



Assessing adaptation options for climate change:
A guide for coastal communities in the Coral Triangle of the Pacific
7. Ecosystem Services Mapping



Scoping



Identifying
options



Evaluation
of options



Planning
implementation

Introduction

Assessing options for adapting to climate change is an important part of building resilient fishing and farming communities.

This brochure is part of a series that collectively detail how a community-based assessment of climate change was used in partnership with coastal communities and provincial and national-level stakeholders in Timor-Leste and Solomon Islands. The assessment contains four distinct, but related, steps (Fig 1) focused on supporting community-level decision-making for adaptation through a series of participatory action research activities. Each brochure in this series details a specific activity in the four-step assessment.

This series of eight brochures is primarily aimed for use where resources are limited or where it is more appropriate to use a rapid, qualitative and non-data intensive method of assessment. Community leaders, local NGOs and regional and national-level government representatives in developing countries may find this series useful.

In this brochure we provide details of an activity relating to the 'Evaluation of options' step of the assessment. This activity involves working with provincial and national-level stakeholders to produce an annotated map of the natural resources that provide essential ecological services needed to underpin fishing and farming livelihoods. Ecosystem services are the benefits that people obtain from ecosystems, such as nutrient cycling and fresh water (Fig 2). The activity generally aims to provide an understanding of the following questions:

- What are the main land uses, coastal resources and natural resource components that contribute to the ecosystem services needed to underpin fishing and farming livelihoods?
- Which natural resource components do communities value?
- What are the likely impacts of a change in the condition, use, or management of natural resources on the ecosystem services they provide?

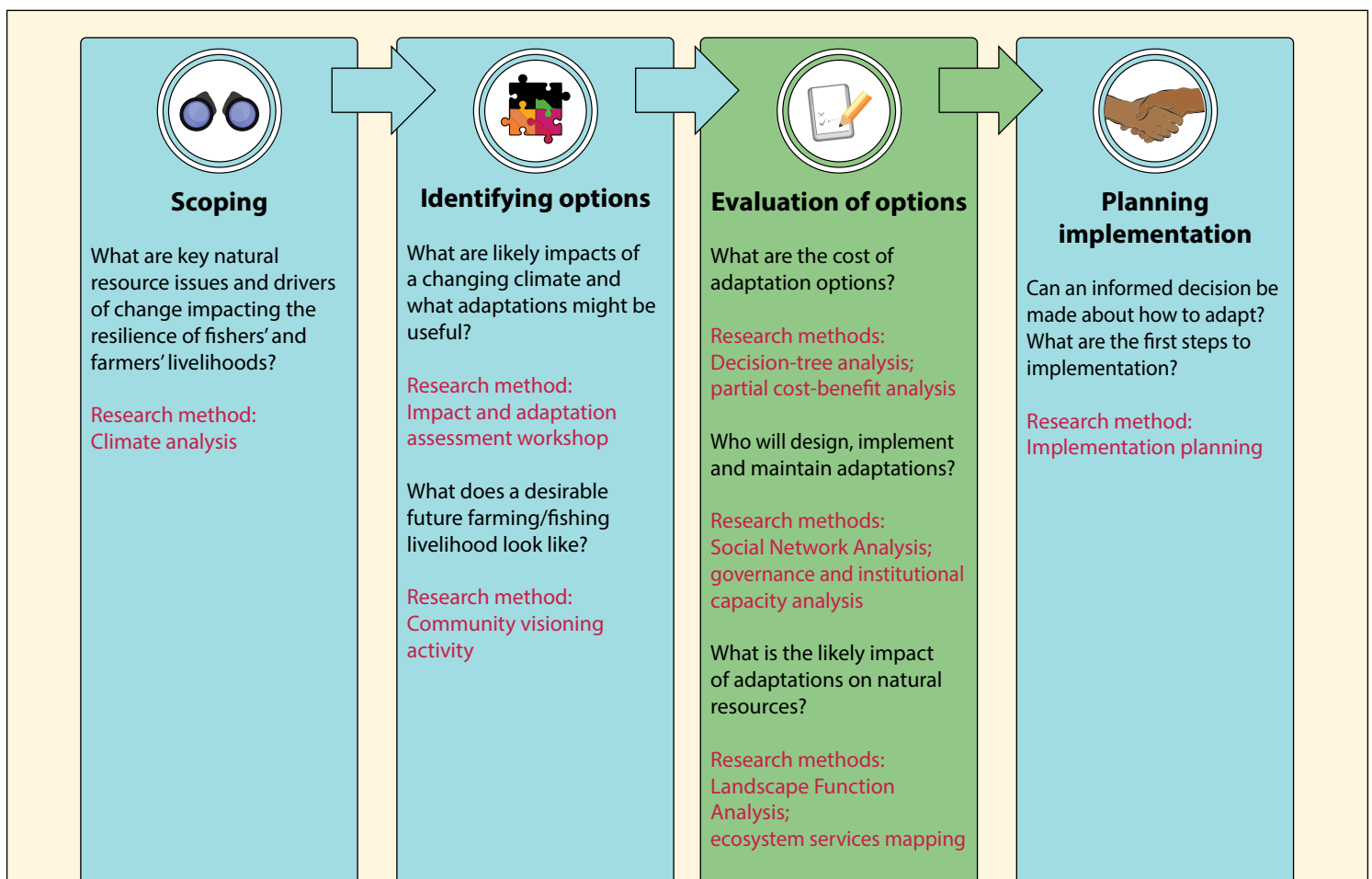


Fig 1: The four steps taken by community, local NGOs and regional and national government representatives in developing a plan to respond to climate change. Each step addresses specific questions likely to be asked by community members needing to adapt.

ECOSYSTEM SERVICES

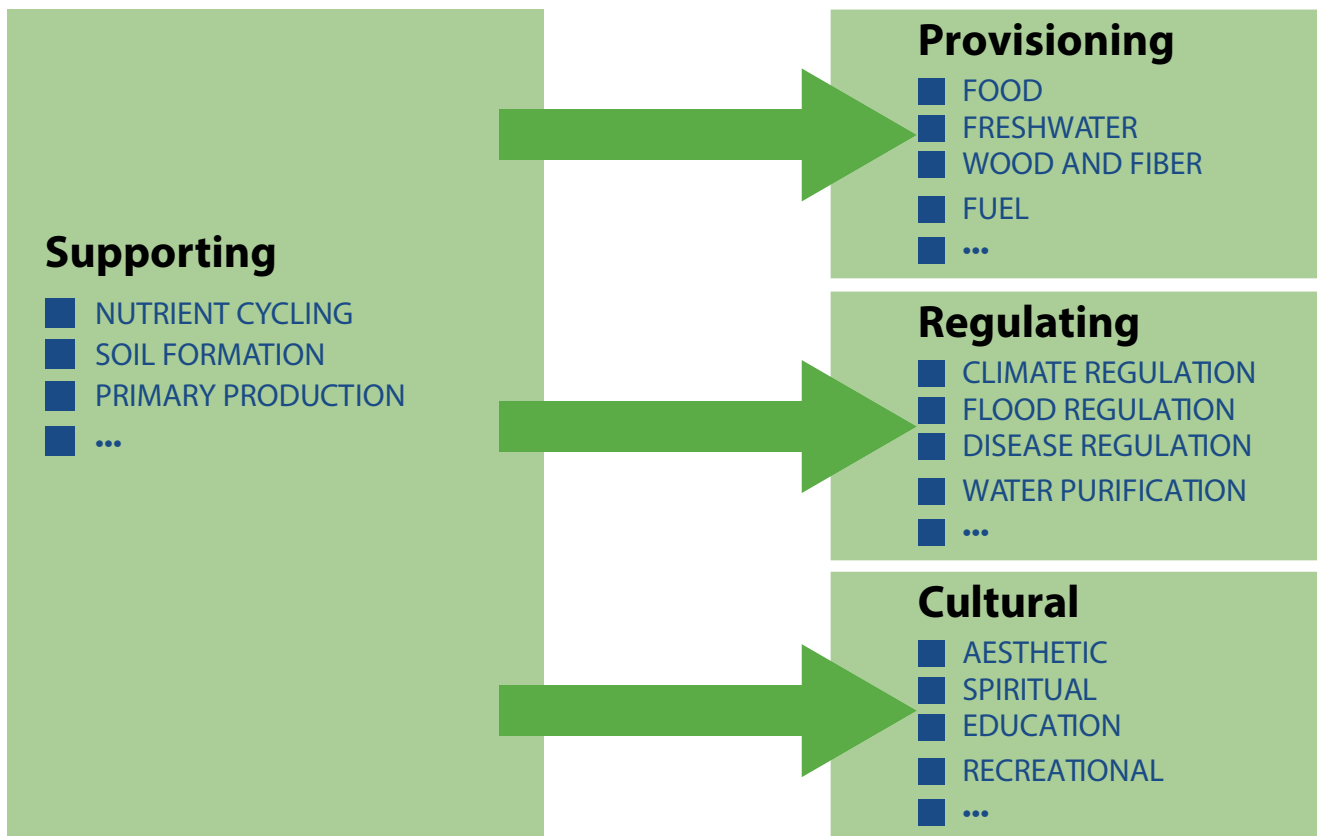


Fig 2: There are many different kinds of ecosystem service, and they can benefit people in a variety of ways. Supporting services, such as soil formation, enable provisioning services such as growing crops for food. Source: Millenium Ecosystem Assessment (2005).

What Is Ecosystem Services Mapping?

Ecosystem service maps are a useful tool for exploring how broad-scale changes in the use and management of natural resources are likely to impact the environment and the ecosystem services it provides. They are regularly used in planning development, natural resource management (NRM) planning and impact assessments.

In Solomon Islands, customary land ownership is central to the use and management of natural resources, with land owners being the primary constituents in development planning and NRM planning. Resource owners and communities also have the best perspective on how the ecosystems are used and therefore on the ecosystem services that the environment provides. Other stakeholders also have a perspective on ecosystem services at a broad scale. As a detailed ecosystem services mapping exercise is planned with land owners in Malaita in the coming years, in this exercise we focused on the perspectives of provincial and national-level stakeholders.

Ecosystem services mapping was used to work with provincial government and national government officers and representatives in Malaita, Solomon Islands, from the perspective of exploring the development of small aquaculture ponds as a response to climate and other drivers of change (Fig 3). More specifically, ecosystem services mapping was used to understand the following:

- What are the main land uses, coastal resources and natural assets considered important to livelihoods by the different stakeholder groups in parts of Central and North Malaita?
- What are the ecosystem services associated with these land uses?
- What are the likely impacts of scenarios of aquaculture pond development on existing land use and ecosystem services?



Fig 3: There is interest on Malaita, Solomon Islands, in developing aquaculture ponds as a response to climate and other drivers of change.

Ecosystem Services Method Used in Solomon Islands

Ecosystem services mapping activities for a part of Malaita Province were conducted with provincial and national-level NRM-related government representatives. These activities provided different perspectives on the importance and value of natural resource assets in the environment.

The main steps in the ecosystem service mapping activity were the following:

1. Focus group meeting to map NRM-related features

- A focus group meeting was held with each of the stakeholder groups. At these meetings the stakeholders were provided with an overview of the activity and its aims. They then received an A1-sized map of the island of Malaita. Over the map were placed consecutive layers of clear plastic sheeting and the stakeholders were asked to identify and annotate using colored pens those NRM-related features they considered important to fishing and farming livelihoods (Fig 4).
- The stakeholder groups were prompted to consider a range of land- and sea-based features during the mapping activity (Figs 4 & 5). For each of the following types of features, different colored pens and a clean layer of plastic were used:
 - Natural habitats – this might include forest, existing, cleared and replanted mangroves, coral reefs, sea grass beds, conservation areas and areas known to support important communities or species.
 - Aquaculture – this was separated into existing aquaculture, provincial government-planned locations for aquaculture and the location of communities or individuals expressing a strong interest in undertaking aquaculture.
 - Fisheries – this included identifying the most important fishing grounds. Additional information on catch estimates is useful to collect here also.
 - Agricultural production and other land uses.
 - Ecotourism enterprises.
 - Other important features, such as agricultural research stations or fisheries centers.



Fig 4: A map of the north of Malaita. Important features relating to coastal fisheries and fishing livelihoods have been marked on the plastic overlay by national and provincial stakeholders.



Fig 5: National government stakeholders marking NRM-related features on a map of Malaita. Collecting multiple perspectives on important NRM assets is useful for identifying possible land use issues and the likely impacts of implementing a climate change adaptation action.

2. Analysis of the maps

- The information contained on the layers of plastic were transferred to a mapping database software package, along with information gathered that related to each feature. Google Earth was selected for this, as it is freely available and relatively easy to use.
- All features mapped in the focus groups were drawn on layers within Google Earth. The software also allowed photographs of the features and information provided by focus groups to be spatially attached to the layers.
- From this process, we built up a multilayered spatial database of the production and natural resource features of parts of the coastline. Because the database is freely available and easy to use, information can be changed and incrementally updated by local users.

3. Assessing impact of aquaculture development

- These types of maps can be used by resource owners to assess areas where more than one land use may be anticipated and so help them with land use planning for the future. For example, this type of mapping can assist with understanding potential land use issues that could arise from the widespread development of aquaculture.

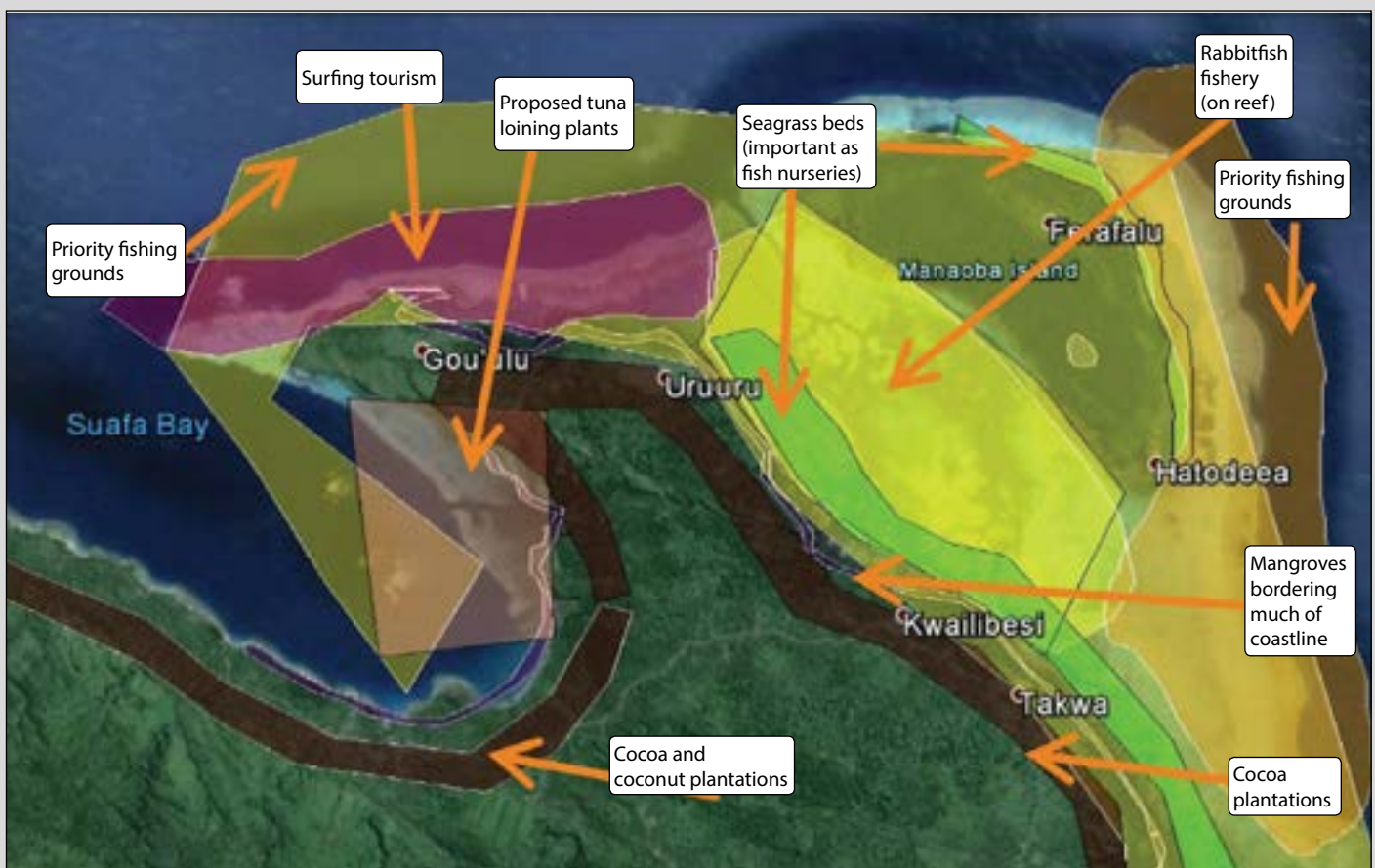


Fig 6: In areas where land use change or increased resource extraction are proposed, mapping the important existing features can show where issues might need to be resolved.

Tips for Implementing LFA

- Collect the materials needed for mapping ecosystem services. This includes detailed maps of the region, clear plastic sheeting to cover the map, colored permanent marker pens and a list of the relevant types of features to be mapped (e.g., fishing grounds, agricultural plantations, coral reefs).
- Use a fresh plastic sheet for each topic or set of features that is being mapped.
- Use large maps and sheets so that detail can be captured (e.g., A1).
- Take notes as you go along, as well as encouraging participants to write as much information as possible on sheets.
- When transferring information to Google Earth, try to be accurate but be aware that a lot of the features may have been marked to an approximate, rather than exact, location.

Key LFA Documents

Google Earth can be downloaded here: <http://www.google.com/earth/>

There are many tutorials on this website to show you how to use its features.

Results and Recommendations in Solomon Islands

- The workshop approach of getting stakeholders to mark features on maps worked extremely well and a large amount of information was collected.
- Areas of high aquaculture suitability are also highly suitable for other productive land uses (Fig 6). If aquaculture density becomes very high in these areas, issues of land use coincidence and resource distribution will need to be addressed.
- For many of these land uses, coastal habitats and other natural features, it was possible to describe which ecosystem services they would be providing to the broader community (Fig 7).

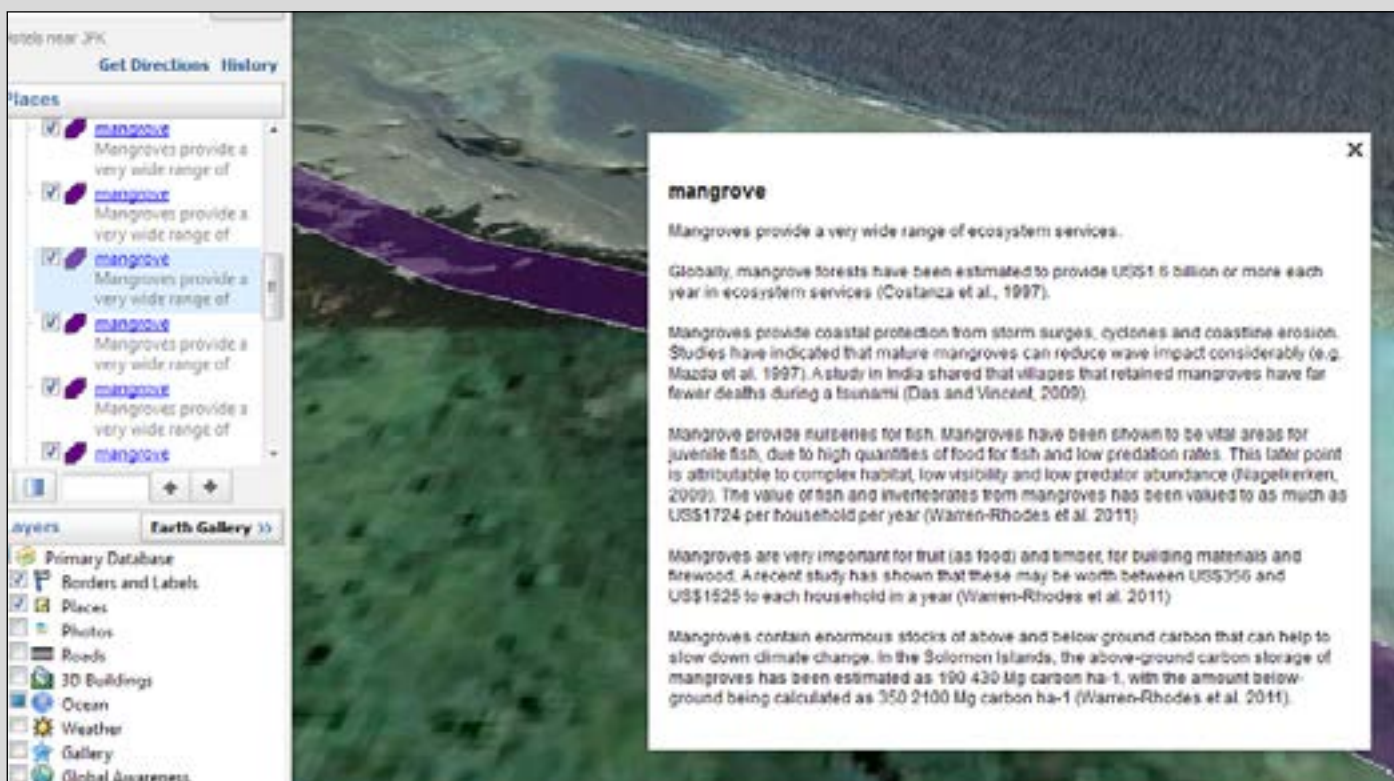


Fig 7: Detailed information, such as this summary of scientific research regarding mangroves and their ecosystem service provision, can be added to any data layer or photos that you place on Google Earth. These can then be accessed and edited by anyone with access to Google Earth, so that the maps are up to date.



This research was conducted by WorldFish under the project “Responding to Climate Change Using an Adaptation Pathways and Decision-Making Approach”, pursuant to the Asian Development Bank and Global Environment Facility cofunded initiative R-CDTA 7753-Strengthening Coastal and Marine Resources Management in the Coral Triangle of the Pacific (Phase 2).

Thanks to the partnering organizations in Timor-Leste and Solomon Islands for their collaboration and in-country support, and, most importantly, to the farmers and fishers who shared their knowledge and time in participating in this community-based assessment of climate change. Thanks also to the CGIAR Climate Change, Agriculture and Food Security Research Program for support.

For further details on this project, visit <http://www.ctknetwork.org/> and <http://www.worldfishcenter.org/ongoing-projects/adaptationpathways-responding-climate-change>

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