Ecosystem-based adaptation and climate change vulnerability

in Choiseul Province, Solomon Islands

Synthesis report

Contents

Choiseul: The people and place	1
Life in Choiseul: supported by nature	2
Climate change and other threats	4
Key vulnerabilities identified	6
Adaptation options	8
Ecosystem based adaptation	10
Planning from ridge to community to reef	11
Protected areas protect people	11
Food and water security, incomes and livelihoods	12
Infrastructure and planning	12
Looking ahead	13

Key definitions

Adaptation: Making changes in order to reduce the vulnerability of a community, society or system to the negative effects of climate change. Includes building skills and knowledge as well as making practical changes such as strengthening coastal infrastructure, adjusting farming systems, and improving water management.

Biodiversity: "Biological diversity" means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD).

Climate change: Changes in the Earth's climate, due to human activities (anthropogenic climate change) or natural processes, that are already occurring or predicted to occur. These include changed rainfall patterns, and more frequent and more intense extreme events such as droughts, floods and tropical cyclones. Anthropogenic climate change is expected to happen much more rapidly than natural changes in the climate, posing an enormous challenge to both natural and human systems.

Ecosystem: A complex set of relationships of living organisms functioning as a unit and interacting with their physical environment. The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2001).

Ecosystem services: The benefits that an ecosystem provides to humans. For example, forests provide food, timber, fuel and fibre; they regulate climate, floods and water quality; and they provide recreational, aesthetic and spiritual benefits.

Resilience: The capacity of a community, society or natural system to maintain its structure and functioning through stress or change.

Choiseul: The people and place

Choiseul province (traditionally named Lauru) is the northern most province of the Solomon Islands. It consists of the main island Choiseul, Vaghena and Robroy Islands, and a number of smaller islets. The centre of the provincial government is on Taro, a small island off the north western tip of Choiseul island.

The population of 26,372 people is growing quickly at a rate almost 0.5% higher than the national growth rate. If this continues, it is estimated that the population in Choiseul would double by the mid 2030s. Although the land area in Choiseul is large for the number of people, most of the population live in coastal villages.

Ethnic groups

Choiseul province has two main cultural groups with distinctive traditions and customs. The majority are indigenous Melanesians thought to have settled around 3,000 years ago. The second ethnic group are Micronesians from Kiribati who were resettled by the colonial government in the early 1960s to Vaghena.

Language

A total of eight native languages and dialects are used in Choiseul. Babatana is most commonly spoken throughout the province, i-Kiribati is spoken on Vaghena, while Pidgin and English are used in formal settings.

Tradition and faith

Governance in rural communities is a blend between tribal/cultural leadership and the church. There are three main churches in Choiseul, the United Church (56.2% of the population), Roman Catholic Church (21.9%) and Seventh Day Adventist Church (16%). There are also a number of smaller evangelical churches.

Biodiversity

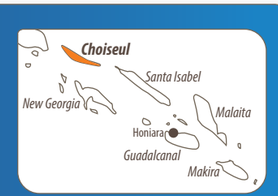
Choiseul province has globally significant biodiversity. Many species of animals and plants that are unique to the Solomon Islands are found here.

Cuscus (Phalanger orientalis), *the only marsupial in the Solomons and rare in many areas. Yet there are still large populations in Choiseul.*

Land ownership

Possession of indigenous Melanesian land in Choiseul is based on tribal land ownership that recognizes tribe (sinaqi) and sub-tribe (jojolo) as a communal unit authority over a piece of land. There are more than 300 tribal land owning groups in the whole of Choiseul province. In the indigenous context, land, sea, reefs, forests, rivers and other natural resources within a tribal land boundary have strong cultural and social connections.

26,372	2.8%	503	3,292km^2
Population recorded in 2009 census	Annual population growth rate	Number of communities	Total land area



Life in Choiseul: supported by nature

Sustainable livelihoods in Choiseul Province are closely linked to healthy terrestrial and coastal ecosystems. The majority of inhabitants earn their livelihood from natural resources such as copra, garden crops, seaweed and timber. Ecosystems also provide other essential services such as freshwater, healthy coral reefs, fertile soil, traditional medicines and protection from the threats of climate change and natural disasters.

The continued ability to utilise natural resources and ecosystem services are essential to the people's resilience and ability to adapt to both localised human impacts and the predicted effects of global climate change.

Copra - Produced from coconuts dried using timber fired ovens and then exported to international markets.

Fish - Reef and pelagic fish are caught using dugout canoes and sometimes craft with outboard motors then sold locally in Choiseul.

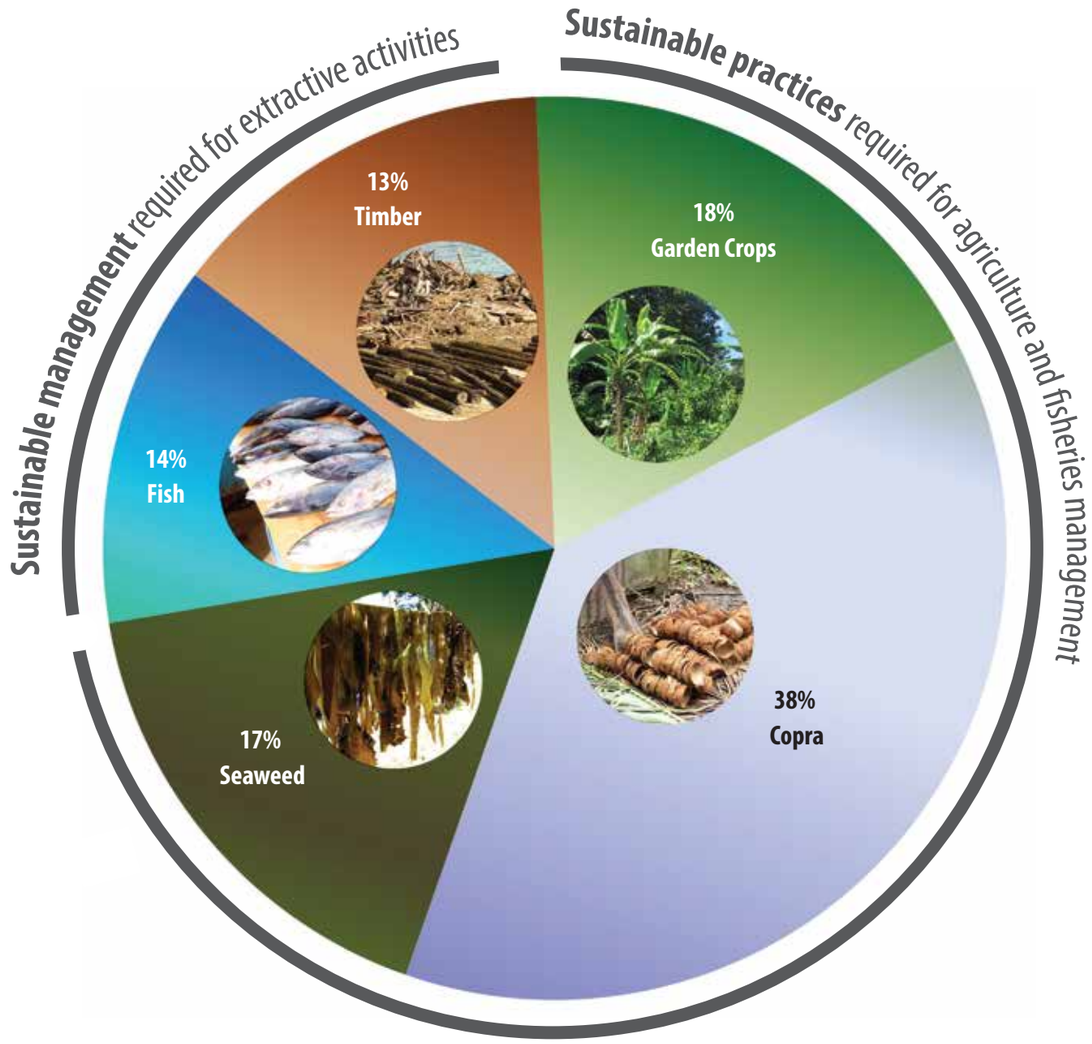
Garden Crops - Excess garden crops such as sweet potatoes, taro, pineapples, papaya, cabbages, etc. are sold locally.

Timber - Selective harvesting of timber is sold by the cubic metre for local and overseas markets.

Seaweed - Farmed by the people of Vaghena and sold to international markets.

Source of income per household

Data collected by household socioeconomic survey of 10% of households



Average source of income

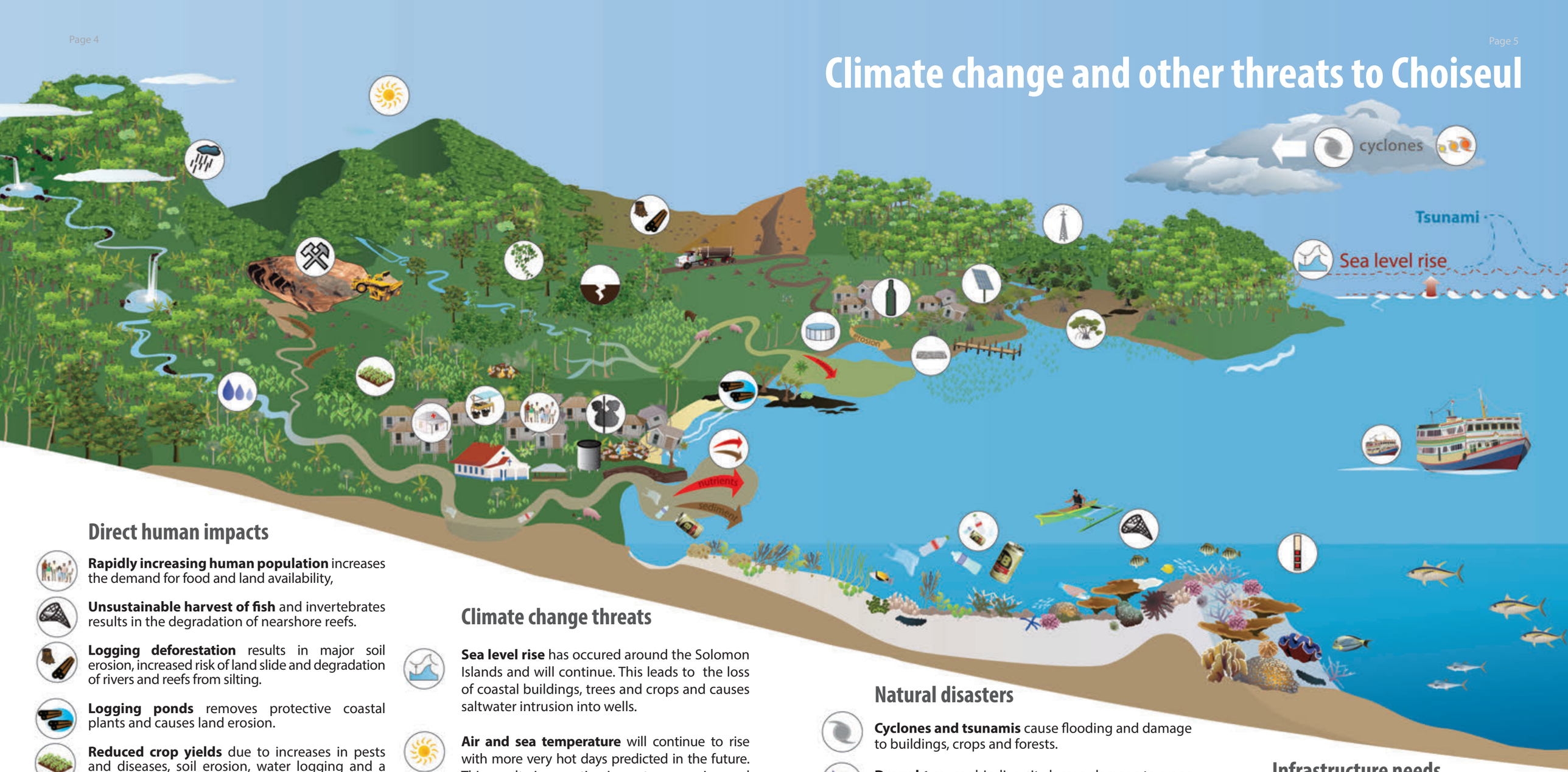
Per household income across all 14 wards

Other priceless ecosystem services

These income figures only represent financial earnings from goods caught or harvested from a healthy ecosystem. There is often far greater value in ecosystem services that are not bought or sold, such as a clean water supply.

For example, previous studies found that households in the village of Nukiki in Choiseul benefit to the value of SBD$49,533 every year from forest products. This value comes from building materials, firewood, medicine, nuts, fruit and food from the forest that are used by families, but not actually sold.

Climate change and other threats to Choiseul



Direct human impacts

Rapidly increasing human population increases the demand for food and land availability,

Unsustainable harvest of fish and invertebrates results in the degradation of nearshore reefs.

Logging deforestation results in major soil erosion, increased risk of land slide and degradation of rivers and reefs from silting.

Logging ponds removes protective coastal plants and causes land erosion.

Reduced crop yields due to increases in pests and diseases, soil erosion, water logging and a lack of crop rotation, fallow periods and terracing.

Mangrove removal reduces coastal resilience.

Inappropriate coastal defences such as wire and rock seawalls cause erosion and hinder the growth of plants and mangroves that protect the coastline.

Proposed mining operations will lead to major forest clearing, pollution and silting.

Invasive species threaten the balance of an ecosystem and can result in the loss of local species and severely impact crop production.

Nutrient and sediment flow into freshwater and marine ecosystems affecting drinking water supplies, coral reefs and fisheries.

Inappropriate rubbish disposal contaminates fisheries, soil and fresh water and affects human health.

Climate change threats

Sea level rise has occured around the Solomon Islands and will continue. This leads to the loss of coastal buildings, trees and crops and causes saltwater intrusion into wells.

Air and sea temperature will continue to rise with more very hot days predicted in the future. This results in negative impacts on marine and terrestrial ecosystems, crops and human health.

Rainfall increases are expected with more extreme rainfall days expected. This can cause soil erosion, flooding, impacts of coral reefs due to runoff and possible increases in rates of disease in humans.

Tropical cyclones are projected to decrease in number, however they are likely to be more intense, resulting in damage to ecosystems and infrastructure

Ocean acidification will limit the growth of corals and shellfish and result in destabilised reef systems and less productive fisheries.

Natural disasters

Cyclones and tsunamis cause flooding and damage to buildings, crops and forests.

Drought causes biodiversity losses, damage to crops and a reduction in water supply for communities.

Earthquakes cause widespread damage to ecosystems and communities.

Social challenges

Reduced self reliance due to the movement from subsistence to cash economy and importation of food and fuel.

Cultural transition as youth leave the Province and do not work the land.

Gender inequities prevent females from contributing to business, the community and in development project planning and implementation.

Foreign logging workers coming to villages degrades traditional social structures.

Infrastructure needs

Limited access to fresh water due to the lack of infrastructure such as water tanks.

Lack of infrastructure for transportation and communication limits the movement of people and goods and reduces educational and information sharing opportunities.

Distance to markets hinders economic growth as local produce cannot be easily sold to other villages or outside the Province.

Limited basic services for health, sanitation and education limit opportunities and leave people vulnerable to sickness.

Limited energy generation hampers the provision of services and slows the general development of the Province.

Key vulnerabilities identified

Land and forest vulnerability

Vulnerability is heightened by a range of land-use decisions that are decreasing resilience to the added pressure from the current and predicted impacts of climate change. Terrestrial impacts are increased by non-climate change factors such as logging and its indirect impacts including the displacement of pigs to gardens coupled with the reduction in hunting pressure, inappropriate farming practices, opening up of forest canopy, soil erosion and lack of land use planning. Reported changes include:

- **Increase in agricultural damage** due to pests and diseases
- **Increased flooding** events of food gardens and cash crops (coconuts and cocoa)
- **Increased incidence of landslides**
- **Reduced crop yields**
- **Increased top soil erosion and sedimentation** into streams and rivers

Marine vulnerability

Choiseul communities rely on fish and marine products as their main source of protein and also as an important source of income at the household level. Many villages reported declines in nearshore fishery resources and coral health. Reported changes include:

- **Mangrove dieback** (due to changes in coastline structure) and removal by humans
- **Declining coral health** as a result of increased sedimentation (from deforestation)
- **Declining fish** and invertebrates
- **Weakened** traditional marine resource management systems
- **Increasing population** putting more pressure on marine resources

Coastal vulnerability

Most communities in Choiseul are located in narrow low-lying coastal areas which are often bordered on the landward side by creeks, swamps and hills, and bisected or adjacent to rivers and streams. Reported changes include:

- **Coastal erosion** exacerbated by removal of mangroves and coastal vegetation
- **Net shoreline recession** over the past 2-5 decades (landward migration of the shoreline from net loss of sediment) averaging at about 0.4 – 0.8 metres per year (estimate from community based vulnerability assessment)
- **Increase storm surge** into villages during spring tides and local storms
- **Saltwater intrusion** into wells (Arariki and Kukitin)

Community vulnerability

Communities in Choiseul are moving between a subsistence and cash economy and experiencing rapid cultural change and population increase. There are a number of factors making communities vulnerable to the impacts of climate change. Reported changes include:

- **Isolation** from transportation and communications and access to markets for locally produced goods
- **Land tenure disputes** • **Reduced income** from sale of crops and fish
- **House and infrastructure damage** from sea level rise and increased storm damage
- **Food insecurity** and reliance on expensive and less healthy imported food
- **Cultural change** (desire to move to cash economy) and loss of traditional knowledge
- **Lack of resource management structures** - disconnect between community and agencies
- **Population increases** • **Potential increase in diseases**, insect and water borne

Village vulnerability index

- **Extreme** - communities currently experiencing a very high loss of livelihood and loss of ecosystem function from most impacts in this category
- **High** - communities currently and trending towards a high loss of livelihood and ecosystem function from many impacts in this category
- **Moderate** - communities currently or likely to experience some loss of livelihood and ecosystem function from some impacts in this category
- **Low** - communities currently and not likely to experience impacts in the short term from most impacts in this category

*These vulnerability assessment results are based on information gathered through visits to 27 communities where facilitated workshops, agricultural, coastal and hinterland assessments were conducted. This information was then further assessed through a literature review of relevant scientific research, recorded data and government legislation related to issues raised in the communities (*see full V&A Report for full description of indicators used to measure vulnerability).*

Communities can act now to secure the future

The vulnerability of Choiseul is strongly influenced by non-climate change factors. As a result, climate change adaptation activities in Choiseul cannot be implemented without also addressing the socio-economic issues and ongoing environmental threats confronting the local people.

To be effective in Choiseul, adaptation planning must be implemented at community, provincial and national levels.

Adaptation must also address a variety of inter-related issues including a lack of local development capacity and the challenge of improving subsistence and cash economies in the province.

The adaptation options below are a way forward that were identified by the communities themselves and represent initial possibilities to be discussed in detail, costed, designed and implemented in partnership with local communities.

Adaptation options identified by communities in Choiseul

1. Minimising damage to village infrastructure

Nuatabu village

Adaptation options include: community and infrastructure planning to include sea-level and flooding projections and relocating buildings and infrastructure.

2. Management and protection of inter tidal and coastal areas

Mangroves at Loimuni village

Adaptation options include: planting coastal trees/shrubs for protection, mangrove reforestation, creating vegetation buffers on river banks and maintaining existing ecosystem functions.

3. Increasing food security and livelihoods

Bee keeping in Southern Choiseul

Adaptation options include: technical agricultural assistance (crop rotation, crop diversity, agricultural techniques), agroforestry of cash crops and fruit trees, reforestation of previously logged areas with valuable timber species, contour planting and terracing and improved pest and disease control.

4. Protection of water resources

Increased sedimentation at Soranamola village

Adaptation options include: protection and/or restoration of water catchment areas, riparian and freshwater ecosystem management, increasing water storage capacity, sediment control of freshwater streams and water quality testing.

5. Marine and fisheries management

Many communities reported a decline in the health of reefs

Adaptation options include: coral reef and mangrove ecosystem management, minimising fishing pressure on key species, trials of fish aggregating devices, locally managed marine management areas and monitoring.

6. Increase disaster preparedness

Landslide in Southern Choiseul

Adaptation options include: emergency management procedures for landslides, tropical cyclones, flooding or tsunamis and planning for food shortages caused by disaster events.

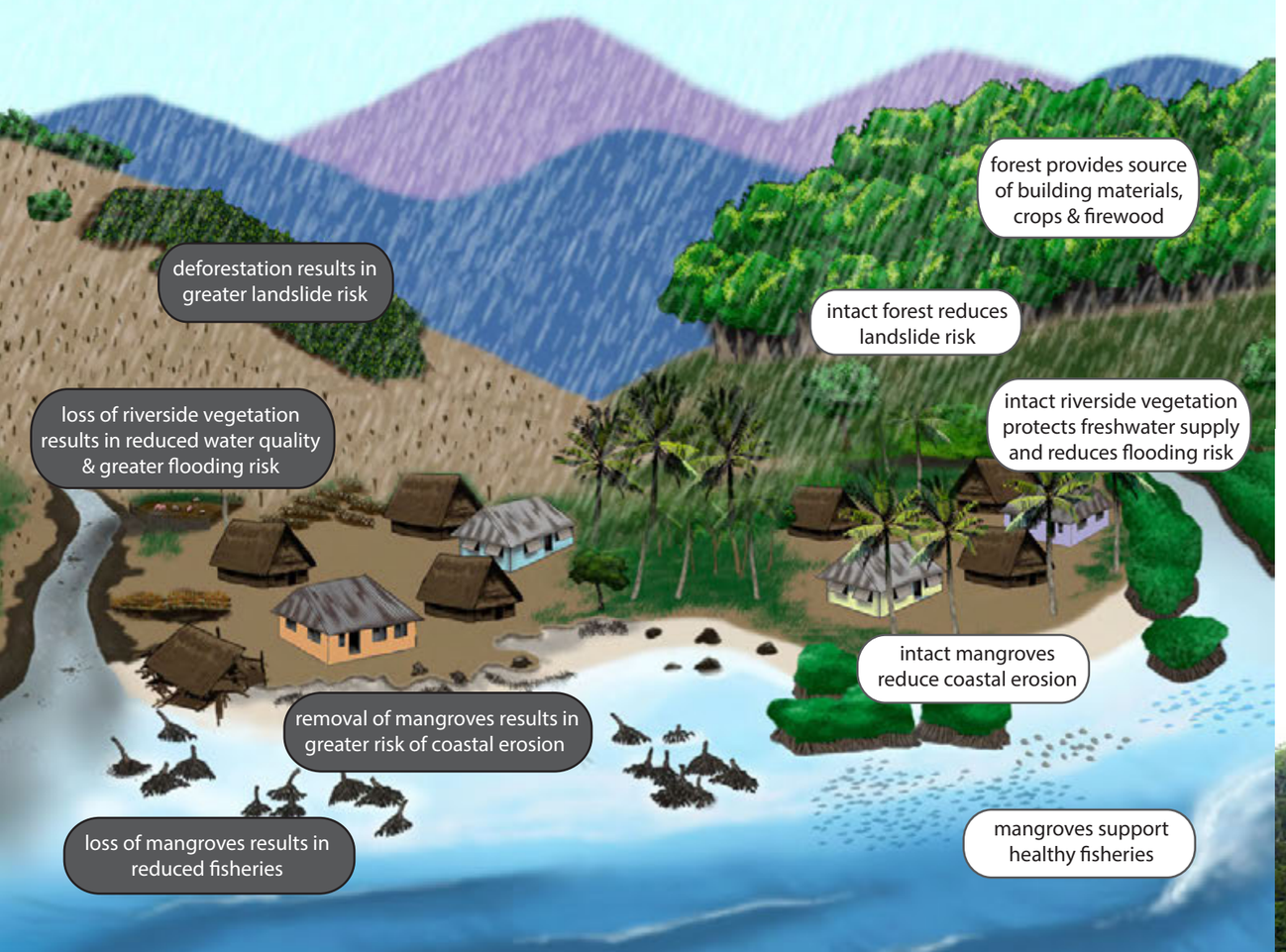
Ecosystem based adaptation

Choiseul contains globally significant natural resources. These are essential in supporting the economies, lives and livelihoods of the people. Ecosystem based adaptation aims to maintain these resources and keep ecosystems healthy to meet the primary goal of reducing vulnerability.

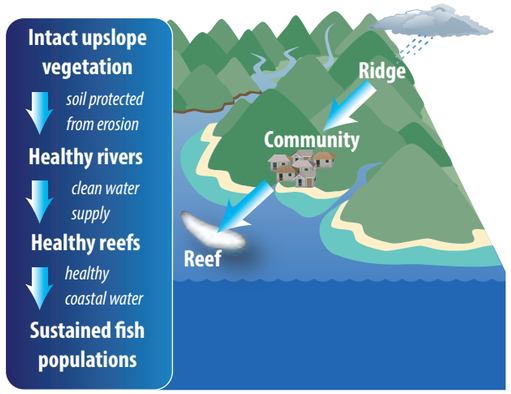
Secondary ecosystem services are also provided through this approach. For example, landslide risk can be reduced by keeping intact forest on steep slopes. Mangroves and coastal vegetation can be replanted for coastal protection. These activities also then provide firewood, fish habitat, building materials and food for local communities.

Village without ecosystem based adaptation

Village with ecosystem based adaptation



Planning from ridge to community to reef



Almost all communities in Choiseul are coastal. The terrestrial, freshwater and marine ecosystems they depend on are closely linked by the relatively small catchment areas that connect the mountains, coastline and reefs.

Ridge to reef planning integrates multiple sectors including agriculture, environment, forestry and fisheries in order to protect community livelihoods.

Since communities are the resource owners, a ridge to reef approach must focus on the community as the central point for adaptation action.

Protected areas protect people

Protected areas on land, on the coastline and in the sea can mean a more sustainable future for Choiseul. They ensure that intact catchments provide a clean water supply, the sea continues to provide a reliable source of fish and decrease the risk of damage from natural disasters.

For example, communities in Central Choiseul rely on the 1,067 metre high Mount Maetambe (photo below) as their water catchment. Land owners from this area have expressed interest in sustainably managing the catchment for future generations and protecting the mountain would significantly build the resilience of this region of Choiseul to the affects of climate change.

The 145 hectare protected area of Zinoa in Choiseul is managed by the tribe who have closed the area to fishing. Marine protected areas such as this allow coral, fish and intertidal reef species time to recover in number, and to grow larger and become more healthy. These marine resources then spread to where people are fishing in surrounding waters, and they also become available directly at times when the tribe opens and harvests from the protected area for a large feast or similar special occasion in the community.

Tribal leaders of Choiseul have already decided to work towards a network of protected areas by agreeing to the Ridge to Reef Protected Area Network plan. This was facilitated by The Nature Conservancy and the Lauru Land Conference of Tribal Community.

Food and water security, incomes and livelihoods

Climatic change and weather extremes have a strong influence on agriculture, water supply, income generation and community well-being in the Solomon Islands. For example, an El Nino weather event in 1997 lead to reduced food production and a shortage of water in many parts of the Solomon Islands. In some areas, the impacts were so severe, they were declared national disaster zones.

Fortunately there are many adaptation options that can assist including: introducing climate and pest tolerant crops to strengthen food security, deploying fish aggregating devices to create additional fishing resources and protecting catchment areas to maintain and improve water quality.

Crops in Choiseul are being affected by introduced pests and diseases

Infrastructure and planning

Responses to both climate change adaptation and mitigation issues have already been factored into the medium term development plan (2012 – 2014) for Choiseul Province. It identifies that key transport, communication and energy infrastructure is currently very limited in the Province and climate change will further impact on both existing and new infrastructure.

Roads, buildings and energy

Planning ahead for these impacts may include: revising standards for buildings and roads to account for climate change, evaluating risk to key infrastructure assets and encouraging communities to consider shifting buildings and infrastructure away from coastal and riverside areas vulnerable to sea level rise and flooding.

Forests for the community

Sustainable forest management and land use planning should be a priority of the Solomon Islands Government as it can ensure the long term social and economic security of small rural communities that rely on forest ecosystems.

Adaptation options for forests can include: supporting provincial and community level forest management, developing agroforestry systems to develop income from wood and non-wood products, utilising traditional knowledge for conservation, supporting global forest carbon schemes, establishing of community plantations with high value, climate resilient timber species on already degraded lands and building protection against the impacts of invasive species.

New infrastructure in Choiseul is still being built on areas highly vulnerable to sea level rise

Looking ahead

Climate change poses serious challenges to the lives and development aspirations of the people of Choiseul Province.

This vulnerability and adaptation assessment has been one of the first steps into considering what climate change adaptation options can be implemented using 'ridge to community to reef' and ecosystem based adaptation approaches to address these challenges.

Other significant challenges

Ongoing commercial logging and planned mining operations are heavily impacting the terrain in many areas of the Province. Even with rehabilitation, these ecosystems may never fully recover to their original state and be able to deliver the ecosystem services required to support the people of Choiseul.

Additional community and social challenges relating to a lack of basic services such as health and sanitation, education and gender inequities also seriously affect the adaptive capacity of the people of Choiseul.

A new partnership for adaptation

The people's adaptive capacity is very closely related to their interaction with the terrestrial and marine resources of Choiseul. The continued ability to protect and utilise these ecosystem services are essential to the people's resilience and ability to adapt to the likely future impacts of climate change.

The national government has selected Choiseul as the first province for a new approach to adaptation, where a number of different partners work in a collaborative partnership to increase the resilience of the Province against climate change.

An example for the country

The success of this province based approach to climate change adaptation rests on the coordination of stakeholders and their activities at the donor and government level, right down to planning and implementation in rural communities.

It is hoped that this model of climate change adaptation will have meaningful results for Choiseul and can then be replicated in other provinces of the Solomon Islands.

SPREP Library/IRC Cataloguing-in-Publication Data

Secretariat of the Pacific Regional Environment Programme (SPREP)

Iacovino, Carlo., Donohoe, Paul., Carruthers, Tim., Chape, Stuart.

Ecosystem-based adaptation and climate change vulnerability for Choiseul Province, Solomon Islands – a synthesis report / by Carlo Iacovino … [et al.] – Apia, Samoa : SPREP, 2013.

16 pp. ; 29 cm

978-982-04-0487-8 (print)
978-982-04-0488-5 (online)

1. Climate change – Vulnerability – Solomon Islands – Choiseul. 2. Ecosystem management – Adaptation – Solomon Islands – Choiseul. I. Iacovino, Carlo. II. Donohoe, Paul. III. Carruthers, Tim. IV. Chape, Stuart. V. Pacific Regional Environment Programme (SPREP) VI. Title.

551.69099593

This publication is also available electronically at: **www.sprep.org**

SPREP
PO BOX 240
Apia
Samoa

T: +685 21929
F: +685 20231
E: sprep@sprep.org
W: www.sprep.org

This report is made possible by the generous support of the American People through the United States Agency for International Development (USAID).

This report was produced as an inter-agency collaboration between the Secretariat of the Pacific Regional Environment Programme (SPREP), Secretariat of the Pacific Community (SPC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Photography credits. Cover: Paul Donohoe & Roger James. Top page 1: Stuart Chape. Bottom page 1: Patrick Pikacha. Page 3: Roger James & Carlo Iacovino. Page 7: Paul Donohoe & Roger James. Page 8: Paul Donohoe. Page 9: Paul Donohoe, Carlo Iacovino & Roger James. Page 11: Patrick Pikacha. Page 12: Sevuloni Tora (illustration) Page 12 & 13: Roger James. Top back cover: Roger James. Bottom back cover: Carlo Iacovino. **Graphic design and layout:** Carlo Iacovino.

Symbols. Courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/symbols/)

For more information, refer to the vulnerability and adaptation assessment report: *Choiseul Province climate change vulnerability and adaptation assessment report: securing the future of Lauru now / by Melchior Mataki… [et al.] (SPC/GIZ/SPREP)*