Climate Change in the Federated States of Micronesia

By Charles H. Fletcher , UH Sea Grant-supported researcher, Professor and Chair, Department of Geology and Geophysics and Bruce Richmond, Geologist, U.S. Department of the Interior, U.S. Geological Survey, Coastal and Marine Geology Program

In his May 2009 State of the Nation address, President Emanuel Mori of the Federated States of Micronesia (FSM) stated "…climate change has continued to threaten food security and our very existence."

The realities of this remarkable statement were made apparent in the winter of 2007 and again in 2008 when low-lying coastal communities in the FSM were flooded with abnormally high tides that eroded beaches, undercut and damaged roads, intruded into aquifers and wetlands, and inundated communities. Food and drinking water were in short supply. Sea water flowed into coastal wetlands and surged up through the water table killing taro, breadfruit, and other crops; once-fertile land turned to degraded, salt-saturated soil. Fresh water ponds and wetlands used for food production turned brackish and have not recovered. Crop sites that had been in use for generations were damaged or destroyed on approximately 60 percent of inhabited atoll islets. A nationwide state of emergency was announced on December 30, 2008 and food security was declared the top priority in the nation.

A decade earlier, during the El Niño of 1997-1998, islanders found themselves without sufficient rainfall, which caused groundwater shortages and food scarcity. Drought destroyed staples such as taro, coconut, breadfruit, banana, yam, sweet potato, citrus, and sugar cane.

Whether affected by marine inundation or drought, traditionally sustainable communities among the atolls only survived these events because bottled water, rice, and reverse-osmosis pumps were imported from outside sources.

The FSM is a young, oceanic nation grounded on the 2000-year old culture of over 600 islands in the western tropical Pacific. Land varies from low-lying, forested atoll islets typically no more than one to five meters above

sea level, to densely vegetated and eroded high islands of several hundred meters in elevation.

The people of FSM live in two worlds: on the main islands of Kosrae, Pohnpei, Chuuk, and Yap are modern communities; on the atoll islets, adults are largely bilingual and have spent time in the modern world but have returned to live close to the land and ocean in low-tech, traditional communities dependent on fishing, agro-forestry, groundwater, and rainfall. The population throughout FSM lives in the coastal zone, hence, both groups are highly vulnerable to climate change. Models predict that with the continuation of global warming, a pervasive El Niño-like condition may develop in the Pacific. This implies that drought may become more frequent and/or longer lasting. Global warming also leads to sea-level rise, perhaps by as much as 1 meter by the end of the 21st century. Because of drought and sea-level rise amplified by regional El Niño –Southern Oscillation (ENSO) processes, many Micronesian communities now live at the edge of sustainability.

Beyond climate change impacts, FSM experiences a number of troubling trends with regard to its coastal resources. There is a loss of mangrove and coastal strand forests; coastal erosion is a nationwide problem; alien species threaten coastal and watershed ecosystems; and because of unstable infrastructure, food and water sources are not secure in FSM even under the best of conditions. As noted by several island leaders, significant funding and development is needed or these issues are likely to grow worse, and in turn worsen the negative impacts of global warming. Adding to the problem will likely be shifts in human populations away from vulnerable atolls to the high islands where the capitals of Micronesian states are located. In most cases, government's ability to serve the existing community is already strained, and surging populations with the addition of environmental migrants may prove untenable.

There is discussion among western scientists that atoll islets might continue to accrete upward during sea-level rise as sand and gravel are added to the interior through marine inundation. What many fail to realize is this island-building process also makes it uninhabitable. Seawater intrusion into the aquifer, wetlands, and soil contaminates food and water resources. Wave overwash, the very process that may give these islands the geomorphic flexibility to adapt to sea-level rise, also destroys taro, banana, breadfruit and other crops, turning the aquifer and wetlands brackish and the soil saline. In fact this process is already underway driving people out of their traditional homelands.

Effective climate risk management will be expensive, requiring external sources of funding and partnerships

with other nations. These partners are going to be most willing when they see that internal programs and policies are being upgraded and improved. Micronesia can begin the process of climate adaptation by focusing on two problems: food and water security, and sea-level rise. Strategies suggested by local leadership include:

1. Strengthen emergency planning and response, staging and delivery of resources, awareness of emerging ENSO and shorter-term conditions, and post-emergency planning that recognizes opportunities for adaptation.

2. Fill data gaps that define sustainability thresholds by modeling and monitoring marine inundation, shoreline change, potable water, soil moisture, agro-forestry production, precipitation and temperature, sea level, and marine resources.

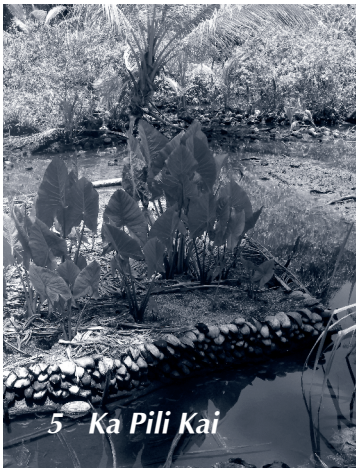
3. Define climate risk management goals including adaptation strategies that build community resilience to drought and marine inundation.

4. Introduce master planning that emphasizes long-term sustainability, climate risk management, ecosystem services, changing demographics, community resilience, human health, and traditional cultural values.

5. Build climate risk management goals into government activities, the education system, the land-use system, and public activities.

6. Broaden public awareness of climate risk management goals.

7. Build and maintain international coalitions that compel the industrial world to curtail global warming.

In August, 2009 President of the European Commission, Jose Manuel Barroso stated "The world's climate looks set to continue changing at rates unprecedented in human history. We know that the poorest people and countries are the most likely to be hit the hardest by rising sea levels, desertification and natural disasters, yet they are often least responsible for the causes."

The FSM government is disinclined to have their nation become one of climate refugees. Now, faced first-hand with the challenge of staying on islands that were initially settled thousands of years ago by seafaring ancestors in open canoes, Micronesia must determine how to develop climate resilient communities in the 21st Century. In words of ~~President Emanuel Mori~~, "We are unwilling to abandon the bones of our 1000 year old ancestors."