

# Enewetak Atoll

## Hazard Vulnerability Capacity Mapping Report

**Project: Inclusive Mitigation and Preparedness in Action (IMPACT – RMI)**

**March 2022**



The contents of this publication are that of the Enewetak Atoll Communities that participated.

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## Acronyms

CBDRM	- Community Based Disaster Risk Management
CVM	- Community Vulnerability and Capacity Mapping Exercise
HVCM	- Hazard Vulnerability Capacity Mapping
IOM	- International Organization for Migration
NDMO	- National Disaster Management Office
RO	- Reverse Osmosis
RMI	- Republic of the Marshall Islands

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## Context

### Background of Study

The Republic of the Marshall Islands (RMI) is located in the North Pacific Ocean. The RMI consists of approximately 180 square kilometers of land spread across just under 2,000,000 square kilometers of ocean as seen in Map 1.

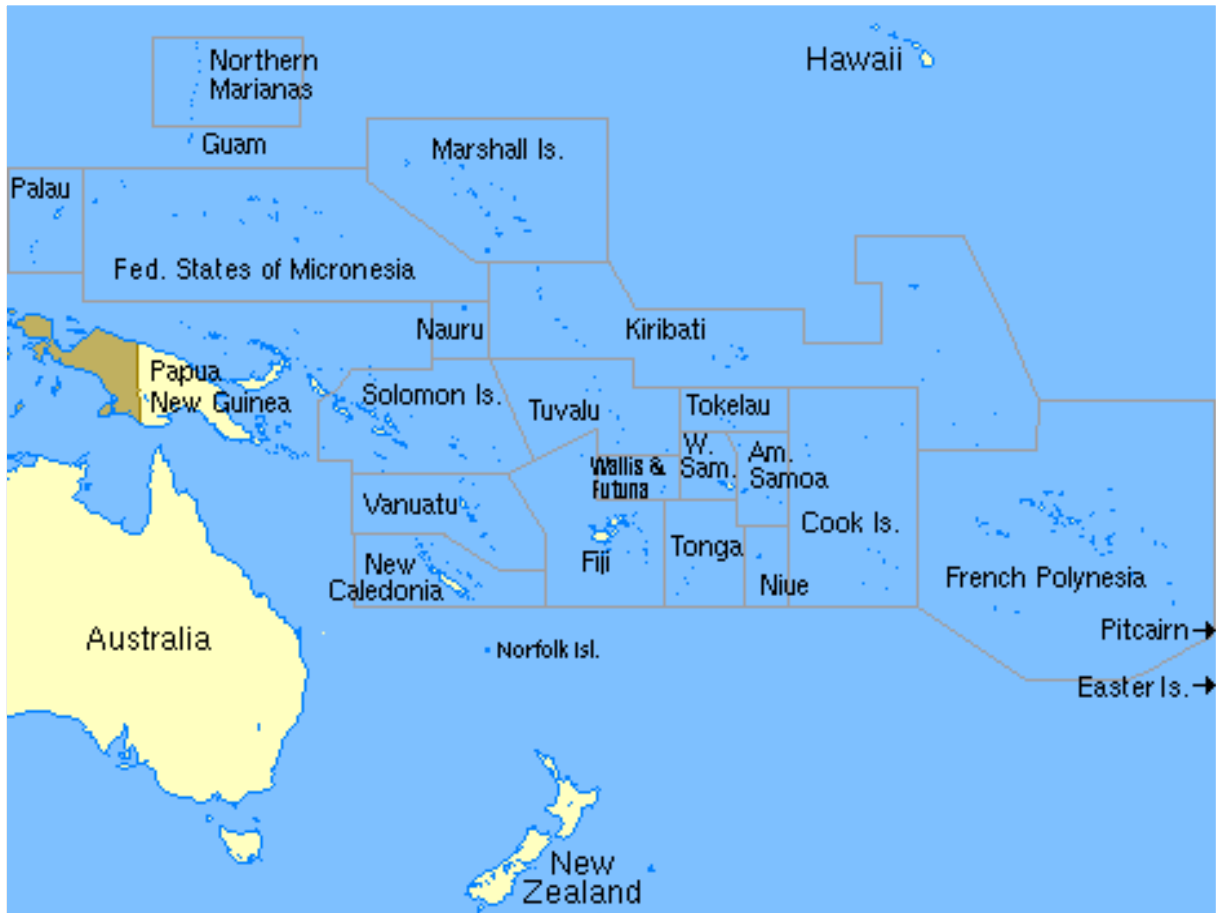
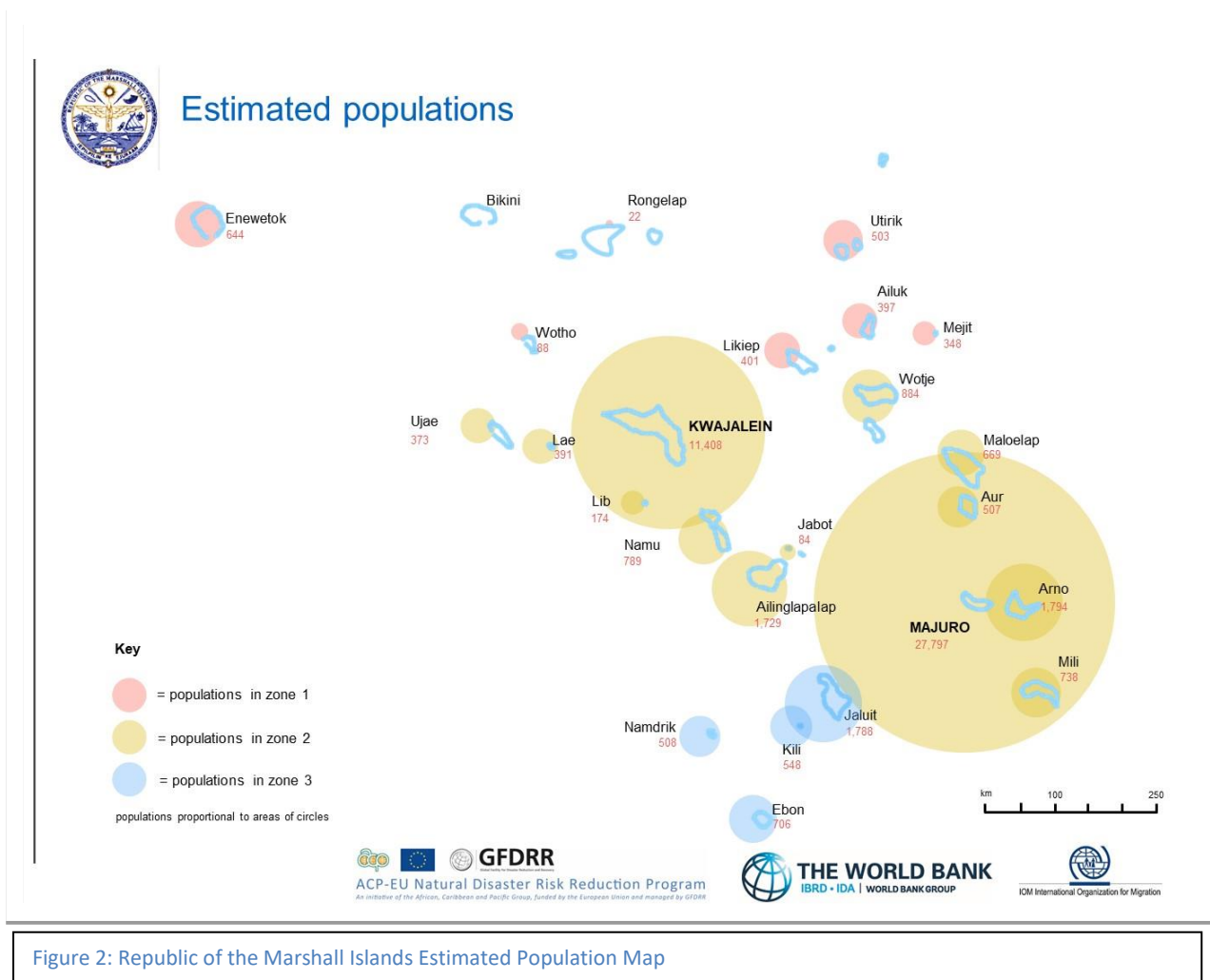


Figure 1: Pacific Ocean map

The RMI comprises of two parallel island chains of 29 atolls (made up of many islets), and 5 islands. The two island chains known as Ratak and Ralik lie about 200 kilometers apart and extend almost 1300 km northwest to southwest. Majuro is the capital with a population of approximately 27,000. Ebeye on Kwajalein Atoll is the second largest urban center with a population of approximately 15,000 inhabitants. The remaining population of RMI's 54,000 individuals reside in the remote outer islands and atolls as seen in Map 2.



Climate change impacts of notable concern in the North Pacific region include extreme temperatures, drought, sea level rise, ocean acidification, and heavy rainfall which lead to flooding and landslides. Such impacts are threatening fisheries and reef environments, and the communities and livelihoods that depend on them. Some of the low-lying coral atolls in the North Pacific are especially vulnerable to sea level rise, storm surges, coastal inundation, and salinization of water lenses. Rising sea levels also exacerbate the pressure on freshwater lenses in these atoll environments and while an overall increase in rainfall is projected, the populations' reliance on water catchments for storage (as opposed to the water lens) will increase. The region has also experienced the cyclical effects of the El Niño/Southern Oscillation (ENSO)-related weather anomalies. Such climate variability is associated with drought; that often leads to water shortages, crop failures, food shortages, and fires. In the El Niña phase there is an increased risk of secondary hazards, such as landslides.

The most common hazards that have occurred in the RMI in the past 10 years include droughts, king tides and typhoons. Drought events took place in 2013 and 2016. 2017 also saw a drought emergency, while the first half of 2022 saw an extreme drought on the northern atolls. In February 2015, wave inundations destroyed 17 homes in Arno Atoll and caused other damage to infrastructure throughout

the country prompting a State of Emergency. In October 2015 Typhoon Nangka passed through the Northern part of the RMI. In January 2019, Tropical Depression TD01W passed through RMI triggering preparatory actions and a State of Emergency. Over the past 10 years there have been numerous small inundation events triggered by king tides across the country.

This report articulates the results of IOM's Hazard Vulnerability and Capacity Mapping (HVCM) exercise that took place in Enewetak Atoll in March 2022. The report highlights the community's profile, key hazard risk concerns and maps. The reports can be used by community members to then plan a full Community Based Disaster Risk Management (CBDRM) Plan.

### Targeted Communities

The Inclusive Mitigation and Preparedness in Action (IMPACT) project was designed in coordination with United States Agency for International Development (USAID), national leadership, local leadership, and IOM. Five vulnerable communities in the RMI were identified to receive disaster risk reduction assistance under the project. One of those communities was Enewetak.

Enewetak, alternate spelling Eniwetok, is a Marshall Islands atoll located northwest of the Ralik chain. It is circular in shape (50 miles [80 kilometers] in circumference) and is composed of 40 islets that form a 23-mile-diameter lagoon. During World War II, US forces captured it from the Japanese (February 1944) and converted its excellent anchorage into a naval base. Following its designation, along with Bikini atoll, as a nuclear weapon testing ground, its inhabitants were evacuated to other atolls. Tests were conducted in 1948, 1951, 1952, 1954, and 1956. In 1980, following the removal of the island's contaminated topsoil, Enewetak was declared decontaminated, and its inhabitants were given the opportunity to return.

Local government leaders, which include the senator, mayor, council members, traditional leaders, elders/landowners, and church leaders on the island, make decisions. However, the landowners rely mostly on the decisions of government leaders. Enewetak Atoll is a land of leaders, and the people place a high premium on tradition as well.

Enewetak consists of only one community.

## **Methodology**

### **Hazard Vulnerability and Capacity Mapping with Early Warning Systems**

#### Introduction

The IOM Community Vulnerability and Capacity Mapping Exercise and Assessment (CVM) Project created the Hazard Vulnerability and Capacity Mapping (HVCM) exercise to assist communities and facilitators generate data to inform community disaster risk management efforts. The exercise is community led. Even though it acknowledges that every community is unique and that modifications to the methodology may be necessary, the three sessions must be completed for the exercise to be completed successfully. Facilitators must always be well-prepared, efficient, and mindful of not wasting community members' time, which is both valuable and voluntary. If all community service activities are

completed, the HVCM can be completed in nine - ten hours. No member is required to attend the entire ten hours of training.

### Objectives and Process

The specific objective of the HVCM is to increase community members' awareness of disaster risk and the impacts of climate change in their community. Doing so helps them to plan activities to reduce vulnerability and increase resilience to both slow and fast onset disasters as well as impacts of climate change. HVCM is a participatory, community-led series of activities that provides essential context-specific information on the local impacts of climate change and community vulnerability, and existing capacities.

In addition to understanding existing disaster preparedness capacity, the HVCM can also help us better understand the communities that we work in, so that we can address their unique concerns. HVCM is an effective entry point to the community and offers an opportunity to allow community members to share their opinions on what is important to them. The results of the exercise can help us to tailor future climate adaptation and disaster risk management plans, training, and disaster mitigation measures to address the specific concerns of the community.

Where feasible, it is preferable for the activities to be conducted in Marshallese. The facilitators should be Marshallese and speak both English and Marshallese.

The HVCM exercise will generally require three sessions:

1. Sensitization and Community Profile
2. Physical Mapping and Hazard Vulnerability Matrix
3. Summary and Action Plan Generation

In all sessions, we should emphasize to participants that we are here to learn from them; we need them to teach us about their community. Much of the success or failure of the exercise hinges on input and active engagement among participants. In all sessions, it is important to ensure the participation of diverse groups in the community, including people of all ages and genders. Groups that are traditionally marginalized or underrepresented such as immigrants and people living with disabilities should also be invited and encouraged to participate. Disasters have the capacity to disproportionately affect vulnerable groups in society. The mapping exercise should assist the community in appreciating that physically and mentally disabled persons will have additional protection needs during a disaster. It is therefore a critical outcome of the mapping exercise that these people be identified, and their locations noted on the map. If possible, ensure their participation in the HVCM exercise.

It is essential that the community feel ownership of this process with facilitators only providing structure and guidance. As with all community engagements, it is important to establish IOM's role from the outset, to not set any unrealistic community expectations. Sessions 2 and 3 will require snacks and drinks for all participants. Where possible community contributions such as coconuts or other refreshments should also be encouraged.



The following report is the output of the HVCM exercise.

## Community 1: Enewetak Community



Figure 3: IOM team at the airport terminal where consultations were held

### Community Profile Statement

#### Background

The HVCM exercise took place on March 22, 2022, at the Enewetak airport terminal. The workshop attracted a total of 30 community members, including 25 men and five women who stayed for the entire duration of the HVCM session. The exercise was held in the evening to accommodate community members' schedules.

According to the community profile that was completed as part of the exercise, Enewetak is home to approximately 310 inhabitants. The number of inhabitants was initially much higher but had substantially reduced due to migration. On the island, there is only one family-owned business/store. In addition, public services such as a health clinic, water, and education are available. The population's primary means of communication are cell phones. Like most remote islands, Enewetak's primary sources of revenue are fishing, handicrafts, and livestock. However, one unique attribute of the community that sets it apart from others is that the majority of Enewetak's population occupy socio political roles such as council members, police officers, health assistants, principals/head teachers, teachers, communications professionals, and boat operators.

Lack of external assistance from other islands or atolls is a serious concern for the Enewetak population. Individuals complained that they received no external assistance in the areas of marine resources, education and livelihood support. This can be partly attributed to the community's isolation, which makes it difficult to access. The community's transport boat – the Lady E – only arrives every quarter from Majuro.

## Geography and location

**Hazards:** Due to the regularity of drought in Enewetak, most community residents ranked it as their most significant natural hazard, followed by king tide/inundation.

Community members referred to a typhoon that ravaged homes, businesses, and public spaces in 1979 during the HVCM. Typhoon threats include debris carried up from the ocean and lagoon, damage to houses and food crops, saltwater contamination of wells, and fallen or destroyed coconut trees and other native plants/trees. There are no seawalls or other forms of coastal protection in place to reduce the risk of high tides and/or flooding. The community relies heavily on pine trees as a source of protection to reduce salt spray and inundation. This dramatically raises the risk of injury or death, especially for those living near the coast during a typhoon event. A lack of access to medical care makes the community vulnerable to illness and disease. In the city, there is one health dispensary with two health assistants. For medical care, residents must rely on traditional remedies or travel to Majuro, the capital of the RMI.

Despite concerns regarding typhoons, the most significant problem is drought. Due to a shortage of resources, members of the community commented on how frequent and terrible droughts are for their community. Community members recalled past droughts dating back to the late 1980s and noted an uptick in them between 2010 and 2015. Droughts have destroyed local food crops, hindered access to drinkable and safe drinking water, increased island dryness, and contributed to the spread of disease. Throughout the HVCM exercise, community members noted that they often lost their food crops and had to ration food and water. The community requested assistance to repair their existing reverse osmosis units. Due to low levels of rainfall in Enewetak, the community has been largely reliant on RO units to meet their water needs. Due to drought and declining local food and agricultural production in Enewetak, the community often travels to Ujelang to get fresh produce, a two-day boat ride. The community receives canned and processed foods as part of the quarterly food shipments sent to them by the U.S. government.

**Capacities:** Women's clubs, men's clubs, youth groups, and religious groups are examples of Enewetak's local social groupings, like those of most remote islands. Typically, these organizations are involved in preserving local traditions and cultural practices, such as greeting and entertaining visitors, conducting meetings, cleaning (community and school), and organizing religious events.

### Hazard Vulnerability Risk Mapping

The method of mapping hazard vulnerability risk begins by dividing the society into multiple categories, often men and women separately, as well as children. Using flip chart paper, they design a map of their neighborhood, highlighting essential sites and infrastructure facilities such as churches, evacuation centers, and docks. Then, they identify areas that have a high disaster risk, such as areas prone to flooding during a hazard. The groups then show their maps to one another, debate their similarities and differences, and make any required adjustments. The hand-drawn maps (from all groups) are then converted to a digital format using Google Earth.

On the map below, you can see which parts of the neighborhood and which residences have been classified as vulnerable to floods or coastal erosion.

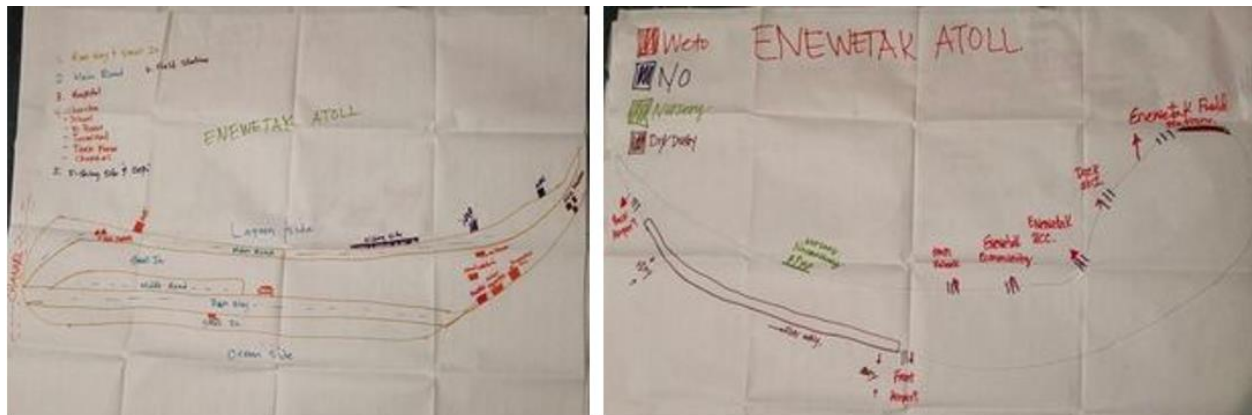


Figure 4: Maps drawn by community members. The women's group created the map on the left, and the men's group created the map on the right.

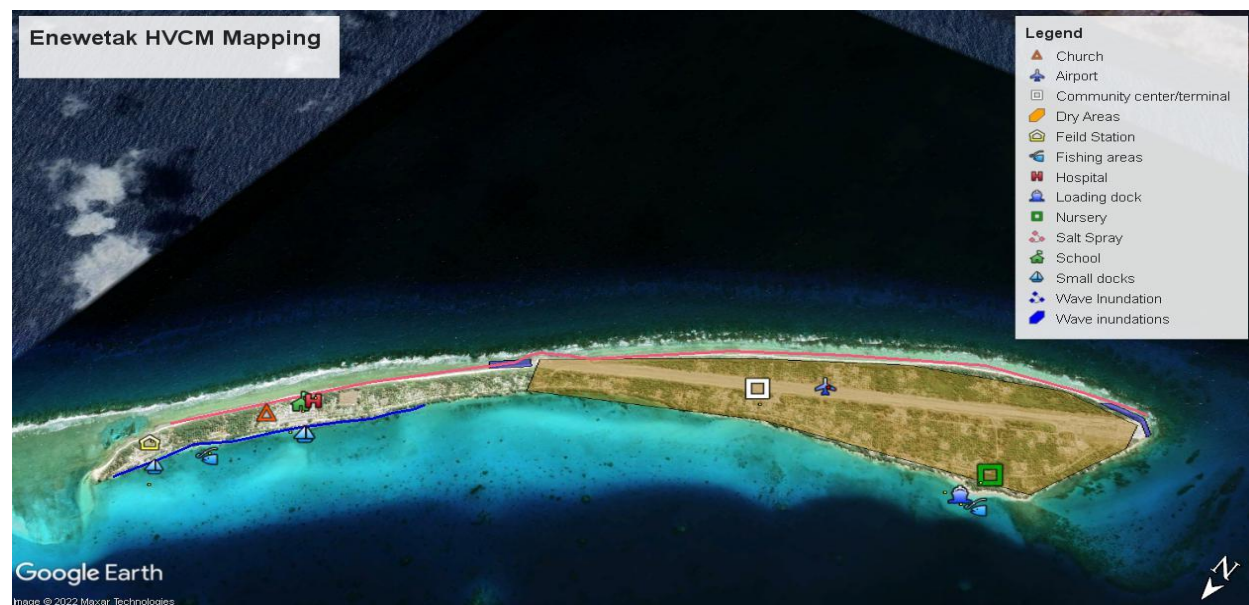


Figure 5: On the Google Earth map, important locations are identified, such as the main road, inundated areas, areas being consumed by the sea, areas which usually flood, as well as evacuation shelters, disabled homes, schools, churches, and stores.

### Hazard Vulnerability Matrix

As part of the prioritization process, the Enewetak community recognized drought and typhoon/inundation as threats, with drought being more prevalent. Drought and typhoon/inundation have affected the lives of participants and community residents. Participants recognized the community's strengths and weaknesses in respect to its susceptibility to these threats and recommended both long-term and short-term solutions.

Hazard	Weaknesses	Adaptive Capacities/Strengths	Short Term	Long Term
Drought	<p>Loss of agricultural crops</p> <p>Lack of water quality testing kits</p> <p>Salinity in groundwater</p> <p>Majority of drinking water catchments are degraded due to a lack of water and high temperatures.</p> <p>Disease outbreak</p> <p>Lack of drought resistant agricultural expertise</p>	<p>Reliant on RO Units</p> <p>Each residence has water filters</p> <p>Public areas have access to clean rainwater collection/concrete drinking water utilities.</p> <p>Access to local medication</p> <p>Establishment of a Disaster Committee</p>	<p>Plant more trees around the island's coastline.</p> <p>Boil well water for drinking water</p> <p>Seawall made of sand and stones</p> <p>Water quality monitoring activities</p> <p>Purified rainwater collection system</p> <p>Small RO Systems</p>	<p>Construct concrete water catchments</p> <p>More vehicles to transport water</p> <p>Equipment and materials for gardening</p> <p>Large RO unit systems</p> <p>RO unit trainings</p>
Hazzard	Weaknesses	Adaptive Capacities/Strengths	Short Term	Long Term
Typhoon/ inundation	<p>No materials / equipment to build a sea wall.</p> <p>One store on the island to provide the population with extra supplies.</p> <p>There are no seeds for replanting</p> <p>No infrastructure funds</p> <p>Nothing to purify water or wells</p> <p>Insufficient medical resources</p>	<p>Rocks and coral that help dissipate wave energy</p> <p>If the dispensary runs out of supplies, local medicine can be used.</p> <p>More native protection trees should be planted along the coastline.</p>	<p>Utilize temporary coastal barriers made of nearby trees, rocks, and sand (coastal protection action plan)</p> <p>Cleaning supplies</p> <p>The preservation of food</p> <p>The Disaster Committee will become certified in First Aid and CPR.</p>	<p>Radio Communication Equipment and Training</p> <p>Additional help and projects on island (regarding disaster preparedness)</p> <p>Greater access to potable water systems</p> <p>Construct robust sea walls</p> <p>Materials for use by the Disaster Committee during emergencies</p>



Figure 6: Enewetak community members listing and prioritizing hazards

## Action Plan

After completing the hazard vulnerability matrix, the community then developed an action plan to address the identified hazards.

Identified Hazards/Risks	Proposed Solution		Who is responsible?		When are tasks to be implemented?
	What has been done or started?	What can be done? Short Term Long Term	(Within Community)	(Outside Community)	
<b>Drought</b>	<p>Disaster Committee has been established</p> <p>Point of contact who has received training on how to perform DSO</p> <p>Clean and repair water collection systems</p> <p>The RO technicians are skilled</p>	<p>Gardening tools</p> <p>Well-water pumps</p> <p>Repairing both large and small RO unit systems</p> <p>Expand water catchment</p>	<p>The Council</p> <p>RO Unit focal points</p> <p>Acting Mayor</p> <p>Disaster Committee Chairman</p>	<p>Mayor</p> <p>Senator</p> <p>Weather station</p> <p>NDMO</p>	2021-2023
<b>Inundation/ Typhoon</b>	<p>Disaster Committee has been established.</p> <p>Shelter has been identified</p> <p>Replanting along the coast to safeguard the coastline</p> <p>Focal point has been instructed on ISO procedures.</p>	<p>Transport for the handicapped</p> <p>HF Radio</p> <p>Preparedness Kit</p> <p>Walkie talkies</p> <p>Heavy Equipment (Cranes etc.)</p> <p>Siren warnings</p> <p>Erect a Seawall</p>	<p>The Council</p> <p>Acting mayor</p> <p>Disaster Committee Chairman</p>	<p>Mayor</p> <p>Senator</p> <p>NDMO</p> <p>Red Cross</p>	2021-2023



Figure 7: Enewetak women's group community members preparing their action plan



### Summary: Enewetak Community

Initially the community profile was completed after consulting with a small group of local leaders. Thereafter, the larger gathering completed the physical mapping exercise to identify areas experiencing increased disaster risk. Then the group used the hazard vulnerability matrix to identify hazards afflicting the community. The exercise was also used by the community to identify strengths and weaknesses vis-à-vis disaster risk. Drought was identified as the foremost hazard of significance for the community. During the process, existing strengths and weaknesses were examined prior to developing an action plan.

Given the significance of drought, the community identified water security as being a vulnerability for them. The communities referred to their dysfunctional RO units, which were producing subpar volumes of clean water and discussed the need for more training on how to maintain existing units. While the community had rainwater catchment systems installed, exceedingly dry spells without rain made them more reliant on RO units and water shipments from Majuro to meet their potable water needs.

Overall, the community members participated enthusiastically in the exercise, sharing with the group and IOM staff their experiences vis-à-vis disasters and disaster risk. While men spoke most of the time, when the HVCM facilitators requested women to speak up, they responded. The women demonstrated that they were equally if not more educated than men about the issues being discussed.

The HVCM exercise succeeded in its objective of collecting data to inform future interventions to reduce disaster risk. Despite the lengthy hours, the community members remained extremely engaged throughout the day and conveyed that they found the exercise to be both fascinating and informative.

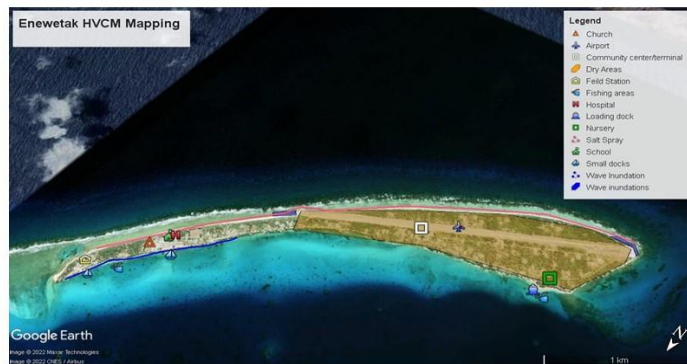
## Community Poster, Enewetak



## Action Plan Community Vulnerability Mapping Enewetak, Enewetak



Enewetak: Developed March 2022



Hazard	Vulnerabilities/ Weaknesses	Adaptive Capacities/ Strengths	Short-term Actions	Long-term Actions
<b>Drought / Mora</b>	<ul style="list-style-type: none"> <li>agriculture ravaged by drought</li> <li>Absence of testing and sanitation of potable water</li> <li>Salinity in groundwater</li> <li>The majority of drinking water catchments are degraded due to a lack of water and high temperatures.</li> <li>Disease outbreak</li> <li>No techniques for gardening</li> </ul>	<ul style="list-style-type: none"> <li>submission to RO Units</li> <li>Provide water filters for each residence</li> <li>Public areas have access to clean rainwater collection/concrete drinking water utilities.</li> <li>Local medicine cures</li> <li>constituted emergency committee</li> </ul>	<ul style="list-style-type: none"> <li>Plant more protecting trees around the island's coastline.</li> <li>Boil well water for drinking water</li> <li>Constructed temporarily using sand and stones</li> <li>Water quality instruction</li> <li>Purified rainwater collection system</li> <li>Small RO Systems</li> </ul>	<ul style="list-style-type: none"> <li>Construct additional concrete</li> <li>Water captures</li> <li>More transportations</li> <li>Equipment and materials for gardening</li> <li>Larger RO Units</li> <li>RO Unit practices</li> <li>Small RO Systems</li> </ul>
<b>Typhoon</b>	<ul style="list-style-type: none"> <li>No materials/equipment for an extremely sturdy coastal barrier</li> <li>One store on the island to provide the population with extra supplies.</li> <li>There are no seeds for replanting</li> <li>No infrastructure funds</li> <li>Nothing to purify water or wells</li> <li>Insufficient medical resources</li> </ul>	<ul style="list-style-type: none"> <li>Rich in rocks and beaches, the island's surroundings are.</li> <li>If the dispensary runs out of supplies, local medicine should be used.</li> <li>More native protection trees should be planted along the coastline.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize temporary coastal barriers made of nearby trees, rocks, and sand (coastal protection action plan)</li> <li>Cleaning supplies</li> <li>The preservation of food</li> <li>The Disaster Committee will become certified in First Aid and CPR.</li> </ul>	<ul style="list-style-type: none"> <li>Radio Communication</li> <li>Additional help and projects on island (regarding disaster preparedness)</li> <li>Greater access to potable water systems</li> <li>Construct robust sea walls</li> <li>Materials for use by the Disaster Committee during emergencies</li> </ul>

Identified Hazards/Risks	Proposed Solution		Who is responsible?		When are tasks to be implemented?
	What has been done or started?	What can be done? <b>Short Term</b> <b>Long Term</b>	(Within Community)	(Outside Community)	
Inundation/ Typhoon	DisCom has been constituted.	Transport for the handicapped	The Council	Mayor	2021-2023
	Shelter has been identified	HF Radio Preparedness Kit	Acting mayor	Senator	
	Replanting along the coast to safeguard the coastline	Walkie talkies	Disaster Committee Chairman	NDMO	
	Focal Point has been instructed on ISO procedures	Heavy Equipment require siren warnings erect a Seawall		Red Cross	
Drought	DisCom has been established	more Gardening tools	The Council	Mayor	2021-2023
	Focal point who has been trained on how to conduct DSO	More water capture sites Well-water pumps and RO systems	Acting Mayor	Senator	
	Water catchment in place wells water	Required repair of a Large RO Unit	DisCom Chairman	Weather Station	
	RO technician has been trained		RO unit focal points	NDMO	



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## Community Profile Questions, Enewetak Atoll

<b>Community Profile Questions</b>	<b>Enewetak, Enewetak Atoll</b>
About how many people live in your community?	310
What are the major occupations of community members? (income and subsistence activities)	handicraft, livestock, and fishing
What local resources does your community depend on? Explain why.	fish, taro, breadfruit, pandanus, clam, lobster, and coconut crab
How are decisions made in your community? Who has the authority?	mayor, council, acting mayor, iroij, traditional leaders, church leaders and elders
What social groups are active and what purpose do they serve?	church group - welcoming, youth group - clean, DRD - clean, cater, welcome, Jar in Ebolmen (JIE)- welcome, cater
What natural hazards affect your community?	drought, typhoon, king tides, inundation
What are the social problems your community is facing?	migration, lack of resources and transportation
What are the main strengths of your community?	fishing, copra and handicraft
Are there any new community improvement projects planned?	red Cross- first aid training, Education- elective courses, ACWA- water security and IMPACT- water security
Is the community participating in programs to improve natural protective barriers? (Mangrove, Steep slopes, rivers)	replanting pine trees which serve as a buffer against sea spray
What natural disasters have occurred here in the past 100 years?	king tide – 2010; typhoon- 1979 and drought- 2011, 2015
Are there many people of different heritage in the community?	Germans, Americans and Japanese



