Hazards, Climate & Environment Program

University of Hawai‘i Social Science Research Institute

Challenges of Climate Change in Island Communities:

Planning and Adapting

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IPCC AR4 Chapter 16 SMALL ISLANDS IMPACTS (2007)

6. Pacific and Mediterranean: Siam weed (*Chromolaena odorata*)	None (CLIMEX model) Kriticos et al. (2005)	Increase in moisture, cold, heat and dry stress	• Pacific islands at risk of invasion by Siam weed. • Mediterranean semi-arid and temperate climates predicted to be unsuitable for invasion.
7. Pacific small islands: Coastal erosion, water resources and human settlement	SRES A2 and B2 World Bank (2000)	Changes in temperature and rainfall, and sea-level rise	• Accelerated coastal erosion, saline intrusion into freshwater lenses and increased flooding from the sea cause large effects on human settlements. • Less rainfall coupled with accelerated sea-level rise compound the threat on water resources; a 10% reduction in average rainfall by 2050 is likely to correspond to a 20% reduction in the size of the freshwater lens on Tarawa Atoll, Kiribati.
8. American Samoa; 15 other Pacific islands: Mangroves	Sea-level rise 0.88 m to 2100 Gilman et al. (2006)	Projected rise in sea level	• 50% loss of mangrove area in American Samoa; 12% reduction in mangrove area in 15 other Pacific islands.

- **Sea Level rise**
- **Erosion**
- **Invasive Species**
- **Mangrove and coral reef threats**
- **Ocean Acidification**
- **Storms, Coastal Inundation**
- **Flooding**
- **Water Resource pressures**
- **Disasters**

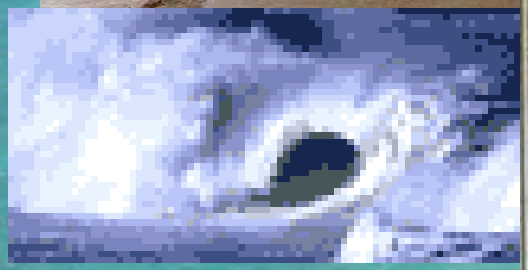
GAPS:

•the role of coastal ecosystems as natural defenses against sea-level rise and storms;
•the response of terrestrial upland and inland ecosystems to changes in mean temperature, rainfall and extremes;
•considering how agriculture, forestry and fisheries, and food security, will be impacted
•expanding knowledge through national and regional research, not only for vector-borne diseases but for skin, respiratory and water-borne diseases;
•given the diversity of 'island types' and locations, identifying the most vulnerable systems and sectors

How do we know and understand *Climate*?

often from "Weather & Climate Extremes" or "Disasters"…

- **Nearly half the costs of global disasters (about $79 billion in 2007) are from climate-related disasters, much stronger in El Niño and La Niña years. Economic losses from natural disasters are more than five times the equivalent figure for the 1970's.**
- **The upward trend in global disasters is mainly driven by the increase in the number of hydro-meteorological disasters**
- **"Climate change constitutes the greatest market failure the world has ever seen," Sir Nicholas Stern, former Chief Economist, World Bank (Munich Re report, 2006). By mid century, loss of 5% in global growth (US $2,200bn) each year.**
- **"…the projected costs of *damage* inflicted by climate change could top US $300 billion per year within the next few decades" (Gerhard Berz, Munich Re)**



People and Livelihood Impacts from Climate Change

Water	Drinking water availability diminished; Freshwater lens shifts; Brackish water; Fire suppression efforts weakened;
Fisheries	Near-shore areas affected by coral bleaching, degradation; Pelagic fisheries shift with climate
Agriculture	Food Security; Loss of important nutrition sources; Cultural impacts -loss of taro
Energy	Reduced access to poorer in society; differential energy needs, with more impact on marginalized communities
Health	Increases in: waterborne diseases; dengue and mosquito vectors; respiratory illness
Ecosystems	Threats to rivers, surface water, corals, marine and terrestrial habitat
Economy & Finance	Development and social welfare funding diverted to disaster response, assistance; Recovery hampered by multiple events
Infrastructure	Impacts to Critical Facilities and Lifelines increase hardship on people, businesses, and government
Wastewater & Solid Waste	Reduced areas for waste streams; added stressor on ecology; pollutants in groundwater resources; toxins & illness
Society & Culture	Erosion of Cultural and Sacred lands; Impacts on Graves and Burial Sites; Loss of Cultural foods, especially for ceremony

Impacts on Island Transportation, Telecommunications and Infrastructure

Critical Ecosystem Impacts

Example of One Extreme Event: December 2008 Inundation Event

- **Flooded Homes**
- **Potable**
  the FSM
- **Ground**
  USGS su
  penetra
  salinity
  increase
  baseline
- **Taro Cr**
  degree
- **Environ**
  garbage

(Homes under sea water, Patta)

(Homes including a water tank covered with Salt water, Patta)

esident whose foundation is wholly covered by salt water)

(Abandoned home in Onei due to Sea Level Rise)

(Incomplete house from Salt water intrusion, Onei)

(Resident loosing its leverage from salt water intrusion, Patta)

C.L. Anderson, Ju

Context of Event: Amidst Multi-Year Hazard

Office of the Governors of Pohnpei and Chuuk Disaster Declarations – April 2007 drought & high tides, May 2007 tidal surge, December 2007 high tides & surge, April 2008 drought & high tides

Feeding Assistance Programs – 9 months supplemental food assistance in Chuuk Outer Islands; coordinated sharing of lagoon island crops (breadfruit); about 5,000 people requiring food because of severe damage to staple crops (taro, breadfruit, banana)

Event Costs: Fuel for Shipping Food; Relief Assistance; Logistics for assessment team visits and disaster declaration coordination

Differential Social Impacts in Disasters
Exacerbated by Climate Change

- **Gender** – impacts on agriculture and fisheries affect men and women differently; more threat immediately on women's traditional work and household sustainability
- **Indigenous People** – access to policy, resources (more notably in islands with mixed populations)
- **Age –** nutrition and health impacts for young and elderly
- **Immigrant and Minority Populations, Environmentally Displaced Persons –** language and communication, access to resources and information, competition over increasingly scarce resources

→ **Conflict , Violence, Poverty if not addressed**

Using Video Conferencing Technology to Link Native Natural Resource Managers in Alaska, the US Southwest, and the Pacific Islands

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Alaska Center for Climate Assessment & Policy

Overview

Impacts to water resources are important concerns of natural resource managers in Native American communities throughout North America and local and indigenous communities in the Pacific Islands. In particular, drought can initiate a cascade of impacts that affect water supplies, water quality, food production, and forest health.

With global temperatures on the rise, the impact of drought on water supplies and ecosystems can only be expected to increase in the coming years. Being prepared by better understanding drought planning innovations and the array of monitoring and forecasting resources may help reduce vulnerabilities and avert disasters.

This project, supported by the National Oceanic and Atmospheric Administration (NOAA), aims to use modern communication technologies to open a dialogue among tribal and indigenous decision-makers and resource managers from Alaska, the US Southwest, and the Pacific Islands as well as climate scientists from these regions.

Next Steps

- Video Conference on April 1, 2009
- Connecting this project with other efforts related to indigenous climate change issues (e.g. American Indian and Alaska Native Climate Change Working Group, National Congress of American Indians Policy Research Center)
- Working within each region to build networks of native natural resource managers and climate scientists

Project Goals

- Provide indigenous resource managers and decision-makers an opportunity to hear about water stress and climate change in other regions and how others are responding and strategizing in response to these issues.
- Raise national awareness of water and drought issues in indigenous communities in Alaska, the Pacific Islands and the Southwest.
- Improve the ability of NOAA and the National Integrated Drought Information System (NIDIS) to address the information needs of underserved populations by strengthening communications, and prioritizing research and decision support needs.

Logistics

- Video conference sites were utilized in Alaska, Hawaii, and Arizona. For both Alaska and Hawaii, this project leveraged the well-equipped distance education and communication infrastructure across these regions.
- A toll-free dial-in teleconference number was also used to allow participants to call in from areas without easy access to video conference technology.

November 2008 Video Conference

Who participated

48 people joined the conference
- 18 from Alaska,
- 19 from Arizona, and
- 11 from the Pacific Islands.

They included water and natural resource managers from:

Alaska:
Association of Village Council Presidents, Kawerak, Inc., the Northwest Arctic Borough, Tanana Chiefs Conference, Yukon River Intertribal Watershed Council, Alaska Native Science Commission

Arizona:
Gila River Indian Community, Navajo Nation, and Tohono O'odham Nation

Pacific Islands:
Hawaii State Commission on Water Resources, Pago Pago Weather Service Office, American Samoa Power Authority

Common Issues discussed

Existence of unusual and unpredictable weather patterns (flooding, storm surge, salt water intrusion into drinking water)

Observations of changing weather and climate patterns and impacts on animals (i.e. frequency, intensity and duration of precipitation in Arizona)

Coordinating issues with sanitation and water quality

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Pacific RISA
managing climate risk in the Pacific

CLIMAS
Climate Assessment for the Southwest


Thank You