Climate Change in the Federated States of Micronesia

Food and Water Security, Climate Risk Management, and Adaptive Strategies

EXECUTIVE SUMMARY 2010

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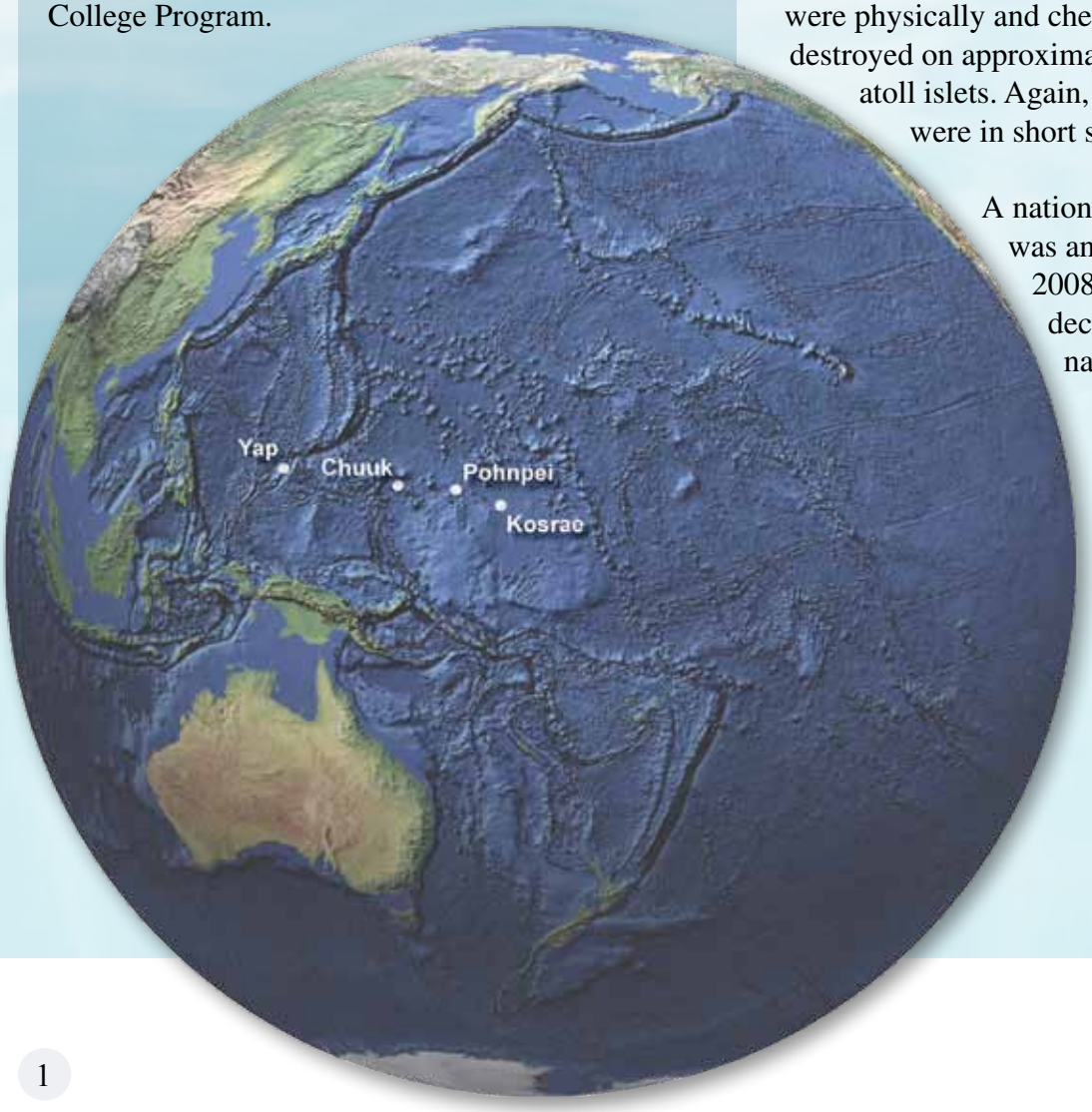
Study Purpose

This study is an outgrowth of concern over the vulnerability of the Federated States of Micronesia (FSM) to sea-level rise and drought associated with climate change. The purpose is to identify climate risk and options in the FSM.

The FSM is an oceanic nation of over 600 islands in the western tropical Pacific. Land varies from low-lying, forested atoll islets, typically 1 to 5 meter elevation (low islands), to densely vegetated and extinct shield volcanoes of several hundred meters elevation (high islands). The population lives in the coastal zone and is vulnerable to climate-related changes in precipitation, sea level, storms, and coastal erosion.

Study partners include: US Forest Service; US Geological Survey; Federated States of Micronesia; and University of Hawai‘i Sea Grant College Program.



Events

The FSM was severely impacted by drought during the 1997-1998 El Niño. Insufficient rainfall caused water and food shortages including staples: taro, coconut, breadfruit, banana, yam, sweet potato, citrus, sugar cane, and others. Communities survived because bottled water, food, and reverse osmosis pumps to purify water were imported.

In 2007 and 2008 FSM communities were flooded by waves and extreme high tides that eroded beaches, damaged roads, intruded aquifers and wetlands, and inundated communities. High sea-level in FSM is associated with La Niña and can result in widespread flooding. During the 2007 and 2008 floods, seawater flowed into the coastal agro-forestry and surged up through the water table killing taro, breadfruit, and other food crops. Fresh water ponds and wetlands turned brackish and have not recovered. Crop sites in use for generations were physically and chemically damaged or destroyed on approximately 60 percent of inhabited atoll islets. Again, food and drinking water were in short supply.

A nationwide state of emergency was announced on December 30, 2008 and food security was declared the top priority in the nation.



Chronic Problems and Management Issues

In addition to these events, chronic problems such as coastal erosion threaten roadways, agro-forestry production, habitable dwellings, and shallow coastal aquifers. There is loss of coastal strand forests and mangrove wetlands due to uncontrolled cutting, salinization of wetlands and lakes, salt diffusion into soils, and salinization of well water. Interviews with residents on several atolls reveal that historically important wetlands and lakes used for food production have turned brackish over the past two decades. Alien plant and insect species have also spread throughout watersheds, threatening ecosystem diversity and resilience.

Climate Risk Management

Successfully achieving climate adaptation within the FSM may be facilitated by two steps: (1) forming international partnerships to aid adaptation efforts; and (2) continuing the development of internal policies focused on building resilient and sustainable communities. In the coastal zone the following actions would support these steps:

1. Public education on climate risks in the FSM including education of government workers and other decision-makers, and of community members, particularly landowners.

2. The true locus of authority lies with island communities. Community-based adaptation offers an opportunity to effectively institute adaptation measures with immediate benefit.

3. Working within traditional land use policies to implement climate risk management, as this will engender domestic partnerships.

4. Defining best management practices and aligning government programs and policies with these practices.

5. Strategic redevelopment of coastal communities vulnerable to flooding now and in coming decades.

6. Conserving and promoting island and oceanic ecosystem services.

7. Preserving and promoting traditional culture to facilitate adaptation strategies and community accord.

8. Improving food and water security with a focus on domestic production as a core strategy in the national economy.

9. Master planning of communities focused on sustainability with enhanced government services such as health, sanitation, water and power, emergency services, and others.

Climate Risk Management Strategies

This study identified the following climate risk management strategies:

Overarching Strategy #1. Establish climate risk management as a national priority.

a. View climate risk management as an opportunity. The FSM can increase resilience if climate risk management is creatively and strongly engaged.

b. Develop a multi-faceted climate change education program for local communities, non-governmental organizations (NGOs), landowners, land-tenured decision-makers, permitting authorities, government staff, and the public.

c. Develop a national climate risk management plan emphasizing adaptation that originates with the involvement of local communities. Utilize community-based adaptation. Clearly articulate state-specific and atoll/island-specific elements of the plan. Align government programs with best management practices.

Overarching Strategy #2. Adapt to sea-level rise and associated impacts.

a. Map vulnerable areas and develop a timeline of inundation with sea-level modeling.

b. Develop adaptation guidelines for assessing critical existing infrastructure and development and determining when and what action is needed to reduce vulnerability.

c. Plan for food and water threats due to sea-level rise.

d. Plan for accelerated coastal erosion and its impacts by developing place-based (site-specific) erosion management plans.

Overarching Strategy #3. Climate risk management is a community-based decision-making process in the context of scientific information. Describe data gaps preventing full and detailed assessment of climate risk and potential steps to fill these.

a. Describe research programs and specific elements for sectors where data gaps can be filled by research.

b. Describe research needs and steps that can be taken immediately for high island and low island communities.

c. Describe priority data.

Overarching Strategy #4. Adapt to drought and improve community sustainability under restricted water conditions.

a. Implement a water resources research program that improves understanding of groundwater, surface water, and their sustainable use.

b. Improve high island water accessibility and retrofit and replace infrastructure in the context of climate risk management.

c. Predict drought events and plan for increased frequency and duration of drought, including improvements to emergency services.

d. Plan for more intense rains and the impacts that accompany them: flash flooding, mass wasting, inundation, drainage problems, "cut-off" communities and others.

e. Improve low island water planning, usage, and conservation.

f. Identify data gaps in water resources and steps to fill these.

g. Support hydrologic modeling of island aquifer systems.

h. Support down-scaled climate modeling that emphasizes water resources.

i. Expand the network of water monitoring instrumentation.

j. Develop a water management plan for each island including each inhabited atoll islet and neighboring resource islets.

Overarching Strategy #5. Plan for changing ocean conditions (e.g., ocean acidification, warming, storminess, etc.).

Overarching Strategy #6. Ensure that critical watershed, coastal, and ocean habitats and ecosystem services are protected and maintained.

Overarching Strategy #7. Build global awareness of the plight of threatened island communities and associated threats to food and water security.

Overarching Strategy #8. Build partnerships within the international community to provide resources and underpin policy changes leading to adaptation steps.

Overarching Strategy #9. Enhance partnerships by vigorously executing internal policy and planning studies designed to identify benchmarks and timetables leading to land-use changes and adaptation activities.

Overarching Strategy #10. Monitor research pertaining to sea-level rise, water-cycle changes, and storminess. Exercise flexibility in national planning and prioritization in light of local climate trends and predictions.

First Steps to Climate Risk Management

Like other science-based planning challenges, managing climate risk involves complicated assessment based on the best available information originating, in part, with scientific research and place-based community knowledge. Effective progress on managing climate risk is facilitated by a strong partnership between scientists and planners in the context of community-based decision-making.

To simplify and summarize the many findings here, the following are proposed as "first steps" that can be pursued simultaneously in the next 12 to 36 months and thereafter. Additional findings can be considered and implemented within the framework of these first seven steps.

1. *Develop a national climate education program implemented through state, NGO and community groups.* Managing climate risk can be facilitated with community involvement – but first the community has to possess awareness and knowledge of climate risk. Training NGOs, community groups and state staff can produce a corps of educators to achieve this goal and perpetuate the program.

2. *Explore the issues of sea-level inundation, drought, and food and water security.* Develop a high level of awareness and knowledge by key decision-makers and community groups. Each community can develop a shared vision of what is at risk and what qualities to protect that can inform a state plan, and ultimately a national plan. Steering committees of stakeholders can facilitate this process. State and national agencies, offices, and programs can be aligned with climate risk management.

3. *Install and maintain climate-monitoring stations throughout FSM.* It is important to improve knowledge of developing regional climate trends and develop model projections of future regional climate trends. Presently, climate models do not agree on regional projections. This problem can be improved by *funding research on regional-scale climate modeling* to provide the FSM with important information for managing risk.

4. *Make maps of inundation risk and vulnerability and develop an inundation timeline.* Marine inundation will continue and worsen with sea-level rise. Managing this problem can be facilitated with maps showing locations where inundation is likely. Remote sensing and aerial photographic imagery, and light detecting and ranging (LiDAR) topographic and bathymetric data are needed to build digital elevation models to conduct vulnerability studies.

5. *Create a national climate risk management plan with individual state plans* that emphasize community-based adaptation to provide a roadmap for managing climate risk.

6. *Build food and water resiliency.* Food and water are at risk now. Collect data on food and water resources and trends; with international assistance build technical knowledge of tropical agro-forestry practices; define per capita sustainability parameters for individual communities; stage emergency resources; and monitor sea level and rainfall to forecast events when food and water assistance will be needed.

7. *Develop international partnerships* to assist with steps 1-6.

ICAP
Center for Island Climate Adaptation and Policy

The University of Hawai`i Sea Grant College Program (UH Sea Grant) has served Hawai`i and the Pacific for over 40 years and is dedicated to achieving resilient coastal communities characterized by vibrant economies, social and cultural sustainability and environmental soundness. In partnership with the William S. Richardson School of Law, the School of Ocean and Earth Science and Technology, the College of Social Sciences, and the Hawai`inuiākea School of Hawaiian Knowledge, UH Sea Grant established the Center for Island Climate Adaptation and Policy (ICAP).

FROM UH TO YOU
ICAP connects individuals and institutions to the rich climate knowledge at the University of Hawai`i. The center offers work product in the areas of law, policy, planning, and science to mitigate and adapt to climate change while embracing the wisdom of local, traditional cultures.

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