical Gardens, in downtown Honiara.
Photo | Wikimedia Commons

Support Botanical Gardens to be a formal protected area and formulate a management plan

DESCRIPTION

Develop a management plan with the ultimate goal of declaring the Botanical Gardens as a forest reserve under the Forest and Timber Utilisation Act 1969 and Protected Areas Act 2010 to secure its future.

LOCATION

Honiara Botanical Gardens

TARGETED ECOSYSTEM SERVICES

- Provision of urban greenspace for socialising, recreation, and reconnecting with traditional land-based cultural practices.
- Habitat connectivity and biodiversity provisions.

SOCIO-ECOLOGICAL RESILIENCE BENEFITS

- Improved robustness of urban greenspace for both community and wildlife uses;
- Shade provision, air and noise regulation (including reduction of the head island effect);
- Improved ecosystem health of downstream water supply (Rove Creek) for washing, bathing, and recreation;
- Improved resilience of urban habitat connectivity and biodiversity (including wildlife refuge provisions);
- Hazard reduction through stormwater regulation, reducing sediment load entering Rove Creek and regulating water quality;
- Promoting community appreciation for natural environments in an urban setting;
- Improved educational platform for community education, training, and awareness;
- Potential income generation from tourism.

Summary: EbA in Honiara

NEED

In Honiara's rapidly expanding urban and peri-urban area with high population growth, remnant fragments of terrestrial, marine and freshwater habitats are highly valuable to the many households who rely on them for food, water, shelter, income opportunities, health and wellbeing.

THREAT

Land clearing, chemical pollution, poor sanitation, habitat loss, coastal erosion, and overharvesting of coastal fish and shellfish all contribute to degrading the highly valuable remnant areas of intact ecosystem in and around Honiara. A range of predicted climate change impacts could worsen these threats in this low lying coastal community.

SOCIO-ECOLOGICAL RESILIENCE BENEFITS

The identified range of EbA options for implementation in and around Honiara has the potential to provide income generation through tourism and products from local natural products, reduce hazards through stormwater regulation, increase sustainable provision of food and fuel supply, provide educational opportunities, reduce human health risks, secure fresh water supply, and increase availability and sustainability of food, building materials, and fuel.

Below left: Selling locally grown produce at the markets in Honiara. Photo | Rob Maccoll, AusAID

Below right: Reeds and bamboo for sale as a building material at the market in Honiara. Photo | Michael Runkel



Policy context

While there is a need to strengthen ecosystem-based adaptation policy in the Solomon Islands, the National Adaptation Plan of Action (NAPA), Solomon Islands Climate Change Policy, and the National Biodiversity Strategy and Action Plan (NBSAP) provide enabling policy frameworks at the national level.

For Honiara, key planning frameworks for stronger integration of ecosystem-based adaptation at the local level are:

- Honiara City Local Planning Scheme;
- City-wide Settlement Upgrading Strategy;
- Honiara Urban Resilience & Climate Adaptation Plan; and
- Guadalcanal Province Wildlife Management Area Ordinance 1990.

At the regional level, enabling policy frameworks for ecosystem-based adaptation in the Pacific islands are:

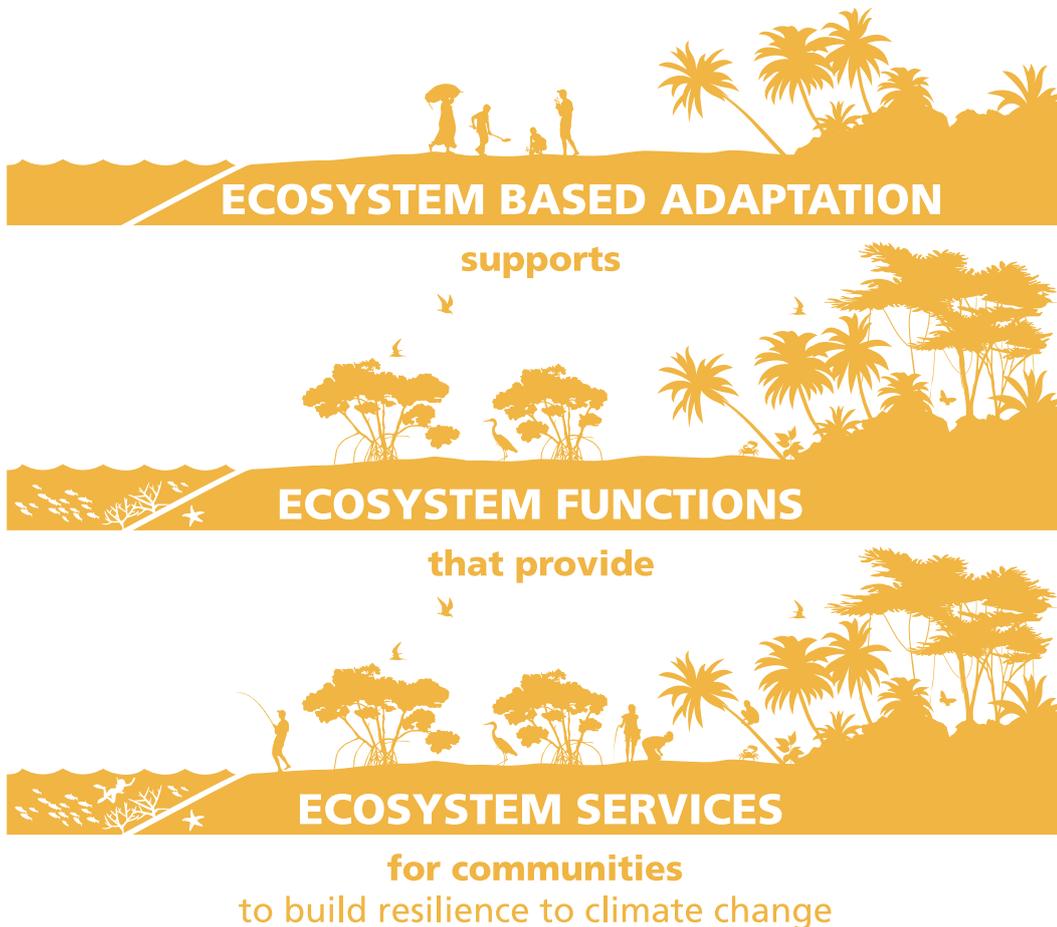
- Framework for Resilient Development in the Pacific;
- Framework for Nature Conservation and Protected Areas in the Pacific Islands;
- Pacific Regional Action Plan for Sustainable Water Management (Pacific RAP); and
- Framework for a Pacific Oceanscape.

At the international level, the ecosystem-based adaptation approach is strongly advocated by:

- UN Framework Convention on Climate Change;
- Sendai Framework for Disaster Risk Reduction (2015–2030); and
- Convention on the Conservation of Biological Diversity (CBD).

Benefits of EbA implementation in Honiara

Based on the vulnerable ecosystem services identified, EbA options have been proposed to protect, restore and strengthen ecosystems to increase the resilience of Honiara's communities and economies. Building environmental resilience to give ecosystems the best chance to adapt will, in turn, increase the ability of communities to adapt to the adverse impacts of climate change. Healthy ecosystems buffer communities from the impacts of climate change.



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**A resilient Pacific environment sustaining our livelihoods
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