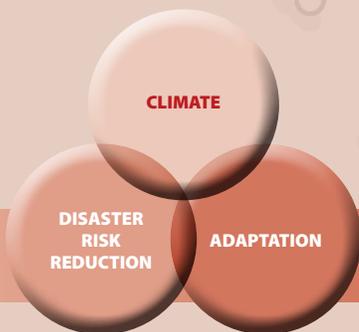


Vulnerability, Risk Reduction, and Adaptation to Climate Change



MARSHALL ISLANDS



GFDRR
Global Facility for Disaster Reduction and Recovery



COUNTRY OVERVIEW

The Republic of the Marshall Islands (RMI) is a raised atoll island nation of low coral limestone and sand islands located in the North Pacific Ocean at equal distance between Hawaii and Australia at 9°N 168° E. The country comprises 34 major islands and atolls, including the atolls Bikini, Enewetak, Majuro, Rongelap, and Utirik, and covers a total land area of approximately 181 square kilometers (km²), approximately the geographic size of Washington, DC. Twenty-two of the atolls and four islands are inhabited, and the country's total population according to the World Bank was nearly 60,000 in 2008, of which 70% live on Majuro Atoll, the RMI capital. The atoll coastline is approximately 370 km, and the average elevation of most islands is approximately 2 meters above sea level, with the highest recorded point on the atoll, Likiep, at 10 m above sea level.

Its relative isolation—small land area separated by vast oceans—and limited resources make the Republic of the Marshall Islands – like all Small Island Developing States (SIDS) – extremely vulnerable to the adverse impacts of climate change. This vulnerability designation is in large part due to the fact that its small land area means that over 99% of the population lives along the coastline, rendering a considerable portion of the country's economy, infrastructure, and livelihoods vulnerable. According to the Intergovernmental Panel on Climate Change's (IPCC) 4th Assessment Report, the effects of rising sea level are “likely to be of a magnitude that will disrupt virtually all economic and social sectors in small island nations”. In addition to these vulnerabilities, excessive dependence on foreign aid and remoteness make the country particularly vulnerable to climate variability and change.

PRIORITY ADAPTATION MEASURES

Key Sectors

Water Resources
Coastal Zones and Marine Resources
Public Health

Source: The Republic of the Marshall Islands' Initial National Communications on Climate Change, 2000.

Climate change impacts are already being felt across the Republic of the Marshall Islands, including increased intensity and frequency of extreme events and droughts. Already, some of the country's northern atolls are suffering more frequent drought conditions, and much of the archipelago is under threat from storm surges and flooding. The country's First National Communications to the United Nations Framework Convention on Climate Change (UNFCCC) engaged in a consultative process across all relevant stakeholders of the RMI to identify needs for

adaptation action in several key sectors, including water resources, coastal and marine resources, and public health. Adverse impacts on these sectors are projected to increase in response to a changing climate.

CLIMATE BASELINE AND CLIMATE FUTURE

The Republic of the Marshall Islands has a warm, tropical climate year-round, with average temperatures around 27°C and annual precipitation of approximately 3500 millimeters (mm). Two seasons are recognized, a wet season that occurs between May and November and a drier season between December and April. Climate in this part of the Pacific is governed by a number of factors including the trade winds and the movement of the South Pacific Convergence Zone (SPCZ), a zone of low-pressure rainfall that migrates across the Pacific south of the equator. Year to year variability in climate is also strongly influenced by the El Niño conditions in the southeast Pacific, which bring drought conditions to the Republic of the Marshall Islands.

CLIMATE BASELINE

The climate baseline summary for this region of the Pacific in general is as follows:

- ➔ Mean temperatures across the South Pacific have increased by approximately 1°C since 1970, at an average rate of 0.3°C per decade.

- ➔ Satellite measurements in this area of the Pacific estimate sea level increases of 8-10 mm/year, approximately three times the global average rate of increase. Precise barometric-pressure corrected sea level changes, however, indicate a trend of +3.5 mm/year, while longer gauging records of less precision suggest a decreased sea level of -2.21 mm/year.
- ➔ Sea surface temperatures in the Pacific have increased between 0.6 to 1.0°C since 1910, with the most significant warming occurring after the 1970s¹.
- ➔ The number of category 4 and 5 storms in the Pacific region has more than doubled when compared to the frequencies and occurrences between 1975-1989 and 1990-2004.
- ➔ The number of hot days² and hot nights has increased significantly across the Pacific.

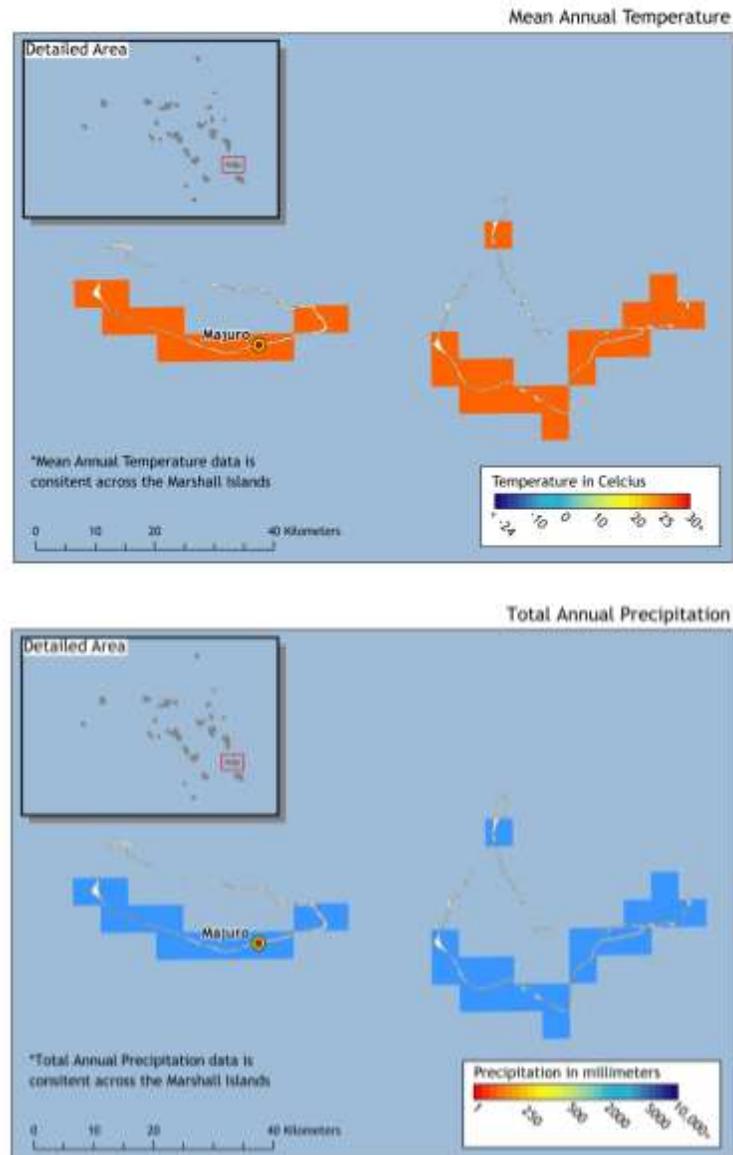


Figure 1: Annual climate baseline for the Republic of the Marshall Islands³

¹ Folland, C.K., J.A. Renwick, M.J. Salinger, N. Jiang, and N.A. Rayner, 2003: Trends and variations in South Pacific Islands and ocean surface temperatures. *Journal of Climate*, 16, 2859-2874 and Folland, C.K., J.A. Renwick, M.J. Salinger, and A.B. Mullan, 2002: Relative influences of the Interdecadal Pacific Oscillation and ENSO on the South Pacific Convergence. *Zone. Geophysical Research Letters*, 29, 21-1-21-4.

² Hot Days/Nights are defined as the temperature exceeded on 10% of days or nights in current climate of that region and season.

CLIMATE FUTURE

The climate science community sources a suite of models to inform decision makers on future climate. Among the most widely used are GCMs (Global Climate Models), RCMs (Regional Climate Models), and downscaling techniques (both empirical and statistical), and several comprehensive reviews are available on the subject. GCMs are our primary source of information about future climate. GCMs comprise simplified but systematically rigorous interacting mathematical descriptions of important physical and chemical processes governing climate, including the role of the atmosphere, land, oceans, and biological processes. Unfortunately, as with all small island nations, RMI faces specific challenges when viewing the projected changes from these models. This “island dilemma” is attributable to the fact that single grid cell values from GCMs are considered by the IPCC (2007) as the least accurate measure of projected changes, and the relatively spatial resolution of GCMs renders interpretation of climate change in small island nations difficult.

The following insights into a changing climate are thus derived for the Pacific region as a whole, a suite of GCMs used by the Intergovernmental Panel on Climate Change:

- ➔ The future of rainfall patterns across the Pacific region is a subject of continued debate, with models projecting +/-25% changes in rainfall. As yet it is not possible to get a clear picture for precipitation change, due to large-model uncertainties.
- ➔ While average annual and monthly rainfall changes are inconsistent across this region of the Pacific, recent evidence and model simulations point to a more frequent occurrence of El Niño weather patterns, bringing an increase in drought conditions along this region. These more frequent El Niño events are believed to be associated with climate change, although some disagreement exists within the science community on this point.
- ➔ More frequent El Niño events could also increase the intensity of tropical cyclones along the Pacific, with important implications for disaster management and response.
- ➔ Temperatures in the Pacific are projected to increase between 1.4 and 3.1°C, and this warming is projected to be somewhat smaller than the annual mean warming in all seasons.
- ➔ Sea levels are projected to rise by the end of the century (2090-2099) by 0.35 m (0.23 to 0.47 m, although the spatial manifestation of this rise will not be uniform due to circulation changes and ocean density.

Secondary impacts from the above changes in climate are discussed throughout this document, and include:

- ➔ Increased coastal erosion and loss of soil fertility.
- ➔ Saltwater intrusion into areas critical to sustaining food security.
- ➔ Damage to coral reefs and fisheries, including depletion of fish stocks.
- ➔ Loss of water quality and quantity.

CLIMATE CHANGE IMPACTS ON NATURAL HAZARD VULNERABILITY

The major climate-related natural hazards impacting the Marshall Islands⁴ are sea level rise, droughts, and tropical storms and typhoons. These are discussed in detail below:

- ➔ **Sea level rise** – Shoreline erosion caused by sea level rise is already a significant problem across the Marshall Islands. According to a study conducted in 1992 of Majuro atoll by the National Oceanic and

³ Worldclim 1960-1990 Averages. Robert J. Hijmans, Susan Cameron, and Juan Parra, at the Museum of Vertebrate Zoology, University of California, Berkeley, in collaboration with Peter Jones and Andrew Jarvis (Ciat), and with Karen Richardson (Rainforest CRC). www.worldclim.org/current.

⁴ GFDRR, the World Bank and SOPAC. Reducing the risk of disasters and climate variability in the Pacific Islands.

Atmospheric Administration of the United States (NOAA), a three foot rise in sea levels would completely inundate the atoll, and defense mechanisms to protect the atoll from a one-in-fifty year storm event would be impossible. It is recommended that a “full retreat of the entire population of the Majuro atoll and the Marshall Islands must be considered in planning for worst-case sea level rise scenarios”⁵.

➔ **Droughts** – Wet season rainfall supplies the majority of freshwater to the RMI. However, EL Niño conditions in this part of the Pacific can shift rainfall patterns, bringing significantly less rainfall than in normal years and leading to drought conditions. Droughts are especially damaging in the atolls lacking sufficient rain-water harvesting/storage capacity⁶ to withstand dry periods, as is the case with most of the outer atolls of the dry North (Utrik, Ailuk, Likiep, Wotho, Lae, and Namu). The El Niño event of 1997/98 was one of the most pronounced drought periods in RMI, bringing only 8% of normal rainfall in a four month period and leading the government to declare the entire archipelago a disaster area, and severely impacting Laura atoll’s fresh-water lens. More frequent El Niño events could increase the intensity and occurrence of these drought events, with important implications for disaster management and response in the RMI⁷.

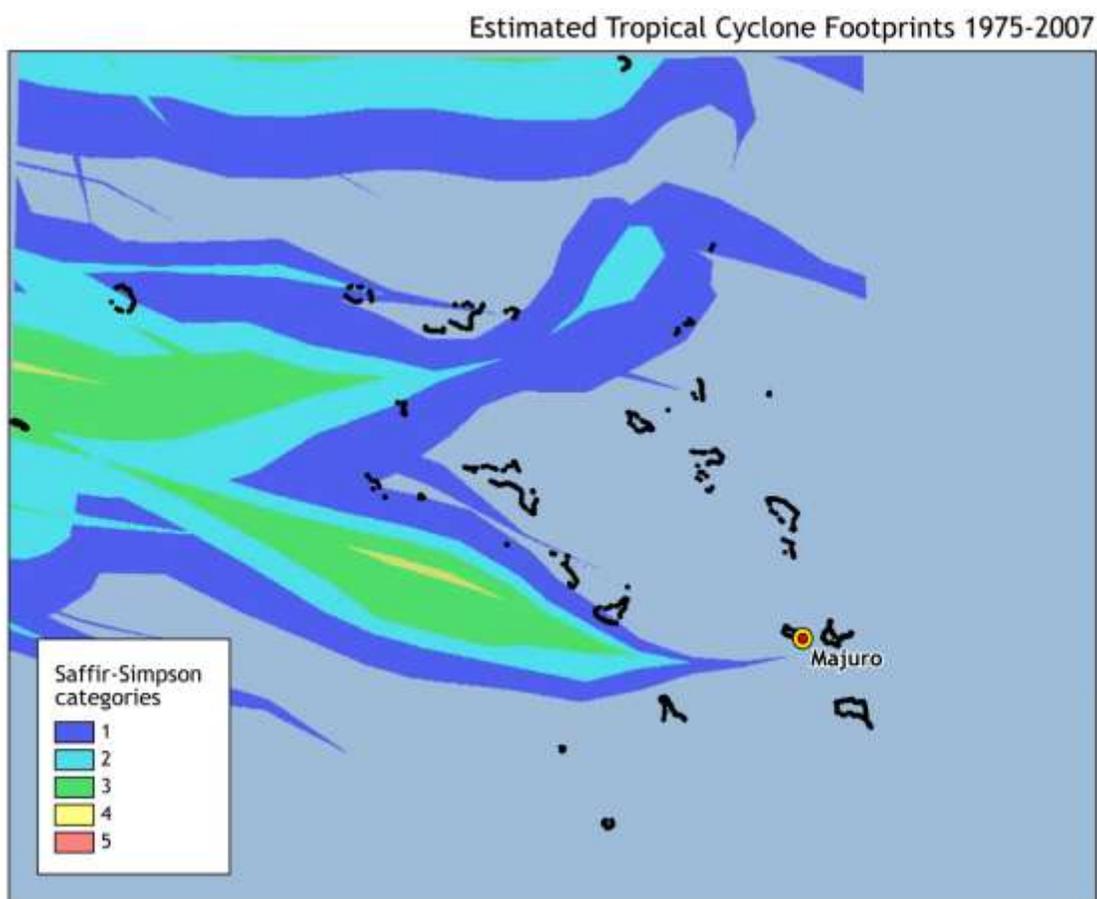


Figure 2: Exposure to cyclones across the Marshall Islands⁸

⁵ Holthus, et. al, 1992. Vulnerability assessment of accelerated sea-level rise: a case study of Majuro Atoll, Marshall Islands, Western Samoa. South Pacific Regional Environment Programme.

⁶ Storage reservoirs can supply water for approximately 30-40 days without replenishment.

⁷ USGS Scientific Investigations Report 2005-5098. Effects of the 1998 Drought on the Freshwater Lens in the Laura Area, Majuro Atoll, Republic of the Marshall Islands

⁸ Columbia University Center for Hazards and Risk Research (CHRR) and Columbia University Center for International Earth Science Information Network (CIESIN).

➔ **Tropical storms and typhoons** – Strong winds, wave run-up, and overtopping of beach berms and protective structures are significant sources of flooding and damage across RMI⁹. Such was the case in 2008, when one of the worst recorded disasters in the nation’s history took place. A combination of factors, including three major storms in two weeks and high tides, together flooded (via storm surges) a large part of the Majuro atoll, damaging more than 300 homes and forcing 10% of the population to temporary shelters.

The impacts of natural hazards in the Republic of the Marshall Islands are exacerbated by the underlying conditions of vulnerability noted in a GFDRR, World Bank, and SOPAC assessment. The conditions noted in the assessment included:

- ➔ extremely high population density, especially on the two urban islands of the archipelago (Ebeye and Majuro);
- ➔ high levels of poverty (20% of the population lives on less than US\$1/day);
- ➔ low elevations—average elevation of most islands is approximately two meters above sea level, with the highest recorded point on the atoll at 10 meters above sea level (Likiep), and the majority of the population living along the coastline;
- ➔ dispersed archipelago (the islands are spread across three quarters of a million square miles) making administration, communications, and operations challenging;
- ➔ limited and fragile island ecosystems and fresh-water resources (vulnerable to over-use, contamination, and droughts);
- ➔ a weak economic base heavily dependent on donor support.

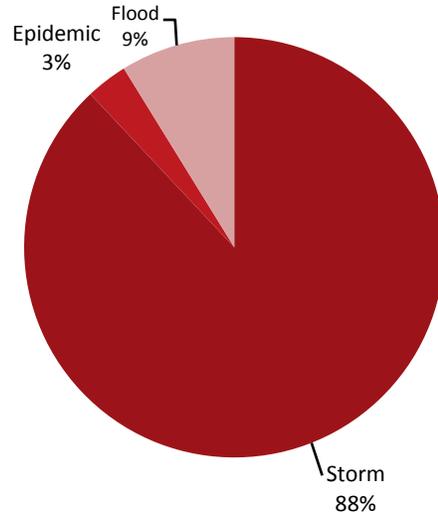


Figure 3: Percentage of affected people reported by disaster type in the top 10 natural disasters

SECTORAL CLIMATE RISK REDUCTION RECOMMENDATIONS

Climate variability and change has and will continue to affect the Republic of the Marshall Islands. Vulnerability is a key factor that needs to be considered to identify the differential impacts of climate. The poor and those farther away from government services have limited access to services necessary to make them resilient to adverse climate effects, and their living conditions are often affected by laws, policies, and economic forces over which they have little or no control. Although it is by no means clear whether vulnerable groups, with their pressures to survive, or affluent groups, with their pressures to consume, ultimately lead to the impacts which continue to drive vulnerability, it is clear that poor people will be vulnerable to the growing demands of a changing climate if this requires looking beyond their immediate needs. The most profound impacts of climate variability and change will be felt in the sectors discussed below: water resource management, coastal and marine resources, agriculture and food security, and human health.

TABLE 1: Climate Change impacts across sectors in RMI¹⁰

Sector	Examples of Effects of Climate-Induced Changes
Water Resource Management	<ul style="list-style-type: none"> • Changes in the freshwater lenses and other groundwater resources • Salt water intrusion in groundwater resources • Changes in surface water resources

⁹ SPREP 1992. Vulnerability Assessment of Accelerated Sea Level Rise: Case Study: Majuro Atoll, Marshall Islands.

¹⁰ RMI’s First National Communication, 2000.

Sector	Examples of Effects of Climate-Induced Changes
	<ul style="list-style-type: none"> • Changes in surface run-of, flooding, and erosion
Coastal Resources	<ul style="list-style-type: none"> • Inundation and flooding of low-lying areas • Coastal erosion • Possible increase in cyclone-related changes in sediment production due to changes in coral reef systems • Coral bleaching and degradation (also possible increase of upward coral growth) • Changes in mangrove health and distribution • Degradation of sea-grass beds
Marine Resources	<ul style="list-style-type: none"> • Changes in distribution and abundance of off-shore fish species • Changes of production of in-shore fisheries • Changes in fish breeding sites
Agriculture and Food Security	<ul style="list-style-type: none"> • Changes in commercial crop yields • Changes in subsistence crop yields • Changes in plant pest population • Possible change associated with change in ENSO, drought, and cyclone patterns • Changes in soil quality
Human health	<ul style="list-style-type: none"> • Increased incidence of vector-borne diseases such as dengue fever • Increased heat stress and heat-related illness • Indirect effects on nutrition and well-being, secondary effects from other sectors such as agriculture and water resources • Deaths, injuries, and disease outbreaks related to possible increase in extreme events such as cyclones, floods, and droughts

WATER RESOURCES

As with many other island nations, the RMI have uniquely fragile water resources due to their small size, lack of storage, and limited fresh-water. According to RMI's 2003 statistical yearbook, rainfall supplies over 70% of the country's fresh water. Staggering increases in population on the two urban islands, however, pose a significant challenge to meeting future water needs. The country has made limited investments in water management and infrastructure rehabilitation for water and waste water; this is also hampered by the typical constraints of small island nations (isolation, fragile natural variability, and a limited human, financial, and capital resource base). Furthermore, almost no attention has been paid to the potential effects of climate-related extremes on current water resources, especially with regards to salt-water intrusion, which negatively affect the limited freshwater lens on some of the lower-lying islands and atolls. Water crises during El Niño-driven droughts are becoming increasingly common on smaller and more remote northern atolls that rely primarily on rainwater and have limited harvesting capacity and high costs to serve from a centralized government. On the Majuro atoll, water supplies rely on the Laura freshwater lens and the airport runway catchment area, which pipes water to the city's principal reservoir. Rising temperatures could lead to increased evaporation from the reservoir, thus reducing already limited freshwater supplies. Hygiene and sanitation continue to be a concern and a particular challenge is to manage a sewage system without contaminating the ground-water lens. Already, some of the country's fresh-water lens has been contaminated with brine.

Adaptation options in the water sector include:

- ➔ Increasing water supply (e.g. by using groundwater, building reservoirs, improving or stabilizing watershed management, desalination) and water efficiency
- ➔ Decreasing water demand through conservation measures, leakage reduction, dual water supply systems, and economic development
- ➔ Building flexibility into the water-provisioning systems to address future climate change.
- ➔ Improving water management infrastructure and planning.

COASTAL RESOURCES

Corals and sea-grasses offer important spawning habitats for a wide diversity of fish, many of which are critical to the food security across the Republic of the Marshall Islands. The country's extensive Exclusive Economic Zone (EEZ) supports a vibrant tuna fishery, which is the mainstay of the economy.

Tuna fisheries are known for their sensitivity to changing sea surface temperatures, and the country's catch in the 1997/98 El Niño episode clearly saw reductions. The coastal zones are also where a large majority of the country's population and therefore livelihood activities and services are located. Coastal erosion driven by both anthropogenic pressure and increased intensity in storm surges is already evident in many parts of the archipelago. Mangrove sedimentation, loss of infrastructure, and/or poorly managed infrastructure make the country's coastal areas particularly vulnerable to a changing climate.

Adaptation options for coastal resources include:

- ➔ Protection by building sea walls and beach nourishment; in some cases the best adaptation option is notably a limited retreat from the coastal areas, while in others resettlement to other areas may need to take place.
- ➔ Implementing an integrated coastal resources management plan.
- ➔ Improve understanding of the impact of temperature rise and ocean acidification on coral habitats.

HUMAN HEALTH

The Marshall Island's public health sector is vulnerable to climate variability and change, particularly with regard to the increased incidences of nutritional deficiencies due to crop yield losses and damages, and diarrheal and vector-borne diseases. Outbreaks of many diseases, including conjunctivitis, are common during droughts.. Limited information is available on the extent and frequency of any health issues, let alone those with a significant link to climate variability and change; but increased temperatures, projected flooding, and anecdotal evidence on reduced water quality point to a potentially deteriorating condition in the health sector under a changing climate. Furthermore, addressing the impacts of climate variability and change on the health sector requires addressing issues of poverty, sanitation, nutrition, and environmental degradation, all of which significantly increase the community's vulnerability and hamper its capacity to adapt.

Adaptation recommendations in the health sector include:

- ➔ Decreasing artificial breeding sites for potential vectors by covering water containers or using alternative storage facilities.
- ➔ Preventing mosquito entry to the country through stricter port controls and quarantine regulations.
- ➔ Preventing exposure to vector-borne diseases through improved house design and the use of mosquito nets.
- ➔ Planting of shade trees to reduce heat stress.
- ➔ Awareness-raising activities on the potential impacts of climate change on health, including projected changes in the outbreaks of water- and insect-borne diseases, as well as appropriate response mechanisms for dealing with these.

ADAPTATION

Ongoing Efforts- At a Glance

<i>Vulnerability Reduction Projects</i>	<i>Description of Project</i>
Pacific Islands Climate change Assistance Programme (PICCAP)	A multi-country regional enabling activity project funded by the GEF, implemented by UNDP, and executed by SPREP to assist participating countries to prepare their initial communications under the UNFCCC.
Schools of the Pacific Rainfall Climate Experiment (SPaRCE)	The Schools of the Pacific Rainfall Climate Experiment (SPaRCE) is a cooperative field project involving elementary, middle school, high school, college, and trade school students along with local meteorological services from various Pacific islands, atolls, and the U.S. Mainland. SPaRCE provides environmental education and enhancement of Pacific Island science programs. In turn, the students collect important data to be used for climate research. Besides gaining a better understanding of basic concepts, these students become an integral part of the study of weather patterns in the Pacific. The rainfall data collected by participants is entered into the Comprehensive Pacific Rainfall Database (PACRAIN). PACRAIN also contains rainfall data reported from the Pacific New Zealand Meteorological Service.
European Union B-Envelope water supply	A project aimed at improving reliability of dry-season and drought-period water supply to urban and rural areas through rainwater harvesting and management, and protection of groundwater resources.
Rongelap Atoll local government, conservation, and sustainable development project	The project is taking a holistic approach to sustainable development of the island, which has a pristine marine environment and from which the inhabitants have temporarily been relocated. The activities include a marine research center, a marine sanctuary, aquaculture, and ecotourism. This includes breeding of marine species.
Integrated Water Resource Management Project for Laura groundwater protection	Groundwater protection activities
Pacific Hydrological Cycle Observing System Program.	The program focuses on (a) working with the RMIEPA and Majuro Water and Sewer Company on several management issues and capacity building; (b) providing equipment for water quality management; (c) assisting with the rehabilitation of the Laura lens and groundwater monitoring; and (d) supporting outer Pacific Islands for water quality and assessment.

Studies

South Pacific Sea Level and Climate Monitoring Project	A program that sets up high-resolution monitoring stations in eleven island countries to measure the relative motions of land and sea at each station. These data will assist in long-term calibration of satellite altimetry and radio astronomy and provide a measure of regional vertical control; they will exchange information and data with national, regional, and international climate change centers. This will help the understanding of the complex problem of measuring changes in sea levels. The project also assists with information exchange and holds two-week training courses on use of oceanographic, atmospheric, and climate data in social and economic decision making.
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GFDRR Interventions

Comprehensive Disaster Risk Management Programme for the Marshall Islands(2008-2018)	This program takes stock of overall DRM situation in the country, fleshes out its main DRM needs, and presents indicative new program areas and projects for GFDRR funding.
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EXISTING ADAPTATION FRAMEWORK/STRATEGY/POLICY AND INSTITUTIONAL SETUP

AT A GLANCE

The Republic of the Marshall Islands, like all Small Island Developing States (SIDS), has been identified as among the most vulnerable to the adverse impacts of climate change. This vulnerability is also increased by the fact that development activities have outpaced traditional conservation and coping practices. While it is clear that climate impacts are already being felt across the country, a specific climate change focus has been missing from many of the current development activities. A number of institutions across the country are actively engaged in activities that should address climate change considerations, but additional work needs to be done.

Representative Institutions

<i>Governmental</i>	<i>Role</i>
Republic of the Marshall Islands Environmental Protection Authority (RMIEPA)	As the RMIEPA is the national focal point for climate change activities, the duty of Facilitator or Chairperson of the Country Team falls to them. The RMIEPA representatives also include water resource and environmental education specialists who have an important role in preparing for the impacts of climate change.
Republic of the Marshall Islands Ministry of Foreign Affairs	The Ministry of Foreign Affairs is represented in the country team in order to provide a contact to the RMI U.N. Mission that handles the UNFCCC negotiations. The Foreign Affairs representative has also first-hand experience of climate change issues.
Marshall Islands Visitors Authority (MIVA)	MIVA has been a long-term champion of environmental protection and sustainable development through its role in promoting the Marshall Islands as a beautiful and serene tourist destination.
Republic of the Marshall Islands Ministry of Resources and Development (R&D)	The Ministry of R&D will bear the burden of preparing much of the adaptation and response to the impacts of climate change as they arise. A representative of the Department of Agriculture and a fisheries representative from the Marshall Islands Marine Resources Authority (MIMRA) are included in the country team.
Marshall's Energy Company	The interests of the utilities provision sector of the Marshall Islands are represented on the Country Team through the inclusion of a representative from the Marshall's Energy Company (MEC). Utility providers will have a significant role to play in responding to the climate change part of Convention requirements to implement certain mitigation strategies to reduce the use of fossil fuel generated power.
Republic of the Marshall Islands Weather Service Office	Through its involvement in the South Pacific Sea Level and Climate Monitoring Project, the RMI Weather Station is responsible for the collection of local data on climate change and sea level rise. Staff people at the Weather Service are also undergoing training through the project so that they will be able to continue to provide interpretation and analysis of the data after the conclusion of the project.

INSTITUTIONAL AND POLICY GAPS

- ➔ The limited integration of disaster risk reduction and climate change consideration into development activities needs to be addressed by strengthening coordination among the country's relevant institutions. This includes improving the country's capacity for emergency preparedness and response at all levels.
- ➔ Responding to climate change requires that a significant effort is made to raise education and awareness regarding current and projected climate variability and change. Integrating climate change into formal education curricula as well as community awareness programs could help in meeting these goals.
- ➔ The technical and financial capacities of existing institutions need to be augmented to address the needs of the country's more remote islands — in particular to adequately train and equip those responsible for addressing climate change risks, as well as future managers of new projects on climate change.

- ➔ Legislative policies and development activities need to take into account climate change. For example, existing infrastructure projects need to be properly climate-proofed to deal with projected climate risks.

RESEARCH, DATA, AND INFORMATION GAPS

The Republic of the Marshall Islands, like all small island states, faces a unique set of challenges in dealing with climate variability and change. While a number of adaptation activities are ongoing, the country's official communications to the United Nations Framework Convention on Climate Change (UNFCCC) point to significant research, data, and information gaps that will need to be addressed in light of projected changes in climate¹¹.

RESEARCH GAPS

- ➔ Water supply and demand studies need to be conducted across the country. Responding to climate change in the water sector is hampered by a limited understanding of how water supplies will be impacted by rising temperatures. Research is desperately required on the links between climate change and water resources in the context of small islands.
- ➔ Detailed assessments of climate change impacts and risks across a variety of sectors are required in order to develop sound response strategies, in particular focusing on food security, water resources, and coastal resources.
- ➔ Almost no work has been done to downscale climate models to individual islands. Realistically, it may not be possible to derive more accurate climate change information due to the small size of these islands, however, more work needs to be done to address the "island dilemma". New information should be credible and useful to decision making at the island scale.
- ➔ A very limited instrumental record makes extensive analyses of the natural variability of cyclones difficult.
- ➔ Overall applied research assistance is required to properly establish an island-specific and robust baseline from which to gauge projected changes and impacts.
- ➔ Research is required on the links between climate change and diseases in the context of small islands, including the collection of robust baseline data sets that offer a village perspective on current and potential impacts.

DATA AND INFORMATION GAPS

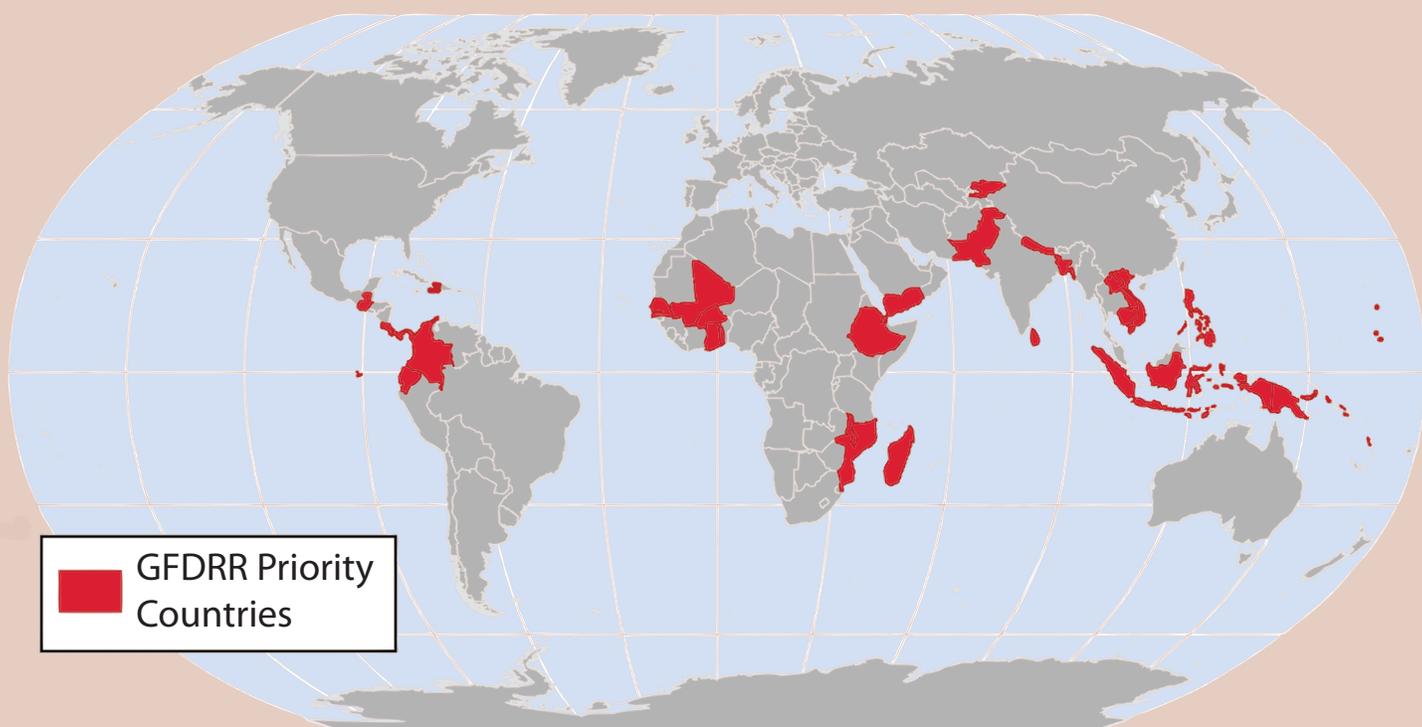
Insufficient resources and lack of institutional capacity factor among the challenges the country faces in addressing climate change. Additionally, lack of specific information and data on current and future vulnerability and risks across the country hamper the country's ability to plan for and respond to these risks. Specifically:

- ➔ There is a general lack of sector-specific data, especially on tuna fisheries and water demand, which needs to be addressed in order to develop appropriate response measures.
- ➔ Addressing sea level and storm surge risks will require the use and interpretation of the information that is coming out of the South Pacific Sea Level and Climate Monitoring Project, listed above.
- ➔ The use of existing meteorological information is limited to specific agencies, and this information needs to be tailored to decision makers across a wider series of sectors, including water resources management.
- ➔ The country's First National Communication points to the need to develop appropriate information management systems to collate and monitor available information.

¹¹ Pacific Adaptation to Climate Change Marshall Islands, Project Proposal.

Climate Risk and Adaptation Country Profile

This Country Profile (<http://countryadaptationprofiles.gfdr.org>) is part of a series of 31 priority country briefs developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) as part of its Disaster Risk Management Plans. The profile synthesizes most relevant data and information for Disaster Risk Reduction and Adaptation to Climate Change and is designed as a quick reference source for development practitioners to better integrate climate resilience in development planning and operations. Sources on climate and climate-related information are linked through the country profile's online dashboard, which is periodically updated to reflect the most recent publicly available climate analysis.



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