



**Title:**

**Overview of Climate Risk Reduction in the US  
Pacific Islands Freely Associated States**

**Prepared by:**

Cheryl L. Anderson, PhD  
Director, Hazards, Climate, & Environment Program

**Date:**

February 2012

**Sponsor:**

Climate Adaptation Partnership in the Pacific: Pacific Regional Integrated  
Science & Assessment, Phase 2  
East-West Center Award No. 12739  
National Oceanic & Atmospheric Administration Climate Program Office  
NA10OAR4310216, CFDA No. 11.431

**Document type:**

Technical Report 201103B

## Summary of Findings

- 1) The US Pacific Island Freely Associated States (US-FAS) participate in the international disaster risk reduction framework, the Hyogo Framework of Action. Disaster risk reduction and climate change adaptation actions focus on reducing risk of impacts from climate-related disasters. There are currently opportunities to integrate national action plans for disaster risk reduction and climate change adaptation through the initiation of the Joint National Action Plans for Disaster Risk Management.
- 2) The US-FAS have developed plans that deal with climate-related disaster risks. The three jurisdictions previously developed National Communications to the United Nations Framework Convention on Climate Change. There is widespread acknowledgment that impacts from extreme climate events and from climate change are among the worst threats to the US-FAS.
- 3) Methods for projecting losses consider exposure of population and buildings. The loss estimates are for 90% loss of buildings exposed to risks. Attempts are made to quantify impacts from sea level rise, storm surge, and coastal erosion. The methods for calculating loss are not based on modeled results.
- 4) Key areas for disaster risk reduction and climate adaptation include: 1) structural mitigation measures for buildings, including hardening and retrofit, and improved design; 2) building codes, permitting for structures, and enforcement; 3) coastal zone management; 4) conservation and natural resource management; 5) infrastructure and critical lifelines design improvements and hardening; 6) insurance; 7) land use designation and zoning; 8) public health interventions and planning; 9) public education, awareness, and training; and, 10) water resource, floodplain and watershed management. Actions to reduce risk fall into these areas for all three jurisdictions.
- 5) The plans propose hazard mitigation activities in key sectors, which include: agriculture and food security, communications, economy and finance, education, energy, environment, health, society and culture, transportation, waste, and water.
- 6) Capacity building highlights key areas in all of the plans where effort to reduce risk is needed. These include attention to: 1) administrative and technical capacity; 2) legal and regulatory capabilities; and, 3) fiscal capabilities. Capacity building is essential to risk reduction and to developing resilient governments and communities that can adapt to climate impacts.

## Table of Contents

<b>Summary of Findings</b>	<b>ii</b>
<b>Table of Contents</b>	<b>iii</b>
<b>1.0 Introduction</b>	<b>1</b>
<b>2.0 Background on Disaster Risk Reduction in the Freely Associated States</b>	<b>2</b>
<b>3.0 Framework for Addressing Risk</b>	<b>5</b>
<b>3.1 Planning Process</b>	<b>5</b>
<b>3.1.1 Climate Change Integration in the Planning Process</b>	<b>6</b>
<b>3.2 Risk and Vulnerability Assessment</b>	<b>7</b>
<b>3.2.1 Climate Change in the Risk Assessment</b>	<b>9</b>
<b>3.2.2 Climate Change in the Vulnerability Assessment</b>	<b>10</b>
<b>3.3 Mitigation Strategy and Actions</b>	<b>13</b>
<b>3.3.1 Climate Change in the Mitigation Strategy</b>	<b>19</b>
<b>3.4 Capability Assessment</b>	<b>21</b>
<b>3.4.1 Climate Change in the Capability Assessment</b>	<b>22</b>
<b>3.5 Maintenance and Plan Update</b>	<b>22</b>
<b>3.5.1 Climate Change in the Implementation, Maintenance, and Update of the Plan</b>	<b>23</b>
<b>4.0 Disaster Risk Reduction Gaps</b>	<b>6</b>
<b>4.1 Risk and Vulnerability Assessment Gaps</b>	<b>6</b>
<b>4.2 Capacity Assessment Gaps</b>	<b>7</b>
<b>5.0 Options for Improving Disaster Risk Reduction and Climate Change Adaptation</b>	<b>8</b>
<b>References</b>	<b>10</b>
<b>APPENDIX A: Hazards included in US Pacific Island Freely Associated State Joint National Action Plans for Disaster Risk Reduction</b>	<b>12</b>
<b>Table 2-1. Disaster Risk Management Structures in the US-Affiliated Pacific Islands, 2012.</b>	<b>4</b>
<b>Table 3-1. Proposed Hazard Mitigation Actions that Contribute to Climate Adaptation by Sector</b>	<b>6</b>

## Introduction

The US Pacific Island Freely Associated States (US-FAS), which include the Federated States of Micronesia (FSM), the Republic of the Marshall Islands (RMI), and the Republic of Palau (ROP), have a complex history of association with the United States. The evolution of disaster management and relief assistance is tied to political and economic development in these island jurisdictions. The current attention to reduce impacts from disasters aligns with the international framework for disaster risk reduction (DRR) under the Hyogo Framework of Action, whereby each country develops a national disaster risk reduction plan, with recent focus on integrating DRR with climate change adaptation (CCA) in a Joint National Action Plan (JNAP) rather than engaging in two separate processes. The regional organization of the Secretariat of the Pacific Community helps to advise and guide the development of these joint plans.

Disaster risk reduction efforts are guided by the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, to which the world's Governments agreed in Hyogo, Kobe, Japan, in 2005. The Hyogo Framework for Action (HFA) aims for "the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries." The HFA lays out a detailed set of priorities to achieve by 2015.

The primary focus on "risk reduction" moved disaster management away from immediate response targeted only at preventing damage from disasters, toward comprehensive, integrated, multi-hazard approaches that would reduce risks from other potential disasters in the region. The resulting document, the *Hyogo Framework for Action 2005-2015*, provides additional language and agency mandate for a risk reduction framework (ISDR 2005).

Disaster risk reduction is a cross-cutting issue in the context of sustainable development and therefore an important element for the achievement of internationally agreed development goals, including those contained in the Millennium Declaration. In addition, every effort should be made to use humanitarian assistance in such a way that risks and future vulnerabilities will be lessened as much as possible (ISDR 2005, Sec IIIA(k)).

The disaster risk reduction framework challenges governments, agencies, organizations, and individuals at all levels to take appropriate responsibility at their levels for risk reduction. Even with government delegation agreement on language in the Hyogo Framework, risk reduction measures must be implemented at the local level to ensure effectiveness of the strategies. In international climate change discussions, the overall threat to island societies from climate-related impacts, especially extreme climate events (droughts, floods, tropical cyclones, etc.), has been recognized as a national security problem that threatens the environment, economies, health, and public safety of all islands.<sup>1</sup> As disaster management evolved in the US-FAS, attention focused on climate-related hazards and impacts from climate change.

---

<sup>1</sup> These security issues were emphasized in a meeting of Pacific Island Nation leaders with President George W. Bush in Honolulu, Hawaii, on October 23, 2003.

The United Nations International Strategy for Disaster Reduction (UNISDR) secretariat provides technical assistance and coordinates the implementation of the HFA. UNISDR specifically works with countries to aid in the integration and mainstreaming of disaster risk reduction in national policies. Since the HFA development in 2005, the UNISDR has coordinated the Global Platforms on Disaster Risk Reduction in 2007 and 2009 to ensure that countries move forward in risk reduction with exposure to new and emerging issues, such as specific impacts from climate change. Regional funding and support for risk reduction come through programs developed at the United Nations Development Program (UNDP). Since many of the climate adaptation programs are run through UNDP programs, more coordination of climate adaptation activities with relation to disaster risk reduction goals emerged.

The focus in the global disaster community supported disaster risk reduction through poverty alleviation and sustainable development, where hazard mitigation becomes a part of the overall framework for addressing risks to impacts from natural hazards. The World Conference on Disaster Reduction “Hyogo Framework for Action 2005-2015” defines disaster resilience in the following declaration: “the starting point for reducing disaster risk and promoting a culture of disaster resilience lies in the knowledge of the hazards and the physical, social, economic and environmental vulnerabilities to disasters that most societies face” (UNISDR 2005, 7). Reducing vulnerability depends on understanding sustainable livelihoods and the capacities, assets, and activities that lead to sustainability (Adger 2006; Chambers and Conway 1992). The consideration, promotion, and development of such assets of a community are critical to fostering sustainable development and disaster resilience (Birkmann 2006; Cannon 2008).<sup>2</sup>

This report highlights ways in which FAS governments are seeking to improve their inclusion of climate-related hazard information in disaster risk reduction planning, which leverages regional resources and support to develop an integrated Pacific Islands risk reduction plans. The US-FAS countries have been engaged in climate change negotiations and have developed status reports referred to as “National Communications.” The research and planning effort to prepare these climate documents enables the US-FAS to benefit from good information about climate change that can be used in the Joint National Action Plans for Disaster Risk Management. This further informs climate adaptation planning and increases resiliency in overall disaster risk reduction.

## **2.0 Background on the FAS and Disaster Risk Reduction**

The US-affiliated Pacific Islands originally received funding and support for the development of disaster management programs through the Federal Emergency Management Agency (FEMA) from the late 1980s until the compacts of free association eliminated FEMA's assistance with these remote island jurisdictions. The difficulty in overseeing risk reduction programs from the US continent and regional offices led FEMA to request that renegotiations of the compacts of free association exclude relief assistance from FEMA, and that these responsibilities shift to the US Agency for International Development (USAID) Office of Foreign Disaster Assistance (OFDA),

---

<sup>2</sup> Resilience: “The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure This is determined by the degree to which the social system is capable of organising itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures” (UNISDR 2005, 4).

which is consistent with independent nations. Although Palau has not had access to FEMA assistance since 1994, the FSM and RMI renegotiated the new compact agreements in 2003, with discussion on the roles of FEMA and USAID occurring in the following years and reaching some agreements in 2009 about the roles of the US in response to disasters for the islands. Because of the negotiations, FEMA required that the FSM and RMI develop hazard mitigation plans in case a disaster occurred.

Since the US-FAS are not entitled to funding assistance for hazard mitigation planning, the RMI worked with regional organizations, such as the Secretariat of the Applied Geoscience Commission (SOPAC) to develop their plan and consultants aided the FSM in producing a national level plan that met basic requirements. The ROP began aligning their national disaster strategy with United Nations.

In the 1990s, the United Nations introduced the International Decade for Natural Disaster Reduction. The focus of the strategy was to reduce hazards by linking disaster planning with development (UN Office of the Disaster Relief Coordinator 1991; Cuny 1983). The hope was that by reducing the conditions of poverty and social inequity, the impacts of the disasters would be reduced. “By the conclusion of the Decade, *the continual rise in the frequency, severity, and cost of disasters facing modern societies*, has underlined the importance of intensifying initial official, professional, and public commitments to making hazard and risk reduction a public value” (ISDR 2000 (2), emphasis in original). Although disaster occurrences and costs seemed to rise, the United Nations and other agencies and organizations believed that the initial approach was not incorrect, and that the work needed to be intensified in this direction. An Inter-Agency Task Force<sup>3</sup> was formed under the International Strategy for Disaster Reduction with the goal to create “long-term, pro-active disaster prevention strategies” and to improve “the resiliency of communities” (ISDR 2000).

Changes in political status and regional collaborations have resulted in an evolution of risk management, as islands such as the Republic of Palau, Federated States of Micronesia, and the Republic of the Marshall Islands have chosen less US dependent governance systems (Table 2-1 provides the current overview of disaster risk management programs in the US-affiliated islands, which vary greatly depending on political association and status). The table shows that the three jurisdictions highlighted in this report have increased their exposure and ability to work internationally for resources, rather than solely relying on the United States. These nations participate in the United Nations and as equal partners in regional political initiatives.

---

<sup>3</sup> The Inter-Agency Task Force for Disaster Reduction was composed of a chairperson from the Office for the Coordination of Humanitarian Affairs (OCHA), representatives from the World Bank, the Food and Agriculture Organization (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Telecommunications Union (ITU), World Meteorological Organization (WMO), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), the World Food Programme (WFP), the Council of Europe, the Asian Disaster Preparedness Centre (ADPC), the Secretariat Pacific Applied Geoscience Commission (SOPAC), Organization of African Unity (OAU), Organization of the American States (OAS), Commonwealth of Independent States (CIS) Interstate Council for emergency situations, and eight representatives from the civil society and non-governmental organizations.

These islands have also expanded their donor relief assistance profiles beyond the unilateral aid historically attained from the United States, and they now receive bilateral aid from Japan, Australia, New Zealand, Germany, and other nations. The support of regional partners through various programs and aid has enabled the FSM, ROP, and RMI to access significant resources for developing risk analyses, climate-proofing studies, and implementing climate change adaptation pilot projects, which has outpaced many of the risk reduction activities in the other US Pacific Islands.

**Table 2-1. Disaster Risk Management Structures in the US-affiliated Pacific Islands, 2012.**

Island Jurisdiction	Formal Risk Management	Regional Partnerships <sup>4</sup>
State of Hawai'i	Hawaii State Civil Defense in the State Department of Defense, responsible to the Office of the Governor. County Civil Defense Agencies, responsible to the Mayors. Hawaii State Hazard Mitigation Forum (public and private partners).	PRiMO, (informal links to regional orgs through UH), Pacific IOOS, PEAC, WMO/US NWS
Territory of Guam	Guam Office of Civil Defense, responsible to the Office of the Governor. Guam Hazard Mitigation Council.	PRiMO, SOPAC, SIDS non-UN/regional associate member, Pacific IOOS, PEAC, WMO/US NWS
Territory of American Samoa	Territorial Emergency Management Coordination Office (TEMCO), under the Office of the Lt. Governor. Homeland Security Office, responsible to the Lt. Governor. Flood disasters in the Department of Commerce AS Coastal Management Program, in the Executive Branch. American Samoa Disaster Mitigation Committee (public and private advisory council), under the Office of the Lt. Governor.	PRiMO, SOPAC, SIDS non-UN/regional associate member, Pacific IOOS, PEAC, WMO/US NWS
Commonwealth of the Northern Mariana Islands	Emergency Management Office, in the Office of the Governor	PRiMO, SIDS non-UN/regional associate member, PacIOOS, PEAC, WMO/US NWS
Republic of Palau	National Emergency Management Office (NEMO), in the Office of the Vice President of Palau	ADB, SIDS, SPC -SOPAC, SPREP, PacIOOS, PEAC, WMO/US NWS, AOSIS, UNDP Pacific Centre, USAID-OFDA, AusAID, WB, German Ministry of the Environment, JICA
Federated States of Micronesia	National Emergency Management Office, in the Office of the President. Chuuk Disaster Management & Emergency Office. Kosrae Disaster Coordination.	ADB, SIDS, SPC-SOPAC, , SPREP, PacIOOS, PEAC, WMO/US NWS, AOSIS, UNDP Pacific Centre, USAID-OFDA, AusAID, WB, , German Ministry

<sup>4</sup> Acronyms are as follows: ADB – Asian Development Bank; PRiMO – Pacific Risk Management 'Ohana; PacIOOS – Pacific Integrated Ocean Observation System; PEAC – Pacific ENSO Applications Climate Center; WMO – World Meteorological Organization; US NWS – United States National Weather Service; SIDS – Small Island Developing States; SPC – Secretariat of the Pacific Community, which manages SOPAC – Secretariat of the Pacific Applied Geoscience Commission since 2011; SPREP – Secretariat of the Pacific Regional Environment Programme; AOSIS – Association of Small Island States; USAID-OFDA- US Agency for International Development Office of Foreign Disaster Assistance; AusAID – Australian Agency for International Development; WB-World Bank; JICA- Japan International Cooperation Agency.

	Emergency Assistance, Office of Public Safety. Yap State Disaster Coordinating Office. State Disaster Managers report to the State Offices of the Governors.	of the Environment, JICA
Republic of the Marshall Islands	National Disaster Management Office, in the Office of the President.	ADB, SIDS, SPC-SOPAC, SPREP, Pacific IOOS, PEAC, WMO/US NWS, AOSIS, UNDP Pacific Centre, USAID-OFDA, German Ministry of the Environment, AusAID, WB, JICA

Disaster risk management encompasses the overall system under which natural hazard risks and vulnerabilities are assessed and mitigated. In the broadest consideration, the system links activities in both formal and informal disaster management sectors, at multiple levels, with participation of multiple agencies and organizations. Hazard mitigation, as part of this system, involves the activities and actions to reduce impacts from natural hazards to prevent disaster. Risk management frames the work of reducing disasters in a holistic context that recognizes the linkages of people and their environment as integral in any strategy for disaster reduction.

In the past, FEMA provided funding to the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau, but responsibilities changed with renegotiation of the Compacts of Free Association that establishes the relationship with the United States for access to funding, technical assistance, and other specified resources.<sup>5</sup> Since the Freely Associated States (FAS) are not eligible for the same levels of planning assistance, they are not required to adhere to the hazard mitigation planning process as the state and territorial governments. The US-FAS have begun to integrate disaster risk reduction and climate change adaptation in their national action plans through regional assistance programs, and these programs guide eligibility for funding to implement risk reduction actions. The focus on disaster risk reduction further enables integrated planning and consideration of the unique geographies and capacities of island ecosystems in addressing risk.

### 3.0 Framework for Addressing Risk

To better understand the entry points for potential inclusion of climate adaptation into the disaster risk reduction efforts in the US Pacific Islands, it is important to understand the similar planning processes. The initial focus for addressing risk is to conduct a vulnerability

<sup>5</sup> An associated state is the minor partner in a formal, free relationship between a political territory with a degree of statehood and a (usually larger) nation, for which no other specific term, such as protectorate, is adopted. The details of such free association are contained in United Nations General Assembly resolution 1541 (XV) Principle VI, a Compact of Free Association, and are specific to the countries involved. Under the Compact Agreements, the Freely Associated States are entitled to US postal services and subsidies in postal mailing rates, establishment of the local Weather Service Offices supported by the US NOAA National Weather Service Pacific Regional Headquarters, the USDA Natural Resources Conservation Service technical assistance, Capital Improvements grant funding, and Federal Aviation Administration (FAA) assistance. Until 2008, the Federated States of Micronesia and the Republic of the Marshall Islands received disaster assistance through FEMA. The renegotiated compacts shifted disaster assistance responsibilities for these two places to the US Agency for International Development (USAID) Office of Foreign Disaster Assistance (OFDA), which already administered aid to the Republic of Palau in emergencies.



assessment that clarifies the exposure and sensitivity of the hazard. It further examines the capacity to reduce the vulnerability.

Disaster risk reduction (DRR) integrates the entire emergency management system, where hazard mitigation actions become one of the ways to address risk. DRR also focuses on poverty alleviation and sustainable development, which expand the types of actions that can be undertaken and further emphasizes the importance of understanding the socioeconomic conditions underpinning the planning framework. Many of the actions proposed to reduce risks remain consistent with the hazard mitigation actions: 1) structural mitigation measures for buildings, including hardening and retrofit, and improved design; 2) building codes, permitting for structures, and enforcement; 3) coastal zone management; 4) conservation and natural resource management; 5) infrastructure and critical lifelines design improvements and hardening; 6) insurance; 7) land use designation and zoning; 8) public health interventions and planning; 9) public education, awareness, and training; and, 10) water resource, floodplain and watershed management. Additionally, limitations on the types of development and sustainable financing mechanisms could be considered in the broader risk reduction framework.

In a review of the national communications and of the disaster management plans and response for the National Action Plans, the types of proposed risk reduction activities were reviewed. They can generally be categorized by sector of impact, and Table 3-1 attempts to categorize the number of risk reduction actions.

**Table 3-1. Proposed Hazard Mitigation Actions that Contribute to Climate Adaptation by Sector**

Sector of Impact	Number of Proposed Mitigation Actions by Hazard for Each Jurisdiction		
	ROP	RMI	FSM
Agriculture & Food Security	3CI, 3D, 1CC	1CI, 1D	4D
Communications	5MH	3MH	16MH
Economy and Finance	2CI, 3F	1CI	4MH
Education	1CC	6MH, 1CC	24MH, 1CC
Energy	4H, 2CI	3MH, 1H	2MH
Environment	2CC, 1W	1H, 1W	3LD, 1W
Government	1SLR	7MH, 3H	17MH
Health	2H	2MH	1MH
Society & Culture	1H, 1F	1H	1MH
Transportation	1H, 4CI, 2LD	2MH	4CI, 1CC
Waste	-	1CI	3MH
Water	1D	1CI, 2D, 2CC	5MH, 3D

**Climate-related Hazard Key:** MH=multi-hazard; CV=climate variability; CC=climate change; CE=coastal erosion; CI=coastal inundation, storm surge; D=drought; EH=extreme heat; F=flooding; H=hurricanes, tropical cyclones and storms, high winds; LD=landslides, mudflow, debris flow (from heavy rainfall); SLR=sea level rise; W=wildfire

There have been some significant projects implemented under climate adaptation projects in each of the island jurisdictions. Palau has two large projects for water development and storage and food security. The Marshall Islands has several projects to enhance water resources by increasing storage capacity and reducing leakages from the airport runway

catchment system. Kosrae, FSM is implementing a coastal roadway “climate-proofing” project that has also resulted in installation of real-time shoreline and sea level monitoring.

#### **4.0 Disaster Risk Reduction and Climate Adaptation Gaps**

The Joint National Action Plan for the RMI has been completed, but the JNAPs for Palau and the FSM are currently underway. The numerous documents and projects developed for either disaster risk management or climate adaptation have been significant. In spite of the significant strides in developing these plans and accumulating the best available information, there remain some significant gaps.

The identification and discussion of these gap areas reveals areas to target efforts in risk reduction. This section identifies key areas that need attention in the risk and vulnerability analyses and capacity assessments to understand and evaluate expected impacts and losses, and areas for capacity building to improve the local jurisdiction’s ability to conduct vulnerability assessments and develop risk reduction and adaptation plans.

#### **4.1 Risk and Vulnerability Gaps**

Many of the efforts to identify vulnerabilities in the jurisdictions are under-resourced and the technical aspects for storing data and analyzing risks are missing. There are several projects underway in all jurisdictions to develop GIS capacity to use in developing vulnerability assessments. Yet, the data sets have in many cases been poorly maintained and the land area is generally so small that climate models do not capture changes. This advocates for more scaled-up, localized assessments of risk to address impacts that are already occurring.

The atoll islands are remote and increasingly rely on imported goods and visitors from outside to sustain the economies, which increases the reliability on transportation systems that do not operate locally. The reliance on donors, compact funding, and other external resources adds a layer of vulnerability to the local population.

Environmental health, waste disposal, water quality, and sanitation issues increase the overall vulnerability of the population in which drought and saltwater intrusion further threatens scarce resources. Hazards and climate change will exacerbate problem areas and create disasters if the underlying socioeconomic issues are not addressed.

Addressing issues in vulnerability from the disaster risk reduction perspective recognizes that many of the threats will be from gaps in addressing sustainable development and livelihood issues. The disaster risk reduction plans advocate improved land use planning, coastal management, environmental management, and building code regulations. It is therefore important to assess the capacity of the islands to deal with issues of vulnerability.

#### **4.2 Capacity Assessment Gaps**

The capacity to assess risks and determine actions is a key feature of building resiliency in hazard mitigation and climate adaptation. Even though the hazard mitigation plans outline the capability of the jurisdictions to reduce their risks, there are a number of issues that arise that

become barriers to implementation of plans and hazard mitigation actions. These will continue to result in challenges to climate adaptation unless these are addressed.

Gaps in capacity to implement hazard mitigation and climate adaptation include:

- **Finance:** The financial resources to identify and implement a risk reduction solution often present a great challenge. With access to international resources, the three US-FAS can be strategic about leveraging resources.
- **Technology:** Monitoring equipment, GIS layers, and other tools for reducing risk require equipment and technologies that may not be readily available. Additional training will improve the ability to address risks.
- **Staff and Personnel:** Even when there are knowledgeable and trained personnel, the island jurisdictions often cannot compete with salaries from other places. People with advanced training are often in high demand, and the government cannot compete with the private sector for salaries and benefits. The islands experience a high degree of turnover in staffing and personnel, which may inhibit implementation of hazard mitigation actions and limit institutional knowledge and capacity to reduce risks.
- **Knowledge:** The climate adaptation plans for the three US-FAS discuss use of traditional ecological knowledge to address risks. Often, the knowledge from local elders may provide a low-cost solution. There are many types of knowledge that are required for developing hazard mitigation and climate adaptation actions. Key socio-cultural knowledge characterized by age, gender, and ethnicity will be essential to building resilient communities because the knowledge about resource use and management may be held by particular groups. If everyone is not engaged in risk reduction, critical information will be missing. Historically, the island jurisdictions have evolved and adapted to change by integrating expertise in different areas of risk reduction and resource management.
- **Planning:** Most of the island jurisdictions subcontract large agencies and organizations from the U.S. continent to conduct the hazard mitigation planning and integrated planning. The ability to identify and engage in land use planning, development planning, disaster risk reduction, and climate adaptation planning will be necessary skills for reducing risks.
- **Legal, Policy, Legislation, and Regulation:** Supportive governmental policies, legislation, and regulations are essential for ensuring implementation of hazard mitigation and climate adaptation actions. Rules and regulations need to be enforced to ensure their effectiveness.

## 5.0 Options for Improving Disaster Risk Reduction and Climate Change Adaptation

The development of the Joint National Action Plan provides the opportunity to integrate disaster risk reduction and climate change adaptation, and to leverage resources and build on synergies to reduce disaster risks.

The area that would benefit the most from increased effort will be on enhancing and supporting capacity development to engage in risk reduction activities. Many of the hazard

assessments and plans are conducted by external consultants, who will not help to build local capacity to implement actions. With expected risks from climate change, integrating specialized, local knowledge in the planning efforts will ensure that it is possible to adapt to climate change. Improving local capacity further ensures that impacted communities and governments have the intellectual capital and knowledge to recover and be resilient.

Bringing the disaster risk reduction aspects into climate change adaptation will enable a more targeted focus in reducing the impacts from climate-related risks. The small atoll islands face challenges and big long-term decisions in ways to deal with climate change that continues to support a resilient people. As those living on the “climate frontlines,” the islanders are among the first to learn climate adaptation and to test risk reduction activities. The knowledge they are gaining needs to be shared to improve coping strategies for other islands and coastal communities, even while building resilience in their home islands. The integration of disaster risk reduction and climate adaptation planning is a step in the right direction---one from we should be poised to learn and adapt lessons toward reducing our own risks to hazards.

## References

ADB Regional Technical Assistance Report on Regional Partnerships for Climate Change Adaptation and Disaster Preparedness. 2008. <http://www.adb.org/Documents/TARs/REG/41187-REG-TAR.pdf>.

Adger, W.N. 2006. Vulnerability. *Global Environmental Change*. 16:268-281.

Ambroz, Angela. 2009. A Pacific Regional Economics of Climate Change Study: Assessing Adaptation Needs in Small Island Developing States. Pacific Applied Geoscience Commission (SOPAC). Regional Economics of Climate Change: Practitioners Workshop, 4-5 March 2009, Washington, D.C.

Bettencourt, Sofia, Richard Croad, Paul Freeman, John Hay, Roger Jones, Peter King, Padma Lal, Alan Mearns, Geoff Miller, Idah Pswarayi-Riddihough, Alf Simpson, Nakibae Teuatabo, Ulric Tritz, Maarten Van Aalst. 2005. Not If, But When: Adapting to Natural Hazards in the Pacific Island Region. The World Bank.

Birkmann, J. 2006. *Measuring Vulnerability to Natural Hazards: Towards Disaster Resilient Societies*. New York: United Nations University.

Brnich, Jr., Michael J. and Launa G. Mallett. 2003. Focus on Prevention: Conducting a Hazard Assessment. Prepared for US Department of Health and Human Services, Centers for Disease Control and Prevention, and the National Institute for Health and Occupational Safety.

Cannon, T. 2008. *Reducing People's Vulnerability to Natural Hazards*. Research Paper No. 2008/34. United Nations University-World Institute for Development Economics Research.

Government of the Republic of the Marshall Islands and Republic of the Marshall Islands Environmental Protection Authority. 2000. Initial Communication under the United Nations Framework Convention on Climate Change. Majuro, Marshall Islands.

Madigan, Anthony. 2005. Republic of the Marshall Islands: A Review of Disaster & Mitigation Plan Arrangements and Alignment with the Pacific Framework for Action 2005-2015 (as per the SOPAC 'Agreement'). Prepared by RIS Consulting International for the Pacific Applied Geoscience Commission (SOPAC).

National Disaster Management Committee and the South Pacific Disaster Reduction Programme (SPDRP). 1997, revised. Marshall Islands National Disaster Management Plan.

National Disaster Management Committee and the South Pacific Disaster Reduction Programme (SPDRP). 1997. Palau Master Emergency/ Disaster Management Plan.

Office of Environmental Planning and Policy Coordination (OEPPC), Office of the President. 2006. Climate Change Strategic Plan Majuro.

Palau National Emergency Management Office. 2010. Palau National Disaster Risk Management Framework (PNDRMF).

Republic of Palau Office of Environmental Response and Coordination and Office of the President. 2002. Republic of Palau First National Communication to the United Nations Framework Convention on Climate Change.

Rykken, David, Paul Heiderscheidt, Gregory Dever, Stevenson Kuartai, and Pearl Maramoto. 2005. Palau's Current and Future Capacity for Disaster Management. In *Health in Palau and Micronesia*. Vol 12 No. 1.

Secretariat of the Pacific Region Environment Programme. 2005. Pacific Islands Framework for Action on Climate Change, 2006-2015.

Sikivou, Mosese. 2009. Disaster Risk Management National Action Plan Workshop for Members of Parliament, 27-29 January 2009. Majuro, Republic of the Marshall Islands. SOPAC Trip Report 477. Pacific Applied Geoscience Commission (SOPAC).

Sikivou, Mosese and Stephanie Zoll.. 2010. Development of a Disaster Risk Management (DRM)/ Climate Change Adaptation (CCA) National Action Plan, 10-18 March 2010. Pacific Applied Geoscience Commission (SOPAC). Pohnpei, Federated States of Micronesia and Majuro, Republic of the Marshall Islands. SOPAC Trip Report 497.

United Nations Development Programme. 2012. Human Development Reports. <http://hdr.undp.org/en/statistics/>, accessed January 23, 2012.

United Nations International Strategy for Disaster Reduction. 2005. *Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters*, Kobe, Japan, [http://www.preventionweb.net/globalplatform/first-session/docs/Background\\_docs/HFA\\_Eng.pdf](http://www.preventionweb.net/globalplatform/first-session/docs/Background_docs/HFA_Eng.pdf) accessed October 6, 2008.

United Nations International Strategy for Disaster Reduction. 2007a. *Words Into Actions: A Guide for Implementing the Hyogo Framework*. Geneva, Switzerland: United Nations Secretariat of the International Strategy for Disaster Reduction. [http://www.preventionweb.net/globalplatform/first-session/docs/Background\\_docs/Words\\_into\\_Action.pdf](http://www.preventionweb.net/globalplatform/first-session/docs/Background_docs/Words_into_Action.pdf), accessed October 6, 2008.

World Bank, Global Facility for Disaster Reduction and Recovery, and Pacific Islands Applied Geoscience Commission. 2005. Reducing the Risk of Disasters and Climate Variability in the Pacific Islands: Republic of the Marshall Islands Country Assessment.

Yauvoli, Amena. 2010. The Federated States of Micronesia Five Year Review of the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States – The Case of the FSM. Secretariat of the Pacific Community.

**APPENDIX A: Hazards included in US Pacific Island Freely Associated State Joint National Action Plans for Disaster Risk Management**

HAZARDS	ROP	RMI	FSM	Yap	Chuuk	Pohnpei	Kosrae
	Climate Change	X	X				
Climate Variability	X	x					
Coastal Erosion			X	X	X	X	X
Coastal Inundation/ Storm Surge	x	X	X	X	X	X	X
Dam or Levee Failure			X	X	X	X	X
Drought	X	X	X	X	X	X	X
Earthquake	X	X	X	X	X	X	X
Extreme Heat			X	X	X	X	X
Flood	X		X	X	X	X	X
Hazardous Materials	X	X	X	X	X	X	X
Hazardous Surf/ Rip Current		X	x	x	x	x	x
Health-Related Hazard / Disease	X	X	X	X	X	X	X
Hurricane, Typhoon, Tropical Cyclones	X	X	X	X	X	X	X
Landslide, Mudflow, Debris Flow (Heavy Rainfall Events)	X		X	X	X	X	X
Sea Level Rise	X		X	X	X	X	X
Strong Winds			x	x	x	x	x
Terrorism			X	X	X	X	X
Transportation Accident (Aviation, Port)		X					
Tsunami	X	X	X	X	X	X	X
Wildfire	X	X	X	X	X	X	X

ROP: Republic of Palau; RMI: Republic of the Marshall Islands; FSM: Federated States of Micronesia. Note: 'X' is used where hazards have been explicitly identified as "hazards" for the State or Territory in the hazard mitigation plan, and 'x' is used where this is mentioned as a secondary impact or threat with another hazard.

	Explicit Climate Risks: Hazards directly caused by climate variability and change or reflect extreme climate events.
	Risks exacerbated by climate change, but are primarily result of other causes, such as technology failure, aging infrastructure, poor sanitation, and lack of household and water system maintenance.
	Not directly impacted by climate change. Effects of seismic hazards on critical infrastructure may further exacerbate risk during climate extremes, such as drought and flooding.