

Pacific Research and Assessment Needs in the Pacific Climate Information System

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1. INTRODUCTION

The Pacific Climate Information System (PaCIS) convened in Honolulu on 5-7 August 2008. Participants gathered in three working groups (Education and Outreach; Operational Climate Observations, Products and Services; and Research and Assessment) to outline an initial program of action. Comprising multi-disciplinary participants from a range of Pacific regional institutions and organizations, the working groups intend to support the regional vision of PaCIS to develop “resilient and sustainable communities using climate information to manage risks and support practical decision-making in the context of climate variability and change.” The working groups identified a range of regional activities for physical climate scientists, social scientists, meteorological services, regional organizations, and multi-sector island managers.

The first actions involve surveying the range of research currently available and requests for climate information and research. The primary tasks for the research and assessment working group include: 1) implement an effective program of regional downscaling and local applications; 2) expand our understanding of the nature and consequences of climate extreme events in the region; and 3) enhance resilience through understanding of regional vulnerability and support for climate adaptation. Within these parameters, the group conceived several collaborative projects that address the needs of meteorological services and other information providers to provide improved delivery of information at various scales from government to site-specific communities. Inherent in the research and assessment needs was the commitment to integrate socioeconomic and climate science data in programs and projects to improve the quality of risk reduction and climate adaptation measures.

2. PaCIS BACKGROUND

Building on work spanning more than a decade, the Pacific Islands have established an integrated climate risk management process that emphasizes actions towards community resilience and adaptation. The process incorporates climate work of the Pacific ENSO Applications Center, the Pacific Regional Integrated Science and Assessment program, regional climate assessments, and links with initiatives from regional meteorological services.

2.1 Developing PaCIS Relationships

The emergence of the Pacific Climate Information System required using trusted relationships established by resource and disaster management communities, engaging in dialogue with experts from all

areas of society on equal grounding, developing a means of communicating technical information, cultural concepts, indigenous knowledge, and societal needs through shared learning processes, and strengthening partnerships across the region irrespective of political boundaries.

2.1.1 Preparing for a Changing Climate

In 2001, a report was published on the potential consequences of climate variability and change in the Pacific Islands, which detailed the types of consequences in specific primary sectors of island society. The organizers framed the workshop in the context of understanding vulnerability to the impacts of climate variability and change (Shea et al. 2001).

Participants included representatives from resource management, the private sector, disaster management, climate science, and community organizations. The workshop framed the discussion within the following sectors:

- Providing Access to Fresh Water
- Protecting Public Health
- Ensuring Public Safety & Protecting Community Infrastructure (extreme events)
- Sustaining Tourism
- Sustaining Agriculture
- Promoting Wise Use of Coastal & Marine Resources

All of the working groups determined that water was critical for their functions (Shea et al. 2001). The strategies developed by each working group for considering near-term mitigation and long-term adaptation to changes in climate involved protection of the water system.

PaCIS and the concept of a Pacific Regional Climate Centre trace their roots back to the 1997-1998 El Niño season and initial discussions of Pacific climate services at a workshop held in conjunction with the 1999 Pacific Regional Environment Program's (SPREP) meeting of the Pacific Regional Meteorological Services Directors (RMSD) (PaCIS 2008, 3). Participants in that meeting envisioned the ways that climate information could be mainstreamed in all sectors, thereby integrating the themes recognized in previous workshops.

2.1.2 Pacific Regional Integrated Science and Assessment

As part of the Pacific RISA and other climate-related initiatives, a series of six workshops at the national or territorial level were conducted in the US Pacific Islands. The workshops used a stakeholder-driven methodology that promotes community resiliency and climate adaptation. The Pacific RISA focuses on climate in multiple timescales, from climate variability to climate change. The workshops enabled the islands to

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think about impacts particular to their islands and develop local strategies to deal with changes in climate (Pacific RISA 2007).

2.2 PaCIS Mission and Action Plan

A steering committee convened to develop PaCIS, which models the functionality of an operational climate service. The mission and action plan outlines the activities pursued with the collaboration of PaCIS members who participate through three working groups on the three main program elements: 1) education, outreach and user information needs; 2) operational climate observations, products, and services; and 3) research and assessment.

The PaCIS mission includes the following objectives:

1. Clarify climate information needs to guide climate education, outreach, user information needs, observations, products, services, research and assessment;
2. Enhance regional and local capacities to maintain and sustain climate observational network and supporting systems in the Pacific;
3. Provide access to critical data, research and new climate information products and services;
4. Translate research and assessment results into useful and usable climate information;
5. Interpret global and regional climate forecasts and projections for local applications;
6. Enhance regional and local capabilities to manage risks and support sustainable development in the context of climate variability and change; and
7. Enhance collaboration among national, regional and international institutions and programs involved in climate information services.
(PaCIS 2008, 4).

2.3 Organizational Structure of PaCIS

The Pacific Climate Information System (PaCIS) builds on relationships established from decades of collaborative work in the Pacific region across multiple sectors to develop "end-to-end" climate services in the region. The Steering Committee has representatives from meteorological services in the region (Australia's Bureau of Meteorology; New Zealand's National Institute of Water and Atmospheric Research; Fiji Met Service; US NOAA National Weather Service; and, a representative from the Weather Service Offices of the US associated islands), the disaster management community (Pacific Risk Management 'Ohana; disaster managers), Pacific regional organizations (SPREP, SOPAC), and sector representation (fisheries, coral reefs, coastal, infrastructure, etc).

Three working groups have been formed in areas of operational product development, research and assessment, and public education and outreach. The Steering Committee and working groups encourage widespread participation and collaboration across sectors at multiple levels that bridge regional organizations, user communities, local knowledge, cultural context, and partners in a system geared

towards the integration of climate information into all sectors and decision making processes.

3. CLIMATE RESEARCH SUPPLY AND DEMAND

There are numerous climate initiatives and projects that exist across sectors and organizations in the Pacific region. Advances in technology and information have improved forecast information. Satellite data and imaging have improved spatial tools, observing systems, and operational products that look at storms, precipitation, and sea levels. In addition, recent extreme events provide accounts of climate change in the Pacific Islands. It is unclear whether the tools available can be used to address real problems that island communities face.

In 2008, the Research and Assessment working group realized that priority actions involve a review of climate information supply and demand. This would highlight gaps and needs in the demand for information and tools to aid in adaptation. Several of the partners were engaged already in supplying different types of climate information through websites, newsletters, and portal systems. The assessment would inventory the range of available products, tools, and information. Assessment of the demand for information would provide enable the climate services community to see if the tools and products provided met needs on the ground. It would provide information on what products can be used by different types of groups with varied skill levels and access to equipment. This would further inform climate research agendas.

The other two working groups also identified the need to inventory information in their areas and to assess the use and benefit of information to the Pacific community. Information can be distributed through a web content management portal system for use throughout the Pacific region. By engaging in an assessment of climate information supply and demand at the outset of PaCIS in three programmatic areas, PaCIS members will be able to evaluate the usefulness of climate information, products, and services.

4. CLIMATE RESEARCH AND ASSESSMENT

The Research and Assessment working group developed a list of eleven projects that could be pursued initially. Within the membership of the working groups, there were already individuals and agencies working on a variety of projects that could be further enhanced with the collaboration of partners in PaCIS. A few of these projects would benefit or build on action items of other working groups.

4.1 Pacific Research and Assessment Actions

The following list of project ideas and action items emerged from facilitated discussions in August 2008 at the PaCIS meeting in Honolulu:

1) Project Name: *Assess the Information Supply that supports the Climate Information System*

Project Description: Activities currently going on that are producing climate information products include: Pacific RISA website, www.pacificrisa.org (available); SPREP's [Climate Change Portal](http://www.pacificrisa.org) (available); PRICIP www.pricip.org (available); and, White Paper Series on Climate Impacts by Sector

2) Project Name: *Assess the Stakeholder Needs (Demand) for Climate Information*

Project Description: Compile government and community needs assessments to ascertain the demand in the Pacific for climate information.

3) Project Name: *Downscaling Climate Information*

Project Description: *PaCIS Review of Basic Climate Change Science Issues in the Pacific Island Region*
Provide a Pacific Island focus for ongoing global warming research and assessment efforts culminating in the preparation of a review document that could inform the IPCC AR5. The project would begin with a local meeting and the PaCIS working group members would write an assessment paper reviewing refereed literature on Pacific Island climate change issues, with the immediate goal of providing a Pacific island perspective for the IPCC AR5.

4) Project Name: *Decision making under uncertainties in Pacific Islands*

Project Description: Develop case studies of specific climate events, such as Typhoon Chataan (landslide in Chuuk), 1997 Typhoon Isa in Pohnpei, Sokehs disaster, 1997-1998 drought, 1990, 1991 Hurricanes Ofa and Val – American Samoa, Samoa. Establish lessons learned about the ways in which the weather and meteorological services operated during these events. Understand decisions that were made to provide early warnings. Examine the organization constraints and opportunities to collaborate, especially across political jurisdictions.

5) Project Name: *Socioeconomic Research to understand Issues and Indicators*

Project Description: The issues affecting communities dealing with climate change are multilayered. Policies and programs need to understand land use, resource use, traditional knowledge, gender, and livelihoods. It is important to document local knowledge and perceptions of risk. The project requires collaboration with climate scientists, community, government, etc. to determine relevant indicators for each site and available climate data that fits the site. There are opportunities to integrate this with climate change adaptation work.

6) Project Name: *Pacific Regional Integrated Science and Assessment Research Plan*

Project Description: Competition for 5 yr Pacific RISA program: strategy will be for development of a Pacific AgroClim.org; risk perception research of the effectiveness of the communication tool; socioeconomic assessment; stakeholder engagement and outreach, including the integration of local and indigenous knowledge in climate assessments and tool development.

7) Project Name: *Ecosystem Research*

Project Description: There needs to be more linkage among the climate science and decision making with ecosystems research to address a number of resource management issues, including conservation, biodiversity, invasive species threats, etc. The coral reef management community has already begun conversations with the climate change community on Coconut Island in early September 2008. Opportunities and partnerships on a series of natural resources need to be further explored.

8) Project Name: *Reanalysis Research*

Project Description: The reanalysis of climate extreme events will help to better understand forecasting reliability and increase useable skills. These methods are similar to post-disaster impact assessments and merging these can build better decision making among organizations. This can link to NIDIS work on understanding drought.

9) Project Name: *Develop Tools that blend information needed for responses to problems*

Project Description: Use the understanding of supply and demand for information to engage multiple stakeholders and information providers in developing solutions. One example: Chuuk Rainfall Forecasts are problematic and the data was not available or provided in time to address risks from recent problems; crops have been impacted but partners (SPC-DSAP) are engaging in research on drought/salinity resistance; opportunities to think about alternative livelihoods: and, development of an end-to-end product. This project sets up the framework for interaction, but will be project driven by engagement among partners.

10) Project Name: *Pacific Climate and Health Research*

Project Description: There's a lack of research in this area overall and a need to develop more information on the variety of health risks facing Pacific Islands from changes in climate. It is difficult to establish the climate connections to many disease outbreaks, such as tuberculosis. Diseases related to mosquito vectors have established more links, such as filariasis, dengue, and malaria, but there is more research that needs to be done and the research needs to be linked to actions.

11) Project Name: *Development of Threshold Indicators for Climate Impact Analysis*

Project Description: Linking extreme climate events to socioeconomic impacts can help to build an understanding of climate information. Indicators need to be phenomenologically-based critical variables. Need to understand key trigger values by sector, by disaster, by event. Need to understand impacts with threshold levels.

5. INTEGRATED CLIMATE SERVICES

By approaching the delivery of climate information and services through the needs of stakeholders, the Pacific Climate Information System (PaCIS) intends promote the development of resilient Pacific communities that understand risks from climate, can adequately address negative climate-related impacts, and will be able to adapt to climate change. Within the working groups, there are collaborative efforts to improve climate knowledge and tools for multiple sectors, urban and rural communities, and diverse island ecosystems to ensure end-to-end climate services that support sustainable development of Pacific island communities.

6. REFERENCES

Anderson, C, and E. Shea. 2006. Executive Summary: Climate Variability and Change Workshops in the US Pacific Islands. <http://www.pacificrisa.org/exec-summary.php>, accessed January 22, 2009.

Bettencourt, S., Croad, R., Freeman, P., Hay, J., Jones, R., King, P., Lal, P., Mearns, A., Miller, J., Psawaryi-Riddhough, I., Simpson, A., Teuatabo, N., Trotz, U., and Van Aalst. M.. 2006. *Not If But When: Adapting to Natural Hazards in the Pacific Islands Region: A Policy Note*. The World Bank, East Asia and Pacific Region, Pacific Islands Country Management Unit, Washington DC.

Hamnett, M.P., C.L. Anderson, and C.P. Guard. 1999. "The Pacific ENSO Applications Center and the 1997-98 ENSO Warm Event in the US-Affiliated Micronesian Islands: Minimizing Impacts through Rainfall Forecasts and Hazard Mitigation." Honolulu: PEAC.

Pacific Climate Information System (PaCIS). 2008, February. Pacific Climate Information System: Building Integrated Partnerships for End-to-End Climate Services, Action Plan.

Pacific ENSO Applications Center (PEAC). 2009, access. *The Pacific ENSO Update*. <http://www.soest.hawaii.edu/MET/Enso/peu/update.html>

Pacific Islands Global Climate Observing System (PI GCOS). 2009, access. Hosted by the Pacific Regional Environment Programme (SPREP), <http://www.sprep.org/vacancies/PacificIslands-GlobalClimateObservingSystem.htm>.

Pacific Islands Global Ocean Observing System (PI GOOS). 2009, access. Hosted by the Pacific Islands Applied Geoscience Commission (SOPAC), <http://www.sopac.org/tiki/tiki-index.php?page=Pacific+Island+Global+Ocean+Observing+System+PI-GOOS>.

Pacific Regional Integrated Science and Assessment (Pacific RISA). 2009, access. Honolulu: East-West Center, <http://www.pacificrisa.org>.

Shea, E., G. Dolcemascolo, C.L. Anderson, A. Barnston, C.P.Guard, M.P. Hamnett, S.T. Kubota, N. Lewis, J. Loschnigg, & G. Meehl. 2001. Preparing for a Changing Climate: The Consequences of Climate Variability and Change for Pacific Islands. Honolulu: East-West Center. Accessed July 29, 2008, http://www.eastwestcenter.org/publications/search-for-publications/browse-alphabetic-list-of-titles/?class_call=view&pub_ID=1298&mode=view,