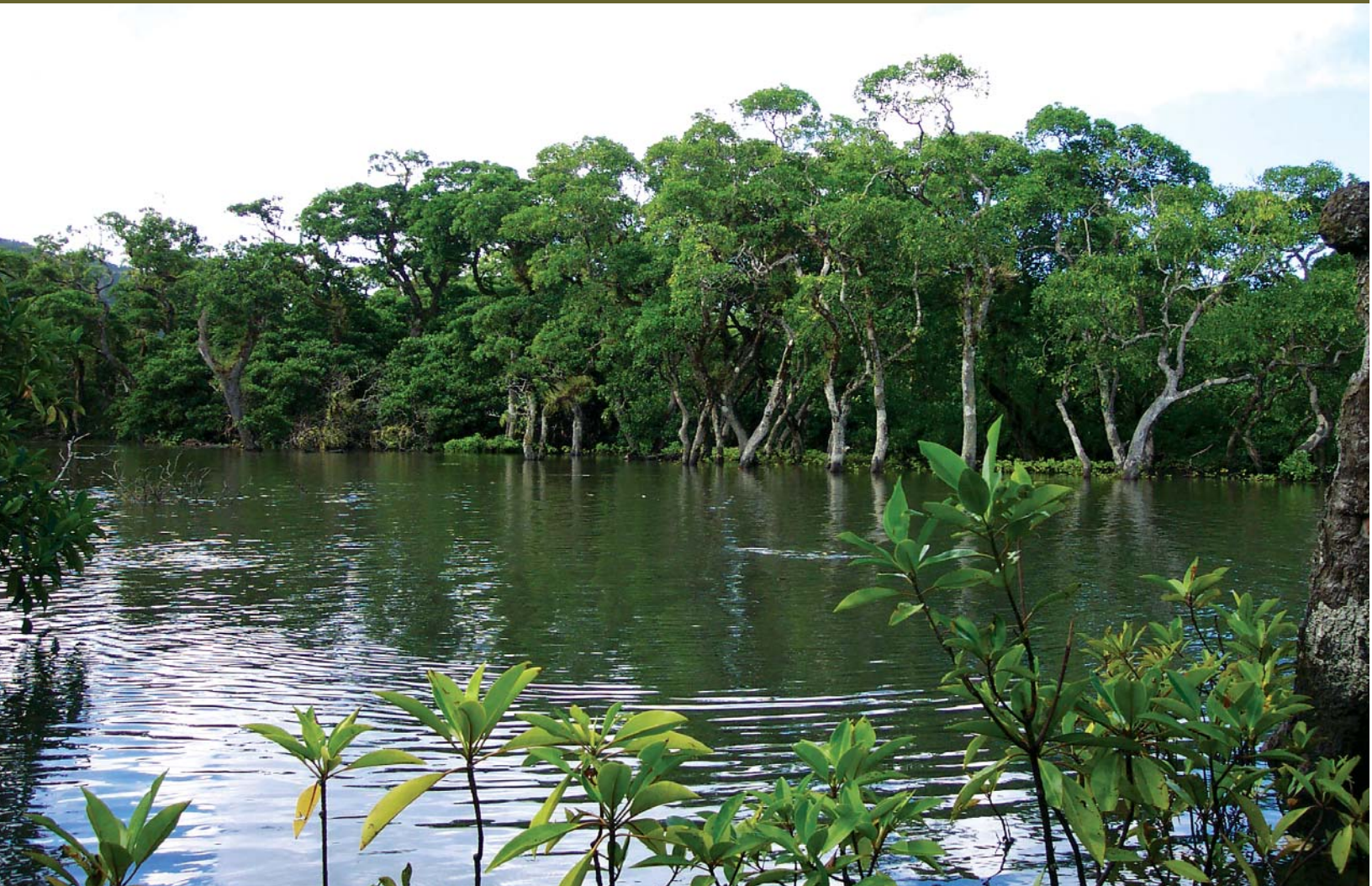


Pacific Island Mangroves in a Changing Climate and Rising Sea

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**Regional
Seas**



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UNEP

PO Box 30552

Nairobi, Kenya

Tel: +254 20 7621234

Fax: +254 20 7623927

Email: cpinfo@unep.org

Web: www.unep.org

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Eric Gilman, Hanneke Van Lavieren, Joanna Ellison, Vainuupo Jungblut, Lisette Wilson, Francis Areki, Genevieve Brighthouse, John Bungitak, Eunice Dus, Marion Henry, Mandes Kilman, Elizabeth Matthews, Ierupaala Sauni Jr., Nenenteiti Teariki-Ruatu, Sione Tukia, Kathy Yuknavage



Authors' Affiliations

Eric Gilman, University of Tasmania, School of Geography and Environmental Studies, and Blue Ocean Institute
(egilman@utas.edu.au, egilman@blueocean.org)

Hanneke Van Lavieren, United Nations Environment Programme, Regional Seas Programme

Joanna Ellison, University of Tasmania, School of Geography and Environmental Studies

Vainuupo Jungblut, Secretariat of the Pacific Regional Environment Programme

Lisette Wilson, WWF – South Pacific

Francis Areki, WWF – Fiji

Genevieve Brighthouse and Ierupaala Sauni Jr., American Samoa Coastal Management Program

John Bungitak, Republic of the Marshall Islands Environmental Protection Authority

Eunice Dus, Wildlife Conservation Society Papua New Guinea Program

Marion Henry, Federated States of Micronesia Department of Economic Affairs

Mandes Kilman, Primary Resources Consulting Company, Vanuatu

Elizabeth Matthews, Palau Conservation Society

Nenenteiti Teariki-Ruatu, Republic of Kiribati, Ministry of Environment, Land, and Agricultural Development

Sione Tukia, Tonga Department of Environment

Kathy Yuknavage, Commonwealth of the Northern Mariana Islands Coastal Resources Management Office

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Ramsar Convention on Wetlands
Millennium Development Goals
Millennium Ecosystem Assessment
Convention on Biological Diversity and World Summit on Sustainable Development
 Biodiversity Targets
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Key Messages and Next Steps

Compared to just a few decades ago, the ever-increasing number and strength of forces affecting coastal ecosystems, including mangroves, require coastal managers to respond and adapt to ensure the sustainability of valued ecosystem services and products. One of the major challenges in the Pacific Islands region is adjusting to the responses of coastal ecosystems to the climate change-induced rise of relative sea levels by developing and implementing appropriate, affordable, and cost-effective adaptation measures with limited resources.

Accurate predictions of changes to coastal ecosystem area and health, including those originating from climate change effects, enable advanced planning to minimize and offset anticipated losses and reduce threats to coastal development and human safety for specific sections of coastline. Relative sea level rise is a major factor contributing to recent losses and projected future reductions of coastal habitats, including mangroves and other tidal wetlands. These losses exacerbate coastal hazards, increasing threats to human safety and shoreline development. Especially in the Pacific Islands region, shoreline development and coastal ecosystems are particularly vulnerable to small increases in sea level and other climate change effects. Many of the low islands do not exceed 4 m above current mean sea level, and even on islands with higher grounds, most development is located on narrow coastal plains. The small land mass, high population densities and population growth rates, limited funds, poorly developed infrastructure, and susceptibility to damage from natural disasters limit the capacity of small island states to adapt to relative sea level rise and the resulting ecosystem responses. It may not be physically or economically feasible for many small island communities to retreat from a landward migrating mangrove and other coastal ecosystems, or to establish zoning setbacks from coastal habitats for new development.



Fig. 1. Pacific island coastlines are particularly sensitive to sea level rise (photo by J. Ellison).

The central aim of this publication is to highlight the results and recommendations from a study that has assessed the capacity of Pacific Island countries and territories to determine mangrove vulnerability and adapt to mangrove responses to climate change effects. The report identifies national and regional priority needs for technical and institutional capacity-building and discusses how results from this Pacific Island study could contribute to other relevant regional and international initiatives. It also describes the status, trends and diversity of Pacific Island mangroves; the services and products derived from mangrove communities; and considerations for the development of a strategy to plan and adapt to site-specific mangrove responses to climate change effects, including the critical need for community-based approaches, integrated coastal zone management, increased mangrove resistance and resilience, and outreach activities.

Status, trends, and threats to Pacific Island mangroves

- The Pacific Islands, while containing only three percent of the global mangrove area, support unique mangrove communities and provide valuable site-specific services and products. Papua New Guinea has the highest global mangrove diversity and hosts over 70 percent of the region's mangrove area. Pacific island mangroves decline in diversity from west to east, reaching a limit at American Samoa. There is little information available on trends in the extent and health of Pacific Island mangroves.
- Mangroves migrate landward as a natural response to a rising sea level. In some cases where this natural landward migration is not possible, e.g., because of the natural physiographic setting or due to the

presence of seawalls and other obstructing development, the mangrove area reduces over time. Global mean sea level is projected to rise 9 to 88 cm between 1990 and 2100. Some Pacific islands are experiencing a rise in relative sea level while others are experiencing lowering. The ten countries and territories in the Pacific Islands region with native mangroves belonging to the former group have experienced an average rise in relative sea level of 2.0 mm per year over the past few decades. Mangroves could experience serious problems due to rising sea level, and low island mangroves may already be under stress. By the year 2100, a reduction in area by as much as 13 percent of the current 524,369 ha of mangroves of the 16 Pacific Island countries and territories where mangroves are indigenous is possible.

- Increased frequency and levels of extreme high water events could affect the position and health of coastal ecosystems and pose a hazard to coastal development and human safety. Extreme high water events are projected to increase over coming decades as a result of the same forces projected to cause global sea level rise, and possibly additional forces such as variations in regional climate and changes in storminess.
- The responses of mangrove wetlands and other coastal systems to global climate change effects other than sea level rise, such as increased air and sea-surface temperatures, changes in precipitation and salinity, and changes in storminess, are less certain and not well understood.
- In addition to climate change effects, mangroves and other coastal ecosystems face numerous other threats, ranging from logging and filling for development to disease outbreaks.

Services and products from Pacific Island mangrove ecosystems

- Pacific Islanders value mangroves as a resource for a wide range of goods and services, including their role in supporting seafood important for their diets, protecting coastlines and development from coastal hazards, supporting good water quality, and providing natural materials used in traditional practices such as dye from mangrove bark used in tapa and to treat textiles, nets, and fish traps.
- The annual economic values of mangroves, estimated by the cost of the products and services they provide, have been estimated to be between USD 200,000 -- 900,000 per ha. The range of reported costs for mangrove restoration is USD 225 -- 216,000 per ha.
- The existence of functional links between coastal ecosystems, including mangroves, seagrass beds, and coral reefs, means that degradation of one habitat type will adversely affect the health of neighboring habitats.

Capacity-building priorities to address mangrove responses to climate change effects

It is a priority to:

- Strengthen management frameworks that regulate coastal activities and develop a plan for adaptation to

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