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GFDRR Project

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

THE WORLD BANK / REGIONAL STOCKTAKE / EAST ASIA AND THE PACIFIC REGION

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

THE WORLD BANK

SOPAC

Acronyms and Abbreviations

AOSIS	Alliance of Small Island States
AusAID	Australian Agency for International Development
CBDRM	Community-based disaster risk management
CCA	Climate change adaptation
CCAIRR	Climate Change Adaptation through Integrated Risk Reduction (Framework)
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
CLP	Community Lifelines Program, SOPAC
CRP	Community Risk Program, SOPAC
DRM	Disaster risk management
DRR	Disaster risk reduction
EU	European Union
FAO	Food and Agricultural Organisation
FSPI	Foundation of the People of the South Pacific International
GCM	General Circulation Model
ICSU	International Council of Scientific Unions
IDNDR	International Decade for Natural Disaster Reduction
INC	Initial National Communication on Climate Change
ISDR	International Strategy for Disaster Reduction, United Nations
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
M&E	Monitoring and evaluation
NAP	National Action Plan (for DRM)
NAPA	National Adaptation Plan of Action (for CCA)
NCSP	National Communications Support Program for Climate Change
NGO	Nongovernmental organization
NIWA	National Institute of Water and Atmospheric Research
NZAID	New Zealand Agency for International Development
O&IP	Oceans and Islands Program, SOPAC
PACC	Pacific Adaptation to Climate Change Program
PICCAP	Pacific Islands Climate Change Assistance Program
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
SPC	Secretariat of the Pacific Community
SPREP	Secretariat for the Pacific Regional Environment Program
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of the South Pacific
WMO	World Meteorological Organization

Contents

Introduction

This **Regional Stocktake** highlights arrangements for supporting hazard and climate change risk management leading to disaster risk reduction (DRR) and climate change adaptation (CCA) measures in Pacific island countries. Specifically the report identifies country and regional needs for supporting risk reduction programs, the primary players who are supporting such programs, gaps in delivering support and possible synergies, and comparative advantages among agencies active in this activity.

The focus of the Regional Stocktake is on risk reduction (as opposed to disaster management measures to prepare for, respond to, and recover from disaster events when they occur). The report reviews regional mechanisms supporting in-country government arrangements and activities and identifies potential improvement measures. While several specific sector activities are addressed as they were encountered, the report does not provide a comprehensive summary of sector-by-sector activities. Other reports have done that and are appropriately referenced.

The synthesis report **Preparedness, Planning, and Prevention: Assessment of National and Regional Efforts to Reduce Natural Disaster and Climate Change Risks in the Pacific** (World Bank, 2009a) presents profiles of the DRR/CCA systems in the seven countries reviewed in this Regional Stocktake. From these profiles as well as the other works cited in the synthesis report, it is clear that both a national and regional perspective are needed among all stakeholders in order to have a comprehensive operational framework. At the same time, given several factors (distance, size, socio-economic linkages, cultural, institutional and other characteristics), it should be acknowledge that in the early phase the potential for regional DRR and CCA initiatives among the Pacific islands is not as promising as it is for individual country initiatives.

In the seven country assessment reports, the focus on in-country government arrangements arises from clear evidence of systemic difficulties from many Pacific island countries in establishing an enabling environment and cross-sector focus for DRR and CCA activities despite clear leadership commitment at the national and regional levels. In many countries it is becoming clear that, in spite of several promising starts, sustainable and systematic risk reduction (i.e., on other than an ad hoc basis) will not occur without stronger government commitment and efforts at the policy and regulatory levels. Among the priorities of the *Hyogo Framework for Action* (HFA), one factor is to promote in-country government arrangements demanding risk reduction considerations across all sectors and promoting community-based, risk reduction initiatives through provincial and local government and through civil society and all stakeholder groups. As discussed below, while there is increasing interest in dealing with many common issues and challenges from a regional perspective, much more nurturing is still needed.

This report is a companion to the seven country assessment reports that assess the extent to which risk reduction activities (including the enabling environment) have progressed in seven Pacific island countries—Fiji, Kiribati, Marshall Islands, Papua New Guinea, Solomon Islands, Timor-Leste, and Vanuatu. The reports were prepared under the auspices of the World Bank's Reducing the Risk of Disasters and Climate Variability in the Pacific Islands. The team of project consultants met with representatives of key regional agencies and visited the seven island countries in carrying out the assessments during the period February to July 2008. The reports identify possible initiatives for improving the outcomes of in-country DRR/CCA activities. These are commented on further in the Business Plan Commentary (World Bank, 2008), which is intended as a basis for discussion between countries and stakeholders for decisions on funding of particular initiatives. As discussed in this report, the initiatives might support better arrangements for understanding hazard-related information (to inform DRR and CCA activities), or strengthening the enabling environment (to improve risk reduction focus and activ-

ity within or among countries) and "on-the-ground" activities (to actually reduce risk).

The structure of the Regional Stocktake starts with the historical and emerging perspectives of climate change adaptation and disaster risk reduction (Chapter 1) and setting a framework for analysis (Chapter II). It follows with the key findings from the regional stocktaking of the country and regional needs and gaps for supporting in-country activity (Chapter III) and leads to an assessment of regional proposals for enhancing the support available to countries (Chapter IV). Appendix A expands the framework used in each of the country assessments. A similar framework was used for the Regional Stocktake. Appendix B contains a summary of detailed issues from the regional stocktaking. Appendix C provides a status of in-country arrangements of risk reduction as published in three other regional reports. And Appendix D lists the project team and the people consulted in the preparation of this report. ❖

I. Perspectives on CCA and DRR Issues

In the case of *climate change adaption*, climatologists and atmospheric scientists in the first instance were the driving force behind the coalescing international concerns about anthropogenic climate change in the 1980s. And the International Decade for Natural Disaster Reduction 1990-99 caused international focus on disaster management to turn its attention to the issue of *disaster risk reduction*. Following is a perspective on each.

Climate change adaption

From the perspective of the climatologists and atmospheric scientists, the problem was most easily characterized as a slow, gradual change in climatic means (e.g., global-mean temperature or global sea-level change). This was because issues of detection and attribution of past changes based on observations, as well as projections of future changes based on modeling, were most easily addressed through analyses of climate variables averaged at a global scale.

This perspective had a "bounce-on" consequence to those in the scientific community concerned with climate change impact and adaptation analyses. During the 1980s and 1990s, the preponderance of such analyses involved overlaying scenarios of average changes in climate and sea level on various sectoral concerns such as agriculture, water, and ecosystems in order to ascertain impacts (for example, on average crop yields, water supply, or biome changes) and to suggest adaptation options. This 'top-down" way of formulating the problem became imbedded in the three working group structure of the Intergovernmental Panel on Climate Change (IPCC), in which the Working Group I (Science of Climate Change) created scenarios of future climate change and passed them down to Working Group II (Impacts, Adaptation, and Vulnerability) for their impact and adaptation assessments and to Working III on Mitigation of Climate Change.

Another major consequence of this perspective was that global climate change was earlier viewed primarily as an environmental problem. Thus, the first major international assessment of the "greenhouse effect" in the 1980s was carried out by the United Nations Environment Program (UNEP) along with the World Meteorological Organization (WMO) and the International Council of Scientific Unions (ICSU). The chapters of this study and the subsequent IPCC reports were initially organized around bio-physical impacts on natural ecosystems, managed ecosystems, the cryosphere, and hydrology. The international response followed similar environmental lines. The Climate Convention evolved from the 1992 Earth Summit. Filtering down to national governments, the mandate for climate change issues is typically assigned to environment ministries or departments.

As illustrated in Table 1, the conventional view of climate change adaptation is "top-down", a process in which the challenge is to anticipate and adjust to gradual changes in average climate; this conventional view has given way to an emerging perspective that climate change adaptation involves a dynamic process of adjusting to *additional risks* posed by changes in climate and sea level over time. Today, it is increasingly evident that while the driving forces of climate change are global, adaptation is largely local. Moreover, at this scale, information about the average changes in climate is by itself not as important as how climate variability and extremes may change locally and thus contribute to the risks—from droughts, floods, cyclones—already faced by nations and communities.

From the "coal face", it also becomes clear that adaptation goes beyond such overt actions as building a sea wall or changing farming practices. It is a complex, dynamic process that includes awareness raising, capacity building, mainstreaming into development plans, acquiring knowledge and data, and assessing risk at all levels.

Table 1. Two Perspectives of Climate Change Adaptation

	The threat	The response	The promotion
Adaptation involves… ***Conventional perspective***	…adjusting to slow, gradual changes in average climate and sea level by…	…adopting discrete measures to reduce impacts (e.g. change crop type) by…	…providing external assessments of impacts and "shopping lists" of options for reducing them.
Adaptation involves… ***Recent perspective***	…reducing the **additional risks** from climatic hazards (e.g., cyclones, droughts, floods) due to climate and sea-level change through…	…a **dynamic process** that includes awareness raising, capacity building, mainstreaming into policies and plans, monitoring, risk assessment and knowledge acquisition by…	…internalizing adaptation within communities, governments, and development agencies (e.g., ADB, World Bank) in order to **"climate-proof" development** projects over time

There are clear signs of this perspective shift in the IPCC (2001) Third Assessment Report and again in its Fourth Assessment Report (IPCC, 2007). There is also evidence that the international CCA funding mechanisms and the related programs of development agencies and regional organizations are moving in this direction (e.g., World Bank, 2006; ADB, 2005). These issues are reflected in the *Pacific Islands Framework for Action on Climate Change 2006–2015* approved in June 2005 and endorsed by the Pacific Forum Leaders in October 2005.

Disaster risk reduction

Despite scientific advances, and improved data collection and analytical skills, the traditional focus on preparedness and response has clearly not been sufficient to deal with the increasing losses and impacts of disasters. Especially for developing countries, disaster losses that exceed 10 percent of gross domestic product (GDP) were having serious adverse impact on already fragile development programs, most particularly in small island developing states. Comparatively, disaster losses seldom approach 1 percent of GDP in industrialized countries.

The 1994 the Yokohama Strategy and Plan of Action is a product of the International Decade for Natural Disaster Reduction (IDNDR). It identified disaster prevention and preparedness as integral aspects of development policy and planning and prompted several disaster preparedness activities. A decade later, the understanding and literature appear to have outpaced commensurate action on disaster risk reduction.

The Hyogo Framework for Action 2005–2015 identified key areas—governance, hazard and risk understanding, early warning, knowledge, and education—as being necessary to reducing underlying risk and strengthening preparedness. These issues are reflected in *An Investment for Sustainable Development in the Pacific Island Countries Disaster Risk Reduction and Disaster Management—A Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters* (SOPAC 2005) adopted by the Pacific Islands Forum in October 2005.

In 2006 The World Bank Policy Note "Not If, But When" identified perverse incentives, poor institutional arrangements, and lack of instruments as major constraints limiting the adoption of natural hazard risk management in the Pacific Islands Region.

While there is evidence of policy development and planning in most Pacific island countries, in-country capacity, institutional arrangements, and information remain major constraints, and risk reduction action on the ground remains elusive despite major efforts by donor and stakeholder institutions at both the national as well as regional levels. ❖

II. Framework for Analysis

From the DRR and CCA perspectives, it is evident that the two pathways are converging in relation to climate hazards. As shown in Figure 1, the desired outcome of both is *risk reduction*. In the context of the Pacific Islands Region and elsewhere, the ultimate outcome is *sustainable development*. The prevalent understanding is that a significant impediment to sustainable development is risk from diverse hazards; and the area of common concern with regard to disaster risk reduction and climate change adaptation is climate-related hazards.

Viewed in this way, the difference lies only in timescale: disaster risk reduction is concerned primarily with risks from *present* climate variability, geographical and related extremes; whereas climate change adaptation is primarily more focused upon the increasing extremes of climate events and the *future* changes in those risks that should be taken into account in development programs. Conceptually, they share a lot in common.

Preconditions for risk-reduction

The processes of risk reduction, particularly related to meeting the *preconditions* for DRR/CCA-related actions, are very similar. Figure 1 illustrates the five major components, or preconditions, that are necessary to provide the enabling environment which allows sustainable, "on-the-ground" reductions in risk. These components are:

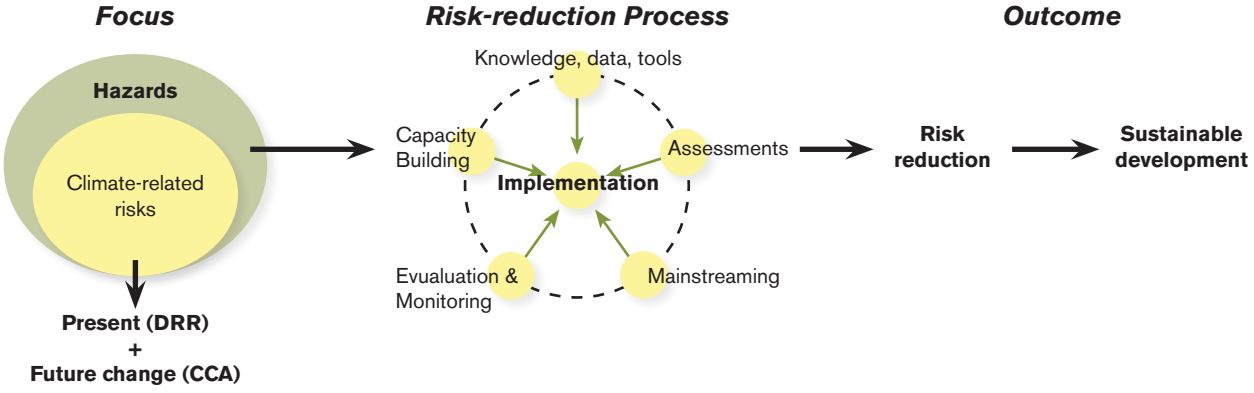
- Knowledge, data and tools;
- Risk and vulnerability assessments;
- Mainstreaming into plans, policy, legislation, regulations;
- Monitoring and evaluation; and
- Awareness raising and capacity building.

To the degree that these do not exist or are deficient, they could be targeted by governments, donors, NGOs, and international and regional organizations for investment and action to encourage risk reduction.

In addition, there are structural, institutional, or *process issues* that are necessary to provide for and promote sustainable risk reduction. These processes are:

- Governance and decisionmaking,
- Coordination among government agencies,
- Coordination among donors and key stakeholders, and
- Planning and budgetary processes.

Figure 1. Areas of common concern and process in reducing risks for sustainable development



These components and processes served as a framework for data collection and analysis for each of the seven country assessments and informed this regional stocktake. Appendix A elaborates on the framework, which has many elements in common with the two 2005 frameworks for action on climate change and disaster risk reduction outlined in the previous section. Both of these latter documents recognize existing limitations and capacity constraints faced by most of these countries and the need for 'mainstreaming' DRR/CCA measures into national policies and planning processes.

Mainstreaming

The term *mainstreaming* is widely used and often interpreted to include any initiative bringing risk reduction activity to the community level. In the policy note "Not If, But When," the World Bank (2006) makes the point that risk management of natural hazards can only become effective on a national scale once it is reflected in key economic and social planning instruments.[1] It defines mainstreaming of risk management as the inclusion of natural hazards (including climate change) ramifications when considering the following:

- National development plans and strategies;
- Sectoral and spatial (including community level) plans—with budget commitment;
- Policies, regulations, and codes of practice—with enforcement; and
- Programs and projects for sectors, infrastructure, civil society, and donors with appropriate hazard assessment and design.

It identifies prerequisites in the form of:

- Strengthened national enabling environment through:
  - accountable performance budgeting,
  - participatory planning and inter-sectoral coordination mechanisms,
  - available financing and appropriate institutional set-ups,
  - staff capacity and national champions, and
  - enforceable legislation, standards and codes.
- Support to decisionmaking with:
  - public awareness to support initiatives;
  - context specific information targeted at decisionmakers;
  - relevant analysis, mapping, and risk evaluation instruments; and
  - implementation support tools.

What has become clear from the seven country assessments is that, while some countries have developed policies and others are developing a National Action Plan (NAP) for Disaster Risk Reduction and/or a National Adaptation Plan for Action (NAPA) for Climate Change Adaptation, in all cases the institutional frameworks and in-country capacity for supporting mainstreaming are in need of substantial development assistance. This is true even for Kiribati where a substantial commitment to assist in the implementation of its Kiribati Adaptation Project over several years is reportedly having some difficulty in achieving targets due to weak institutional arrangements and lack of capacity. In other countries, as implementation commences, attention to these issues will be important. More positive experience with infrastructure projects in Samoa and Cook Islands appear to be more successful because of in-country government commitment and sustained institutional support for engagement with communities. These are necessary ingredients. ❖

[1] In-country evidence supports this view. The lack of cohesion between structures set up to address the external frameworks and the internal national planning and budget structures was stark. In Vanuatu steps were being promoted at the Ministry Directors-General level to begin addressing this, and it should be supported.

III. The Regional Stocktake

The synthesis report, *Preparedness, Planning, and Prevention: Assessment of National and Regional Efforts to Reduce Natural Disaster and Climate Change Risks in the Pacific* (World Bank, 2009a), a companion to the 7 country assessments (World Bank, 2009b), calls attention to areas of progress in each country and on barriers and impediments to sustainable risk reduction. In the fundamental areas of the institutional arrangements and in-country capacity to support mainstreaming, the country assessments reach similar conclusions discussed in "Not If But When" (World Bank, 2006); GEF-Pacific Alliance for Sustainability Program Framework (GEF, 2008), and Integrated Water Resources Management in Pacific Island Countries: A Synopsis (SOPAC, 2007). Details from these 3 reports are found in Appendix C.

It is clear from these three regionwide reports that the issues are understood across a number of sectors. They are fundamental issues, and efforts over the past 10 years to address them have apparently had little impact on the outcome so far. In several initial national communications for climate change prepared earlier in this decade, many of these issues were identified as opportunities for development. In the country assessments, it is noted that the capacity in some areas (particularly in hazard monitoring and assessment) seems to have diminished rather than increased, over that time.

There is concern that with increasing hazard risks due to land use and population pressures and the actual and potential increase in climate extremes, progress in these critical areas remains elusive. This is difficult, crosscutting work, and both in-country commitment and sustained support from all stakeholders will be necessary if the risks to the many vulnerable Pacific communities are to be addressed.

This Stocktake reviews many of the main regional supporting mechanisms for country activities in the Region. While there are many positive initiatives underway, it is clear that current regional and donor-support arrangements are not working as well as they should be. Collaborative discussions needed to find solutions can take place once this is acknowledged and the possible reasons reviewed and assessed.

Engaging in the process

At the regional level, three groups are responsible for regional stocktaking of DRR/CCA activities. For hazard risk, the mandated agency is the Secretariat of the Pacific Islands Applied Geoscience Commission (SOPAC), which manages its Community Risk Program and other related activities in the Community Lifelines and Oceans and Islands programs. The Secretariat for the Pacific Regional Environment Program (SPREP) is the mandated agency for climate change, which includes climate risk and adaptation activities.

The second group comprises the key donors funding regional initiatives through SOPAC, SPREP, and other stakeholders or direct funding of bi-lateral in-country initiatives. The third group, the stakeholders, are active in the Region and in-country and include sector agencies and NGOs that can play critical roles in supporting implementation of programs and engaging at the community level.

The Regional Stocktake team visited SPREP and SOPAC in February 2008 prior to its visits in the 7 countries in connection with the assessments. This Regional Stocktake has been informed by the country assessments. Donors and stakeholders were met by the project team in association with the regional meetings with SPREP in Apia and SOPAC in Fiji. In-country counterparts were met as appropriate during the country visits. The people and agencies met in connection with the reporting of the Stocktake are listed in Appendix D.

Key findings at country and regional levels

This section addresses the key findings from the regional stocktake as they relate to country needs and to broader regional needs. They principally address the fundamental issues of capacity and coordination, institutional strengthening and hazard data. For more detailed commentary of these and wider issues refer to Appendix B.

Country needs and gaps. The major common impediments to achieving sustainable hazard and climate risk reduction appear to be lack of in-country capacity, weak institutional arrangements for mainstreaming and poor understanding of explicit hazard risk needed to assist in the decisionmaking process. To assist in these, the following areas are identified for greater regional assistance:

(1) ***Integration of the demands for CCA and DRR.*** Climate change adaptation and disaster risk reduction are elements of hazard risk management that requires similar information systems, skills, and institutional arrangements. Countries with separate strategic and planning frameworks embedded in separate departments, which prepare and implement both NAP for DRR and NAPA for CCA, could streamline their response and avoid costly duplication of scarce resources. Integrating in-country systems and making these compatible with regional country-support arrangements will require concerted local, national, regional leadership and support.

(2) ***Support for the development of appropriate institutional arrangements for mainstreaming hazard risk management.*** Given the importance of this issue and the capacity and resource constraints in many Pacific island countries, they will need help in establishing, operating, and maintaining appropriate structures and mechanisms commensurate with their level of development. Neither SPREP nor SOPAC, as the mandated regional agencies, appears to have the focus or resources to provide for these tasks. This is a crosscutting area for national development planning which should also address such issues as accountable performance budgeting, participatory planning, and inter-sectoral coordination.

(3) ***Support for the development of in-country capacity.*** This has been a major focus of external resources over the past decade with mixed results so far. Consequently, new approaches are needed. Many past activities are perceived to have been supply driven and project based with not enough attention being given to the underlying national, sector, and related policy framework. The Vanuatu-sought approach for sustained support that addresses country priorities is showing some promise. Resources currently available to SPREP and SOPAC appear insufficient to provide this type of support to all their member countries, and so more assistance in this area will be needed.

(4) ***Support for hazard monitoring, analysis tools, information systems, and codes or guidelines for practice.*** Available evidence shows a deterioration of the information system and analytical tools in most Pacific island countries over the past 10-15 years. Since they are part of the institutional requirements for mainstreaming and risk assessment for planning and decisionmaking, an appropriate support package is needed. Instead of simply trying to continue past approaches and practices, given the technological improvements made over past decades, such support should include studies of alternative ways of data collection and analysis (e.g., through regional and/or third parties) and providing the relevant information required by the countries in their planning, budgeting, investment, and maintenance activities. Past and current support arrangements with Australia and New Zealand could be the basis of a new focus and strengthened support.

(5) ***Donor coordination and in-country program funding.*** To the degree that hazard risk reduction also has a regional dimension despite donors' reluctance to bi-laterally fund NAP and NAPA implementation, there is a need at both the country and regional levels for addressing the issue and examining program-funding options for sustained support.

(6) ***Monitoring and evaluation.*** Given the need for sustained support for the country initiatives that have so far shown minimum commitment, there is need to identify the main reasons for this, perhaps using improved basic monitoring and evaluation mechanisms to assist all parties to better understand the issues and address them.

(7) ***Regional needs and gaps.*** The existing country support arrangements for CCA and DRR initiatives through SPREP and SOPAC have been effective in developing plans, creating awareness, and maintaining reporting systems needed to fulfill international obligations. They have also been effective for individual project delivery in several countries—despite resources being spread thinly over these countries. The Stocktake review indicates that the existing regional CCA/DRR support mechanisms are unfortunately not very effective in the critical areas of helping to develop and support institutional capacity for mainstreaming climate change adaptation and disaster risk reduction and for supporting downstream tasks.

The primary needs and gaps identified at the regional level follow:

(1) ***Integration or coordination of regional CCA and DRR activities.*** This need, which runs parallel with the first above-listed country need, is an issue as much for donors and international agencies as it is for the regional agencies. Regional leadership is needed to acknowledge and then address the issue to ensure the available synergies are obtained to benefit the member countries. While improved coordination among all stakeholders could be a good initial step, integrating and mainstreaming of DRR and CCA initiatives into the national and regional systems is needed for sustained maximum benefits. Any momentum should not be lost in the comparative advantage of SOPAC as a science-based agency actively engaged in supporting in-country projects.

(2) ***Stronger regional governance to support progress of hazard risk management programs.*** Current indications are that the regional mandated agencies are weak with limited cooperation and minimal coordination between them, as well as among clients. To promote institutional frameworks at the country level, stronger strategic and operational planning is needed. Currently neither SPREP nor SOPAC appears to have performance budgeting with meaningful measurable outcomes (although the SOPAC Community Risk Program has internal assessment measures). Program support arrangements to countries tend to be passive and reactive. For example, the SPREP-prepared *2005 Action Plan for the Implementation of the Pacific Islands Framework for Action on Climate Change 2006-2015* remains in draft version 12 with no measures and no commitments to action in the current year's budget. There is a need to strengthen the coordination mechanism of the Council of the Regional Organizations in the Pacific and provide for monitoring of progress and achievement of expected outcomes along with appropriate feedback loops to facilitate any required corrective measures.

Current requirements from the Pacific Islands Forum call for arrangements to be developed to split SOPAC between SPREP and the Secretariat of the Pacific Community (SPC). This could be an opportune juncture for addressing the overall requirements of the reconstituted organizations, in-

cluding the integration of disaster risk reduction and climate change adaptation in a more streamlined process as noted above.

(3) ***Provision of leadership for the coordination of the regional support for country CCA and DRR activities, including donors and international agencies.*** In order to address country as well as regional needs, an appropriate regional leadership mechanism is necessary to provide guidance to regional agencies and the countries in addressing the issues of critical hazard risk management. Such a mechanism could also include an overview system for regional needs and co-funding for implementation of regional CCA/DRR programs.

Available evidence indicates that the SOPAC-sponsored Pacific Disaster Risk Management Partnership Network and the SPREP-sponsored Round Table for Climate Change Adaptation may not be considered appropriate for this integrated approach leadership role. These are just 2 of 14 such regional groupings comprising donors, stakeholders, and countries trying to foster greater cooperation and information sharing, but they still appear to maintain general silo structures and are answerable to the respective sponsoring agency.

(4) ***Development of common programs, information systems, and codes of practice.*** Common systems or programs can be efficiently developed at a regional level and adapted for individual country uses. However, neither SPREP nor SOPAC appears to be appropriately resourced to provide for such needs.

(5) ***Regional support for the critical meteorological and hydrological networks in the member countries.*** As noted in each of the 7 country assessment reports, the availability of analyzed data to facilitate local climate hazard assessments, infrastructure design, and land use decisions is woefully lacking. This is a fundamental issue for risk reduction initiatives in the Region—without data there can be no full understanding of changing risks. Given the general degradation of these networks over the past decade, a regional overview is needed to assess if the individual country-operated facilities and systems in their present form are still relevant in light of recent technological advances; or there is also the possibility of third parties helping to provide most of the data that the countries need as input for their respective plans. While SPREP has a role to support in-country meteorological services, it is severely under-resourced and does not appear to be able to appropriately respond to client needs. It will therefore need assistance in order to help client countries.

(6) ***Development of regional and local climate projections, taking account of topographic/orographic effects, to inform local potential effects of climate change.*** For the larger hilly nations of Fiji, Papua New Guinea, the Solomon Islands, and Vanuatu, the local climate models using General Circulation Model (GCM) projections cannot differentiate potential effects across different topographical parts of the country. Development of a long-term regional model is needed to better inform local understanding of potential changes to climate extremes, including the incidence of droughts and extreme rainfall. While this is recognized as a major exercise, the practicalities of building on Australian and New Zealand models through the Commonwealth Scientific and Industrial Research Organization (CSIRO) and the National Institute of Water and Atmospheric Research (NIWA), respectively, should be addressed to help improve knowledge of such factors. ❖

IV. Opportunities for Investment

Among the country and regional needs in the previous chapter, several require further discussion at the regional level to identify the way forward while others can be implemented within country agencies. Further discussion should center on those needs regarding CCA and DRR integration, strengthening of regional governance, regional leadership, and supporting institutional arrangements and capacity development. Discussions on these issues might identify opportunities for investment.

The following five potential opportunities for regional investment have been identified. each with a practical application to meet a core need:

(1) Review existing regional hydrological and meteorological service systems, assess how they are being used in formulation of NAP and NAPA and identify any gaps for sustainable operation to meet priority needs for Pacific island countries;

(2) Develop a sustainable regional program funding mechanism for NAP and risk implementation in Pacific island countries;

(3) Progressively develop regional and local climate projections within the larger topographically diverse countries;

(4) Develop, disseminate, implement, and monitor regionally consistent technical guidelines and codes for infrastructure and buildings, incorporating key DRR/CCA elements that facilitate later mainstreaming; and

(5) Develop collaborative regional institutional arrangements with DRR/CCA focus in professional development and knowledge adoption.

In the following matrices, each of these opportunities is expanded to provide preliminary information on indicative costs, first-order actions and tasks, and timeframes. This information is a preliminary step toward the development of more detailed proposals and terms of reference should any stakeholder wish to pursue any of these opportunities for investment. ❖

Proposal:	**R1 Review existing regional hydrological and meteorological service systems and needs for Pacific Islands**				
Sector:	**Regional: Hazards monitoring and advice**				
Goal and purpose:	**Strengthen hazards monitoring and advice capacity to inform CCA and DRR issues**				
Lead agencies:	**WMO, SPREP, SOPAC, BOM/NIWA/NZ Meteorological Service**				
Cost and duration:	**US$250 000 over 6 months**				
Hazards targeted	***Actions to reduce risks***	***Key gaps/barriers***	***Tasks***	***Cost US$k***	***Time-frame***
Cyclone Storms Flooding Tsunami Earthquakes Volcanic eruptions Wave surge Coastal inundation Drought – including climate change effects for all these hazards	Improve monitoring network for weather, rivers and climate change Improve capacity for hazard advice Improve arrangements for managing the services	Inadequate monitoring networks to provide credible data Inadequate institutional arrangements to support a credible service Insufficient capacity and resources to manage the networks Insufficient capacity to develop advice to inform DRR/CCA issues	Review the state of meteorological and hydrological monitoring networks across the region and: • identify minimum requirements on a regional scale to inform weather, hazard management and climate change needs • identify minimum requirements broadly at a country level to inform country assessments	250	December 2008

Continues

Proposal:	**R1 Review existing regional hydrological and meteorological service systems and needs for Pacific Islands**				
Sector:	**Regional: Hazards monitoring and advice**				
Goal and purpose:	**Strengthen hazards monitoring and advice capacity to inform CCA and DRR issues**				
Lead agencies:	**WMO, SPREP, SOPAC, BOM/NIWA/NZ Meteorological Service**				
Cost and duration:	**US$250 000 over 6 months**				
Hazards targeted	**Actions to reduce risks**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
Cyclone Storms Flooding Tsunami Earthquakes Volcanic eruptions Wave surge Coastal inundation Drought – including climate change effects for all these hazards	Improve monitoring network for weather, rivers and climate change Improve capacity for hazard advice Improve arrangements for managing the services	Inadequate monitoring networks to provide credible data Inadequate institutional arrangements to support a credible service Insufficient capacity and resources to manage the networks Insufficient capacity to develop advice to inform DRR/CCA issues	Review the state of meteorological and hydrological monitoring networks across the region and: • identify minimum requirements on a regional scale to inform weather, hazard management and climate change needs • identify minimum requirements broadly at a country level to inform country assessments	250	December 2008

Continues

Proposal:	**R2 Develop a sustainable regional program funding mechanism for NAP and risk reduction implementation in Pacific island countries**				
Sector:	**Regional: Hazards, Climate Change**				
Goal and purpose:	**To facilitate the implementation of National Action Plans for DRM (including DRR) through establishing a multi-donor programmatic funding arrangement**				
Lead agencies:	**World Bank, Donors**				
Cost and duration:	**US$80,000 over 6 months**				
Hazards targeted	**Actions to reduce risks**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
All hazards	Overcome sustainable funding mechanism constraints for program funding for implementing NAPs	Difficulty in getting bi-lateral funding in-country for DRM activity With 2 NAPs completed and 4 being prepared, funding arrangements for implementation are inadequate Credibility of the NAP development process is at risk while adequate funding arrangements for implementation are not in place	Review and set out the funding issues from a country and regional perspective Develop possible funding mechanisms in consultation with donors and countries Identify a preferred option, obtain donor buy-in and implement	80	3rd Qtr 2008

Continues

Provisional Proposal:	**R3 Progressively develop regional and local climate projections within the larger topographically diverse countries**				
Sector:	**Regional: Climate modeling**				
Goal and purpose:	**Better understand local climate projections of climate variability through progressively extending New Zealand and Australian regional modeling to address orographic influences in the larger island states.**				
Lead agencies:	**Regional and local**				
Cost and duration:	**NIWA, CSIRO**				
Proposal:	**US$1.5 million over 3 years (Suggested expansion of the NZ/Australian Climate Change Modeling)**				
Hazards targeted	**Actions to reduce risks**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
Cyclone Storms Flooding Tsunami Wave surge Coastal inundation Drought – including climate change effects for all these hazards	Improve understanding of changing climate variability within larger island states Addressing adaptation measures with better focus Reducing potential for having "regrets" about adaptation measures missed through lack of understanding	Regional climate models not developed to address local orographic influences in large island states Sparse local data to populate regional and local projections Lack of capacity in-country to address local projections of climate variability	Establish a regional agreement for collaboration on this work Extend New Zealand and Australian regional models progressively to include orographic influences of Papua New Guinea, Vanuatu, Solomon Islands, and Fiji Populate the models with available historical country data and progressively with new data Establish a mentoring or "buddy" arrangement in-country with New Zealand and Australian climate scientists to enhance in-country capacity for climate variability projections		December 2008

Continues

Provisional Proposal:	**R4 Develop, disseminate, implement, and monitor regionally-consistent technical guidelines and codes for infrastructure and buildings**				
Sector:	**Infrastructure, Building and Public Works**				
Goal and purpose:	**Sustainable infrastructure and built environments, by providing regionally consistent technical guidance for reducing risks to infrastructure and buildings**				
Lead agencies:					
Cost and duration:					
Proposal:	**US$400,000 over 2 years**				
Hazards targeted	**Actions to reduce risks**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
Geotechnical (earthquakes, land-slips, tsunami) Extreme weather events High winds Storm surge Flooding Fire	Provide regionally consistent technical guidelines for roads, bridges and other related infrastructure works and building codes Build public and private sector capacity to ensure DRR/CCA mainstreaming	Technical manuals, guidelines and building codes are out of date Poor utilization of existing guidelines and codes within governmental bodies and by consultants and contractors Lack of mainstreaming technical standards to reduce risks	Review status of existing documents in terms of: institutional origins, date of preparation; source of original materials; authorship for preparation Assess departmental and sectoral requirements for up-to-date technical guidelines and building codes that embed DRR, and climate proofing Redraft guidelines/codes and associated regulatory supporting documents Establish collaborative arrangements with governmental bodies, consultants and contractors to optimize utilization of revised documentation Promulgate schedules for roll-out and take up of generically developed guidelines, codes and supporting regulations and enforceable processes and procedures	50 50 160 110 30	1st half 2009 1st half 2009 2nd half 2009 Ongoing 2009-2010 Last quarter 2010

Continues

Provisional Proposal:	**R5 Collaborative regional institutional arrangements with DRR/CCA focus for professional development and knowledge adoption**				
Sector:	**Regional: Institutional-Higher Education and Research Sectors**				
Goal and purpose:	**Institutional strengthening and capacity building by building collaborative regional partnerships to support professional development and knowledge adoption in DRR-CCA**				
Lead agencies:					
Cost and duration:	**UPNG, USP, national sectoral research institutes, key donors**				
Proposal:	**US$280,000 over 1 year**				
Hazards targeted	***Actions to reduce risks***	***Key gaps/barriers***	***Tasks***	***Cost US$k***	***Time-frame***
Geological (earthquake, landslips, tsunami, volcanic) Climatic variability Extreme weather events Storm surge Flooding Drought Bush fires	Collaborative delivery of professional development Enhanced professional development in DRR and CCA Embedded institutional capacity in DRR CCA Proactive knowledge adoption	Limited range of professional development programs, courses, research and training activities in higher educational institutions Poor coordination of professional development at regional and national scales Accredited professional qualifications in DRR CCA	Identification and engagement of institutional partners for collaborative activities in professional development education and training, applied research and research training and knowledge adoption Evaluate the status of professional development education and training and institutional arrangements Formalize partnership arrangements for collaborative professional development, research and research training and knowledge adoption activities Initiate collaborative workshop activities to draft a program of activities and identify appropriate funding to roll-out collaborative professional development and knowledge adoption activities	50 20 50 160	1st Quarter 2009 1st Quarter 2009 2nd Quarter 2009 2nd half 2009

Continues

Annex A. Model and Framework for the Country Assessments

In order to carry out the Regional Stocktake and country assessments, a common framework was required that was sufficiently comprehensive to capture the major factors and processes involved in decisions to reduce risk, whether from present hazards (DRR) or from future climate change (CCA). For these purposes, the project selected a modified version of the Climate Change Adaptation through Integrated Risk Reduction (CCAIRR) Framework (Warrick, 2000; 2006). This framework was originally proposed at the 2nd Alliance of Small Island States (AOSIS) meeting in 2000 in Apia, Samoa. The CCAIRR Framework was subsequently tested and applied successfully in case studies of risk reduction in the Federated States of Micronesia and the Cook Islands in which issues of present climate variability and future climate change were effectively integrated (ADB, 2005). It was also used as an organizing assessment framework in the recent Intergovernmental Panel on Climate Change (IPCC) on Australia and New Zealand (Hennessy and others, 2007).

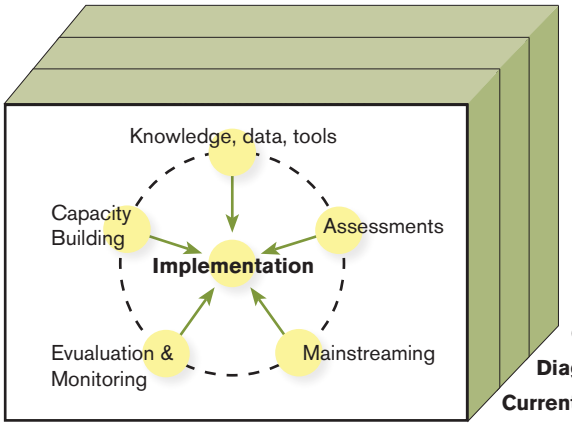
The processes of risk reduction for both disaster risk reduction and climate change adaptation are similar as illustrated in the resulting framework shown in Figure A1.

From Figure A1 there are five major *components*, or pre-conditions, that are necessary to provide the enabling environment that allows sustainable, "on-the-ground" reductions in risk. Insofar as these components need to be adjusted, they can be targeted by governments, donors, NGOs, international and regional organizations for investment and action to encourage risk reduction. These components are:

- Knowledge, data and tools;
- Risk and vulnerability assessments;
- Mainstreaming into plans, policy, legislation, regulations;
- Monitoring and evaluation; and
- Awareness raising and capacity building.

In addition, there are structural, institutional, or *process issues* that are necessary to provide for and promote

Figure A1. Framework and approach to the country assessments



Opportunities–What are the possible solutions?
Diagnosis–What are the gaps and impediments?
Current situation–What is the current situation and capacity?

Process issues (arrows)
- **Governance**
- **Donor and stakeholder coordination**
- **Coordination between government agencies**
- **Planning and budgetary processes**

sustainable risk reduction. These processes are the institutional frameworks for:

- Governance and decisionmaking,
- Coordination among government agencies and levels of government,
- Coordination among donors and key stakeholders, and
- Planning and budgetary processes.

These components and processes served as a framework for data collection and analysis for each of the 7 country assessments and informed this Regional Stocktake; each component and process evoked indicative questions, as follows.

Components

Knowledge, data and tools. This component comprises the basic ingredients needed to understand hazards and historical events to provide for the assessment of vulnerability and risk. It includes monitoring and the scientific understanding of hazards and their effects, observational data, and models, as well as traditional knowledge.

- *What are the key hazards of the country? Is there adequate monitoring of these hazards to inform vulnerability and risk assessments?*
- *Is there an adequate understanding of the hazard profile across the country including hazard mapping?*
- *Is historical disaster information readily available?*
- *Are models and tools available to answer key questions?*
- *Is access to information and technical advice readily available?*
- *Can information be readily promulgated across sectors to inform decisions?*
- *Can information be readily promulgated to the community level to provide information and for warnings?*

Vulnerability and risk assessments. This component comprises the ingredients needed to assess vulnerabilities and risks and identify risk-reducing measures. Using the existing knowledge, data, and tools, such assessments are designed to portray what is known about the hazards and risks in a fashion relevant to issues related to policy and decisionmaking.

- *What are the key risks and vulnerability of the country? Are there adequate assessments of who is at risk, and where?*
- *Is there an adequate understanding and risk profile on these issues?*
- *What risk data are available? What kind would be needed to better understand the situation?* (for example financial/economic losses; socio-economic; human; assets at risk etc)
- *Which institutions are involved in providing technical data needed for DRR/CCA?* (list various types of information needed, including weather/climate/other hazards; forecasting, observations, modeling/interpreting international data, risk mapping).
- *What are the estimated average annual losses attributable to natural hazards?*
- *Who is carrying out the required analyses?*

Mainstreaming into policies, plans, legislation, and regulations. Mainstreaming involves the incorporation of DRR and CCA into policies, plans, legislation, and regulations in order to help provide an enabling environment in which decisions and action regarding risk reduction can be made.

- *Do DRR/CCA feature in national and sectoral development plans?*

- *Does the government have a policy on DRR/CCA?*
- *If so, is it being implemented? At all levels? Which levels are not yet including these aspects and what is needed to make them participate—what are the key impediments?*
- *Are there adequate legal provisions? Are they appropriate? [i.e., not too old as to preclude risk reduction; clear enough to be interpreted by all needing to use them; clear guidance on roles responsibilities and accountability; inclusive of key ministries and community implementation]*
- *Have land-use regulations, building codes and risk-design standards taken account of DRR/CCA? If not, what are the impediments?*
- *Are they enforced?*

Monitoring and evaluation. In this context, monitoring and evaluation (M&E) seeks to determine the extent to which the outcomes (i.e., risk reduction) are being achieved (as opposed to, say, monitoring for data collection, like sea-level monitoring, or project or program auditing). It thus serves to provide feedback for adjusting programs and risk reduction activities over time.

- *Are hazards and impacts systematically monitored? By whom? Where does the information reside? Who monitors during and post disasters?*
- *Who carries out damage assessment and, if they get assistance, from whom?*
- *Are impacts of risk reduction efforts systematically monitored?*

Awareness raising and capacity building, including stakeholder engagement. The capacity, awareness, and engagement of the various stakeholders and decision-makers is vital to ensuring that other preconditions (such as risk assessments) are met and risk-reducing measures are enacted.

- *Does the government systematically inform the public on DRR/CCA? Is this information enhanced periodically? What mechanisms are used to carry out public awareness?*
- *Which agencies are engaged in this awareness raising?*
- *Does it systematically include all key groups in society (geographically and socially)?*
- *Does it include outreach to the private sector?*
- *Does it engage civil society?*
- *Does it include the education sector? And any others?*
- *What is the level of attention given to training and capacity building?*
- *What is the retention rate and sustainability of capacity built?*

Process issues

There are various coordination or process issues that can act as barriers or impediments to effective implementation of risk reduction measures.

Governance and decisionmaking. Given that DRR/CCA are development issues requiring mainstreaming of action, clear governance and institutional arrangements assigning functions, accountabilities, and decision processes across sectors and levels of government are necessary to set support an enabling environment.

- *Is there clear government policy for DRR/CCA setting functions and accountabilities across sectors?*
- *Is there a decision-making body across the relevant sectors and is it effective?*
- *Is there a sound institutional and planning structure for addressing DRR/CCA across sectors at the national, provincial and local levels?*

Coordination among government agencies. Given the multi-hazard, multi-sectoral dimensions of DRR/CCA, coordination between government agencies is necessary for effective implementation.

- *Which key government agencies are currently engaged in DRR/CAA? When there is more than one, do they coordinate and how (especially between the disaster risk and climate change entry points)?*
- *Is there a coordination forum? How are other parts of the government involved/participate before/during and post disaster event?*
- *What are the mandates of the various levels of government in DRR-CCA implementation and are they supported by appropriate legislation and policies?*
- *If there are recommendations for improving policies/legislation, how would you describe these?*
- *Do these agencies have a structure to engage at lower levels of government and with nongovernmental actors (including participatory planning down to the community-level)?*
- *Do these agencies have appropriately skilled human resources?*

Coordination—donors and key stakeholders. Donors, and international and regional organization play key roles in the Pacific island countries and territories in facilitating DRR and CCA.

- *Who are the key donors, international and regional organizations engaged in/investing in disaster risk reduction and adaptation?*
- *What are their current programs? Do they focus on institutional aspects, policy, data, early warning systems, and investments? What is the monetary value of support, if available? Under which sectors/themes?*

Planning and budgetary process. The extent to which plans are formulated and implemented depends heavily on budgetary allocation.

- *How is DRR/CCA budgeted – separately and recognizable or are there provisions for the recipients to allocate to these activities if and when needed? And if so, do they do so?*
- *What is the average yearly budget for DRR/CCA? Is there a difference in event years from non-event years?*
- *Do planning and budget complement each other?* [Infer from who proposes budget and how final budget is then approved—discuss with finance and planning ministries]

Implementation. The above components and processes provide the preconditions, or the enabling environment necessary for sustainable risk reduction. The ultimate goal is to promote the process of *implementation* of actual risk-reducing measures. These could include, for example, changes in land use, engineering protection structures, strengthened buildings, "climate-proofed" infrastructure, warning systems and effective behavioral response to them, and avoidance of settlement in high-risk zones. As part of the country assessments, therefore, attempts were made to judge the extent to which implementation of risk-reducing measures is, or is not, happening; and, to the extent that implementation is not happening, to relate it back to the components and processes of the enabling environment that may be acting as impediments. Indicative questions, in this regard, include:

- *Do line agencies (e.g. Public Works, Agriculture, Fisheries, Health, etc) engage in DRR/CCA? What structures do they have for implementation at national/regional and community levels?*
- *What investments are they making?*

- *Do they have the right information and human resources for effective DRR/CCA?*
- *Do they have adequate budget to response to disasters but also importantly to mitigate for and prevent disasters?*
- *Do they make systematic use of risk information? If yes, what type of risk information is available to them? Given the country's vulnerability, what type of information should they have access to?*
- *Do these agencies have appropriately skilled human resources? If not, what skills are lacking?*
- *Are there programs and activities that focus directly on risk-reduction implementation, and, if so, how extensive and effective are they?*
- *Do they adequately bridge the gaps among region, national and community action?*
- *What provisions exist for early warning—systems at the national and lower levels? What are they? If not adequate what else is needed?*

Approach

The components and processes, along with their guiding questions, served as the framework—a simple three-part, crosscutting approach to the country assessments. For each of the components and processes described above, the following questions were asked:

- *Current situation: What is the current situation and capacity?*
- *Diagnosis: What are the gaps, barriers or impediments to effective risk reduction?*
- *Opportunities for investment: What are the possible opportunities for investment to overcome the barriers and fill the gaps?*

Overall, this approach leads to the development of a set of investment opportunities to implement activities to encourage risk reduction. ❖

Annex A. Regional Stocktake Issues

Process issues, and then content issues are discussed with regard to the structures, and procedures that can facilitate or impede risk reduction at a Pacific regional perspective.

Process issues

The key programs and activities of the mandated agencies involved in DRR and CCA, once quite separate, are tending to merge conceptually, with risk reduction serving as the common theme and intended outcome. This is reflected in:

- Two Frameworks for Action that are nearly identical in content and direction;
- A large overlap in content and approach of their respective plans of action (as reflected, for example, in similarities between NAP for DRR and NAPA for CCA);
- An emerging commonality of language between the agencies concerned with DRR and CCA;
- An expressed recognition on the part of key players in these organizations of their common interests.

While converging in concept and planning, operationally the DRR and CCA agencies remain quite separate. There are significant regional governance issues around expectations on the regional agencies, their roles and accountabilities and a plethora of passive coordination mechanisms. This is evidenced by:

- Two separate regional agencies having the respective mandates for DRR and CCA and driving their own separate programs and activities, albeit often to the same end (risk reduction) for the same expressed outcome (sustainable development).
- Little evidence of substantive collaboration and coordination between the mandated regional agencies that would be expected given the similarities of objectives.
- When activities are "down-loaded" to the national level, a similar "silo effect" is the rule, with DDR concerns housed in a separate ministry or line agency from that of CCA, with little communication or understanding between them.

This situation is producing the potential for duplication and lost opportunities for synergies that otherwise could be gained through outcome-driven, rather than mandate-driven, regional agencies.

There are many international agencies and NGOs in the Pacific Region that are now beginning to integrate climate change into their programs and activities. This is reflected in:

- The WHO regional offices in Samoa and Fiji are cognizance of the mandate expressed by WHO at the global level and are becoming actively involved in CCA initiatives.
- The FAO, which has had a long-term concern with DRR, is now taking on CCA, both from directives from global headquarters and regionally from Heads of Agriculture and Forestry from each country.
- UNESCO, with its new strategic plan, addresses climatic change adaptation.

Especially in the case of CCA, there is a "disconnect" between the primary mandated regional agency and the growing number of other UN agencies, regional organizations, and NGOs that are incorporating climate change into their activities. This growing lack of coordination and cooperation between the two groups of agencies appears to be outpacing the attempts to inject coordination and commonality of purpose through regional partnerships and networks.

With respect to the mandated agencies for DRR and CCA, the proportion of project funding in relation to program funding is relatively large and increasing, with the potential to stifle pro-active, innovative work for the Re-

gion. The increasing emphasis on re-active, short-term projects, while providing direct service at the request of Pacific island countries, makes it more difficult to maintain capacity and to introduce new and innovative programs to the Region. There is some danger that this situation may overly increase the service provider function of the regional organization at the expense of their leadership and mentor roles. At worst, it could put the sustainability of the regional programs at risk.

Content issues

In terms of basic knowledge, data, and models, one of the major gaps is lack of data collection and systematic understanding of hazards and information regarding how climate changes will affect the risks posed by climatic hazards. This situation reflects the gap that has separated the DRR and CCA agencies in the Pacific Region. This is evidenced by:

- The lack of concrete, quantitative information about the *additional* risks posed by climate change in the national communications and NAPAs from Pacific island countries;
- The absence of climate change issues in the NAPs of Pacific island countries;
- The absence of substantive, quantitative information about climate change risks in the work of the regional agency mandated with jurisdiction of DRR, other than general advice to countries;
- The failure of the regional agency mandated with jurisdiction of CCA to build systematically upon the large and substantive foundation of knowledge about climatic hazards as a starting point for its consideration of climate change;
- Lack of access to regional hazard profiles and their development at the country level is seriously lacking.

In terms of assessments to support decisionmaking, one of the major gaps for both DRR and CCA is the lack of meaningful assessments and hazard maps necessary to implement risk-reducing measures. One of the biggest regionwide constraints is the lack of high-resolution elevation data (for both near-shore and land) necessary to identify hazard zones at a scale appropriate for implementing risk-reducing measures, for both present climate variability and long-term change. In particular, this situation is crucial for assessment of:

- Coastal hazards, including erosion and storm surge risks, which pervade the Pacific Island Region; and
- Flooding risks, which concern nearly all high islands of the Region.

The opportunity exists for supporting a regionwide program to identify key "hot-spots" that are high-priority for hazard mapping, and to provide the support for the development of high-resolution digital elevation maps that are prerequisite to hazard mapping, risk assessments, and promotion of risk-reducing measures.

In terms of DRR/CCA mainstreaming into development policies, planning, and projects, there are signs that, at a regional level, the needs for mainstreaming are clearly being recognized and action has begun. This is evidence by:

- The assistance with elements of governance provided to Pacific island countries and territories by both mandated agencies for DRR and CCA;
- The inclusion of mainstreaming in the pilot climate-proofing projects of ADB and generally through mainstreaming CCA into its own development policies and projects;
- The World Bank adaptation work in-country, particularly in the Kiribati Adaptation Program.

Nonetheless, at a country level where implementation of risk-reducing measures takes place, the overall uptake by countries in the region still remains low. There is now opportunity to move from individual one-off pilot cases to a concerted regional program designed to

accelerate CRR and CCA mainstreaming—preferably in an integrated fashion rather than separately—at the national level.

In terms of monitoring and evaluation, it is clear that large gaps exist. Monitoring and evaluation (M&E), if it exists, is designed for programmatic and project processes, procedures, and auditing. There is little in the way of internal, consistent on-going M&E of outcomes to verify whether risk-reducing measures are being adopted and risks reduced. In other words, there is no systematic way of determining the large expenditures in DRR and CCA are producing on-the-ground benefits. This is evidenced by:

- The lack of M&E information in all agencies contacted during the stocktaking;
- The admission by those key individuals interviewed in the regional organizations and agencies;
- The gaps identified by the PIFS.

In terms of awareness raising and capacity building, both the mandated regional organizations, and nearly all the other UN, regional organizations, and NGOs interviewed, are actively involved through programs and projects. This is evidenced by:

- The programs of both the mandated regional organizations for DRR and CCA, as responding to their respective Frameworks for Action for which they are responsible;
- The inherent function of the University of the South Pacific as a tertiary education institution with a programmatic focus on oceans and islands as well as earth sciences;
- The projects undertaken by the burgeoning number of UN agencies and NGOs in the Region.

However, despite the widespread attention to awareness raising and capacity building, much activity is rather ad hoc, either as a one-off component of a project or a narrowly focused sectoral activity. The gaps are fourfold: (a) there is a general lack of overall coordination of awareness-raising and capacity-building activities; (b) there is a lack of connection between DRR and CCA in these activities; perhaps most importantly, (c) there is the lack of sustainable capacity and (d) lack of behavioral change at the institutional level and also at the community level. There is lack of incentive for those whose capacity is built up to remain on the job. A recurrent theme throughout the Region is the ephemeral nature of capacity built; once trained, people often seek better positions elsewhere. This situation has to be resolved if sustainable capacity building is to be achieved. A major effort is required to determine what measures have to be taken to retain (or re-engage) the skilled human resources, and then to take positive steps to implement them. Otherwise, the benefits of the present, large expenditures on capacity building will come to naught.

In terms of implementation of risk-reducing measures, the large, top-down flow of resources into the Region, and thence to countries, has had relatively minor effect at the local and community level where risk-reduction occurs. For many countries there is a large gulf between the village or community level and the provincial or national level at which scientific knowledge, mainstreaming, and capacity building are usually directed. This gap has been identified and some effort is underway to fill it, as reflected in:

- An emerging emphasis on "community-based adaptation" for CCA, as pursued by the Red Cross;
- The community-based resource management and risk-reducing work carried out by the University of the South Pacific (USP);
- The increasing number of NGOs, like the Foundation of the People of the South Pacific International (FSPI), whose entry point for engagement is the community level;

- World Bank and ADB have a CBDRM input into their projects.

One of the major reasons for this state of affairs is the lack of institutional arrangements and capacity at the national and local level, or the lack of opportunity or incentive to engage the capacity. Often it is the manner or form in which information or assistance is provided, which is inappropriate to the cultural or organizational context. A major effort is required to integrate across scales in order to bridge the gulf noted above. ❖

NOTES: DRR and CCA are at different stages of establishment in the Pacific Region. DRR has been around longer and has more firmly established frameworks and pathways to risk-reduction, as compared to CCA. So, despite its constraints, DRR has steps which lead to implementation. In contrast, CCA is still constrained by the Stage 2 lid on funding via the GEF main funds, and still has difficulty identifying exactly what constitutes climate change adaptation.

The opportunity, one would think, is for CCA to piggyback onto DRR in order to get adaptation on the ground. This requires both conceptual understanding of the commonality of interests in terms of risk reduction and additional risks posed by climate change, as well as a re-shuffle of regional organizations along outcome-driven instead of their current mandate-driven (i.e., DRR vs. CCA) lines.

Annex C. Status of In-Country Arrangements for Risk Reduction

The following status of in-country arrangements for risk reduction derives from three recent regional reports—the World Bank (2006) policy note, "Not If, But When", GEF (2008) "Pacific Alliance for Sustainability Program Framework", and "Integrated Water Resources Management in Pacific Island Countries: A Synopsis" (SOPAC 2007). All raise similar issues.

Not If, But When

The background to the terms of reference for this Regional Stocktake paraphrases the World Bank policy note "Not If, But When". It notes adaptation to climate change and risk management of natural hazards is a core development issue for Pacific island countries. The CCA and DRR activities are differentiated from development activities by the fact that they seek to reduce a recognized actual or developing risk associated with a known hazard or expected impact of climate change.

It notes the regional work on climate change builds on work under the Pacific Islands Climate Change Assistance Program (PICCAP) from around 1998. The two 2005 frameworks—*Pacific Islands Framework for Action on Climate Change 2006–2015 and Disaster Risk Reduction and Disaster Management Framework for Action 2005–2015: An Investment for Sustainable Development in the Pacific Island Countries*—reflect the strong overlaps and common challenges between risk management of climate change adaptation and natural hazards.

While at a national level, many countries are developing national strategies on risk reduction (through the NAP for disaster risk and/or the NAPA for climate change), few have begun to implement their national strategies on risk reduction. What is missing are practical measures that countries can take to inform their national development policies and strengthen their programs against the risk of natural hazards, including climate change. Also missing, according to the policy note, is a concrete regional collaborative mechanism.

Additional constraints identified include inadequate enabling environment in many institutions in the Pacific and the absence of essential top-down and bottom-up approaches. The mainstreaming of risk management is not afforded the highest priority, and donor development assistance does not encourage risk reduction behavior.

At the country level, the institutional arrangements are crucial, and potential overlaps exist between coordination on climate change adaptation (lead by environment ministries) and on disaster risk management (led by National Disaster Management Offices). It notes that proactive disaster risk mitigation has attracted limited funding and that the problems are compounded by limited capacity to implement risk management activities.

Furthermore, experience has shown that stand-alone climate and disaster risk programs or strategies are often undermined by unfavorable national policies or investments. To be effective, climate and disaster risk management need to be incorporated into the national processes that are crucial to decisionmaking. Mainstreaming processes also need to be linked to investments on the ground.

The policy note concludes by pointing out that climate and disaster risk management requires an enabling national environment under which key players—communities, government, and private sector—can implement risk-reduction behavior. It points out there are three aspects that might need to be in place before risk management can be effective: (a) accountable performance budgeting; (b) participatory planning; and (c) pre-existing inter-sectoral coordination mechanisms.

GEF Pacific Alliance for Sustainability Program Framework

The 2008 GEF-Pacific Alliance for Sustainability report on future investment programs contains a number of observations and lessons learned from the past 15 years of

activity in the Pacific Region. It notes interventions have achieved limited impact even as global and linked national environment problems in these countries remain unresolved. Among the many lessons learned, the following have been drawn from the report:

- It is often difficult to fulfill international obligations related to the Conventions and deliver global environmental benefits while also addressing national priorities.
- Many national efforts designed to improve environmental performance and to contribute to sustainable development have been undermined because they are located in junior or weak ministries.
- Initial emphasis should be placed on ensuring adequate in-country capacity; "country teams" can often play fundamental and crucial roles; preference should be given to the use of national and regional experts who have received the advanced training that allows them to play critical roles.
- More importance should be placed on establishing and using fully functional and comprehensive information bases, including their use in building understanding of the priority issues and appropriate responses.
- Resources made available by Governments to develop and maintain management and research capabilities are often inadequate. Instead there is a tendency to rely extensively on external assistance program. Such a reliance on external funding is untenable in the long term.
- A weak project design will usually necessitate significant subsequent changes.
- A robust project design, based on regional coordination and cooperation with national implementation, can often be more effective and efficient.
- Five-years timeframe is considered too short for a medium-size project that requires major knowledge by communities and government. The report summarizes barriers that have had to be addressed to meet both national aspirations and GEF requirements. These include:
  - Balancing community-focused actions, country drive, regional coordination, and delivery of global benefits;
  - Programmatic versus project-based approach;
  - National versus regional projects;
  - Planning versus action;
  - Increased absorptive capacity;
  - Limited co-financing;
  - Sharing expertise; and
  - Sharing information.

Integrated Water Resources Management in Pacific Island Countries–A Synopsis

This 2007 SOPAC report prepared with UNDP, UNEP, and GEF on the progress of the 2002 Pacific Regional Action Plan on Sustainable Water Management notes several barriers to integrated water resources management in the Pacific, including:

- Limited and fragile water resources susceptible to overexploitation and pollution, but with little technical management capacity to exploit and protect them;
- Vulnerability to climate variability resulting in rapid onset of flooding and droughts;
- Insufficient political and public awareness of the critical role of water;
- Fragmented national water governance due to little formal communication and coordination among government departments;
- Conflicts between national versus traditional rights;
- Weak linkages to other stakeholders, within the water sector but particularly to other economic sectors, public health, and the environment.

The report also identifies the following solutions related to integrated water resources management: building upon existing activities and improving the coordinating, and integrating of planning and management. It also notes that a much greater political and financial commitment was required at both the country level and internationally. ❖

Annex D. Project Team and People Consulted

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References and Select Bibliography

ADB (Asian Development Bank). 2005. Climate Proofing: A Risk-based Approach to Adaptation. Pacific Studies Series. Asian Development Bank, Manila. 191pp.

ADB. 2004. Pacific Region Environmental Strategy 2005-2009: Executive Summary.

ADB. 2005-06. Country Environmental Analysis. Reports from various countries.

Australian Greenhouse Office. 2007. Climate Change Project Development and Implementation Workshop for Pacific Island Countries. Apia, Samoa July 20-21, 2007.

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.* World Bank.

GEF (Global Environment Facility). 2008. *GEF-Pacific Alliance for Sustainability - Program Framework.*

GEF/UNDP 2006. PACC – Report of In-Country Consultations. Reports from various countries.

Hennessy, K., B. Fitzharris, B.C. Bates, N. Harvey, S.M. Howden, L. Hughes, J. Salinger, and R. Warrick. 2007. "Australia and New Zealand." In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds. Cambridge, U.K.: Cambridge University Press. 507-540.

IPCC. 2007. *Climate Change 2007: Synthesis Report*. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC. Cambridge, UK, and New York, NY: Cambridge University Press. 104 pp.

IPCC. 2001. *Climate Change 2001: Synthesis Report*. A Contribution of Working Groups I, II, and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Watson, R.T. and the Core Writing Team (eds.)]. Cambridge, UK, and New York, NY, USA: Cambridge University Press. 398 pp.

ISDR 2008. *Private Sector Activities in Disaster Risk Reduction – Good Practices and Lessons learned*

SOPAC (South Pacific Applied Geoscience Commission). 2008. *Approved Work Programme and Budget for 2008*

SOPAC. 2007. *Integrated Water Resources Management in Pacific Island Countries- A Synopsis* – and related Country Diagnostic Reports.

SOPAC. 2005. *An Investment for Sustainable Development in the Pacific Island Countries Disaster Risk Reduction and Disaster Management— A Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters.* SOPAC Miscellaneous Report 613 (revised July 2008). www.sopac.org/RfA+2005+2015

SPREP (Secretariat to the Pacific Regional Environment Program). 2008. *Approved Work Programme and Budget for 2008*

SPREP. 2006. *Action Plan for the Implementation of the Pacific Islands Framework for Action on Climate Change 2006-2015 – Draft Version 12*

SPREP. 2005. *Pacific Islands Framework for Action on Climate Change 2006-2015*

UNDP (United Nations Development Program). 2007. *NCSP Workshop on the Second National Communications and Vulnerability and Adaptation Assessments for Pacific Island Countries,* Apia, Samoa 16-19 July 2007

Warrick, R.A. 2006. "Climate Change Impacts and Adaptation in the Pacific: Recent Breakthroughs in Concept and Practice." In Chapman, R., Boston, J. and Schwass, M. (eds) *Confronting Climate Change: Critical Issues for New Zealand*. Wellington: Victoria University Press.

Warrick, R. A. 2000. "Strategies for Vulnerability and Adaptation Assessment in the Context of National Communications." *Asia-Pacific Journal for Environment and Development*. 7 (1), p. 43-51.

World Bank. 2009a. Preparedness, Planning, and Prevention: Assessment of National and Regional Efforts to Reduce Natural Disaster and Climate Change Risks in the Pacific – A Synthesis Report. East Asia and the Pacific Region. Washington, D.C.

World Bank. 2009b. Country Assessment for Pacific Island Countries. Separate reports for Fiji, Kiribati, Marshal Islands, Papua New Guinea, Solomon Islands, and Timor-Leste. East Asia and the Pacific Region. Washington, D.C.

World Bank. 2008. Reducing the Risk of Disasters and Climate Variability in the Pacific Islands – Business Plan Commentary, A GFDRR Project.

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**In bold, GFDRR Donors*

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

REPUBLIC OF FIJI COUNTRY ASSESSMENT

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

THE WORLD BANK

SOPAC

Acronyms and Abbreviations

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
CCA	Climate change adaptation
CHARM	Comprehensive Hazard and Risk Management
DRM	Disaster risk management
DRR	Disaster risk reduction
EU	European Union
FJ$	Fiji dollar
GDP	Gross domestic product
GEFPAS	Global Environment Facility Pacific Alliance for Sustainability
GEFPACC	Global Environment Facility Pacific Adaptation to Climate Change
GIS	Geographic Information System
GFDRR	Global Facility for Disaster Reduction and Recovery
HFA	Hyogo Framework for Action
ISDR	International Strategy for Disaster Reduction
NAP	National Action Plan (for DRM)
NAPA	National Adaptation Plan of Action (for CCA)
NDMO	National Disaster Management Office
NDMP	National Disaster Management Plan
NGO	Nongovernmental organization
NZAID	New Zealand Agency for International Development
P-HYCOS	Pacific Hydrological Cycle Observing System
PICCAP	Pacific Islands Climate Change Assistance Program
SEEDS	Sustainable Economic and Empowerment Development Strategy
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change

Contents

Introduction

The World Bank policy note, "Not If, But When" shows the Pacific island countries to be among the world's most vulnerable to natural disasters. Since 1950, natural disasters have directly affected more than 3.4 million people and led to more than 1,700 reported deaths in the Pacific Islands Region (excluding Papua New Guinea). In the 1990s alone, reported natural disasters cost the Region US$2.8 billion (in real 2004 value). The traditional approach of "wait and mitigate" is a far worse strategy than proactively managing risks.

The Hyogo Framework for Action (HFA) 2005-2015 lists the following 5 key priority areas for action:

(1) Ensure risk reduction is a national and a local priority with a strong institutional basis for implementation;
(2) Identify, assess, and monitor disaster risks and enhance early warning;
(3) Use knowledge, innovation, and education to build a culture of safety and resilience at all levels;
(4) Reduce underlying risk factors; and
(5) Strengthen disaster preparedness for effective response at all levels.

This assessment represents a stocktaking exercise to review the extent to which disaster risk reduction (DRR) and climate change adaptation (CCA) activities have progressed in Fiji. It also identifies the gaps or impediments to achieving the HFA principles, and proposes opportunities for future DRR/CCA investments that would be timely, cost-effective, and implementable within a three-year timeframe. The focus is on risk reduction, as opposed to post-disaster recovery and response. While some sector-specific activities are addressed in the assessment of national and local government policies and institutional arrangements, the Fiji report does not provide a comprehensive summary of sector-by-sector activities. Instead, it cites other reports that have covered this and complements these with suggestions for taking the necessary steps.

The assessment aims to deepen the understanding of the gaps, opportunities, and needs at the national level toward stronger operational disaster and climate risk management in Fiji and to link closely to other ongoing and future efforts by other donors and stakeholders (such as the SOPAC regional initiatives following the Madang Framework and the National Action Plans) to ensure synergy and avoid duplication. The assessment focuses on practical, proactive measures as ways in which Fiji can inform its national development policies and plans and strengthen its capacity to reduce the adverse consequence of natural hazards and climate change with regard to risk reduction. The linkage of these two areas mainly includes managing the impacts of extreme weather events, variability in precipitation and storm surges, and sea-level rise.

This Fiji assessment highlights the current country status; gaps, opportunities, and barriers related to (a) national policies, strategies, plans, and activities to manage natural hazards; (b) the enabling environment for a comprehensive risk management approach to natural hazards; and (c) the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. It also reviews and identifies the need for informed policy choices, improved decisionmaking processes, strengthened regulations, and legislative and policy changes required to support proposed country-level activities.

With respect to achievement of the first (1) HFA priority action principle, there is clear evidence of systemic difficulties among many Pacific island countries in establishing an enabling environment and promoting a cross-sector focus for DRR and CCA activities. Since the available evidence shows that ad

hoc, externally driven approaches have not yet provided satisfactory results, the HFA emphasis upon a strong government commitment and action is one of the primary and early challenges to be surmounted in achieving the goals of the UN International Strategy for Disaster Reduction (ISDR).

World Bank experience in countries with similar challenges shows that while it is important to have a clear long-term vision given the institutional, financial, and resource constraints, more modest "bottom-up" approaches tend to have better results. Also, taking existing investment programs and incorporating simple key DRR/CCA elements demands relatively fewer efforts and resources and yields results that can lay the foundation for more complex, follow-up stages. Getting stakeholders to coordinate their activities in line with the 2005 Paris Declaration on Aid Effectiveness also appears relatively easier with such a modest starting point than with formal efforts aimed at comprehensive "top down" coordination.

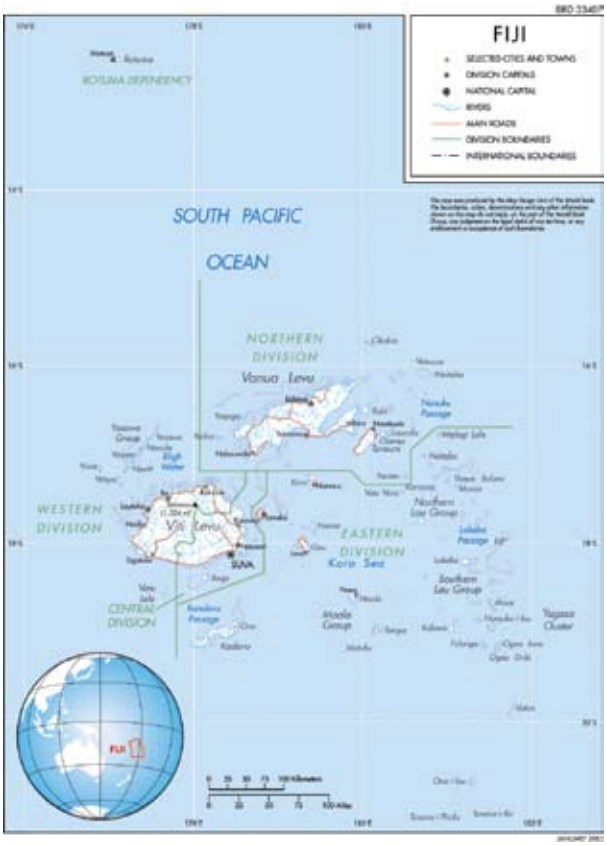
This report begins by explaining the DRR/CCA-related context of the country. It follows with sections on key findings and a detailed country assessment that focuses on some relevant components to achievement of the HFA: adopting and mainstreaming policies; data and knowledge; risk and vulnerability assessments; monitoring and evaluation; awareness raising and capacity building; planning and budgetary processes; and coordination. From this assessment, possible opportunities for addressing the identified gaps and needs within the HFA are presented in the final section. Three proposals for investment support to Fiji are presented in Annex A.

Funding for this assessment was provided by the Global Facility for Disaster Reduction and Recovery (GFDRR), which is a partnership of the UN International Strategy for Disaster Reduction (ISDR) system to support the Hyogo Framework for Action. Other acknowledged partners who support the GFDRR work to protect livelihoods and improve lives are Australia, Canada, Denmark, European Commission, Finland, France, Germany, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, USAID Office of Foreign Disaster Assistance, and the World Bank. ❖

Country Context

The Republic of Fiji is an island nation with an estimated population of 850,000 people and an annual population growth of 0.8 percent. The country has a total land area of 18,333 square kilometers, and a much larger exclusive economic zone of 1.26 million square kilometers that encompasses over 320 islands of which 105 are inhabited (Figure 1). The inhabited islands are mostly volcanic in origin, including the largest—Viti Levu (10,390 square kilometers) and Vanua Levu (5,538 square kilometers). Together these islands make up about 87 percent of the nation's landmass.

Figure 1. **Map of Fiji**



Fiji is second only to Papua New Guinea as the Pacific island country having been most affected by natural disasters since 1990 (ADB 2005). The social and economic implications of climatological and hydrological risks are considerable across all primary production sectors, especially agriculture. Floods and droughts can disrupt agricultural production for domestic and export activities and landslips can cut roads and disrupt communications and access. Cyclonic events are a threat to settlements, infrastructure, tourist facilities, and the population that is located on the coastal fringe of the high islands and on the low islands.

Despite low population growth rate, pressure on land resources for increased food production is growing. According to the estimates of the Asian Development Bank (ADB 2005), about 30 percent available land is flatland suited to sustainable agricultural production.

Fiji has a diverse economy. Economic activities encompass agriculture, fisheries, forestry, garment manufacturing, and mining. Exports include sugar, clothing, gold, coconut products, tropical fruits, root crops, vegetables, tobacco, fish, and timber products. Tourism is the fastest growing industry in the country. Tourism contributes about 17 percent to GDP, while 3-4 percent draws from agricultural production, 4 percent from forestry, and 1-3 percent from the minerals sector. The nation's biodiversity resources, upon which many economic activities are dependent, represent over 40 percent of the country's GDP (ADB 2005). All of these economic sectors are at risk to adverse impacts from climatic variability and climate change.

Geographically characterized by high and low islands, Fiji is exposed to a wide range of geological, climatological, and hydrological hazard and risks. It has a tropical-oceanic climate with tempering influences of prevalent southeast trade winds producing a mean annual temperature of 28° Centigrade. Rainfall varies considerably, with the windward sides of larger islands being extremely wet while leeward sides have considerably less rainfall. For example, annual rainfall ranges from approximately 440 millimeters in the west and 1,120 millimeters in the southeast of the larger main is-

Table 1. Key Hazards to be Addressed by the Republic of Fiji

Key natural hazard	Key human-induced hazard
Flooding and droughts	Fire (dwellings and wild-fire in forest)
High cyclonic /storm winds	Oil and chemical spills
Storm surge and coastal inundation	Contamination of water supplies
Landslides	Disease outbreaks
Earthquakes	Slope instability due to over-clearing
Seabed volcanism	Contaminated storm run-off
Tsunami	Coastal siltation

lands. The combination of high rainfall accompanying cyclonic activity and storm events, as well as steep bare slopes, causes rapid runoff with river floods and sediment discharges into the nearshore coral reef habitats. It has adverse implications for coastal communities, as well as for commercial fishing and tourist activities.

Table 1 provides a summary of the key natural and human-induced hazards in Fiji. The current key hazards and risks of most concern to Fiji are products of cyclonic and geological-forcing activity. Fiji is in the tropical cyclone belt, and one cyclone on average passes through Fijian waters each year. Cyclones cause loss of lives and property, coastal and riverine flooding, as well as damages to agricultural and tree crops from high winds. They have severe consequences for the nation's economy. Reaping damages to the country at a cost of FJ$100 million, Cyclone Ami exemplified how poor building standards can result in large infrastructure losses and aggravate the human catastrophe (ADB 2005).

Other hazards of a priority nature include landslides on unstable slopes resulting from geological and soil conditions and excessive clearing of vegetation; and storm waves and swells, and rising sea level contributing to coastal erosion.

Fiji's location on the Pacific "ring of fire" puts it at risk from geological hazards, in particular earthquakes and locally generated tsunamis. The last major destructive earthquake and tsunami was registered in 1953. The threat from volcanic eruptions is rather low with their primary effects on the maritime sector limited to the impact of large pumice rafts from sub-marine eruptions to the east of Fiji.

The core natural hazards are weather and climate related. They are caused by tropical storms and cyclones that produce storm surge, flooding, and heavy seas. Drought, which affects coastal and upland areas, is another outcome of a climatic condition. Since 1978, several droughts have had a major impact on the economic productivity and subsistence livelihoods across the country. The threats can become significantly higher due to a longer-range climate change.

The Fiji Islands are characterized by physical, demographic and socio-economic conditions and pressures that exacerbate vulnerability and the risks posed by natural and human-induced hazards. The characteristics of Fiji include the following:

- ***Geographic extent*** of an island nation that covers a large area of ocean that makes communications and disaster response difficult;
- ***Topographic variability*** with low-lying coastal areas and atolls that are susceptible to overtopping by storm surge and the considerable areas of steep hills and mountains that are over-cleared, geologically unstable, and susceptible to landslips;

- ***Diverse and terrestrial and marine ecosystems*** that offer a diversity of habitats and ecosystem services, for example, related to mangroves and coral reefs that provide some coastal protection from storm waves and seas;
- ***Fresh-water resources*** that are highly vulnerable to over-use, contamination, and droughts;
- ***High-density population pockets*** in coastal areas of Viti Levu (for example of Suva), as well as the coral coast and low islands that have been developed for tourist resorts;
- ***Socio-economic disparity*** with a considerable part of the rural and low island populations at subsistence levels;
- ***Primary industry-based economy*** vulnerable to droughts, floods, and global market influences.

To address disaster risk reduction and disaster management, the Government of Fiji adopted the *Strategic Development Plan 2007-2011,* based in large part on the regional *Framework for Action 2005-2015.* In November 2007, the Interim Fiji Government promulgated the *Sustainable Economic and Empowerment Development Strategy (SEEDS) 2008-2010*, One key goal of the new policy strategy is to reduce vulnerability to disasters and risks, while promoting sustainable development. ❖

Key Country Findings

The key natural and human-induced hazards of major concern to Fiji require DRR/CCA measures that are tailored to the geographic characteristic and type of governance of the island nation. Key areas of concern for disaster risk reduction arise from Fiji's salient characteristics:

- ***Some coastal tourist developments are sited in vulnerable areas*** that make disaster risk management and liability in relation to early warning and evacuation more difficult.
- ***Settlement planning processes and building codes are needed*** to integrate risk reduction and adapting to climatic variability and change.
- ***Significant areas of the coral reef, beach and mangrove systems are degraded*** making coastal areas more vulnerable to storm surges and coastal erosion.
- ***Emergency response and relevant infrastructure, early warning mechanisms and community arrangements are limited*** with scattered islands particularly vulnerable to cyclones and droughts, with subsequent water and food shortages.
- ***Waste management and sanitation are inadequate,*** which increases the potential for the pollution of critical water sources and the general threat to public health, especially in coastal lowland areas utilized for tourist developments.
- ***Poor agricultural land use practices*** are one of the main causes of soil erosion, flooding, and siltation of nearshore coral reef habitats.

While relevant policies and regulations in Fiji are reasonably well structured, their implementation remains weak. This situation is compounded by a widely acknowledged lack of institutional capacity. The task at hand—reducing risks to human life and health, land-surface stability, terrestrial and marine biodiversity, socio-economic viability, and public and private property and infrastructure—deserves urgent attention to translating these objectives into effective, well-planned, and coordinated activities.

This assessment concludes that the climatological, hydrological, and geological pressures raise concerns about risk reduction when taking into account the cumulative effects of the risks from interactions between natural and human-induced hazards. The assessment findings can be summarized as follows:

- ***Fiji has an inherently high potential for exposure to considerable array of natural disasters.*** The probability for catastrophic damage and loss of life from hazards, such as cyclones and tropical storms, storm surge, flooding and landslips, is assessed as very high.
- ***Fiji is extremely vulnerable to natural and human-induced hazards.*** Overall, the associated risks appear to be increasing due to population pressures, poorly regulated land resources, and the potential for climate change.
- ***Human-induced hazards increase negative impacts from cyclonic and tropical storm events and geological (including seismic) activity.*** The impacts result from poorly planned and developed urban and peri-urban areas, vulnerable tourist facilities and infrastructure; unsustainable economic development processes and activities; and inadequately resourced disaster response mechanisms.
- ***Insufficient preparation for natural and human-induced hazards increases the underlying risks.*** While core hazards and risks have been identified and priority issues are known, they are not integrated into national and sector plans and policies. Furthermore, the ability to manage population growth in certain areas, land use, and protection of environment is severely undermined by institutional constraints, including professional and technical capacity of government agencies.

The situation is complex in a financial, structural, and functional nature. Also being considered is the gap between short-term government priorities and perceived long–term priority needs for disaster risk reduction and climate change adaptation. In addition, disaster risk reduction and climate change adaptation are often seen as externally driven, lacking local political champions and institutional commitment. This situation is further complicated by culture and traditional practices involving land ownership, power relationships, and leadership. Common in other Pacific island countries, lack of awareness and poor consultation and engagement mechanisms exacerbates the problems in Fiji.

Within the context of country findings, this assessment has identified priority areas where investment could prove effective in strengthening disaster risk reduction and climate change adaptation. These areas of strategic investment are targeted rather than broad-based, and seek to improve the collection, collation, synthesis, analysis, and dissemination of information that is essential for effective disaster risk reduction and climate change adaptation. The proposed activities reflect priorities identified across governmental and nongovernmental bodies.

The way forward depends to some extent on the continued presence of a "champion" in-country to provide some basis for a sustainable outcome. Any initiatives should also result in capacity development throughout Fiji. Further work is required to identify appropriate areas of activity that meet these criteria and for the development of project contexts with the appropriate sector. Any proposals should form the basis of a longer- term strategic commitment.

A summary of broad situations, gaps, and opportunities is shown in Table 2. The final chapter of this Fiji report expands on these opportunities. ❖

Table 2. Summary of Key Gaps and Opportunities for DRR and CCA in Fiji

Situation	Gap or Impediment	Opportunities
Adequate legislative steps have been taken (i.e., current redrafting of the Disaster Management Act) but are not followed with action.	Arrangements for addressing risk reduction are not penetrating into national or sector development plans and budgets. Hence, there is no operational commitment to address these issues	**Strengthen the institutional environment**, through fostering leadership and supporting capacity-building initiatives at the national planning and budgetary level and follow through to the sector levels.
Data and risk information on threats to life, infrastructure and property is not readily accessible across and between sectors making effective DRR and CCA response difficult.	No operating central system for information management, storage and access to allow vulnerability and risk analyses to inform DRR and CCA initiatives.	**Establish an integrated hazards information and analysis system to facilitate DRR and CCA activities** that would be subject to a thorough review of sector agencies, provided their revitalization of institutional mandates and reactivation of their responsibilities.
Hazard monitoring and data collection in Fiji has regressed in the past decade.	Monitoring networks are degraded and the monitoring agencies are dispersed through a range of departments. Combined with lack of funding and commitment data on future disasters is not being used.	**Review hazard monitoring needs and the institutional arrangements,** particularly for hydrological monitoring combined with meteorological monitoring.
Cyclones, floods, and droughts are key hazards and pose a major threat to food and water security, and social and economic well-being of the nation.	Measures to improve water supply systems and food security and production (subsistence and cash crops) are lacking in communities at risk.	**Water supply and food production systems need to be climate-proofed,** which should involve assessing the increased risks from a changing climate.
Some public infrastructure, coastal settlements, and tourist facilities are sited in low-lying coastal areas and are vulnerable to cyclones, storm surge, flooding, and tsunami.	Capacity in inadequate for planning and development approvals that are required to address exposure to natural hazards (including climate variability).	**Enforcement of land use planning and building codes need to be strengthened,** including the application of reviews by the public, commercial, tourist, and residential sectors; the linking of risk reduction measures with insurance and financial lending instruments should be taken into account in the funding processes.
Awareness programs, such as successful Disaster Awareness Week, have limited potential in extending its message to all communities to promote community engagement.	Community awareness of and attitudes toward DRR and CCA is variable across the Fiji islands, and there is a big gap between awareness and action at the community and local government levels.	**Promotion of community-based awareness programs for community groups, local government, and NGOs**, including education on changing attitudes and behavior critical for responding to DRR/CCA and building resilience of environmental, social, and economic systems to reduce vulnerability. Due to its success, Disaster Awareness Week should be copied in all communities.

Detailed Country Assessment

Legal framework and policies, and their effectiveness

The much-needed *Sustainable Economic and Empowerment Development Strategy 2008–2010,* adopted in 2007 by the Government, could only be effective with practical targets and an implementation plan. These are not included. At this point, there are no planned risk reduction activities coming from the strategy.

Adopted by the previous Government, the *Comprehensive Hazard and Risk Management (CHARM) guidelines* also endorsed the need for disaster risk reduction. These guidelines led to some activities directed by the Ministry of Regional Development but have not been adapted across all government departments, thus limiting coordinated efforts.

At the sector level, a national DRR framework had been proposed through two instruments: an updated draft of the *1995 National Disaster Management Plan* (NDMP) and a draft rewrite of the National Disaster Management Act 1998. Both instruments focus mainly on disaster prevention and mitigation. Their effectiveness could be insured through institutional and political commitment that is now lacking. Implementation of the NDMP awaits development of a National Action Plan (NAP), which depends on governmental priorities and donor funding.

Another important piece of legislation — *the 2005 Environment Management Act* — had potential to become the promotional vehicle for CCA efforts. However, the Act does not explicitly state this statutory underpinning. In December 2007, the Government of Fiji adopted a Climate Change Policy Paper that commits the Government to addressing governance issues, integrating policies, data collection, and capacity building. Since the policy paper neither lists targets nor provides budget and action plans, its adaptation has made no progress.

Fiji issued in 2005 a *First National Communication on Climate Change Strategic Actions*, pursuant to commitments under the United Nations Framework Convention on Climate Change (UNFCCC).

Other relevant legislation is in place and being administered. Fiji's *building codes* are used on a voluntary basis as informal guidelines since there is no institution regulating and monitoring their implementation. As a prerequisite to securing home insurance coverage, the main risk design standards applied to roofs of buildings will be introduced through a Government program to adapt the standards to schools and other public buildings.

There is no evidence that *land use regulations* have been updated to incorporate DRR and CCA components. Evidence shows that if land use regulations and other legal instruments are continually inadequate or not enforced, adverse impacts caused by some coastal development, particularly by the tourism industry, will continue in the future (ADB 2005). Across Fiji, the institutional capacity to control the spread of settlement and tourism development in the sensitive coastal margins is limited from the viewpoints of public and private sector interests. Physical, social, economic, and cultural vulnerability of these settlements is higher when low institutional capacity is coupled with land degradation and changes in rural land use. This coupling can influence food and water security and the quality and productivity of inshore marine waters.

In summary, DRR and CCA policies are currently in place but the institutional arrangements for implementation are ineffective and lack national and sector planning and budgetary provisions.

These plans, policies, and strategies require the following actions to become effective:

- ***Adequate institutional capacity and commitment*** within the key Ministry of Finance and Planning, as opposed to its present view that disaster risk reduction and climate change are environmental or disaster management issues. This position undermines the ability of the Fiji Government to adequately confront the challenges of risk reduction and climate change in the context of national economic and social development.
- ***Integrating DRR/CCA policies across the whole range of relevant portfolio areas*** that have DRR- and CCA-related responsibilities rather than using existing instruments located in individual agencies. Consequently, the Fiji public sector needs to address disaster risk reduction and climate change adaptation contiguously rather than treating both as separate issues.
- ***Linking policy instruments to applicable action plans*** with adequate resources to support new sector-driven instruments promoted and put in place by the Fiji Government.
- ***Promoting the knowledge of risk reduction,*** which tends to be misinterpreted as either a disaster response mechanism or an area to be addressed during the statutory environmental impact assessment process.
- ***Better use of available tools and techniques,*** such as CHARM guidelines and the SOPAC Environmental Vulnerability Index. It requires enhanced data and information exchange across the institutions of government.

Inter-government and agency coordination

Overall coordination of the National Disaster Management (NDM) Plan and the Disaster Management Act is a responsibility of the National Disaster Management Council. Serving the NDM Council, the National Disaster Management Office was recently transferred from the Ministry of Provincial Development and Multi-Ethnic Affairs to the Ministry of Defense, National Security, and Immigration and Disaster Management. The NDM Council is active and supports NDM Office programs. Measures have been underway to review the NDM Plan and the Disaster Management Act in order to address some of the critical gaps. The NDM Office has a role to promote disaster risk reduction through all government sectors and, as a sign of increased commitment to this effort, is strengthening its staff. Serving as the minister in charge of disaster management and the NDM Office, the Minister of Defense also chairs the NDM Council.

The establishment of a National Environment Council to coordinate the formulation of environment-related policies and strategies was proposed under the 2005 Environment Management Act. However, it is uncertain whether the policies and strategies under the Environment Management Act will extend to coordination and implementation of disaster risk reduction.

Coordination measures include several long-established committees and working groups. One of the groups addresses the development of national building codes. Until now, these codes have not been adopted. Also, a long-standing working group on drought operates in Fiji. A relatively new working group was formed to address DRM impact on tourism. A coordination committee in Fiji, chaired by a representative from the private sector, has been working on the Suva Earthquake Risk Management Project. Another working group was more recently formed to study a tsunami early warning system. In light of the lack of evaluation information, the effectiveness of these committees has not been assessed. Experience has shown that in Fiji —as in other Pacific island countries—committees tend to be formed as a reactive instrument, and their effectiveness depends on the dedication and competence of the members who participate.

In 1999, a Climate Change Working Group was formed to interface with the Pacific Islands Climate Change Assistance Program (PICCAP). With the ending of PICCAP, this group no longer operates and, as confirmed by governmental consultations, no alternative has been established to continue CCA activities that have been initiated by international bodies.

Climate change issues are primarily the responsibility of the Department of Environment. The Ministry of Foreign Affairs and External Trade is the political focal point for climate change, particularly on issues related to international conventions and obligations. The Fiji Government proposed that all line ministries establish environmental management units to address the cross-cutting aspects of climate change. This may prove difficult as illustrated by the problems encountered in recruiting skilled personnel for the Department of Environment.

Critical shortages of human resources in Fiji are hampering DRR and CCA activities. The Fiji Meteorological Service is probably the best-resourced technical agency operating although with a minimally sustainable staffing level. The situation is more severe in the Hydrology and Mineral Resources Departments, responsible for monitoring earthquakes, tsunamis, volcanic eruptions, landslides, and other geological hazards. Both agencies are critically under staffed and resourced. These and other line agencies are pursuing DRR and CCA activities, although it is largely on a site-specific project basis. Donor initiatives or regional programs often drive these DRR and CCA projects.

To enhance inter-governmental and agency cooperation in disaster risk management and climate change adaptation, the following weaknesses need to be addressed:

- ***Weak political and institutional commitment, as well as accountability.*** Poor attendance at meetings of coordination groups is one issue. In 2007 the NDM Council held 1 out of 4 scheduled meetings. Much of the coordination is geared toward information exchange and awareness rather than effective implementation. Non-participation and cooperation of leading agencies is cited as the main reason for the ineffectiveness of many committees and working groups. In particular, the establishment of informal bodies for disaster risk management and climate change adaptation demonstrates a low-level concern over accountability.
- ***Poor coordination of intra-governmental activities.*** There is a need to review institutional arrangements and the reallocation of institutional responsibilities with respect to disaster management, risk reduction, and climate change adaptation. Also missing is a one-stop center to help focus leadership and coordination and to avoid proliferation of committees and working groups.
- ***Insufficient understanding of risk reduction as a key development issue.*** For coordination to become more effective, risk reduction must be addressed as a key issue in promoting sustainable development. Within the Fiji Government and in some private sector enterprises, risk reduction is viewed as an environmental impact assessment or a disaster response issue.
- ***Lacks of connection between SEEDS and viable plans of action.*** The DRR and CCA activities are not strongly linked to Fiji sustainable development goals embedded in SEEDS, and there are no matching implementable action plans. It is fundamental to SEEDS effectiveness to set up priorities along with strategic planning and appropriate budgets.
- ***Limited participation of the Ministry of Finance and Planning in DDR and CCA efforts.*** There is a clear need for the Ministry to play a key role in developing national strategies, along with relevant budgets, to lead the nation in disaster risk reduction.

- ***Limited understanding of the differences between disaster risk reduction and disaster response, as well as of the risks from climatologic, hydrological, geophysical, and disease hazard.*** As a consequence, at the decisionmaking level, opportunities are missed to improve understanding of disaster risk reduction in the rehabilitation and reconstruction phases of disaster response. For example, damaged infrastructure is often replaced in situ as a result of lack of a clear understanding of the hazards and risk-exposure faced and more appropriate options are not fully considered. Another example is undertaking flood mitigation solely through river dredging rather than dealing with the root causes, such as deteriorating land use upstream or inappropriate land use on the downstream flood plains. Such knowledge gaps can be remediated by in-house DRR/CCA workshops and training activities.

Planning and budgetary processes

Fiji's planning and budgetary processes do not significantly incorporate DRR and CCA linkages. Although SEEDS does highlight integrating disaster risk reduction into political decisions and states that Government efforts are underpinned by a "risk management approach," no particular strategy is offered to address the issue. Also, no evidence supports the assertion stated in the SEEDS that effective risk reduction projects would be identified and implemented.

Continuing deterioration in governmental support for hydrology, meteorology, and hazard and environment assessments also seems to contradict the SEEDS priorities. The Hydrology Section of the Fiji Government is located in inadequate accommodations at an operational division of the Suva Water Supply. Hydrology should have a higher profile and more prominent presence to emphasize its key role in addressing flooding as the first priority of the Fiji Government. The Hydrology Section also lacks scientific, technical, and budgetary support. As the nation's key hydrological monitoring service, the Hydrology Section should be better equipped and have dedicated field transport. The present situation is viewed as most unsatisfactory by some governmental bodies and business sectors. Other alternatives such as relocation with Fiji Meteorological Service would be possible if adequate financial resources are found. Support to the Hydrology Section is only possible with a realistic Government-supported operating budget.

The Fiji Meteorological Service has a well-established national and regional cyclone warning system. However, it suffers from resource problems common to Pacific island countries: lack of funding and limited professional capacity. The Meteorological Service is a critical regional asset and should be supported by guaranteed long-term international technical support, appropriate capacity-building programs, and adequate funding and staff.

Planning is underway in Fiji and throughout the Region on an all-hazards early warning system. The NDM Office plans to promote this initiative at the village level in Fiji. As such, the system could herald a revival of traditional early warning and disaster preparedness customs and practices.

Fiji should continue to re-allocate existing capital works and maintenance budgets to better respond to major disaster events. Poor resource allocation is reflected in the deterioration of essential services and lack of maintenance and upgrading of infrastructure. There is an urgent need for disaster management and response-specific budget allocations, as well as for development of special financial risk transfer mechanisms to support unforeseen emergency events.

A common response of the Fiji Government to disasters is freezing of capital expenditure. At times this freeze extends to the recurrent expenditure of a range

of ministries. This action is taken by the Fiji Government to offset rehabilitation and rebuilding costs. Many public and private sector consultants contributing to this assessment report view this standard practice as counterproductive since it prevents the delivery of risk reduction by line agencies.

Effective DRR and CCA implementation may prove problematic without the pro-active involvement and leadership from the Ministry of Finance and Planning that would include risk reduction initiatives in national planning and budgets. In addition, while the policy frameworks are reasonably strong, their implementation through the institutional frameworks and the commitment of others requires strengthening.

Greater project funding alone is not a viable solution for enhancing DRR and CCA efforts. To a large degree, minimal investments in DRR and CCA projects in Fiji could be attributed to the prevailing political and economic situation. Without appropriate assistance, Fiji will not be able to train staff with the basic required skills or have resources and general absorptive capacity to formulate and implement DRR and CCA initiatives and incorporate these in sector plans and projects. It also faces the challenge of using data and other risk information for implementing projects to reduce vulnerability and potential adverse impacts from climatologic, hydrological, and geophysical hazard.

Impediments

- ***Absence of a favorable enabling environment at the national level.*** This key institutional weakness applies particularly within the Ministry of Finance and Planning. This governance issue is exacerbated by apparent lack of capacity in understanding and undertaking appropriate policy analysis and framework development of implementable actions. Limited professional understanding of DRR and CCA issues only compounds the inherent difficulties from lack of skill and expertise.
- ***Insufficient operational commitment to DRR/CCA initiatives.*** Across Government, the absence of an operational culture and commitment fails to generate a risk management approach in planning and budget preparation. This deficiency is attributable to inadequate capacity building and DRR/CCA championing at the highest levels of government and civil society.
- ***Ineffective governance/institutional mechanisms to address DRR/CCA issues.*** Some key line agencies are not capable of delivering on either risk reduction or climate change adaptation due to systemic administrative and operational deficiencies.
- ***Limited implementation of strategic and location-specific development planning for high-risk zones.*** Disaster risks increase in parallel as both exposure and vulnerability factors increase. This situation is sometimes best demonstrated by the poor planning of tourist resorts and infrastructure development in the fragile coastal zone where lives and property are vulnerable to extreme weather events, storm surge, and flooding.

Vulnerability and risk assessments

The exposure of coastal towns and cities to disasters has increased with their expansion due to reclamation and urban development into more geologically marginal areas. Civic assets become more exposed to inundation from the sea and increased landslide risks in less geologically safe areas. It is particularly visible in and around the national capital, Suva. Recognizing this vulnerability, SOPAC-assisted mapping for flood and landslide hazards is being carried out.

Poor or inappropriately planned agricultural practice has exacerbated the impact of droughts and floods. The lack of an assessment of the effect of certain non-indigenous forestry on groundwater and base-stream flows could undermine effective water resources manage-

ment. Inappropriate land use—such as promoting agriculture on steep terrain—has caused what is considered to be near uncontrollable soil erosion in some major watersheds. Thus, increased river sedimentation has influenced the rising occurrence and severity of flooding. At the national level, there is no strategy to understand the threat or to address flooding problems with preventive initiatives—control land use on steep slopes, reduce land degradation, and rehabilitate severely eroded land surfaces—at the most vulnerable spots.

Coastal erosion, due to changing climatic conditions or from human-induced interference with coastal processes, also threatens coastal communities and infrastructure. Coastal engineering is often not based on understanding of climate drivers of geomorphic change. In these instances, sea-level rise scenarios or the complexity of coastal oceanographic and hydrodynamic conditions and processes operating on the shoreline require more attention.

The average annual social and economic losses from geological and climatic hazards in Fiji are unclear when reviewing the mixed sources with disparate figures. Between 1950 and 2004 there were a reported 38 disasters with estimated losses of approximately US$2.2 million. The highest reported damage causing climatic event in Fiji was Cyclone Kina in 1993. The Fiji Government estimates 100 in human lives lost and FJ$500 million in economic loss from tropical cyclones over the last decade (1997-2007) (Government of Fiji, 2007c). In this period Cyclone Ami in 2003 caused economic losses of more than FJ$44 million, which is less than half the 2005 ADB figure. Other estimates reported that the 2004/2005 and 2006/2007 floods caused FJ$135 million and FJ$20 million in damages, respectively. By comparison, figures provided by the Ministry of Regional Development cite losses in more recent years: flash flooding caused damages of FJ$113,000 in 2005 and FJ$15 million in 2007; and in 2008 Tropical Cyclone Gene caused FJ$45 million in damages. The Ministry further states that in the period since 1985 there have been 130 disaster-related fatalities. In 1998 an outbreak of dengue fever amounted to FJ$12 million in economic costs to Fiji.

Apart from a 2005 study carried out by SOPAC and the University of the South Pacific (McKenzie and others 2005) no other more detailed socio-economic loss data are readily available. The inconsistency in damage and economic loss data coupled with differences in assessment procedures makes it difficult to substantiate average annual losses from hazards, either singly or in aggregate. Consequently this is an impediment to any economic evaluation of risk-reduction measures and funding. Overall, adequate socio-economic data to support rigorous vulnerability assessment is critically needed.

The absence of accessible risk profiles is also a concern. Over the past 20 years, at-risk assets have increased significantly, particularly with the proliferation of tourism development facilities and infrastructure along the main island coasts and on more and more smaller offshore islands. In this context the tourism sector, which is important to Fiji's economy, is vulnerable in two ways: in the short term to the possible impact of category-4 or -5 cyclonic events and in the medium term to sea-level rise, storm surges, and the impact of a locally generated tsunami.

Disaster risks in Fiji often appear to be based on post-event perceptions and usually are non-quantifiable. Moreover, the descriptions of threats are often anecdotal. Adaptation is largely pursued as a pilot project or a site-specific study with no obvious strategy for up-scaling. Characteristically, analytical work is also difficult in the absence of a comprehensive database containing raw geophysical, climatological, and hydrological data; hazard maps; and synthesized biophysical information.

Where datasets have been collated, the quality is often questionable due to incomplete or missing data. Furthermore, data are not shared between specific data gatherers in the various governmental sectors. The Mineral Resources Department and the Environment Department, which are responsible for impact assessment, do not share data.

Often global or regional data sets are not easily accessible in Fiji for varying reasons. Additionally, country-based resource managers, who would be more interested in interpretation rather than raw data, cannot obtain the types of data-derived products they require for natural resources and risk management. Similarly, in terms of future changes in risk management, there is no evidence that agencies maintain up-to-date databases of meteorological and climate data and sea-level projections that could be used for DRR and CCA purposes.

Gaps

- ***Poor scientific understanding and monitoring of hazards.*** Hazard-monitoring agencies are poorly resourced and lack technical skills. Monitoring networks are degraded and lack operational budgets. Agencies are uncoordinated, and there is little sense that their services are appreciated.
- ***Asset data and information is not made available for the purposes of assessing exposure to risks.*** These data are required to ensure effective management and planning. Current activities are largely ad hoc as data collection and information for risk reduction management is not a requirement or governmental strategy. The DRR and CCA programs have no rigorously documented socio-economic base to build from for risk assessment and reduction.
- ***Limited vulnerability mapping to guide development planning.*** This is a serious deficiency and a matter of urgency. It is likely to require donor support.
- ***Poor evidence of systematic use of climate change information for assessing future changes in risk,*** such as climate-related diseases or possible changes in flood frequencies. Socio-economic analyses of disaster impacts and future risks are fundamental to decisionmaking on risk reduction initiatives.
- ***Limited meteorological and hydrological datasets, databases, ecosystem monitoring, and information system management.*** Specifically, a unified and consistent data and information system for all the government sectors does not exist, and there are no channels of information exchange for government agencies. This is a matter of urgency and may need donor support.
- ***Shortage of technical and scientific resources at monitoring institutions.*** Although flooding is recognized as a priority area of disaster risk response, the sustainable collection and analysis of hydrologic data is not occurring.

Knowledge, data, and tools

The National Disaster Management Office leads the national effort in carrying out post-disaster damage assessments. Fiji also has access to the UN Disaster Assessment and Coordination Team. In the past Fiji could also call upon New Zealand and Australia for post-disaster airborne surveys.

The following is a list of Fijian Government departments and other organizations and institutions with the technical data provided within their areas of statutory responsibility and operational interest:

- ***Fiji Meteorological Services***–rainfall data, weather forecasting, climatology;
- ***Land and Water Resources Management Division***–drainage, irrigation, land use planning;
- ***Mineral Resources Department***–hydrogeology, seismology, engineering geology, coastal processes;

- ***National Disaster Management Office***–post-disaster damage assessments;
- ***Environment Department***–environmental impact assessments, waste management, pollution control;
- ***Divisional Engineer*** (Hydrology Section)–hydrological data;
- ***Fiji Land Information System***–land and remotely sensed information; and
- ***Ministry of Health and Fiji School of Medicine***–water- and vector-borne diseases.

Other external organizations, among the following, contribute biophysical and socio-economic information to Fiji Government, the private sector, and civil society:

- ***Secretariat of the Pacific Applied Geoscience Commission***–hazard and risk mapping, sea-level rise products, oceanographic information (including the IOC Global Ocean Observing System data), satellite and airborne data and imagery, coastal resources and processes data, water resource management information;
- ***Pacific Tsunami Warning Center***–tsunami warnings;
- ***Secretariat of the Pacific Regional Environment Program***–climate updates in collaboration with National Institute for Water and Atmospheric Research in New Zealand and other partners;
- ***World Meteorological Organization Global Climate Observing System***–regional climatological information;
- ***University of the South Pacific***–laboratory analyses, community vulnerability studies, professional development in disaster management and climate change;
- ***Secretariat of the Pacific Community***–pandemic awareness, germplasm center, land use planning; and
- Others, including Bureau of Meteorology Australia.

There is a strong body of hazard knowledge and historical hazard information available within each of the hazard-monitoring agencies in Fiji. The Fiji Government acknowledges that current hazard monitoring, data collection, and analysis tools are deficient and need strengthening. Much of available information is not readily accessible or transferable to other agencies. Government's concern is laid out both in the SEEDS 2008-2010 (Section 9.13) and the National Climate Change Policy Framework for Fiji (Section 6) of December 2007.

The hydrological monitoring network has become non-operable over the past decade. The Hydrology Section of the Public Works Department notes that its 2008 operational budget was halved from its 2007 allocation. And with a critical shortage of technical staff, a credible gauging and monitoring program has proven impossible to maintain. A 2007 EU-funded Navua catchment flood monitoring and warning project is not operating because the gauging station cannot be maintained. A similar prognosis exists for the 2008 HYCOS-funded Rewa catchment flood monitoring and early warning system.

The better-served meteorological network provides a regional service with support from the World Meteorological Organization and links to the Bureau of Meteorology in Australia and National Institute for Water and Atmospheric Research in New Zealand. However the Fiji Meteorological Service, in addition to its weak capacity, requires enhanced monitoring network and analysis tools to identify and quantify the increasing climate variability potentially associated with climate change.

The seismological monitoring network is degraded and does not have a 24-hour capability. The Japan International Cooperation Agency has identified a program to upgrade the network and monitoring capability.

Hazard monitoring of cyclones and earthquakes is done by national and international bodies. Cyclones are tracked by the Fiji Meteorological Services with the support of the U.S. National Oceanographic and Atmospheric Administration. Tsunami warnings are provided by the Hawaii-based Pacific Tsunami Warning Center.

Considerable time and resources have been placed on participation in a regional tsunami warning system. There is considerable professional opinion that believes this effort may be somewhat misdirected with respect to understanding the geotechnical vulnerability of the Fiji islands. There is some experiential evidence that the tsunami threat to Fiji will be from locally generated tsunamis, such as the 1953 tsunami. Tsunami, like the one that struck the Solomon Islands on April 2, 2007, had faster impact than the reaction time of any known early warning system.

Some risks and threats from climate change do not result from catastrophic events. Changes in biology —often slow and imperceptible to the naked eye, such as increasing aridity, marine sedimentation, coastal erosion, and altered ecology—require tools and programs for identifying trends over long-term monitoring rather than reacting precipitously to irreversible damage. Currently, such biophysical changes are not being monitored except for coral bleaching studies undertaken by the University of the South Pacific.

Support of decisionmakers is necessary to invest in long-term monitoring in order to assess trends and take precautionary steps to reduce the risks that may arise from potentially disastrous situations. Overall, monitoring of climatological, hydrological, and geophysical systems in Fiji is at a very basic level. More critical, systematic monitoring of policy implementation and/ programmed actions in and among governmental agencies is lacking. Overall, it is extremely difficult to ascertain whether DRR/CCA activities are achieving their desired outcomes.

Gaps

- ***Weak institutional and support arrangements, unsteady funding, and lack of coordination for hazard agencies.*** The importance of hazard monitoring to support sustainable development decisions goes widely unrecognized, although it is gaining recognition in the SEEDS. Support for hydrological and meteorological services is growing.
- ***Lack of technical or scientific expertise to observe and assess natural and human disaster events.*** There is an urgent need to provide national capacity to learn from all types of disaster events. Specifically, developing realistic hazard and vulnerability maps and assessment is required.
- ***Limited disaster mapping and assessment support.*** Ability to access land information and mapping capability or airborne platforms to carry out rapid post-disaster mapping and assessment needs to be improved. There is also need for adequately resourced remote sensing programs and expertise to interpret data.
- ***Limited integrated information systems for hazard data and analysis with GIS capability.*** There is limited ability to store, analyze, and map hazard data. Data availability in and among government agencies is an important input to decisionmaking on DRR and CCA issues.

Monitoring and evaluation

There is currently little or no monitoring or evaluation conducted by any government agency of risk reduc-

tion activities related to hazards or climate change. A number of objectives for environmental sustainability (including climate change) and for reducing vulnerability to disasters and risks are listed in the 2008-2010 Government strategy (SEEDS) but commitment to monitor or evaluate progress is lacking.

In addressing the institutional framework objectives for good governance under SEEDS, the Government should introduce performance budgeting, and monitoring and evaluation arrangements in order to measure progress against its commitments.

Awareness raising and capacity building

On the basis of regional and local experience, more emphasis should be placed on public awareness, education, and taking precautionary measures.

On-going DRM awareness programs, coordinated by the NDM Office, focus primarily on disaster management with some elements of family risk reduction. These program, as recognized by the NDM Office, need to be strengthened to include community exercises. The Suva-based, Pacific program director of The Asia Foundation/U.S. Office of Foreign Disaster Assistance thinks that there were two main problems related to the promotion of disaster risk reduction: (a) much of the awareness activities were conducted at the national level and were not filtering down to provincial and community levels, and (b) this was in part due to the lack of effective support for the NDM Office across government.

The main awareness raising effort in Fiji is the NDM Office-led annual National Disaster Awareness Week held in October at the beginning of the hurricane season. In 2007 this event encompassed a range of activities in 19 different centers throughout 3 of the 4 national administrative divisions. The budget for the event has been rather small: in 2007 the government budgetary allocation for its awareness activities was less than 2 percent of its annual budget.

Hazards are major socio-economic concerns to many governmental bodies, NGOs, and the tourism sector. These are often expressed in terms of identifiable threats such as sea-level rise, coastal erosion and deposition, food and water security (especially in terms of availability and quality), pollution of the marine environment, and the degradation of terrestrial and marine ecosystems.

The media in Fiji provide substantial coverage of disaster-related news. Awareness of potentially catastrophic situations in the Fiji water sector has not reached all levels of government and communities. Continued use of the media is an important tool in emphasizing risk awareness of the threat to water security by climatic variability and change, and then turning awareness into action.

An effort to mainstream DRR lessons into curricula has started in 6 pilot schools. The Fiji Schools of Medicine and Nursing have also introduced DRM courses to its second-year students. Over the past 12 to 13 years, The Asia Foundation/U.S. Office of Foreign Disaster Assistance has provided significant training to Fiji nationals. This package offers 6 training courses covering disaster management, damage assessment, and risk management; and another DRR course is being developed. The Asia Foundation/U.S. Office of Foreign Disaster Assistance has been running about 20 in-country courses with an average of 24 to 28 participants and has attracted Fiji participants who have attended 18 regional courses. This would equate to over 500 nationals being exposed to some form of awareness training. Regional organizations and NGOs, such as Fiji Red Cross and Live & Learn, also participate in awareness programs.

In terms of climate change capacity building, the University of the South Pacific, the region's largest tertiary institution located in Suva, initiated a CCA program in 1999. Aimed at capacity building for Pacific island countries, this PICCAP-funded initiative was conceived, developed, and initially delivered by the International Global Change Institute at the University of Waikato. The program provided courses for professional training, as well as post-graduate and undergraduate students. Subsequently, the program was suspended due to lack of scholarships to maintain a critical number of trainees, but was re-instated in 2008. Professional and technical support to the University of the South Pacific for development of new CCA courses and program delivery has been made available from the University of the Sunshine Coast in Queensland, Australia. The program still faces potential problems due to limited financial support for students from Fiji and other Pacific island countries.

Impediments

- ***Obtaining means to measure the effectiveness of public awareness efforts or to determine whether there has been any measureable behavioral change at the community level.*** For example, coastal communities aware of the risks to their lives and property can decide independently whether or not to pursue measures to reduce risks.
- ***Gathering funds to effectively bridge the gap between national and community awareness-raising initiatives.*** This needs to be addressed at all levels and may require initiating of innovative measures to fund community-based activities.
- ***Scholarships for CCA tertiary-level professional development and training.*** This is a regional problem and part of a greater capacity-building issue, and as such it should be addressed with appropriate donor support.

Coordination among donors and key stakeholders

The regional Pacific Partnership Network plays a useful information and coordinating role for disaster risk reduction. This SOPAC-facilitated network encompasses over 40 member agencies and has championed the development of National Action Plans and the Pacific Disaster Net, an improved disaster information system. Operationally, the Pacific Partnership Network has no power of decisionmaking, funding, or implementing. Project implementation is through the initiatives of individual members or groups.

A Regional Roundtable on Climate Change received attendance from donor organizations and the Council of Regional Organizations in the Pacific. Operationally, the Roundtable is viewed as an information exchange mechanism, but whose effectiveness has yet been assessed.

Over the past decades, AusAID and NZAID have been key bilateral donors for Fiji. Both of these donors have suspended assistance to Fiji after its last coup and as a consequence, several DRR/CCA activities are presently left unfunded. Australia was about to provide FJ$250,000 toward the formulation of a NAP, and New Zealand support was anticipated for a flood hazard mapping project; both of these activities now face implementation problems

At the regional level, the main DRR proponents are SOPAC and the UNDP Pacific Center. The CCA projects are initiated through the Secretariat for the Pacific Regional Environment Program and the UNDP country offices. Fiji also accesses DRR assistance and related environmental activities, including CCA related, through the Secretariat for the Pacific Regional Environment Program, Secretariat of the Pacific Community, University of the South Pacific, and other regional organizations. The major donors who make contributions to Fiji are the European Union,

the Global Environment Facility, the United Nations Development Program, the World Meteorological Organization, the World Health Organization, and The Asia Foundation/U.S. Office of Foreign Disaster Assistance. Of these organizations, the European Union has possibly emerged as the largest donor in the DRR area. Fiji continues to benefit from EU programs starting with the regional EDF8 reducing vulnerability program. The European Union is also a major donor in the Pacific Hydrological Cycle Observing System (P-HYCOS) program. Risk reduction and adaptation projects get their start from donor initiatives or regional programs such as the P-HYCOS.

The impact of flooding on food security has been identified as Fiji's top priority for the Pacific Adaptation to Climate Change funds. The Ministry of Agriculture (Land and Water Resource Management Division) will implement these funds. Support has been provided for studying the Navua and Rewa river basins. Work in these major basins has commenced as part of the P-HYCOS program. The New Zealand National Institute for Water and Atmosphere will execute this SOPAC-implemented initiative. Fiji Government has made subsequent requests to SOPAC for additional assistance with implementing further work in catchment hydrology.

The Japan International Cooperation Agency is a bilateral donor specifically supporting DRR initiatives and continuing support of other environmental initiatives in Fiji. About 10 years ago, Japan was the key donor in refurbishing the main meteorological facilities at Nadi Airport and has supported the seismological network in Fiji for a long time. More recently, Japan was involved in upgrading the monitoring systems in Fiji and Tonga and has supported the on-going river dredging program in Fiji.

Government agency representation and interests initiate requests or proposals for donor support for DRR/CCA activities. Specifically, the Department of the Environment represents Fiji's CCA interests at the Secretariat for the Pacific Regional Environment Program. The Mineral Resources Department and the NDM Office represent Fiji's DDR agenda at SOPAC. Other line ministries represent Fiji's interests through their own contacts with international bodies, such as the Ministry of Health with the World Health Organization. However, it is done with what appears to be minimal intra-governmental communication and coordination.

Regional organizations are also under-staffed and unable to service their member countries, such as Fiji, in a timely manner. For example, Secretariat for the Pacific Regional Environment Program has the services of just one person handling both the Global Climate Observing System and regional meteorological issues. Additionally, although SOPAC appears to be well resourced, it has to spread this capacity over some 14 countries; consequently, the Pacific island countries cannot fully rely on SOPAC as a substitute for the lack of in-country capacity. In some ways, the activities provided by donors and regional organizations mask the true nature of challenges being faced with DRR/CCA implementation in Fiji.

Possible areas of improvement:

- ***Donor awareness of Fiji's specific DRR and CCA needs.*** Apparently, over the past years there has been little evidence that donor support for DRR/CCA programs in Fiji has been addressing priority institutional strengthening, capacity building, and technical support issues. Donor support is urgently needed to address these issues of core risk reduction and climate change vulnerability and adaptation. The lack of donor attention to these core needs is probably influenced by Fiji's own lack of support for DRR/CCA initiatives, which are not listed among the island's priorities during bilateral aid negotiations.

- ***Sufficient absorptive capacity to take advantage of donor assistance.*** Some assistance provided to Fiji is unsustainable since the absorptive capacity of the country is weak. For example, professional and technical capacity is extremely limited, if not critical, within the hydrology services in the key area of Fiji's flood management. Hydrological measurement and analysis has been designated a low priority. The main focus of government action with respect to riverine flood control appears to be on dredging rather than up-land stream and land surface rehabilitation. This engineered approach is viewed as unsustainable: little effort is being made to control the erosion of excessively cleared slopes. A proper understanding of the rates of erosion and riverine siltation requires inputs of climatological, hydrological, and soil data, which is not readily available.

- ***Joined efforts by donors and their respective mandated agencies.*** The separation of DRR and CCA issues is perpetuated when donors continue to support different agencies whose own mandates are narrowly focused. The Pacific Partnership Network and the Climate Change Roundtable have promoted separate DRR and CCA development; as regional collective bodies, they could use their influence to address the issue of joining those two areas of concern.

- ***Regional leadership on sustainable development.*** The working group on Sustainable Development of the Council of Regional Organizations in the Pacific has been ineffective in promoting risk reduction activity as part of the sustainable development approach. This group should be responsible for active regional coordination, while it focuses on providing briefing and position papers. ❖

Opportunities for Investment

This assessment highlights the current country status, gaps, opportunities, and barriers related to national policies, strategies, plans, and activities, as well as with the enabling environment for a comprehensive risk management approach to natural hazards. It further focuses on the capacity to undertake a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. From Fiji's assessment, it is evident that the situation is a little more complex than in many of its Pacific island neighbors. While the enabling environment in terms of policies and regulations is reasonably well developed, the institutional arrangements are weak in giving effect to the policies. It is evident that commitments to meet international obligations and internal programs are not supported by current budget and institutional arrangements. Progress depends on the implementation of SEEDS.

Policymakers, sector officials, and various donors, and financial institutions have identified key institutional weaknesses relevant to planning and budgeting, as well as hazard monitoring for weather, climate, and flood. The Government might want to pursue any of these options with its own resources, with support from the international donor community, and/or international financial institutions such as the Asian Development Bank and the World Bank.

Awareness of the need for disaster risk reduction and climate change adaptation with new organizational arrangements appears widespread within the Government of Fiji. Disaster management and response also seem to have firm institutional and legislative basis as demonstrated by the many agencies and actors engaged throughout the country that have some role related to disasters and climate change. However, there are critical and systemic institutional weaknesses that with the proper enabling environment provide an opportunity for strengthening and mainstreaming DRR and CCA initiatives.

Prerequisites for an enabling environment are centered on addressing accountable performance budgeting, encouraging broader participatory planning, ensuring high-level inter-sectoral coordination and leadership, and demonstrating national commitment through the realistic allocation of national budgets. At the heart of Fiji's DRR and CCA effort, the Ministry of Finance and Planning requires well-planned strengthening and capacity building. Without this, all DRR and CCA efforts in Fiji would continue to be ad hoc and deprived of leadership. This role would be further strengthened if it were implemented in parallel with implementing SOPAC-issued Comprehensive Hazard and Risk Management guidelines.

As is common in many countries, Fiji could improve its communication and operational links, as well as its central system for information management, storage, and access. The country has a number of information system models such as Fiji Land Information System based in the Lands Department; unfortunately, they are as yet too narrowly used and data-focused. It would be advisable to build an integrated all-hazards information system and tools (with GIS capability).

Opportunities also exist for addressing critical gaps in awareness raising and encouraging behavioral changes at the community level. As a reaction to the most recent disaster, flood mitigation and related concerns of greater food security emerged as a country priority. Fiji has identified this as top priority for support from the GEF Pacific Alliance for Sustainability and GEF Pacific Adaptation to Climate Change. As in other countries, the need for risk reduction instruments, such as the enforcement of improved building codes, is highly necessary; but might be better addressed through some regional initiative.

Not unique to Fiji but definitely critical to any sustainable DRR/CCA implementation is the issue of capacity both in terms of human skills and resources,

as well as technical institutional capacity. Short-term challenges lie in the broader area of climate-related risks and, more specifically, in the water sector. The hydrological services in Fiji are under-resourced and verge on being dysfunctional. Without a sustainable hydro-meteorological service, the country remains extremely vulnerable, putting sustainable development and food and community security at risk. Finally, another priority issue should be the strengthening of the Fiji Hydrological and Meteorological capability.

Annex A expands on the three main proposals for opportunities to support DRR and CCA programs in Fiji. The tables provide preliminary information on indicative costs, timeframes, and first-order actions and tasks. This information should be sufficient for the development of detailed proposals and terms of reference for possible further investment opportunities. ❖

Annex A. Proposals for Support to Fiji

Proposal	**F1 Strengthen Integrated Hazards Information System and Tools (with GIS capability)**				
Country/sector	**Fiji: Hazards advisors and sector users**				
Goal and purpose	**To inform and promote risk reduction decisions through information sharing and sound data management, analysis and presentation**				
Scope	**National**				
Lead agency	**To be determined with Ministry of Lands and the NDM Office**				
Cost and duration	**US$220,000 over 12 months**				
Hazards targeted	***Risk reduction measures***	***Key gaps/Barriers***	***Tasks***	***Cost US$k***	***Time-frame***
Wind, storm surges Sea-level rise Climate change extreme events Coastal inundation and erosion Fire Droughts, Fresh and marine waters pollution Pandemics	Evaluate and map hazards Assess risks and map vulnerability Map assets and assess critical infrastructure Monitor environmental changes and increased exposure to risks	Generally weak information management systems in most agencies and no Information System Management policies. Much historical hazard information is still hard-copy based. Limited capacity for information system management Weak hardware and software computing capacity Limited tools and models for resource managers	Provide technical assistance support (8 person months) for development of an integrated hazards information system including: – Development and adaptation of a Hazards Information Policy addressing: • data sharing and availability • single GPS datum/projection system for Fiji • catalog of data to be held • datasets to be made available digitally – Assessment of data needs and products for DRR/CCA – Identification of long-term storage requirements, analysis tools and mapping needs – Acquiring appropriate computer hardware, software and high-speed Internet connection – Supporting capacity building through populating information system with available historical data and undertaking vulnerability mapping and risk modeling and for climate change& risk prediction Fiji Government to ensure sustainability through annual recurrent budget for data & image acquisition, hard/software maintenance, and communication access costs	160 30 30	Year 1 Year 2 Year 2

Continues

Annex A. Proposals for Support to Fiji *Continues*

Proposal	**F2 Strengthen Risk Reduction Policy, Planning, and Budgetary Arrangements – SEEDS 9.13 Objectives**				
Country/sector	**Fiji: Planning, Finance, Climate Change, Disaster Risk Management**				
Goal and purpose	**Country policy**				
Scope	**To promote the mainstreaming of risk reduction initiatives, through strengthened policy, decisionmaking and funding frameworks**				
Lead agency	**Ministry of Finance and National Planning with Dept. for Environment and Ministry for Province Development**				
Cost and duration	**US$250,000 over 10 months**				
Hazards targeted	***Risk reduction measures***	***Key gaps/barriers***	***Actions and tasks***	***Cost US$k***	***Time-frame***
All hazards	Hazard and Climate Change risks assessed Policy frameworks developed for decision-making Planning and budgeting mechanisms addressing risk reduction issues through all sectors	Risk issues not on political or departmental priorities Departmental barriers Skills in risk management lacking	Provide technical assistance support for: – Review of the hazard profile of Fiji and the potential effects of climate change in exacerbating climate risks – Development of a policy framework for a whole of government mechanism for addressing risk as a development issue within sector planning and budgeting. Complete the review of the NDMP and the Act and address the integration of DRR and CCA – Strengthening Ministry of Finance and National Planning capacity for understanding and bringing a focus to this issue – Strengthening political and departmental awareness of hazard risk issues and how to reduce them, in order to enhance sustainable development	50 100 70 30	2 months 4 months 2 months 2 months

Annex A. Proposals for Support to Fiji

Proposal	**F3 Rationalize and strengthen the hydrological and meteorological capability for Fiji**				
Country/sector	**Fiji: Hazards monitoring and advice**				
Goal and purpose	**Functional and coordinated hydro-meteorological capability, by strengthening and rationalizing hazards monitoring and advice capacity to inform CCA and DRR issues**				
Scope	**National and related to HYCOS and Meteorological Office review**				
Lead agency	**National Environmental Council, with Fiji Meteorological Service, Ministry of Works**				
Cost and duration	**Phase 1 US$1.25 million over 2 1/2 years, Phase 2 US$3.0million to follow**				
Hazards targeted	***Risk reduction measures***	***Key gaps/barriers***	***Actions and tasks***	***Cost US$k***	***Time-frame***
Cyclone Storms Flooding Tsunami Wave surge Coastal inundation Drought – including climate change effects for all these hazards	Improve monitoring network for weather, rivers and climate change Improve capacity for hazard advice Improve arrangements for managing the services	Inadequate monitoring networks to provide credible data Inadequate institutional arrangements to support a credible service Insufficient capacity and resources to manage the networks Insufficient capacity to develop advice to inform DRR/CCA issues	Review the meteorological and hydrological monitoring networks and identify minimum requirements to inform weather, hazard management and climate change needs Review and develop institutional arrangements to support a credible and sustainable level of service Implement institutional arrangements Identify and provide for necessary systems and tools to support the service Enhance the meteorological, hydrological and climate change networks to the minimum required level	*Phase 1* 150 100 500 500 *Phase 2* 3,000	Year 1 Year 1 Year 2 Year 2 Year 3

Annex B. Project Team and People Consulted

Project team

Alf Simpson	Consultant, Australia
Graham Shorten	Consultant, Australia
Richard Warrick	Consultant, New Zealand

People consulted (Country visit, March 11-14, 2008)

Salomone Karusi	Acting Director, NDMO
Manasa Vaniqi	PS Min of Provincial Development and Multi Ethnic Affairs
Epeli Nasome	Director, Dept of Environment
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Waisea Quminikelo	Principal Administrative Officer, Emergency Coordination, NDMO
Colin Simmons	Principal Agricultural Officer, Land and Water Resources Management Division
Mukesh Chandra	Executive Officer ,Mineral Resources Department
Gulab Chandra	Administrative Officer, Mineral Resources Department
Emosi Davetanivalu	Economic Planning Officer, National Planning Office
Viliame Tuimanu	Administrative Officer, Policy Research Risk Management, NDMO
Jope Sadranu	Medical Officer, Ministry of Health
Eliki Malodali	CCD Commissioner Central
Lagisoa Delana	Tailevu, Provincial DISMAC
Manoa Malani	Director, Tourism
Rajendra Prasad	Director, Fiji Meteorological Services
Ana Vesikula	Director, Development Services, Min of Provincial Dev
Pajiliai Dobui	Risk Manager Policy Research, NDMO
Joeli Rokovada	Commissioner, Western Division, Fiji Government
Lloyd Smith	Water Sector Advisor, SOPAC
Peni Bava	Acting Hydrologist, Hydrology Section, Ministry of Works
Ravindra Gopal	Technical Assistant, Hydrology Section, Ministry of Works
Joeli Cawaki	Director NDMO (July 08)

References and Select Bibliography

ADB (Asian Development Bank). 2005. *Fiji Islands: Country Environmental Analysis*.

ADB. 2004. *Pacific Region Environmental Strategy 2005-2009. Executive Summary.*

Bettencourt, Sofia, Richard Croad, Paul K. Freeman, John Hay, Roger Jones, Peter King, Padma N. Lal, Alan Mearns, Geoff Miller, Idah Pswarayi-Riddihough, Alfred Simpson, Nakibae Teuatabo, Ulric Trotz, and Maarten van Aalst. 2006. *Not If, But When – Adapting to Natural Hazards in the Pacific Islands Region – A Policy Note*. Pacific Islands Country Management Unit, East Asia and the Pacific Region, World Bank.

GEF (Global Environment Facility). 2008. *GEF-Pacific Alliance for Sustainability - Program Framework*.

GEF/UNDP. 2006. *Pacific Adaptation to Climate Change. Fiji Islands, Report of In-Country Consultations*.

Geoscience Australia. 2008. *A Natural Hazard Risk Assessment of the Asia Pacific Region*

Government of Fiji. 2008. *National Disaster Management Office Presentation:* 2007 Performance Assessment Workshop, MPD Conference Room, 21-22 January 2008

——. 2007a. *Fiji Tourism Development Plan 2007-2016: Tourism - Fiji's Opportunity.*

——. 2007b. *National Climate Change Policy Framework for Fiji*.

——. 2007c. *Sustainable Economic and Empowerment Development Strategy (SEEDS) 2008-2010*.

——. 2006. *Strategic Development Plan 2007-2011: Maintaining Stability and Sustaining Growth to Achieve a Peaceful, Prosperous Fiji*.

——. 2005. *Environment Management Act 2005*

——. 2005. *Fiji Islands Initial National Communication under the UNFCCC*

——. 2005. *Fiji Climate Change Policy Paper for Fiji - Adapting to Climate Change, Variability and Sea Level Change: Planning for the Future*.

——. 1998. *National Disaster Act 1998*.

——. 1995. *Disaster Management Plan 1995 (DMP)*.

McKenzie, E., B. Prasad, and A. Kaloumaira. 2005. *Economic Impact of Natural Disasters on Development in the Pacific. University* of South Pacific.

SOPAC. 2007. *Integrated Water Resources Management in Pacific Island Countries- A Synopsis* – and related Country Diagnostic Reports.

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**In bold, GFDRR Donors*

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

REPUBLIC OF KIRIBATI COUNTRY ASSESSMENT

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

THE WORLD BANK

SOPAC

Acronyms and Abbreviations

AusAID	Australian Agency for International Development
CCA	Climate change adaptation
CCST	Climate Change Study Team
DCC	Development Coordinating Committee
DRM	Disaster risk management
DRR	Disaster risk reduction
ECD	Environmental Conservation Division of MELAD
EEZ	Economic exclusive zone
EIA	Environmental impact assessment
ENSO	El Niño Southern Oscillation
EU	European Union
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
GoK	Government of Kiribati
HYCOS	Hydrological Cycle Observing System
KAP	Kiribati Adaptation Program (I and II)
KSDP	Kiribati Sustainable Development Plan
M&E	Monitoring and evaluation
MELAD	Ministry of Environment, Lands and Agricultural Development
MEYS	Ministry of Education, Youth and Sport
MFED	Ministry of Finance and Economic Development
MFMRD	Ministry of Fisheries and Marine Resource Development
MISA	Ministry of Internal and Social Affairs
MOP	Ministry Operational Plan
MPWU	Ministry of Public Works and Utilities
NAP	National Action Plan for DRM
NAPA	National Adaptation Plan of Action for CCA
NASC	National Adaptation Steering Committee
NGO	Nongovernmental organization
NIWA	National Institute for Water and Atmospheric Research of NZ
NWSCC	National Water and Sanitation Coordination Committee
NZAID	New Zealand Agency for International Development
OB	Office of *Te Beretitenti* (Office of the President)
PICCAP	Pacific Islands Climate Change Assistance Program
SAPHE	Sanitation, Public Health, and Environment Improvement Program
SNPRA	Strategic National Policy and Risk Assessment (Unit)
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
SPSLCMP	South Pacific Sea Level and Climate Monitoring Project
UNFCCC	United Nations Framework Convention on Climate Change

Contents

Introduction

The World Bank policy note "Not If, But When" shows the Pacific island countries to be among the world's most vulnerable to natural disasters. Since 1950, natural disasters have directly affected more than 3.4 million people and led to more than 1,700 reported deaths in the Pacific Islands Region (excluding Papua New Guinea). In the 1990s alone, reported natural disasters cost the Region US$2.8 billion (in real 2004 value). The traditional approach of "wait and mitigate" is a far worse strategy than proactively managing risks. The Hyogo Framework for Action (HFA) 2005-2015 lists the following five key priority areas for action:

(1) Ensure risk reduction is a national and a local priority with a strong institutional basis for implementation;
(2) Identify, assess, and monitor disaster risks and enhance early warning;
(3) Use knowledge, innovation, and education to build a culture of safety and resilience at all levels;
(4) Reduce underlying risk factors;
(5) Strengthen disaster preparedness for effective response at all levels.

This assessment report represents a stocktaking exercise to review the extent to which disaster risk reduction (DRR) and climate change adaptation (CCA) activities have progressed in Kiribati. It identifies gaps or impediments that hinder achieving the HFA principles and identifies opportunities for future DRR/CCA investment that would be timely, cost-effective, and implementable within a three-year timeframe. The focus is on risk reduction, rather than post-disaster recovery and response. While some specific sector activities are addressed in the assessment of Kiribati national and local government policies and institutional arrangements, the Kiribati report does not provide a comprehensive summary of sector-by-sector activities. Instead, it refers to other reports that have covered this and complements these with suggestions for taking the necessary steps.

The goal of the report is to deepen the understanding in the gaps, opportunities, and needs at the national level toward stronger operational disaster and climate risk management in the Pacific islands and to link closely to other ongoing and future efforts by other donors and stakeholders (such as SOPAC regional initiatives following the Madang Framework and the National Action Plans) to ensure synergy and avoid duplication. The assessment focuses on practical, proactive measures that Kiribati can take to inform its national development policies and plans and to strengthen its capacity to reduce the adverse consequence of natural hazards and climate change, as it relates to risk reduction. The linkage of these two areas mainly includes managing the impacts of extreme weather events, variability in precipitation such as storm surges and sea-level rise.

This assessment highlights aspects such as the current country status, gaps, opportunities, and barriers related to (a) national policies, strategies, plans, and activities to manage natural hazards; (b) the enabling environment for a comprehensive risk management approach to natural hazards; and (c) the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. It also reviews and identifies the need for informed policy choices, improved decisionmaking processes, strengthened regulations, and legislative and policy changes required to support proposed country-level activities.

With respect to achievement of the first HFA principle, there is clear evidence of systemic difficulties among many Pacific island countries in establishing an enabling environment and promoting a cross-sector focus for DRR and CCA activities. Since the available evidence shows that ad hoc and externally driven approaches have not provided satisfactory results so far,

the HFA emphasis upon a strong government commitment and action is one of the primary and early challenges to be surmounted in achieving goals of the International Strategy for Disaster Reduction.
World Bank experience in countries with similar challenges shows that, while it is important to have a clear long-term vision, given the institutional, financial, and resource constraints, more modest "bottom up" approaches tend to have better results. Also, taking existing investment programs and incorporating simple key DRR/CCA elements demand relatively fewer efforts and resources and yield results that can lay the foundation for more complex, follow-up stages. Getting stakeholders to coordinate their activities in line with the 2005 Paris Declaration on Aid Effectiveness also appears to be relatively easier with such a modest starting point than with formal efforts aimed at overall "top down" coordination.

This Kiribati assessment begins by explaining the context of the country in relation to disaster risk reduction and climate change adaption. It follows with sections on the Key Country Findings and Detailed Country Assessment that focus on some key components relevant to HFA achievement: adopting and mainstreaming policies, data and knowledge, risk and vulnerability assessments, monitoring and evaluation, awareness raising and capacity building, planning and budgetary processes, and coordination. From this assessment, possible opportunities for addressing the identified gaps and needs within the HFA are presented in the final section. Some potential opportunities for future support are proposed in Annex A.

Funding for this assessment was provided by the Global Facility for Disaster Reduction and Recovery (GFDRR), which is a partnership with the UN International Strategy for Disaster Reduction (ISDR) system supporting the Hyogo Framework for Action. Other partners that support GFDRR work to protect livelihoods and improve lives include Australia, Canada, Denmark, European Commission, Finland, France, Germany, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, USAID Office of Foreign Disaster Assistance, and the World Bank. ❖

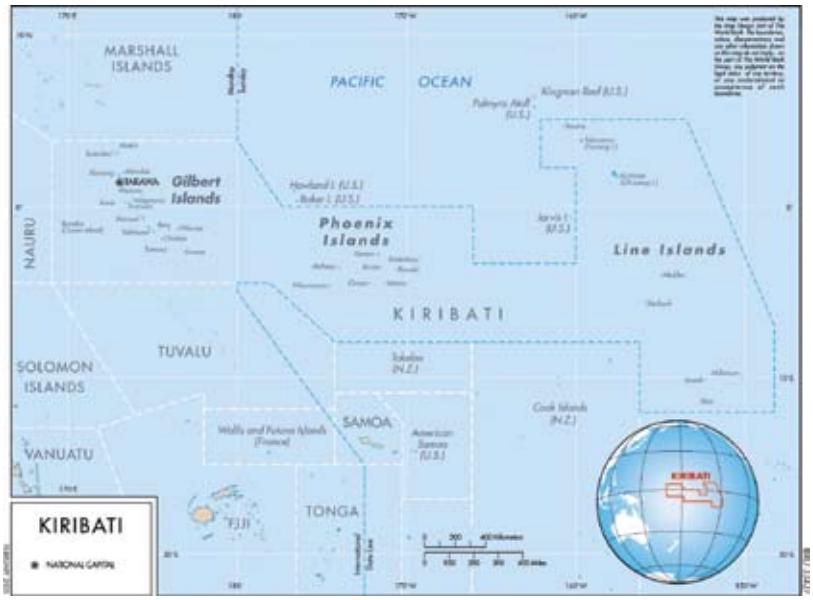
Country Context

The Republic of Kiribati comprises 32 low-lying coral atolls, which are divided into 3 main island groups—the Gilbert Group to the west, the central Phoenix Group, and the Line Islands to the east—and the oceanic island, Banaba (Figure 1). Kiribati is broadly situated in the dry belt of the equatorial oceanic climatic zone with an average mean temperature of 29°C. Rainfall varies from 1,000 millimeters per year in the south to 3,000 millimeters per year in the northern group. Due to its specific geographic location spanning the equatorial belt, Kiribati generally escapes the major climate-related threat of cyclones. However, the relatively small size of its islands means it is highly vulnerable to most climate-related hazards. The limited information base does not allow a definitive assessment of any geologic hazards to which Kiribati may be prone.

Its total land area is about 811 square kilometers within an equatorial economic exclusive zone (EEZ) of some 3.6 million square kilometers spanning the Central Pacific.[1] Of the estimated Kiribati population of 95,000 in 2005, over 90 percent lived in the Gilbert Group, mainly on Tarawa atoll, the capital and commercial center of Kiribati. The combination of unsustainable population growth, environmental degradation and the exploitation of scarce and fragile natural resources has exacerbated the already high physical vulnerability of low-lying atolls. This is particularly noticeable in South Tarawa.

There are several resource and environmental issues, common to island nations, affecting sustainable development in the Republic of Kiribati. These include climate variability and sea-level rise, environmental degradation and pollution, and resource management. More specific challenges to sustainable development include coastal erosion, water quality, water availability, and sanitation. Sustainable management of resources such as aggregate, terrestrial, and offshore minerals and renewable energy are other issues that impact on Kiribati's quest for development.[2] ❖

Figure 1. Map of Kiribati.



[1] EEZ as defined by UNCLOS (United Nations Convention on Laws of the Sea) Pt 5, Article 55.
[2] Summarized from SOPAC Kiribati Country Profile.

Key Country Findings

Among the Pacific island countries, Kiribati is unique in terms of the effort and process being followed to address the impacts of natural disasters and climate change. While many countries have started to develop a National Action Plan (NAP) for Disaster Risk Management (DRM) and/or a National Adaptation Plan of Action (NAPA) for CCA, Kiribati is now at the stage where it is implementing the second stage of the Kiribati Adaption Program (KAP II), its national adaptation strategy.

The DRR/CCA process through the KAP and the NAPA in Kiribati has a built-in mechanism for review and possible readjustment. Following are some of the findings from this assessment and the KAP process:

- ***Process is lagging.*** The KAP process commenced with much to commend the governance structure, coordination mechanisms and, most of all, the leadership. The focus, plans, and strategy appeared to be of sound design. However, progress is not as fluent, delivery is a bit more difficult, and implementation is falling behind. As issues become more technical, the management, direction and timing of the process presents a not unexpected challenge for the generalist leadership. Coordinating the existing expertise and capacity in the various ministries worked well in the early planning stages and still does in the case of normal bureaucratic oversight. However, DRR/CCA mainstreaming requires more than just accepting a defined process; it demands some capacity to deliver on the technical and scientific substance in several key areas.
- ***Capacity is inadequate.*** One key over-riding weakness is an absence of critical human resources and experience. How skills, expertise, and absorptive capacity will be addressed is critical at several levels of the KAP process such as mainstreaming, coordination, and taking an integrated and holistic approach to CCA and DRR. Looking to the future of sustainability, the KAP approach could be more of a challenge when upscaling is required. There is a feeling there might be too much activity for the limited in-country capacity to manage. All the usual concerns about coordination, sequencing, value-adding, and sustainability post-project life seem to apply.
- ***Information systems are weak.*** There are basic technical and scientific weaknesses that affect data, knowledge and information systems in terms of quality, depth, and geographical coverage. Physically, Kiribati is one of the most vulnerable countries where small threats or small incremental changes are likely to have a disproportionate impact. There is no room for error in using trends based on limited data or good guesses about climate change, and neither is ballpark figure modeling acceptable for future planning.
- ***Donors are supportive.*** The Kiribati effort does not lack for external support from donors. The Government does not appear to apply oversight and control of all the external assistance. There is no question of the need for the donor support. It is the effectiveness and the question of sustainability that is the issue.

A summary of the country situation and the gaps or impediments that lead to effective risk reduction, which justify the selection of these opportunities, is presented in Table 1. The opportunities for Kiribati are further discussed in the final chapter.

Table 1. Summary of Key Gaps and Opportunities for DRR and CCA for Kiribati

Situation	Gap	Opportunities
Current involvement in DRR by the various ministries appears to be project based rather than issues related.	Risk mapping not integrated into planning process.	Develop whole-of-government, simple DRR arrangements, coordinated with CCA activities.
Potential importance of data and information system management already recognized within Government. Risk data seen as of paramount importance to most institutions but are fragmented and often too difficult to coordinate.	Lack of knowledge concerning hazard/risk zones. Lack of a robust, fully operational, and a whole-of-government information management system (currently only one map server based in a single ministry and a sprinkling of IT persons with some short-term training).	Develop a comprehensive GIS spatial mapping base for recording geographic hazard and oceanographic data.
Access to technology and specifically airborne or space platforms is not readily available to carry out long-term monitoring or the short-term post-disaster mapping and assessment. Current successes in access have been largely due to SOPAC support. Several global ocean observing systems are operating across the Pacific but products are not being transferred to Kiribati.	Lack of a common geographic information database across departments. Mechanisms to collect, collate and interpret data and information is ineffective or absent. Lack of basic climate and hazard data collection capabilities.	Promote mechanism to collect key data, and map onto a GIS-based system.
Critical deficiency in scientific human resource capacity and whole-of-government information management systems is common to all areas of Government assessed. Mistaken notion that IT expertise is equivalent to GIS or other information system expertise.	Required experience or minimum human resources in the various ministries to manage the numerous projects is lacking. Lack of capacity to assess risks from natural hazards.	Develop a facility for developing risk maps and assessments for all relevant hazards.
Central authority needed for updating data and informing users.	No single entity is in charge of knowledge products relevant to DRR and CCA.	Build a qualified and experienced cohort in a central authority capable of sustaining and promoting the spatial database. Ensure a national capability to replicate data to different IT-based systems in line ministries and other interested NGOs.
Low sustainability of projects after the (externally supported) life of the project ends is a major risk.	Major challenge presented by the low absorptive capacity of the GoK to coordinate and implement the large suite of externally supported projects.	Develop key and sufficient skills and experience.
Donor coordination and leadership is required to ensure better-focused, better-designed, and better-sequenced assistance	Lack of coordination of external forces promotes environment of information hoarding.	Develop information system and meta-database for not only storing information and data but for sharing lessons between all stakeholders, including donors & CROP.

Detailed Country Assessment

At the outset it should be stated that, among the Pacific island countries, Kiribati has a higher-than-average level of awareness with regard to potential climate change and associated issues. This is as a result of the significant number of studies, communications, and CCA projects generated over the past 15 years that have provided opportunities to consult with the general population and provide directions for the way forward.[3] This heightened awareness however does not necessarily equate with knowledge, leading to understanding, and most of all, to implementation of adaptation or risk reduction measures.

Identification, assessment, and monitoring risks

The main risks for low-lying atoll nations such as Kiribati are assessed to be those arising from sea-level rise, coastal erosion and inundation, droughts, saline intrusion, and ecosystem degradation.

Earthquakes. Kiribati is located within the more stable center of the Pacific tectonic plate, which in theory reduces the likelihood of damaging geological hazards such as earthquakes. There is little public information however on the seismological history of the relatively geologically young Kiribati atoll chains. Data from the SEAFRAME tide gauge installed at Betio provides information on recent (vertical) movements of Tarawa atoll. Currently, it appears from the Continuous Geographical Positioning System results that the island of South Tarawa at Betio is showing a slight emergence (+0.1 millimeters per year) but is essentially vertically stable with respect to the International Terrestrial Reference Frame, within the present uncertainties of measurement given the relatively short-time frame since installation in 2002.

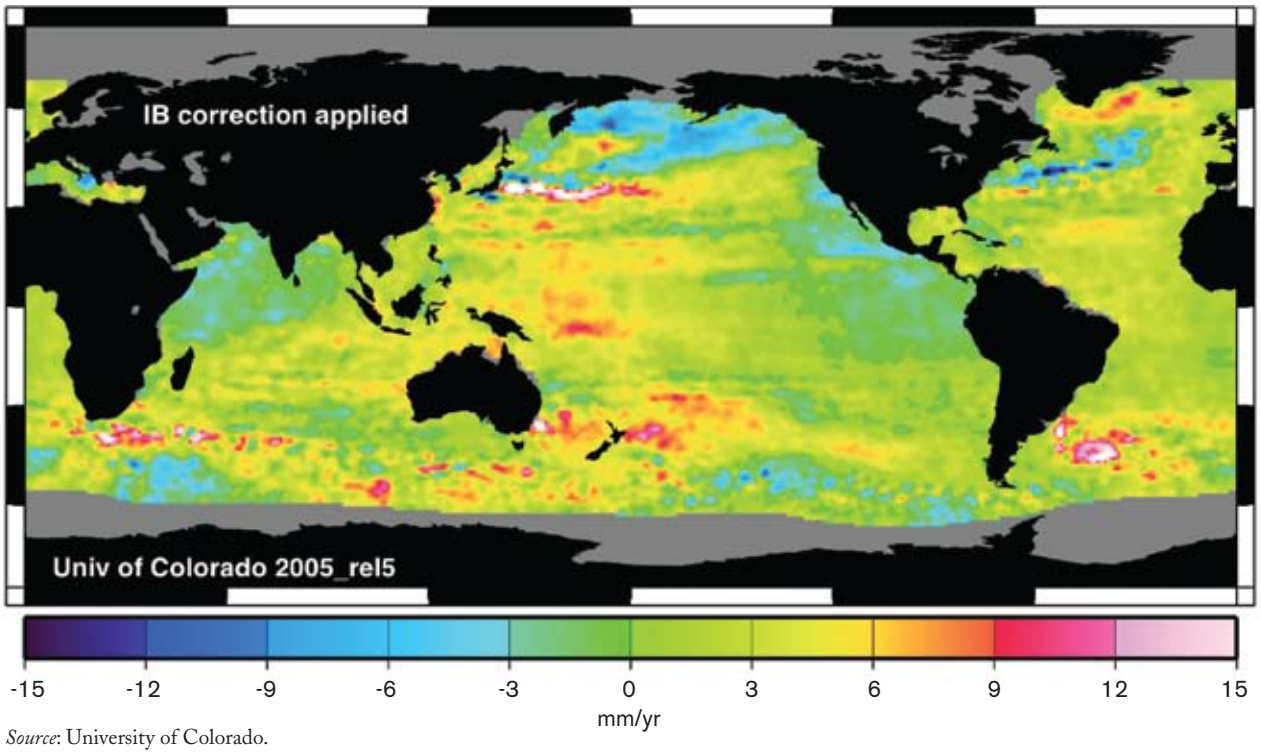
Unpublished information[4] from geologic mapping indicates relative emergence of the eastern end of South Tarawa relative to the western end where the Betio tide gauge is located, suggesting recent tilting of the atoll and possibly active tectonism as has been put forward by Dr. Loren Kroenke of the University of Hawaii.[5] There is untapped geological knowledge available in the form of storm or tsunami deposits on Tarawa (and probably other islands) that could give indications as to the long-term frequency and severity of potentially disastrous events. This indicates the need for better understanding of the geology and geomorphology of the atolls of Kiribati before the threat posed by critical geologic hazards can be properly assessed.

Sea-level rise. The fact that the country is largely made up of atolls just a few meters above mean sea level increases the possible threat from ocean- or climate-generated hazards. The figure often used for sea-level rise on Tarawa is +4 millimeters per year or just less than 34 centimeters rise over the last 100 years.[6] A number of longer-term records are available in the Joint Archive for Sea Level Data from gauges at Tarawa, Kiritimati, Fanning, and Kanton islands. Most have less-than-adequate survey control and precision and, in fact, give inconclusive results as widely varied as -3.78, +0.80, +3.15, and -0.43 millimeters per year.

The net relative sea-level trend estimated as of June 2006 by the South Pacific Sea Level & Climate Monitoring Project (SPSLCMP) from the SEAFRAME gauge at Betio, taking into account inverted barometric pressure effect and vertical movements in the observing platform, is currently +5.3 millimeters per year. However, the authors who reported this trend are careful to warn that, even though the survey quality is well controlled and of high precision, this sea-level

[3] 1993 National Environmental Management Strategy, PICCAP, UNFCC 1st National Communication (1999), Kiribati Adaptation Projects (KAP I & II), ADB 2006 Country Environmental Analysis, and the 2007 National Adaptation Plan for Action.
[4] Dr. G.G. Shorten, personal communication.
[5] Dr. Loren Kroenke, personal communication.
[6] Kiribati NAPA (1999).

Figure 2. Regional Rates of Sea-Level Change as Measured by Satellite Altimeters, December 1992 to August 2005



Source: University of Colorado.

record is relatively short, and it is still too early to deduce a long-term trend.

The sea-level trends from SEAFRAME stations are mostly higher than the global average rate derived from satellite altimetry (+2.9 millimeters per year) but are consistent with the map of regional satellite altimetry sea-level trends (Figure 2) adopted from the SPSLCMP report. Global mean sea-level change during this time has not been geographically uniform, and continued monitoring is necessary. For example, sea level has risen at higher rates in the Southwest Pacific region and has fallen in the Northwest Pacific due to a basinwide decadal 'slosh' in the Pacific Ocean.

Droughts. Droughts are one of the main climate-related risks. In addition to rainwater harvesting the primary source for water supplies is from the narrow, shallow, and often fragile groundwater lenses. The recharge of these lenses and therefore their viability as community water sources are directly related to rainfall recharge. Rainfall variability is linked to ENSO events, which have a major impact on water availability on the atolls. Specifically, El Niño events are associated with high rainfall and more secure water supply in Kiribati. The reverse situation is linked to periods under La Niña.

Severe, prolonged droughts are common in the drier islands in the central and southern equatorial region (e.g., the Gilberts, Banaba, the Phoenix Islands, and Kiritimati). As a result, the tools required for better climate modeling and rainfall prediction become extremely critical. The ability to use the regional climate models to provide predictions specifically for drought becomes very important. However, their utility to date in the outer islands is untested. There are plans as part of KAP II to upgrade the meteorological equipment and network to assist improve climate and rainfall data.

Groundwater aquifers and particularly the water lenses on small atolls are very complex, three-dimensional bodies. Understanding the critical hydrogeological parameters is essential for sustainable water resources management. Apart from the water lenses at Bonriki and close by at Buariki on North Tarawa, there is little knowledge of the sustainable yield and development potential of groundwater elsewhere in the country. It is uncertain whether this assertion also applies to the other major population center, Kiritimati Island.

Coastal erosion and inundation. On small atolls the loss of land due to erosion or inundation from the sea is a major threat. Quantitative coastal change modeling on South Tarawa might have been possible from a relatively long (20-year plus) beach-profiling program conducted by the Lands Department. However, it was reported that this exercise has recently stopped, and there are now questions raised about the reliability and accuracy of the surveying data.

The 33 islands of Kiribati, spread as they are over one of the largest exclusive economic zones in the world, make the use of airborne or satellite remote sensing extremely practical both as a mapping and a monitoring tool. The oldest air photos used, particularly for coastal change assessments, are no earlier than 1969. Air photos from World War II are also a possibility but have been difficult to obtain. Satellite imagery used in recent work carried out by SOPAC has been shown to be very useful particularly in mapping the impact of coastal erosion and stability. However, it comes with the usual constraints of imagery acquisition and the requisite specialist interpretative skills base. Recently some air photo analysis was carried out on Tarawa and the 4 outer islands of Abiang, Abemama, Butaritari, and Onotoa. Apart from geology, the other weak area is in regard to oceanographic information. There are several global ocean-observing systems operating across the Pacific, but the products are not as yet being transferred to Kiribati.

A Kiribati map server was established by SOPAC in its focal point government ministry, Ministry of Fisheries and Marine Resource Development (MFMRD), and apparently contains data for 7 atolls.[7] This country assessment was not able to ascertain how well used and maintained it is.

Disaster records. In recent times storm surges, coastal erosion, droughts, and pandemics have been perceived as having the greatest impact on the country. In the last 50 years of global records the only disasters listed for Kiribati have been the coastal impacts of Cyclone Bebe in 1972, the 1977 Cholera outbreak, and the drought from May 1998 to March 1999.[8] These 3 reported major disasters do not reflect the perception within Kiribati where frequent disasters having regular impact on individual islands and communities present a picture of a much more disaster-prone nation.

Climate modeling. Despite apparent awareness of the risks associated with climate-related hazards, it is questionable whether there is any in-depth knowledge and understanding underpinning projections of future risk. In the absence of long and reliable data sets and better scientific understanding, realistic future scenarios become difficult to formulate. There are however, a few site specific studies mainly on Tarawa that are often used as the basis for predictions.[9]

Locally, a great deal of emphasis is placed on traditional knowledge and often referred to in the absence of long-term monitoring and data. The prediction of strong "westerlies" in December and January is an example of one such prediction based on traditional knowledge.

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[7] Kiribati MapServer website, http://map.gov.ki.

[8] EMDAT data, World Bank (2006). Kiribati is not prone to cyclones so Cyclone Bebe probably refers to impacts on Tuvalu when both countries were part of the Gilbert & Ellice Islands.

[9] Summary results from KAP II PAD of 1999-2000 World Bank-funded study in Annex B.

Possibly the longest national monitoring program has been that carried out by the Meteorological Division with both upper air and surface observing systems in Tarawa. There is some limited surface observing capabilities on Banaba and on 6 other atolls. Whether these data sets are useful enough for water resources and coastal zone management on the outer islands remains to be seen. Kiribati is a participant in the regional Island Climate Update Network and is also a user of climate prediction models such as those linked to Bureau of Meteorology of Australia and National Institute for Water and Atmospheric Research of New Zealand (NIWA).

As part of KAP II, some significant progress has been made on the development of information for climate change management focusing on reports and use of a NIWA calculator for wave climate and rainfall over decadal periods.

Gaps

In general, development of the knowledge base required for natural and climate-related hazard assessment requires broader skills and stronger experience base than that which presently exists.

- ***"Gaps in data and in knowledge about the atolls contribute significantly to the difficulty faced in trying to identify options for adaptation,"*** as stated in the Kiribati first UNFCC Initial National Communications (1999). It further states, "Gaps in data and knowledge could misdirect policies towards different focus from areas which when given attention can ensure long term benefits to the economy and environment."
- ***Data and knowledge related to geologic hazards is weaker than those for the climate-related threats and, in some areas, absent altogether.*** All this leads to a weak scientific understanding and monitoring of hazards, even though there is potential to glean much more geological information about long-term risk for relatively little investment.
- ***Insufficient asset data and maps lead to a poor understanding of exposure to risks.*** Where data exists it is far too patchy and not enough to ensure sustainable management and planning. This will become particularly evident and more critical when dealing with the outer islands. Some island profiling is scheduled as part of the KAP II project, but it is unlikely to substitute for detailed hazard and vulnerability mapping. Where profiling has been undertaken (1999-2000 World Bank study), the internal assessment of the level of certainty is said to be *low to very low*.[10]
- ***In general there is a lack of long time-series data sets.*** Where they exist, which is mainly on Tarawa, they are not readily retrievable or user-friendly. A good long-term dataset of beach profiling on South Tarawa is thought to be of dubious value due to questions about the surveying methods.[11] The SEAFRAME sea-level gauge located at Betio is providing useful time-series data, but the conversion of the data into useful products for coastal engineers and other local users has not been developed.
- ***The availability of products to be used by the water supply, agriculture, fisheries, and other sectors appears limited.*** However, there does appear to be a long time-series meteorological dataset. This gap could possibly be reduced with the recent input from KAP II and SOPAC Pacific HYCOS program.
- ***Other data gaps exist with regards to unaccounted for water losses, water resource reserves, and water quality data.***

[10] See Annex B. In 1999-2000 the World Bank funded a study of vulnerability and adaptation in Tarawa, conducted by experts from the International Global Change Institute, the Government of Kiribati, the University of Otago, and Eco-wise Environment. This assessment taken from Table 2 of World Bank (2006) Project Appraisal Document.

[11] Personal communication, MFMRD (Biribo)/Simpson.

- ***Nationwide data on beach mining, aggregate use, and the status of other natural resources is limited*** or at least not readily available.
- ***The atolls are fairly low-lying.*** It is estimated that the highest point above sea level is about 8 meters. As a prerequisite to any detailed mapping, monitoring, and land-use planning, accurate maps together with digital elevation models are required.

Understanding of the gaps is nothing new as illustrated by the feedback from questions asked in Tarawa, which identified the following as specific data and information needs and limitations:

- Data from sea-level monitoring gauge is of limited use and provision of products would be more useful.
- Targeted modeling products from rainfall/climate data for storm surges, drought prediction, and migratory fisheries management are needed.
- Water resources data from borehole hydrometric monitoring for water quality and quantity management.
- Health of coral reef and marine ecosystem information, including mangrove and sea grass ecosystems stress data.
- Coastal change data, including erosion hot spots and mining sites.
- The economic assessment of marine and terrestrial species value in the Phoenix Island through the Phoenix Island Protected Area Project.
- Island topography or contours to isolate very low-lying high-risk areas from slightly higher grounds.
- Location of critical infrastructure.
- Location of groundwater galleries or potable groundwater aquifers.
- Location of settlements, including village institutions on the outer islands.

The critical shortage of scientific human resources is largely responsible for the unsatisfactory state of knowledge and absence of data. The ineffectiveness or absence of mechanisms to collect, collate, and interpret the data and information is a basic weakness. This issue of general scientific capacity and a need for a whole-of-government information management system (geographic information system or spatial database) recurs time after time with most issues assessed as part of this country assessment.

Vulnerability and risk assessment

The risks from natural hazards and climate change faced by Kiribati are exacerbated by its small size and the physical vulnerability of the atolls together with the high exposure of its coastal-dwelling communities to oceanic- and climate-related hazards.

The most substantial natural hazard risk assessment-related work carried out to date has been part of the KAP projects. Some site-specific technical studies, some as part of KAP II, have evaluated the possible impact of natural hazards: Coastal erosion, coral reef and ecosystem degradation, coastal engineering with potentially adverse effects, uncontrolled beach mining and over-exploitation and degradation of groundwater resources have been some of the issues assessed. Many of these were classified as environmental stress symptoms by the National Adaptation Program of Action (NAPA) process, completed in January 2007.

Risk profiling or hazard mapping, being a key requirement for risk assessment, has not been completed nationwide, and what has been carried out has been largely site and hazard specific. It is not the intention to repeat the detailed results from the extensive KAP and NAPA consultation and development processes that prioritized what were perceived vulnerabilities.[12] Immediate issues related to water resources, which impact on the daily lives of the communities, figured as

[12] KAP II Project Implementation Paper (December 2005), and PAD Report No 35969-KI (May 2006).

a high priority in the national consultations. Whereas externally, as often highlighted in various international fora, the perception would be that sea-level rise and the resultant loss of valuable coastal land might be a higher priority. For Kiribati, knowing the risks is not the problem but it is important to be able to understand, prioritize, and develop coping strategies.

From consultations with two key ministries (MELAD and MFMRD), backed up with questionnaires, the following specific issues are highlighted:

- The risk due to sea-level rise, sea inundation, saline intrusion, coastal erosion, ecosystem degradation, and droughts were seen as priorities.
- The risk of climate change escalating health-related issues and the exposure of most village infrastructure to potential storm surge hazards were key social issues.
- Islands are particularly vulnerable due to being low-lying (2-3 meters above mean sea level), narrow in width, close to reefs, and composed of relatively non-indurated permeable carbonate material (at least at the surface); and having fragile groundwater lenses, fragile coastal fisheries, negative impact of beach mining and inappropriate coastal engineering, and pressures of unsustainable population growth, particularly on South Tarawa (Betio).[13]
- The pressure or negative environmental impact from over exploitation of natural resources is apparent. Around 90 percent of the population is dependent on limited land resources and the fragile coastal marine ecosystem for their livelihoods.
- The risk from climate change and sea-level rise would put further pressure on the island economy.[14]

Sea-level rise. Until scientific studies prove otherwise, the greatest perceived threat is from inundation due to sea-level rise[15] and the increasing threat in the short term from more frequent extreme climatic events. The increased risk is related to the high exposure of both the population and critical infrastructure. The absence of detailed surveys and asset maps makes the exact exposure and potential economic losses difficult to quantify. Where such information exists, it is largely kept within individual ministries, organizations, or with individual researchers. Dr. A. Webb (SOPAC, 2005) and Dr. P. Kench (KAP II, 2005c) have produced detailed analysis on critical infrastructure on South Tarawa such as the Bonriki airfield, the main Tungaru Hospital, and the South Tarawa causeways. However, the in-country capacity to use such advice remains one of the key challenges.

Poorly planned coastal development. Analysis of historical changes on South Tarawa show that the vulnerability of the area has increased significantly over time, exacerbated by anthropogenic pressures from development and high population growth. Poorly planned development, many projects initially intended as short-term solutions, has resulted in increased vulnerability and escalated impact of hazards and climate change. The blocking of channels between the atoll islets through reclamations or by building causeways has now significantly changed nearshore oceanographic processes. As a result of poorly designed coastal engineering and protection structures, the natural lagoon circulation patterns, sand deposition, and erosion processes have been significantly modified in places. Some possible solutions have been proposed as part of KAP II. They will be tested through pilot activities implemented in 2009 and 2010.

[13] Half the population and growth rate of approx 3 percent per year.
[14] World Bank Regional Economic Report (2000) estimate: by 2050 economic impact around US$8-16 million per year.
[15] World Bank Regional Economic Report (2000) estimate: up to 54 percent of areas in Bikenibeu, South Tarawa, and up to 80 percent of Buariki, North Tarawa, could become inundated.

This situation could be of even greater concern on most of the other outer islands. During the 4-year period, 2004-2007, the Ministry of Internal and Social Affairs (MISA) has approved over Australian (A)$3.3 million of coastal infrastructure work in the outer islands, including a rainwater catchment project on Banaba. The project list includes the building and repair of 5 causeways, 3 seawalls, a bridge, a boat passage, and a wharf. It is not clear whether much of this work is proceeding with the necessary environmental impact assessment (EIA) or if the engineering design is based on any proper risk assessment.

Water resources. Other risks linked to anthropogenic activity include the degeneration of lagoon and fresh-water quality. Both human and, to a lesser degree, industrial pollution place the fragile freshwater resources and the surrounding marine ecosystem in a highly vulnerable state. A healthy coral reef is the main source of sand replenishment on the atolls and a major contributor to marine ecosystem survival. Apart from understanding the response of reefs to changing water depths and temperature, there is a critical need to monitor the adverse impacts from land-based pollution. It was estimated (J. Hay & K. Onorio) that about 60 percent of the households in South Tarawa still carry out beach toileting.[16] Broad-based baseline studies against which to measure changes, as well detailed surveys, are lacking.

Climate change risks. The ADB 2006 Country Environmental Analysis by Hay and Onorio demonstrated that vulnerability to climate and weather impacts were critical to economic planning in Kiribati as a whole. During La Niña, the resultant low rainfall meant lower copra production. Hay and Onorio asserted that lower ocean temperatures brought with it higher sea levels and increased coastal erosion. Lower ocean temperatures also mean lower fish (i.e., tuna) catches resulting in lower EEZ access fees. However, during an El Niño period, the high rainfall improved water supply security but at the same time increased the likelihood of vector-borne diseases. Hay and Onorio assert that higher ocean temperatures combined with lower sea levels increased the possibility of increased coral bleaching. The higher sea temperatures (i.e., the "warm pool") resulted in higher fish catch and EEZ access fees.

Since access fees contribute about 60 percent of government revenue, a better understanding of ENSO events and the effect on ocean temperatures can lead to better economic planning and possibly leave the Kiribati economy less vulnerable to the impact of La Niña events.

Coastal erosion and degradation. One of the main factors increasing coastal vulnerability has been the impact of uncontrolled aggregate mining, particularly but not exclusively on the beaches. A solution in the final stages of finalization was the location of an economically recoverable deposit of lagoon sand just off Betio. The EIA for this EU-funded mining venture is being carried out. The project is attractive in that it provides an alternative to mining the beaches and the areas around the groundwater lens reserves. However, it remains to be seen if it stops the many who mine sand locally because it is their only source of income.

Gaps

- In spite of the claim to have followed the CHARM process,[17] the general lack of vulnerability and risk assessments maps, surveys, and use of appropriate tools does not indicate much rigor has been applied in the process.
- There is a noticeable gap between data collection and investigative studies and the generation of in-

[16] ADB Kiribati Country Environmental Analysis, TA:6204-REG (December 2006).
[17] Comprehensive Hazards and Risk Management – Guidelines for Pacific island countries promoted by SOPAC.

formation and products for use by planners and resources managers.

- There is an apparent disconnect between plans for future development and CCA and DRR work. If some of the outer islands are being earmarked for resettlement or other such development (e.g., mariculture), then they need to be subjected to vulnerability and risk assessment procedures.
- Transferring lessons learned and extrapolating trends and data are commonly used techniques. How much this is possible between atolls in Kiribati requires further evaluation.

Mainstreaming into plans, policy, legislation, and regulations

Stand-alone DRR and CCA efforts have historically caused limited nationwide impact. Kiribati DRR and CCA will only be effective once reflected in the key policy and planning instruments. Kiribati, where the Constitution is the supreme law, is well endowed with plans, policies, and legislations.

- As part of KAP, a Legislative and Regulatory Review was carried out (KAP II, 2005a). The Review identified a number of specific CCA-relevant issues:
- The capacity for implementation and enforcement of policy and legislation was a problem.
- Overlap and poor coordination exists between some closely related regulatory regimes.
- Exemptions in some legislation reduce the effectiveness of the law.
- Striking a balance is needed between traditional values and the modern regulatory framework.
- Better public education and participation is required in policy and legislation development.

The main existing CCA-related legislative instrument is the Environment Act (1999) and its Regulations (2001), which have been amended (2007). The amended regulations contain explicit reference to climate change issues. The Mineral Development Licensing Ordinance (Cap 58) covers the brief for what should be the important inter-ministry Foreshore Management Committee. Among other issues, seawall construction is covered by the Foreshore and Land Reclamation Act (1977), which was amended in 2005 apparently "to assist landowners".

Customary law is considered part of the law in the country and may be applied to issues relating to land ownership, fishing rights, and sea and lagoon ownership.

In terms of government policy, the National Development Strategies, 2004-2007, provides the main development agenda. The high potential cost and effects of climate change on economic growth and its potentially dangerous social impact are recognized in the Strategies. The period 2008-2011 is now covered by the Kiribati Sustainable Development Plan (KSDP), which is the successor to the National Development Strategies.

There is a Climate Change Policy (2005) as well as a CCA Strategy. The Climate Change Policy Statement sets three main aims:

(a) Kiribati should be mentally, physically, and financially well prepared to deal with whatever climatic trends and events the future may hold.
(b) This should be achieved through a coordinated, consultation-based adaptation program carried out by official and private agencies.
(c) External financial assistance should be obtained to meet the costs of the national adaptation program.

The CCA Strategy describes detailed strategies to implement the Climate Change Policy Statement. These are addressed as action items under eight headings:

1. Integration of climate change adaptation into national planning;
2. External financial and technical assistance;

3. Population and resettlement;
4. Governance and services;
5. Freshwater resources and supply systems;
6. Coastal structures, land uses, and agricultural practices;
7. Marine resources; and
8. Survivability and self-reliance.

A Water Resources Policy was developed as part of the KAP II and adopted by Government in 2008.

The main instrument for implementation, under the responsibility of the National Planning Office of the policies and strategies, is the Ministry Operational Plans (MOP). The performance of each ministry (and possibly the CEO) is linked to delivery against their MOP.
In addition to the formal instruments there are other guidelines and tools. The CHARM approach or SOPAC-promoted DRR tool were used as part of the national consultation process under KAP. The MELAD has draft guidelines for applicants to the Foreshore Management Committee. Building codes are presently under development although this assessment could neither ascertain the status of this work nor whether the codes will be based on the results of local field testing.

The Environment Regulations (2001) require EIA processes but are silent in the screening process on the potential effects of climate change. However, under the new draft Environmental (General) Regulations (2007), two types of EIAs may be required as per Section 33(1) (d) of the Environment Act: basic EIA (para 7) and comprehensive (para 8). For some reason only under requirements for a basic EIA (Item 8) is any explicit reference made to climate change, which requires "*a description of how climate change and climate variability may impact on the activity.*"

The National Disaster Management Office, which previously was located within MISA, has been disbanded, and post-disaster management is now managed out of the Office of the President (OB) when the need arises.

In summary, Kiribati as demonstrated by the advanced stage of the KAP process is the most advanced of all Pacific island countries in attempting to mainstream CCA. However, mainstreaming CCA/DRR is a new concept and much remains to be done beyond acceptance of the concept.

Gaps

It may be too early to assess the effectiveness or impact of the attempts at mainstreaming CCA/DRR. However, initial indications from observing the implementation of inter-ministry policy and project coordination seems to indicate that mainstreaming is still not effectively carried out in the various sectors.

- ***This slow progress is influenced by the historic silo architecture of government ministries.*** The effect is heightened by limited human resource capacity; available staff see as their first priority to concentrate on what is perceived as core business. Involvement by various ministries appears to be project based rather than issue (i.e., DRR) related. The issue arises whether true ownership by the various parties has in fact been achieved.
- ***A major issue already identified in regard to the existing laws is the lack of enforcement.*** Dr. R. Kay (KAP II, 2008d) estimated that 50-70 percent of the seawalls built did not go through any approval process. The country's largest contractor, the Government, in particular the Civil Engineering Unit of the Ministry of Public Works and Utilities (MPWU) does not systematically adhere to the normal approval procedures, including EIAs.
- ***The limited human resources are further reflected in the lack of enforcement of laws and regulations.*** Hay and Onorio state that the Environment Act and its regulations have just not delivered against the re-

quired outcomes. The low number of prosecutions under the Act, such as for illegal sand mining, indicates ineffectiveness or the lack of political will to enforce the law.

- ***There may also be tension between the law and customary practice.*** Though apparently illegal, some 60 percent of the households in South Tarawa still practice beach toileting. Hays and Onorio explain that "often individuals have no viable alternative to non-compliance."
- ***It is felt that policies and guidelines (and possibly even the draft environment regulations) might not be specific enough to address the distinct culture and geography of a nation of small atolls.*** The difficulty of moving from rhetoric to action often still applies, and the development of building codes is a good example of the problem in practice.

Monitoring and evaluation

It is probably safe to say that it is too early in the cycle to objectively comment on monitoring and evaluation (M&E) as it relates to DRR in Kiribati. Also, in the early stages of the KAP and other CCA programs it is estimated that some 80 percent of the priorities that have been identified are associated with awareness raising, policy development, and similar activities. The M&E becomes challenging, particularly early in the process when investment opportunities are limited and not envisaged until KAP III and beyond. The other challenge is the need for measurable performance indicators.

The M&E that is being performed is therefore mainly in relation to the few pilot projects under the KAP. Specifically, technical assistance has been instigated to monitor coastal changes, coral reefs, environmental impacts of offshore sand dredging, and water leakage. Some baseline profiles are also planned for some outer islands against which changes might be assessed. Even though financial resourcing under the specific projects appears not to be an issue, the success to date of these activities is at best marginal. The lack of people, expertise, and tools again is a contributing factor. It raises early concerns not only with the plans to up-scale the pilot projects, post-KAP II, but also with the general sustainability of risk reduction through CCA in the country.

The issue of data and information system management weaknesses is already identified as an issue and recognized as such within the Government. The MELAD stated, in effect, that risk data is of paramount importance to most institutions, but these data are fragmented and often too difficult to gather. It would be good to collect these key data, map them onto a GIS-based system, set up a central authority and replicate to different IT-based systems in line ministries and other interested NGOs. The central authority is responsible to update versions of data and inform users of data.

Gaps

- ***There is a lack of technical or scientific expertise to observe, assess, and learn the lessons from each event.*** It is often found that expertise within ministries is based around a single person.
- ***M&E requires benchmarks against which to measure change, both with time and geographically across the different islands.*** In the absence of ground truth, much of the evaluation is subjective. It is a concern that generally applies to the broader environmental issues. Again, Hay and Onorio in their wider environmental assessment work found the same subjectivity because environmental indicators are very under-developed.
- ***Apart from benchmarks, quantifiable targets are needed to assess effectiveness and realistic progress.***
- ***Subjectivity is further enhanced by lack of a robust, fully operational, and a whole-of-government information management system.*** A map server based in one ministry and a sprinkling of IT persons with

some short-term training cannot substitute for acceptable GIS capacity and expertise.

- ***Access to technology, and specifically airborne or space platforms, is not readily available to assist with long-term monitoring or the short-term, post-disaster mapping and assessment needs.*** Whatever past success has been due in part to externally supported projects. If SOPAC or other external mechanisms are unable to satisfy the ongoing needs of Kiribati, then some in-country-based solution will need to be developed to provide the necessary tools.

Awareness raising and capacity building

Awareness raising has been a noticeable success of the KAP and NAPA processes. It has been at the core of the community consultation processes that have been the base on which both initiatives were developed. The awareness raising not only covers the whole country but also has extended to the highest level of government to include the Office of the President. Initially it began at the grassroots involving a number of consultations in the three island groups that make up Kiribati.

Other activities as part of KAP II have commenced, including a survey of public awareness and attitudes; in December 2007, a national consultation on CCA was carried out with another planned in 2009.[18] Other public awareness activities include the annual Environment Awareness Week and a Ministry of Marine Resources Week, supported by MELAD, which is responsible for weekly releases on CCA and other environmental issues.

In spite of general awareness, there is still lacking a specific understanding of consequences. Actions such as continuing beach mining, over-fishing and beach toileting reflect the fact that the message is still not getting through and affecting behavioral change. The absence of an alternative gives the defaulters little choice. Whatever strategies employed in the past, they are not as yet totally effective, although the recent KAP II efforts might prove otherwise.

Some long-term investment in greater awareness is planned through education, particularly by introducing CCA into the curricula taught in schools. This initiative is also part of the KAP II project in collaboration with the Ministry of Education Youth and Sport (MEYS).

Capacity building and human resource issues are key challenges facing Kiribati. There is strong evidence to support the argument that the difficulty in implementing DRR and CCA is largely due to the absence of experienced people. There is no obvious quick-fix solution; in the meantime, the absence of capacity affects ongoing adaptation programs and the sustainability of longer-term DRR and CCA programs.

In the present division of labor by the lead implementing ministries, MFMRD takes on a lead role for coastal and reef surveying and monitoring, leaving MELAD with responsibility for permitting and approving coastal structures, aggregate-removal, and compliance monitoring. The Civil Engineering Unit investigates coastal erosion problems and rehabilitates and rebuilds seawalls, causeways, and other coastal structures. These three ministries alone have responsibilities and functions that are not only critical to CCA but should have an impact on risk reduction. Good reports and advice are available; but in the absence of human resources, skills, and experience, very little change is effected.

The MFMRD has a qualified marine biologist, and its Minerals Unit has one person with post-graduate

[18] A better update of KAP II awareness-raising activities is found in the KAP II (2008c) Aide Memoire.

expertise in coastal zone management (but may be away on study leave for a year or two). The Civil Engineering Unit is grossly under-staffed and does not have a graduate engineer. The MELAD Environment Conservation Division (ECD) has several graduates, but it is unlikely to have adequate EIA experience for coastal or offshore projects.

At the upper governance end of the Government, there are very experienced administrators and managers. There is however a lack of depth and experience in natural resources management and more particularly in disaster reduction management.

To carryout and achieve sustainability in implementing DRR and CCA, appropriately qualified and experienced staff should be recruited. A complication exists in that in certain circles there is a feeling that expatriate expertise is not the preferred choice. So real difficulties arise where indigenous expertise is not available

Gaps

- ***Measuring the effectiveness of the public awareness efforts or gauging whether there has been any measureable behavioral change at the community level has not been a priority.*** For example, the continuation of beach mining is an indication that behavioral change has been minimal.
- ***Sensitizing and educating the next generation has not gained importance or value.*** Some careful thinking and consultation between curriculum developers, DRR experts, and the local people is required.
- ***Awareness information and material has not been tailored for local consumption and for different targets in society.*** Awareness should start with politicians with appropriate advocacy material and spread to the villager with advice on "no regrets" actions, such as building setback that can be carried out without outside intervention.
- ***The lack of involvement by the Public Service Commission or the ministry responsible for the public service and human resource is a major impediment to sustainable capacity building.*** An expertise and skills gap analysis is required across the board. There is a short-term gap to be addressed; if mainstreaming of DRR and CCA is to be carried out, some serious and immediate training and capacity building is required.

The Public Service Commission may also need to review the government organization structure in order to allow for the effective mainstreaming of DRR and CCA. There is a need to build synergies between line agencies and ensure more effective delivery of services and capacity building.

Implementation

In spite of an ongoing decade-long process, implementation of DRR and CCA, in particular, is at best considered still in its early or pilot project stage. The intended governance mechanisms are best reflected in the implementation plan for the KAP projects. An enabling environment has been established with leadership and overall management emanating from the Office of the President (OB). The actual processes and mechanisms for mainstreaming are presented in the next section when describing the coordination mechanisms within government.

If all is successful, then the main design instrument for implementation is through the Ministerial Operational Plans. A key development objective of KAP II is to change the way planning and implementation activities are handled so that better account is taken of climate risks (KAP II, 2008c). However, progress to date has been slow with regard to the technical work of risk assessment and identifying adaptation investments. Within the Office of the President, the delay in forming the proposed Strategic National Policy and Risk Assessment (SNPRA) unit has also been identified as a critical bottleneck.

Gaps

- Lack of a robust scientific and technical base will continue to undermine efforts and put at risk attempts to mainstream CCA. A model should be developed for acquiring the necessary expertise and staffing appointments to address the particular CCA/DRR requirements.

- For the longer term (i.e., beyond KAP II) and to ensure some degree of sustainability, plans should be put in place to address the required permanent skills base. The non-participation of the Public Service Commission does not bode well for any capacity-building program either for short or long term.

Coordination

As previously stated, Kiribati's efforts have benefited by establishing an "enabling environment" through the KAP process together with the leadership offered by the Office of the President. An enabling environment requires, among several things, performance-based budgeting, enforceable legislation, capable staff, participatory planning, and most importantly, intersectoral coordination.

Overall leadership is in the Office of the President, where the Permanent Secretary has overall responsibility for coordination of CCA/DRR initiatives. Implementation through the MOP is the responsibility of various ministries. The link between the ministries and the Office of the President is provided through 3 committees: the Development Coordinating Committee, the policy-focused National Adaptation Steering Committee (NASC), and the technical Climate Change Study Team (CCST). There are other key national committees with major responsibilities, probably none with a more challenging task than the National Water and Sanitation Coordination Committee (NWSCC).

It appears to be a workable structure but much depends on continuing leadership and the required expertise within the various committees. There are critical capacity gaps in some key implementing ministries. In terms of funding alone, two of the water sector projects, the ADB Kiritimati (US$10.7 million) and the EU outer islands program (6.7 million Euros), are larger than both KAP II and NAPA. Both will present coordinating, staffing, and implementation challenges that could possibly go beyond present capacity within the Government of Kiribati.

The NZAID-funded Sustainable Towns Program (STP) (urban renewal initiative) also has possible activities (e.g., infrastructure) that will need to be coordinated with all others.

Challenges and impediments

- The major challenge is one of absorptive capacity of the Government to coordinate and implement the many externally supported projects.

- Present indications are a lack of experience and minimum human resources in the various ministries to manage the numerous projects.

- Sustainability when the (externally supported) project ends is a major challenge. In this regard, the lessons learned from the completed Sanitation, Public Health, and Environment Improvement Project (SAPHE) might be useful. The completed SAPHE Project had a US$10.24 million ADB loan.

- There is also the risk of depending too much on managing by committees. A great deal of non-accountability and key skill gaps can be hidden within the committee mechanism.

- The usual challenge of non-donor coordination continues to be an issue. It is unlikely that Kiribati will refuse offers of continued external assistance so some donor leadership is required to ensure better focused, designed, and sequenced assistance.

- In spite of the early national consultations, the initial stakeholders appear to have their roles diluted or marginalized altogether. The NGOs rarely get a mention, and communities are referred to as recipients rather than partners. The areas outside of South Tarawa are reportedly much under the control of Island Councils and traditional leadership. For coordination, awareness raising, implementation, and ownership of sustainable DRR/CCA, a more effective way of engaging the grassroots stakeholders needs to be designed. It might be too much to expect MISA alone to provide the necessary links.

Planning and budgetary processes

Figures are not available but the key role played, in theory at least, by the Ministry of Finance and Economic Development (MFED) ensures that CCA is mainstreamed into the planning and budgetary process. The KSDP and the MOP development process are probably the two main mechanisms for ensuring Government budgetary support.

Funding, already mentioned, includes the A$8.7 million for KAP II over 4 years with 35 percent Government contribution and the USD$3.1 million for the NAPA. In addition to the ADB and EU water sector projects, there is in excess of several million dollars for other water sector activities. The EU is also committed to funding a substantial offshore sand-dredging project.

Challenges

- The quantum of external assistance does not presently appear to be an issue. The concern maybe in the Government of Kiribati being able to meet its counterpart obligations both in terms of budget and implementation capacity.
- The question of sustainability is a concern. The Pacific is littered with projects and infrastructure that collapse at the first problem or when governments are unable to meet the annual recurrent budget needs for maintenance (for example, the numerous non-operating desalination plants.)
- As a great deal of the support is through external funding, the key issues of donor coordination and sequencing and scheduling of support and programs become critical. The coordination and scheduling of the KAP and the NAPA is the first such challenge. The second major area requiring attention is how to sequence the many activities in water sector projects. ❖

Opportunities for Investment

From the Kiribati country assessment, it is evident from the gaps and impediments that a myriad of opportunities for investment leading to the improvement of risk reduction can be identified. Gaps range from the standard weaknesses with institutions, instruments and incentives. Hopefully, much will be addressed over time if the KAP and NAPA processes are closely coordinated, properly reviewed and allowed to run their course. However, there are some critical precondition issues like better data, systems and policy, which need to be addressed.

The major gap, and one which could undermine the whole goal of implementing DRR, is the human resource capacity issue, a far too ambitious challenge for investment by the pilot GFDRR project but nevertheless one on which the whole success of DRR/CCA depends. A dialogue on capacity building in Kiribati and the other small island states in the Pacific should be held immediately. Project technical assistance is unsustainable and regional organizations because of the sheer scale of the challenge are often limited to an advisory service and some limited backstopping. A comprehensive review, beyond the intention and scope of this country assessment is required to provide some real and sustainable solution.

This assessment highlights country status, gaps, opportunities, and barriers related to national policies, strategies, plans and activities with regard to the management of natural hazards in Kiribati. This focus extends to the enabling environment for a comprehensive risk management approach to natural hazards and the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. In most discussions among key government officials and other stakeholders, investment programs are prioritized and selected based on expectations of several criteria (costs, available funding, efficiency, expected benefits, institutional, financial, legal and related capacity).

Kiribati and most of the Pacific island countries already have established policies, institutions, systems, and related structures to address DRR/CCA challenges. Several programs (NAPs, NAPAs, etc.) are ready to be implemented. Different from the other Pacific island countries, Kiribai has an ongoing DRR/CCA process through the KAP and the NAPA. As a process, it already has an inbuilt mechanism for review and possible readjustment. However, there are significant gaps in the 5 key HFA priority areas discussed; additionally, while some efforts have been made to address certain issues, others (funding, staffing and related operational support) persist. High-yielding, short-term priority issues have been identified by several participants; however, it appears that more effort is needed to fully analyze such needs and decide upon appropriate corresponding short-, medium- and long-term programs.

The Kiribati policymakers, sector officials (in consultation with local stakeholders), and various donors and financial institutions identified the list of priorities. The Government could choose to pursue any of these options with its own resources, with support from the international donor community, and/or international financial institutions such as the Asian Development Bank and the World Bank. Grant funding for Kiribati is being mobilized from the Global Facility for Disaster Reduction and Recovery to support pilot programs, which could be leveraged to undertake some of the proposed investments, based on demand. Funding would be expected to support programs from 2009-11.

There are two particular opportunities proposed in the country assessment. One opportunity is in the area of information systems and management. It is proposed because of its critical role in mainstreaming disaster risk reduction, and development in general, beyond the bounds of KAP & NAPA. It is an issue, which is seen as a key impediment throughout the Pacific Region, and so presents an opportunity to be addressed regionally without losing the specific focus of the country-driven needs. The second proposal focuses on establishing a simple DRR/CCA institutional framework. These proposals are presented in Annex A.

It is expected that the 2008 KAP II mid-term review will identify many of the key gaps flagged in this country assessment, and that strategies will be devised to address them. ❖

Annex A. Proposals for Support to Kiribati

Proposal:	**K1 Establish Integrated Hazards Information System and Tools (with GIS capability)**				
Country/sector:	**Kiribati: Hazards advisors and sector users, KAP**				
Goal and purpose:	**To inform and promote risk reduction decisions through information sharing and sound data management, analysis and presentation**				
Lead agency:	**MELAD with MPWU, MFMRD, Met Services, MISA**				
Total cost:	**US$220,000 over 12months**				
Hazards targeted	***Risk reduction measures***	***Key gaps/barriers***	***Tasks***	***Cost US$k***	***Time-frame***
Wind, storm surges sea-level rise Climate change extreme events Coastal inundation and erosion Fire Droughts Fresh and marine water pollution Pandemics	Evaluate and map hazards Assess risks and map vulnerability Map assets and assess critical infrastructure Monitor environmental changes and increased exposure to risks	Generally weak information management systems in most agencies and no information system management policies. Most hazard information is still hard-copy based and of questionable standard. Limited capacity for information system management Weak hardware and software computing capacity Limited tools and models for resource managers	Provide technical assistance support (8 person months) for the development of an integrated hazards information system Develop and adopt a Hazards Information Policy addressing: • Data sharing and availability • Single GPS datum/projection system for Kiribati • Catalogue of data to be held • Datasets to be made available digitally Assess data needs and products for DRR/CCA Identify long-term storage requirements, analysis tools, and mapping needs Acquire appropriate computer hardware, software, and high-speed Internet connection Support capacity building through populating the information system with available historical data and undertaking vulnerability mapping and risk modeling and for climate change and risk prediction Kiribati Government to ensure sustainability through annual recurrent budget for data and image acquisition, hard/software maintenance, and communication access costs	160 30 30	3rd Qtr 2009 to 3rd Qtr 2010

Continues

Annex A. Proposals for Support to Kiribati

Proposal:	**K2 Establish a simple DRR/CCA institutional framework**				
Country/sector:	**Kiribati: All**				
Goal and purpose:	**To increase the effectiveness and efficiency of CCA and DRR initiatives**				
Lead agency:	**Office of the President**				
Total cost:	**US$200,000 over 12months**				
Hazards targeted	***Risk reduction measures***	***Key gaps/barriers***	***Tasks***	***Cost US$k***	***Time-frame***
Wind, storm surges Sea-level rise Climate change extreme events Coastal inundation and erosion Fire Droughts, Fresh and marine waters pollution Pandemics	Improve institutional arrangements for DRR	Currently no clear DRR institutional arrangements, but recent appointment in the Office of the President Lack of coordination between CCA and DRR	Provide technical assistance support (8 person months) and training for the development of simple institutional arrangements to strengthen DRR	200	4th Qtr 2009 to 3rd Qtr 2010

Annex B. Potential Impacts of Climate Change, Variability, and Sea-Level Rise in Kiribati, 2050

[This Annex is based on KAP II PAD.]

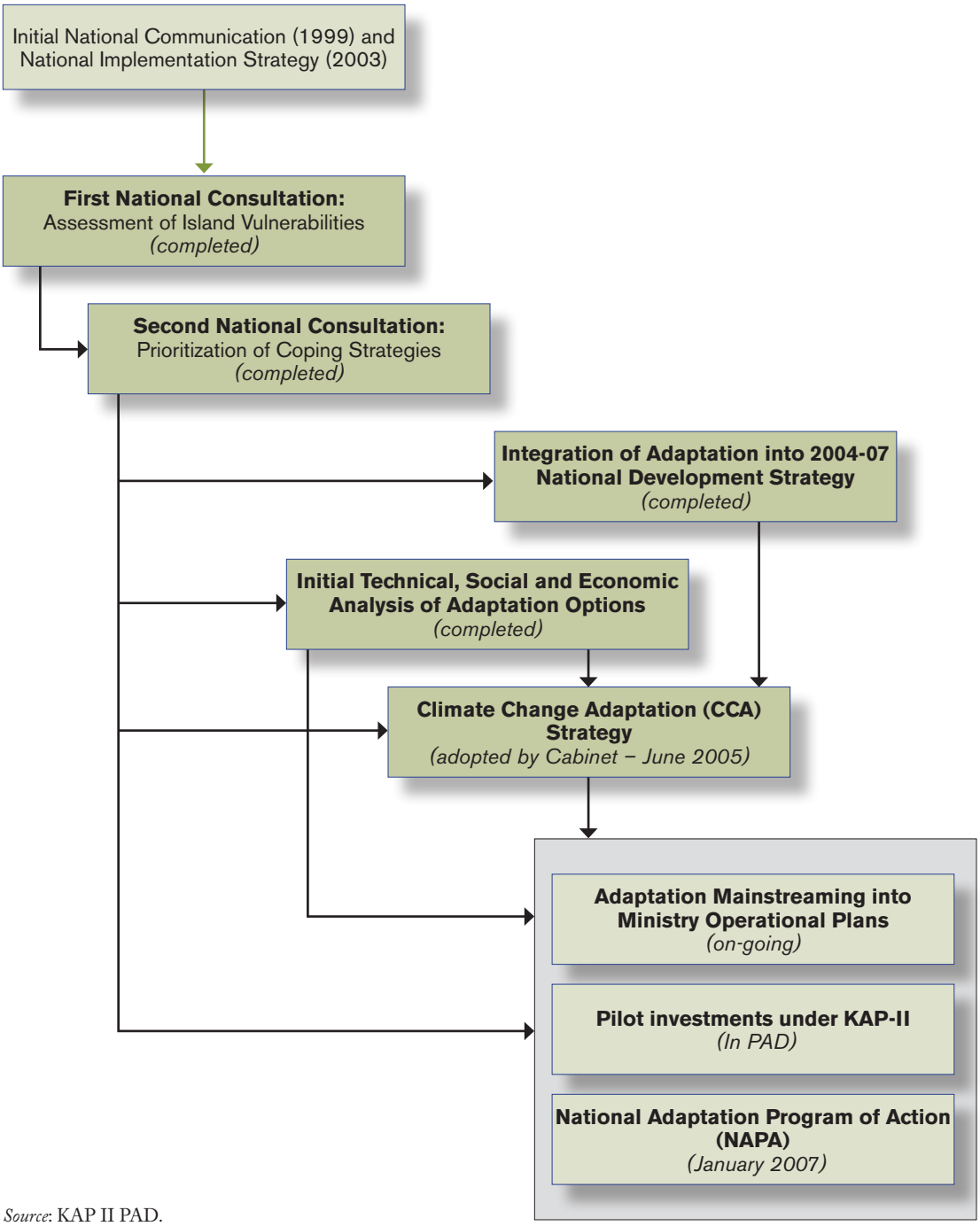
A 1999-2000 World Bank-funded study of vulnerability and adaptation in Tarawa, conducted by experts from the International Global Change Institute, the Government of Kiribati, the University of Otago, and Eco-wise Environment, found that climate change and sea-level rise are likely to lead to severe incremental impacts, disrupting major economic and social sectors (Table A1). By 2050, in the absence of adaptation, Kiribati could experience potential economic damages of US$8-16 million a year, equivalent to 17-34 percent of the 1998 GDP.

Table A1. Potential Impacts of Climate Change, Variability and Sea Level Rise in Kiribati, 2050

Type of impact	Physical impact	Annual damages (US$ millions1998)	Level of certainty
Impact on coastal areas:			
Loss of land to erosion Buariki (North Tarawa) Bikenibeu (South Tarawa)	 0.3 to 0.7% 0.6 to 1.3%	0.1-0.3	Low
Loss of land and infrastructure to inundation Buariki (North Tarawa) Bikenibeu (South Tarawa)	 18 to 80% 0 to 54 %	7-12	Low
Loss of coral reefs	10 to 40%	0.2-0.5	Very low
Impact on water resources:			
Change in groundwater thickness (Bonriki lens)	19 to 38%	1-3	Low
Impact on agriculture:			
Agriculture Output Loss	Depends on rainfall scenarios; sea-level rise would have negative impact	+	Low
Impact on public health:			
Increased incidence of diarrheal disease	Expected to increase	++	Low
Increased epidemic potential of dengue fever	22 to 33%	+	Low
Increased incidence of ciguatera poisoning	4.6 to 6.1 fold	+	Low
Impact on public safety and the poor	Substantial: impact on subsistence crops/fisheries, increased crowding	+	Very Low
Potential increase in fatalities due to inundation and water-borne or vector-borne diseases	Expected to increase	+	Low
Total Estimated Damages		***>8-16+***	

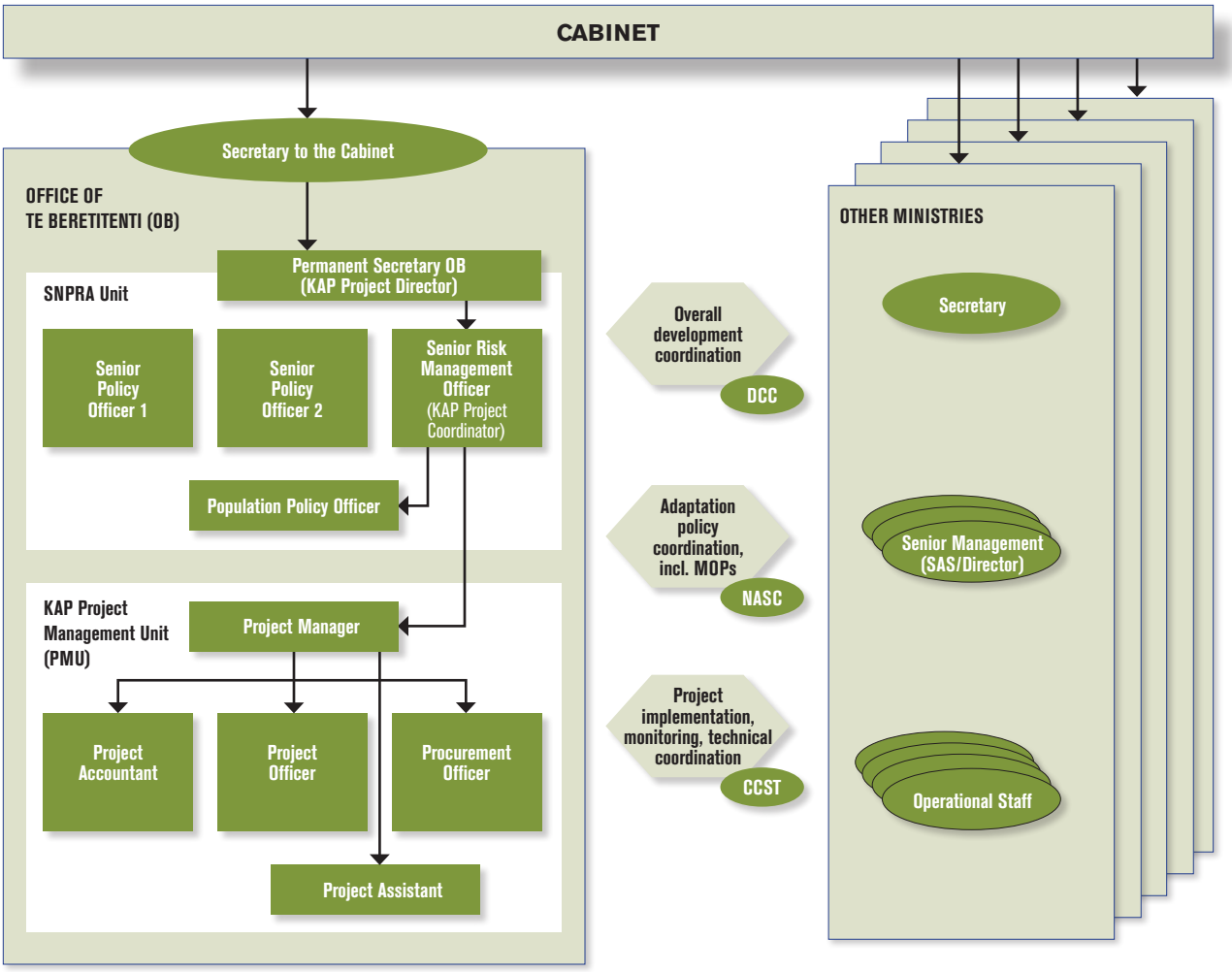
Furthermore, the study suggested that 18 to 80 percent of the land in Buariki, North Tarawa, and up to 54 percent of land in Bikenibeu, South Tarawa, could become inundated by 2050, although the effects of erosion are expected to be relatively small. The combined effect of sea-level rise, changes in rainfall, and changes in evapotranspiration due to higher temperatures could result in a 19-38 percent decline in the thickness of the main groundwater lens in Tarawa. Agriculture productivity—particularly for taro and pandanus—could decline due to storm-induced saltwater intrusion into groundwater. Higher temperatures could also increase the epidemic potential for dengue fever by 22-33 percent, increase the incidence of ciguatera poisoning and degradation of coral reefs, and divert critical tuna resources away from Kiribati waters.

Annex C. Mainstreaming Adaptation In National Economic Planning



Source: KAP II PAD.

Annex D. Proposed Institutional Relationships



Source: KAP II PAD.

SNPRA: Strategic National Policy & Risk Assessment Unit

MOP: Ministry Operational Plans, specifically to ensure that there is mainstreaming of adaptation at the operational level. The MOP is a key planning tool for all Government ministries and public enterprises.

NASC: National Adaptation Steering Committee was established for promoting and monitoring coordination among project activities across the implementing agencies. The NASC is chaired by the Secretary of the Office of the President (OB), and includes higher-level officials from all key ministries.

CCST: Climate change study team comprises technical officers from all key departments affected by climate risks to provide expert analysis and technical advice on climate-related matters, as well as coordinate scientific activities

Annex E. Project Team and Country Visits

Country team

Alf Simpson	Consultant, Australia
with	
Marianne Grosclaude	World Bank

Persons consulted (April 1-8, 2008)

Kautuna Kaitara	KAP Coordinator, PM Office
Kaiarake Taburuea	KAP Manager, PM Office
Maurongo Kalatia	Water Unit Services, MPWU
Moanataake Beiabure	Director of Engineering, MPWU
Taboia Metutera	Public Utilities Board, MPWU
Kianteata Teabo	Deputy Secretary, MPWU
Tierata Metio	Civil Engineering, MPWU
Taareti	Meteorological Services
Tarsu Murdoch	Deputy Secretary, MICTT
Miire Raieta	Deputy Secretary, MFMRD
Reenate Willie	Mineral Development Officer, MFMRD
Manikaoti Timeon	Deputy Secretary, MISA
Amina Uriam	Director of Local Government, MISA
Teboranga Tioti	Deputy Secretary, MELAD
Tererei Abete Reema	Director of Environment & Conservation Unit, MEALD
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Riibeta Iabeta	Environment Inspector, MEALD
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Richard Croad	Consultant, World Bank KAP Review Team
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References and Select Bibliography

ADB (Asian Development Bank). 2006. Republic of Kiribati: Country Environmental Analysis. TA:6204-REG, December 2006. Prepared by J. Hay and K. Onorio.

ADB. 2004. Pacific Region Environmental Strategy 2005-2009.

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. World Bank.

GEF (Global Environment Facility). 2008. GEF-Pacific Alliance for Sustainability - Program Framework.

Greer Consulting Services. 2007. Economic Analysis of Aggregate Mining on Tarawa.

KAP (Kiribati Adaptation Project) II. 2008a. Monitoring and Sustaining Coastal Ecosystem: Coastal Monitoring Network. Prepared by Naomi Biribo. World Bank.

KAP II. 2008b. Review of the 2005 Coastal Protection Measures Report. Prepared by

Robert Kay (Principal, CZM Pty). World Bank.

KAP II. 2008c. Second Review Mission (April 1-8, 2008) – Aide Memoire. World Bank.

KAP II. 2008d. KAP II Project Terms of Reference 1.3.2, Climate Change Adaptation Risk Diagnosis and Response: Task 1 & 2 Reports. January 3, 2008. Prepared by Robert Kay (Principal, CZM Pty). World Bank.

KAP II. 2007a. Leakage Detection Interim Report. Prepared by Denis Haraham. World Bank.

KAP II. 2007b. Coral Reef Benthic Monitoring Final Report. Prepared by Simon Donner. World Bank.

KAP II. 2006. Project Appraisal Document (PAD) on a Proposed Grant from the GEF Trust Fund to the Republic of Kiribati for an Adaptation Project – Implementation Phase (IWP11). World Bank.

KAP II. 2005a. Legislation & Regulatory Review Report. Prepared by Fiona Ey. World Bank.

KAP II. 2005b. Water Resources Investments Report. Prepared by Tony Kalkland. World Bank.

KAP II. 2005c. Coastal Protection Measures Report. Prepared by Paul Kench. World Bank.

Republic of Kiribati. 2008. Kiribati Sustainable Development Plan (KSDP) 2008–2011 (draft).

Republic of Kiribati. 2007. Environment (General) Regulations 2007.

Republic of Kiribati. 2007. National Adaptation Program of Action (NAPA).

Republic of Kiribati. 2005. Climate Change Adaptation Strategy (CCAS).

Republic of Kiribati. 2005. Climate Change Policy Statement (CCPS).

Republic of Kiribati. 2004. National Development Strategy (NDS), 2004–2007.

Republic of Kiribati. 1999. Kiribati Initial National Communication under the UNFCCC. Submitted October 1999.

Republic of Kiribati. 1999. Environment Act 1999.

SOPAC. 2007. Integrated Water Resources Management in Pacific Island Countries- A Synopsis – and related Country Diagnostic Reports.

SOPAC. 2005. An Assessment of Coastal Processes, Impacts, Erosion Mitigation Options and Beach Mining. Prepared by Dr Arthur Webb.

SOPAC. Regional CHARM Guidelines for Pacific Island Countries.

SOPAC. Madang Framework. An Investment for Sustainable Development in the Pacific Island Countries Disaster Risk Reduction and Disaster Management: A Framework for Action 2005-2015 – Building the Resilience of Nations and Communities to Disasters. Ref: SOPAC Miscellaneous Report 613.

World Bank. 2006. Project Appraisal Document on a Proposed Grant from the global Environment Facility Trust Fund in the Amount of US$1.80 Million to the republic of Kiribati for an Adaptation Project – Implementation Phase (IWP 11). WB Report No. 35969-IU, May 4, 2006.

World Bank. 2000. Regional Economic Report.

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**In bold, GFDRR Donors*

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

REPUBLIC OF THE MARSHALL ISLANDS COUNTRY ASSESSMENT

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

THE WORLD BANK

SOPAC

Acronyms and Abbreviations

ADB	Asian Development Bank
AusAID	Australian Agency for International Development
CCA	Climate change adaptation
COFA	Compact of Free Association
CSO	Chief Secretary Office
DRM	Disaster risk management
DRR	Disaster risk reduction
ENSO	El Niño Southern Oscillation
EPPSO	Environmental impact assessment
ENSO	El Niño Southern Oscillation
EU	European Union
FEMA	U. S. Federal Emergency Management Agency
GEF	Global Environment Facility
GIS	Geographic Information System
HFA	Hyogo Framework for Action
HYCOS	Hydrological Cycle Observing System
IA	Ministry of Internal Affairs
JICA	Japan International Cooperation Agency
MIMRA	Marshall Islands Marine Resources Authority
MWSC	Majuro Water and Sewer Company
NAP	National Action Plan
NAPIU	National Action Plan Implementation Unit
NDC	National Disaster Council
NEMCO	National Emergency Management & Coordination Office
NGO	Nongovernmental organization
NOAA	U.S. National Oceanic and Atmospheric Administration
OEPPC	Office of Environmental Planning and Policy Coordination
RMIEPA	Republic of Marshall Islands Environmental Protection Authority
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
UNFCCC	United Nations Framework Convention on Climate Change

Contents

Introduction

The World Bank policy note "Not If, But When" shows the Pacific island countries to be among the world's most vulnerable to natural disasters. Since 1950, natural disasters have directly affected more than 3.4 million people and led to more than 1,700 reported deaths in the region (excluding Papua New Guinea). In the 1990s alone, reported natural disasters cost the Pacific islands region US$2.8 billion (in real 2004 value). The traditional approach of "wait and mitigate" is a far worse strategy than proactively managing risks. The Hyogo Framework for Action (HFA) 2005-2015 lists the following 5 key priority areas for action:

(1) (Ensure risk reduction is a national and local priority with a strong institutional basis for implementation;
(2) Identify, assess, and monitor disaster risks and enhance early warning;
(3) Use knowledge, innovation, and education to build a culture of safety and resilience at all levels;
(4) Reduce underlying risk factors; and
(5) Strengthen disaster preparedness for effective response at all levels.

This assessment report represents a stocktaking exercise to review the extent to which disaster risk reduction (DRR) and climate change adaptation (CCA) activities have progressed in the Republic of the Marshall Islands (RMI). It identifies gaps or impediments that hinder achieving the HFA principles and identifies opportunities for future DRR/CCA investment that would be timely, cost-effective, and implementable within a three-year timeframe. The focus is on risk reduction, rather than post-disaster recovery and response. While some sector-specific activities are addressed in the assessment of RMI national and local government policies and institutional arrangements, the RMI report does not provide a comprehensive summary of sector-by-sector activities. Instead, it refers to efforts made by ADB, SOPAC and others in the sector and complements these with suggestions for taking some necessary additional steps.

The goal of the report is to deepen the understanding in the gaps, opportunities, and needs at the national level toward stronger operational disaster and climate risk management in the Pacific islands and to link closely to other ongoing and future efforts by other donors and stakeholders (such as SOPAC regional initiatives following the Madang Framework and the National Action Plans) to ensure synergy and avoid duplication. The assessment focuses on practical, proactive measures that the RMI can take to inform its national development policies and plans and to strengthen its capacity to reduce the adverse consequence of natural hazards and climate change, as it relates to risk reduction. The linkage of these two areas mainly includes managing the impacts of extreme weather events, variability in precipitation and other hazards such as storm surges and sea-level rise.

This assessment highlights aspects such as the current country status, gaps, opportunities, and barriers related to (a) national policies, strategies, plans, and activities to manage natural hazards; (b) the enabling environment for a comprehensive risk management approach to natural hazards; and (c) the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. It also reviews and identifies the need for informed policy choices, improved decisionmaking processes, strengthened regulations, and legislative and policy changes required to support proposed country-level activities.

With respect to achievement of the first HFA principle, there is clear evidence of systemic difficulties among many Pacific island countries in establishing an enabling environment and promoting a cross-sector

focus for DRR and CCA activities. Since the available evidence shows that ad hoc and externally driven approaches have not provided satisfactory results so far, the HFA emphasis upon a strong government commitment and action is one of the primary and early challenges to be surmounted in achieving goals of the International Strategy for Disaster Reduction.

World Bank experience in countries with similar challenges shows that, while it is important to have a clear long-term vision, given the institutional, financial, and resource constraints, more modest "bottom up" approaches tend to have better results. Also, taking existing investment programs and incorporating simple key DRR/CCA elements demand relatively fewer efforts and resources and yield results that can lay the foundation for more complex, follow-up stages. Getting stakeholders to coordinate their activities in line with the 2005 Paris Declaration on Aid Effectiveness also appears to be relatively easier with such a modest starting point than with formal efforts aimed at overall "top down" coordination.

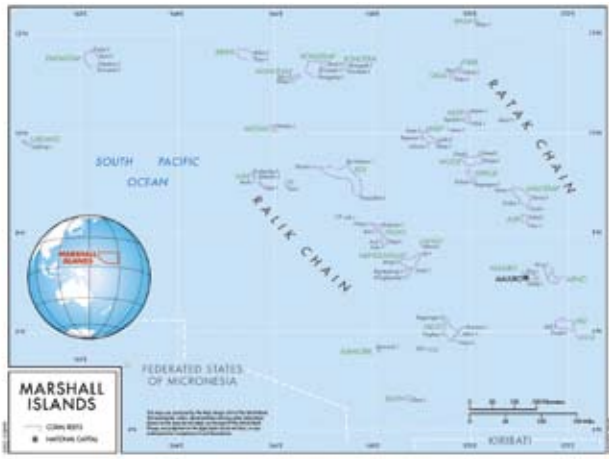
This RMI assessment begins by explaining the context of the country in relation to disaster risk reduction and climate change adaption. It follows with sections on the Key Country Findings and Detailed Country Assessment that focus on some vital components relevant to HFA achievement: adopting and mainstreaming policies, data and knowledge, risk and vulnerability assessments, monitoring and evaluation, awareness raising and capacity building, planning and budgetary processes, and coordination. From this assessment, possible opportunities for addressing the identified gaps and needs within the HFA are presented in the final section. The proposals for future support are presented in a matrix in Annex A.

Funding for this assessment was provided by the Global Facility for Disaster Reduction and Recovery (GFDRR), which is a partnership with the UN International Strategy for Disaster Reduction (ISDR) system supporting the Hyogo Framework for Action. Other partners that support GFDRR work to improve livelihoods and protect lives include Australia, Canada, Denmark, European Commission, Finland, France, Germany, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, USAID Office of Foreign Disaster Assistance, and the World Bank. ❖

Country Context

The Republic of the Marshall Islands, is located between 160° E to 173° E Longitude and 04° N to 15° N Latitude. It comprises two chains of 29 low-lying atolls and 5 islands (Figure 1). The country has a total land area of about 181 square kilometers and a much larger Exclusive Economic Zone of approximately 2 million square kilometers of ocean. Over two-thirds of its approximately 57,000 inhabitants live in the capital of Majuro Atoll and on Kwajalein Atoll. These two atolls are essentially urban in nature while the remainder of the atolls and islands—commonly referred to as the outer Pacific islands—are rural. Administrative district centers are located at Majuro, Kwajalein, Jaluit, and Wotje.

Figure 1. Map of the Reublic of the Marshall Islands



The major natural and human-induced hazards facing the RMI are highlighted in Table 1. Additional challenges or hazards listed in other reports include sea-level rise, coastal erosion, pollution of the marine environment, ecosystem degradation, and food security.

Two aspects of these hazards are notable. First, the key natural hazards—tropical storms and typhoons, high surf and drought—are climate related and thus would probably lead to worse CCA and DRR issues affected by longer-term climate change. Second, the RMI faces physical, demographic and socio-economic conditions that exacerbate vulnerability to these hazards, including the following:

Table 1. Key Hazards of the RMI

Key natural hazards	Key human-induced hazards
Tropical storms and typhoons	Fire
High surf	Contamination of water supply
Drought	Outbreak of epidemic diseases
	Commercial transport accidents

Source: DRM National Action Plan

- ***Extremely high population densities.*** This is caused mainly by internal migration and urbanization (e.g., in Ebeye and Majuro, the latter having a seven-fold increase over the last 50 years).
- ***High levels of poverty.*** An estimated 20 percent of the population lives on less than US$1 per day. While there are many outer island subsistence communities, even within the urban centers of Majuro and Ebeye, there is also increasing incidence of poverty, with several communities living under conditions of extreme poverty.
- ***Low elevation.*** The RMI has an average elevation of two meters above sea level.
- ***Wide dispersal.*** The RMI is dispersed over a large area of ocean making administration, communications, and other operations very difficult.
- ***Fragile island ecosystems.*** Fragility includes the invaluable natural ecosystem protection provided by coral reefs and coastline vegetation and formations.
- ***Limited and fragile fresh-water resources.*** The available supply is highly vulnerable to over-use, contamination, and droughts.
- ***A weak economic base.*** The RMI has very limited economic resources and is vulnerable to global influences, with high dependency on two main donors, the United States and the Republic of China (Taiwan).

In recognition of these challenging conditions, the RMI drafted its *National Action Plan (NAP) for Disaster Risk Management (DRM)*, which requires Cabinet approval. The NAP was prepared in consultation with and participation of national and local governments, nongovernmental organizations (NGOs), and other stakeholders. It documents the current situation; evaluates gaps and barriers; and identifies required key goals, objectives, and needed actions. These are aligned with RMI development policies and plans.

The NAP preparation process sought to combine a bottom-up and top-down approach in line with the HFA consultative principles. There are other reports that cover similar ground, including *Republic of the Marshall Islands: Country Environmental Analysis* (ADB 2005), which seeks to mainstream environmental considerations in the economic and development planning processes.

Instead of recreating a separate diagnosis and plan, this RMI report bases its assessment on the foundation and analysis of other recent documents. While there is a general coincidence of assessment, conclusions, and recommendations, this RMI report focuses more upon country adoption and institutionalization of policies and implementation of action plans to address disaster risk reduction and climate change adaptation within a unified development framework. One main goal is to identify short-term (e.g., 3 years or less, in first instance) and longer-term needs that can fill critical gaps in line with the HFA guidelines. The identified goals and outcomes of NAP are presented in Table 2. ❖

Table 2. NAP Goals and Outcomes for RMI

Goals	Outcomes
Goal 1. Establish an enabling environment for improved DRM in RMI.	Well-functioning institutions and systems for DRM.
Goal 2. Mainstream DRM in planning, decision making and, budgetary processes at national and local level.	DRM is mainstreamed in all relevant processes at all levels, and in all relevant sectors.
Goal 3. Improve capacity for emergency preparedness and response at all levels.	Organizations and agencies at all levels are well prepared and resourced to respond to disasters.
Goal 4. Build strong and resilient disaster management early warning and emergency communication systems.	Effective early warning and communication among Majuro, Ebeye, and the outer Pacific Islands at all times.
Goal 5. Access to safe and adequate clean water at all times.	Reduced vulnerability to water-related hazards and water shortages resulting from hazards.
Goal 6. Sustainable development of the coastal area.	Reduced vulnerability to coastal hazards.
Goal 7. Reduce economic dependency of the Outer-Islands.	Improved outer island resilience to hazards.
Goal 8. Improve understanding of the linkages between zoning, building codes, and vulnerability to disasters.	Decisionmakers and public more receptive to the need for adequate zoning and building codes in reducing vulnerability.
Goal 9. Raise the awareness of DRM amongst the public.	Public is better informed of national and outer island DRM issues.
Goal 10. The NAP implementation and impact is monitored and reviewed on a regular basis.	The NAP is effectively implemented and kept up to date.

Key Country Findings

Overall, this report concludes that three features of the hazard situation in RMI raise major concerns about the urgency for reducing risks in the country:

(a) ***Vulnerability to natural and human-induced hazards, inherently high in the RMI due to its fragile island environment, appears to be increasing.*** This is a consequence of modernization, urbanization, and unsustainable development processes that have not taken current and future risks into account.

(b) ***The potential for catastrophe in RMI is very large and growing.*** While the list of hazards is relatively small, the potential for catastrophic damage and loss of life from several hazards is very high. Disease, epidemic,[1] and fire are potential hazards, but typhoons top the list. In terms of RMI as a whole, the greatest impact would be from direct typhoon hits on Majuro and Ebeye. While its location on the relatively low-risk edge of historical typhoon tracks mitigates this somewhat, the RMI is not immune from strong typhoons like ones suffered in 1905 and 1918. The last major typhoon in 1991 significantly affected 6,000 people. If there was even a level-2 or -3 event today, the impact on life and property could be significant for many reasons. Two urban areas account for 66-70 percent of the population. The land has low elevation (less than two meters) and is narrow. Housing and most buildings are generally of poor construction, not well maintained and tightly packed. There are no established agreed means of evacuation or identified shelters to seek refuge. The airport would be unusable. Climate change is likely to increase the intensity, frequency, path, and other characteristics of typhoons.

(c) ***Current efforts to deal with underlying risk issues appear to be under-resourced and not well organized or managed.*** Despite having been identified as long-standing priority issues, solid waste disposal, inadequate sanitation, and issues related to water quality and quantity remain largely unmitigated problems. These severe problems have negative consequences for human health, settlements, and sustainable development in both urban and rural atolls. The RMI capacity to manage the patterns of population growth, land use, and environmental impacts in order to reduce the risks is subject to some severe constraints:

- ***Inadequate waste management systems.*** Given the limited land space available in Majuro and Ebeye, solid waste management has been a growing problem with the potential for pollution of critical water sources and the general threat to public health.
- ***Poor sanitation.*** While much of Majuro and Ebeye have reticulated sewerage, treatment of raw sewerage before disposal at sea is inadequate. Elsewhere, overflowing septic tanks or lack of toilets increase the threat of contamination of groundwater. Water-quality testing revealed high levels of contamination of wells and of coastal waters, in both the urbanized areas as well as the outer Pacific islands, with consequent outbreaks of gastroenteritis, cholera, and other health impacts.
- ***Coral reef and beach degradation.*** Mining of beaches for building aggregate increases vulnerability of adjacent areas; and with less natural reef protection, the islands are more vulnerable to storm surges and coastal erosion.
- ***Unregulated coastal development.*** Environmental Impact Assessment regulations and newly revised Coastal Management Regulations provide the conditions necessary for improving development to reduce risks. However, imple-

[1] In 2000 a cholera epidemic affected 218 and killed 6.

mentation and enforcement of their provisions face considerable challenges. More needs to be done to address the perception of several stakeholders who are not apparently convinced of the benefits of such regulations (through their economic, social, and related welfare).

- ***Poor settlement planning and lack of building codes.*** These are exacerbated by the existing land-tenure system, overcrowding, poverty, and resource and other constraints on monitoring and enforcement measures, all of which contribute to high-density, structurally deficient buildings and health and fire hazards, especially in areas of rapid urbanization.
- ***Isolation, lack of emergency infrastructure and high dependency, especially in the outer Pacific islands.*** The outer islands are particularly subject to typhoons and droughts, with resultant water and food shortages. Their recent increased integration into the monetary economy, and the consequent reliance on remittances and purchased food, has increased their vulnerability to such shortages.
- ***Recent positive steps.*** Having noted the above areas of concern, it is also important to record some of the past and recent positive initiatives of the RMI in such areas as improved governance structures and promotion of an enabling environment in support of disaster risk reduction and climate change adaptation. Key features of this progress include the following:
- ***Overarching development strategy (Vision 2018).*** This strategy explicitly recognizes hazard risks and climate change as priority issues to be addressed.
- ***Legislation.*** Several laws — the National Environmental Protection Act 1984, the Planning and Zoning Act 1987, the Coast Conservation Act 1988 — all provide a very good framework requiring specific measures to be undertaken to prevent further environmental degradation and to reduce vulnerability.
- ***Office of Environmental Planning and Policy Coordination (OEPPC).*** The OEPPC was established in 2003 to specifically address compliance with various international conventions and activities including those involving climate change.
- ***National Action Plan for DRM.*** Upon its completion, the National Action Plan has a direct link to the RMI development policy and strategy and includes actions for enhancing the enabling environment as well as actual on-the-ground risk reduction.
- ***NAP Implementation Unit.*** When created, this unit will be housed under the National Emergency Management Coordination Office (NEMCO) within the Office of the President. This is expected to elevate DISASTER RISK REDUCTION as an important multi-sector function at both national and local levels.

So that the above strategies, legislation, and institutions become operational tools toward achieving DRR and CCA objectives throughout the country, one main challenge will be ensuring adequate human and financial resources, authority, accountability, and other related elements. Current indications recognize several impediments in the system. Actions at several levels are urgently needed if the HFA objectives are to be achieved as envisaged.

The reasons for the current situation are complex: resource gaps; institutional, structural, functional, and perceptual rigidities; and national and local government disconnect. These are further complicated by several cultural and traditional practices involving leadership, land ownership, power, and inter-group dynamics. Some of the recent consultation initiatives

have assisted in preparation of action plans, which generally reflect population concerns and priorities. However, continued engagement among all levels of stakeholders for implementing, monitoring, and supervising proposed changes is not occurring. This may be where more effort is needed to ascertain the problems and how to address them.

Within this context, the report has identified the following 6 priority areas where appropriate interventions, consistent with the NAP goals, could prove especially effective in removing obstacles and promoting DRR and CCA objectives:

- Strengthening the capacity of the National Emergency Management and Coordination Office,
- Developing an information management system,
- Enhancing community-based awareness and education to change attitudes and behavior toward effective risk reduction,
- Climate-proofing new water supply developments,
- Reviewing and revising draft building codes,
- Testing early warning response.

These 6 opportunities for investment are selective, not comprehensive. They are based on a combination of priorities identified by the NAP; through consultations with the RMI government, local government, and private sector; and in other reports.[2] The selection was further narrowed, based on 4 criteria: (a) key bottleneck points requiring relatively small investments to address simple obstacles but yielding disproportionate benefits within a short time; (b) direct help in addressing critical DRR and CCA issues; (c) sustainable, longer-term benefits; and (d) identified in-country commitment, champion, and/or effective arrangement for implementation. A summary of the country situation and the gaps or impediments that lead to effective risk reduction, which justify the selection of these opportunities, is presented in Table 3. ❖

[2] For example, *Republic of Marshall Islands: Country Environmental Analysis* (ADB 2005).

Table 3. Summary of Key Gaps and Opportunities for DRR and CCA for RMI

Situation	Gap or Impediment	Opportunities
A NAP was approved, with coordinating Lead Agency being the National Disaster Council and its operating arm, the NEMCO.	The NEMCO has limited resources, capacity and overall commitment to implement NAP.	Strengthen the capacity of NEMCO, by ascertaining basic reasons for its current performance, identifying key actions needed and assisting counterpart in preparing an adequate response (including needed resources) to achieve goals.
DRR and CCA require cross-sectoral cooperation and sharing of information and basic data to assist it in its task.	No central system for information management, storage, access, maintenance, retrieval, interpretation, etc.	Assist RMI in identifying an appropriate basic "low-tech" starter system to facilitate a simple management information system with the goal of having all sector actors utilizing the same database for all phases (conceptualization, planning, implementing, benchmarking, monitoring and follow up).
Success of NAP and other risk reduction programs require community and local government engagement and participation.	A large gap exists between national and community levels regarding awareness, attitudes, and behavior toward DRR and CCA.	Community-based awareness, including education and efforts to change attitudes and behavior regarding engagement in DRR and CCA and in building and maintaining the resilience of environmental, social, and economic systems to reduce vulnerability.
Droughts are a major hazard in RMI and a major threat to water supply.	Current plans and projects to expand and improve water supply systems are not taking into account past lessons learned or expected higher risk due to future climate change.	Climate proofing of water supply systems, involving assessing the increased risks from a changing climate and the design changes that should be taken into account to achieve acceptable levels of risk for sustainable development.
Development in RMI, particularly in the private sector, is generally of poor construction and is vulnerable to disasters.	The country has no building codes and each donor or entity uses its own codes. This makes it difficult to monitor and ensure compliance with various safety and other requirements.	Review current practices, specific country needs, and preparing draft building codes, including rolling out the codes to public, commercial, and then residential sectors, and tightening linkages to financial lending and other institutions.
Early warnings exist for some hazards like droughts and typhoons.	Warning dissemination and response is not well developed or tested.	Early warning response (4.3 of NAP), including filling the gaps in warnings, and reviewing and improving dissemination and public perception and response measures.

Detailed Country Assessment

Identification, assessment, and monitoring risks

The Hyogo Framework for Action highlights identification, assessment, and monitoring of disaster risks and enhancing early warning systems as key priority areas. With regard to these aspects in the RMI, there are some activities where the country has made good progress and others where it lags. For example, in climate change statistics, the RMI has a very good database and a well-organized system and process in place. This achievement is thanks to the Meteorological Service Unit, which is owned and supported by the U.S. National Oceanic and Atmospheric Administration's (NOAA) National Weather Service and operated by RMI nationals contracted by NOAA. Within the RMI, there is one station with an approximately 50-year record, and 6-7 automatic stations strategically spaced throughout the country (with records ranging from 10-20 years). There are 2 tidal gauges—the older established gauge provided by the University of Hawaii and the more recent SeaFrame gauge supported by Australia. The 2 gauges record sea-level data that are readily accessible.

The record of temperature, precipitation, wind, and pressure data are archived and available for time periods and in formats that facilitate a range of risk and climate change reviews and assessments. These data are housed at the U.S. National Climate Data Center and can be readily accessed (but at a cost, even for in-country studies). Tools are also available to analyze and provide the data at the request of RMI government agencies, contractors, and consultants working on RMI projects.

While some attempts are being made to analyze the data and provide information to the relevant user groups,[3] there is still a significant level of under-utilization of the available data, both in terms of DRR/CCA activities as well as in several other areas. For example, with its high dependency on revenue from fishing licenses/catches and close correlation between water temperature and catch, more could be done in estimating these and assist the RMI to better manage its migrant tuna stocks and income from fisheries.

Knowledge, data, and tools pertaining to other biophysical, social, and technological elements of risk are not as advanced as with climate change data. For example, the RMI Environmental Protection Agency has limited databases on solid waste, coastal management, or water quality, and limited access to geographic information systems (GIS) for spatial, land use, and similar analyses. This is a major constraint to disaster risk assessment, reduction, benchmarking, monitoring, and enforcement. The GIS is often considered a useful tool. Its effectiveness however depends upon the skills of the people using it; the assessments done; and information provided to relevant users, policymakers, and other stakeholders. Other uses of mapping tools to show coastal areas, water quantity and quality changes, and public assets appear to be limited at this time. The severe skills shortage in the region could be one reason why the potential for improved data management, analyses, and related tasks is not being fully achieved. This should be an important factor in efforts aimed at finding more appropriate technology solutions to ensure appropriate operation and maintenance and long-term sustainability.

Overall, while there is a relatively solid base of knowledge, data, and tools for some sectors in the RMI, particularly in terms of climate data, there are some important gaps affecting mapping, monitoring, and related activities. The NAP provides a framework for RMI to implement risk-reducing activities and, in terms of risk assessment, focuses on key needs in the water sector and coastal areas. It is essential that

[3] For example, the three-month climate and rainfall forecasts by the Meteorological Service Unit (Pacific ENSO Applications Climate Center) have been used by water resource managers to mitigate drought impacts.

risk-reduction activities in these areas are grounded on sufficient data and a sound understanding of the dynamics of the process.

Gaps

Some of the key gaps are summarized below:

- ***Low level of assessment and development of tools to aid resource managers and decision makers.*** Efforts are needed to help in identifying ways of using the available data more appropriately in key DRR, CCA, and socio-economic activities. A system should be put in place to facilitate areas where reliable data are not available. Care should be taken in ensuring that recommended actions are compatible with country skills, capacity, and resource base; and sustainability factors should be a key consideration in deciding upon recommended technologies.
- ***Inadequate data management tools.*** At best, most of the existing collection, storage, and analytical tools appear to be rather basic. For example, in the RMI Environmental Protection Authority (RMIEPA), data are still largely stored in hard-copy form. For most cases, the system would benefit from more reliable storage, monitoring, security, access, and fire-safety facilities. If information (reports) and data system are designed to rely more upon established processes and guidelines, it could become more immune from the disruptive impact of frequent staff turnover.
- ***Absence of a system for information sharing and exchange.*** Climate data is stored with the Meteorological Service Unit, terrestrial data (including water quality) with the RMIEPA, and marine data with Marshall Islands Marine Resources Authority (MIMRA). There is need for a stronger, more effective national information system, a digital strategy or a mechanism for information sharing and exchange. The NAP implementation could help to address some of these constraints.

Vulnerability and risk assessment

Current situation. Twenty-two of the 29 low-lying atolls and 4 of the 5 coral islands are populated. They are all extremely vulnerable to climate-related hazards such as typhoons, storm surges, and droughts. Additional risks from fire, epidemics, water contamination, and increased salinity, especially in the urban areas, complicate the task of undertaking comprehensive risk assessments and also tend to combine and accelerate their negative impacts. Table 4 below summarizes the primary threats facing various sectors in the RMI while the rest of this section focuses upon some manifestations of system failure and needs.

Table 4. Threats to the RMI

	Threat				
System	**Storm surges**	**Tropical storm**	**Rain storm**	**Drought**	**Epidemic**
Housing	H	H			
Transportation	H	H			
Communications		L			
Power	H				
Health				H	H
Water	M	M		H	H
Agriculture		M	H	H	
Fishing					
Tourism	M	M			M

Source: United States Army Civil Affairs, 2003 (as reported in ADB 2005).

Ecosystem degradation. The physical integrity of the islands is dependent on the natural supply of coralline material from healthy reefs and uninterrupted coastal processes that ensure replenishment of material along the coasts. Human activities that have an adverse impact on the natural equilibrium have made the coasts more vulnerable to erosion and seawater intrusion. The threats stem from the degradation of the marine ecosystems, unsustainable use of groundwater, the blocking of sediment supply paths, unsustainable coastal sand mining, and building of inappropriately designed coastal protection structures (e.g., seawalls).

The marine ecosystem and particularly the reefs suffer by such physical change as well as pollution and increased solid waste dumping. On Majuro, raw sewage is discharged over the reef edge at an estimated depth of 20-30 meters. However, a break in the outfall pipe at the reef edge has resulted in raw sewage being swept along the coast.

The indiscriminate mining of reef and lagoon flats and beaches have had a major impact on sand replenishment and exacerbated coastal erosion. Unless alternative sources for aggregate are provided, this destructive practice will continue to further threaten the very stability of the atolls, particularly Majuro. Studies carried out in 1997 by the Secretariat of the Pacific Islands Applied Geoscience Commission (SOPAC) indicate that, while there is an awareness of the problem, an appropriate response is still not in place, either because of competing priorities or inadequate access to these prior studies.[4]

Poor solid waste management, including ineffective sanitation and sewage disposal, threatens coastal resilience, water quality and community health. There have been significant cholera outbreaks in the RMI, and gastroenteritis is a continuing threat to a large portion of the population on Majuro and Ebeye.

Disaster preparedness for effective response

Current situation. At the national level, disaster risk management responsibilities lie with the National Disaster Council (NDC) and NEMCO. Even though efforts are being made to change the focus from post-disaster response to primarily disaster risk reduction and climate change adaptation, it will take some time and effort to accomplish this. In the past, as a matter of course, other sector agencies did not explicitly take disaster risk management into consideration in whatever policies and plans they had. Significant changes are expected to result if Cabinet endorsement of the NAP is accompanied with enough commitment and resources to commence its implementation under an NAP Unit based in the Office of the Chief Secretary and led by the Deputy Chief Secretary.

One major goal of the NAP is to mainstream DRM into the planning, decisionmaking, and budgetary processes across a broader sectoral arena at both national and local levels. This is because DRR requires an integrated and cross-sectoral approach, one in which disaster risk considerations form an integral component in all development-related planning. Importantly, this includes integration of DRM considerations in budgetary allocations. The key sectors for disaster risk management in RMI, as identified in the NAP situation analysis, include:

- Planning
- Finance
- Local Government
- Environment
- Fisheries
- Health
- Agriculture

[4] SOPAC Report by Chunting Xue, September 1997.

- Tourism
- Utilities (power, water, transport)
- Private sector
- Civil society organizations

The policy framework for the NAP is the RMI *Vision 2018: The Strategic Development Plan Framework 2003–2018*, which explicitly includes disaster risk reduction and climate change adaptation and foreshadows the synergies between them. Goal 10 (Environmental Sustainability), Objective 2 states the following:

> …to develop and have in place a contingency/adaptation plan to counter the emerging threats resulting from the adverse effects of climate change including a National Disaster Plan.

While this represents one major step in mainstreaming at a high national level, there remain considerable gaps to fill, especially in translating this policy goal into the plans, strategies, and regulations at sector and agency levels. As in many other countries, those trying to make this transition in the RMI are finding it to be a challenging task in several respects (knowing what to do, obtaining human and financial resources, convincing key players to become more active participants, logistical support, etc.). In RMI there is very little left from the Compact budget, and there are major challenges to releasing funds from the Republic of China (Taiwan) for risk reduction.

Institutions, *instruments,* and *incentives* could provide the focus for facilitating strategic assistance. Most sector agencies do not prepare strategies and plans into which risk reduction activities can be readily mainstreamed. The challenge will be to get these entities to develop and use simple strategies and plans that transform DRR and CCA national policy statements into operational instruments as part of normal sector agency activities,

Establishing and operationalizing the NAP could provide the ideal entry point for mainstreaming DRR and CAA principles in operations. Among other things, this involves identifying champions within the ministries and lower-level agencies and ensuring adequate resource capacity for the task at hand. After ensuring that the entities are adequately resourced, they must be held accountable for their agreed commitments. Currently, only a few government agencies are trying to develop strategic plans with performance-based budgeting and associated accountability elements. For example, the RMIEPA is responsible for water quality, coastal management, and solid waste monitoring, areas which are directly related to key hazards of drought, typhoon, storm surges, outbreak of epidemic diseases, and contamination of water supply and their potential impacts. The RMIEPA has responsibility for the whole country, but its budget, staff, equipment, and other resources are clearly inadequate for these responsibilities. The REMIEPA has a US$400,000 annual budget, three staff on Majuro and one on Ebeye for water quality monitoring, three staff for coastal management, and two staff for solid waste monitoring. Additionally, its current activities are more geared to monitoring of water quality and solid waste for operational and compliance purposes. As a consequence, it does not necessarily prepare or maintain any systematic time-series databases that can provide the information required for evaluation of overall risk reduction efforts in the long term (as relates to NAP Goal 10). On the other hand, for some sectors, such as health, various indicators of public health are routinely measured and can be used for monitoring and evaluation. For some hazards, such as coastal erosion, there is no systematic comprehensive monitoring in place. Overall, the need for integrating monitoring and evaluation activities into a more comprehensive approach is recognized in the NAP. There appears to be excellent low-cost opportunities to accomplish several initial steps with relatively small resource outlays. For example, given the size of the RMI and the overlaps among subsectors, there appears to be many opportunities for joint field visits, common databases, pooled assessments, and more.

A necessary condition for successfully mainstreaming any DRR and CCA plans is to have participants identify where they are and agree where they want to go, what they need to get there, and how they will know what progress they are making. In this context, monitoring and evaluation of performance requires that strategic planning and performance indicators are uniformly adopted throughout government agencies, using simple tools for initial benchmarking and measuring progress (further discussed in "Planning and budgetary processes" section below).

Possible areas of initial assistance for the NAP might include the following:

- Supporting key systematic data and information gathering related to the specific operations of relevant government and sector agencies; and
- Establishing simple benchmarks based upon such information, formulating simple strategic plans consistent with the capacity and resource constraints of the respective entities, and having an established monitoring and evaluation system.

Awareness and capacity building. The NAP Task Force and other assessment reports (e.g., ADB, 2005) highlight awareness raising as a key component to ensure that the goals of NAP are achieved. Even with extensive publicity and coverage of government commitment to the DRR and CCA principles, it appears that among most groups (elected officials, line agencies, mayors, private sector, communities, etc.) awareness of NAP and the opportunities and benefits of risk reduction are not taken seriously. This seems to be especially so among local government, communities, and civil society. Yet it is perhaps at this level where, in the longer term, changes in awareness and attitude can really make a difference. Only by building a both a strong top-down as well as bottom-up foundation and ownership can the benefits of disaster risk reduction and climate change adaptation be achieved in an effective and sustainable manner.

In large part, this will require not only raised awareness in the narrow sense of the term, but also a greater effort on the part of national government to build a more participatory approach to the implementation of the NAP and other related risk-reduction activities. An excellent start was made during the development of the NAP. There is now the need to continue and strengthen the participatory process during the implementation phase.

In concert with awareness raising, there will continue to be a need to upgrade knowledge and skills for risk reduction. At the national government level and from one sector to another, the pervasive constraint to effective risk reduction is the lack of capacity. This need will grow as NAP and other risk reduction programs move forward, unless concerted action is taken to build capacity. This need applies as well to the local government, communities, the private sector, and civil society

Gaps

- ***Large differences between national and local levels with regard to awareness of, and the need for, disaster risk reduction and climate change adaptation in the NAP process.*** There needs to be a mechanism to bridge this gap, with a combination of awareness raising, education, and participatory engagement of local government and civil society in the process. This is a role that a strengthened NEMCO could assume.
- ***Disasters risk reduction and climate change adaptation not included in education.*** The Ministry of Education will need to assess how best it can incorporate appropriate curricula at all levels so that students will have the required knowledge.
- ***Lack of strategy for effective capacity building to sustain risk reduction.*** A large gap in the whole process is the non-participation of the government arm responsible for human resources. If disaster risk reduction and climate change adaptation are

to move beyond short-term goals and technical assistance, a strategy for capacity building and sustainable human resource needs to be put in place within government institutions.

Governance and decisionmaking

Current situation. The RMI Government has a bicameral legislature with an upper and lower house. Elections are held every 4 years with each of the 24 constituencies electing a senator to the lower house, the *Nitijela*. The upper house, the *Council of Iroij,* is an advisory body comprising 12 tribal chiefs. The Council of Iroij is consulted on all customary and land issues. The Nitijela elects the President, who is head of state as well as head of government. The executive branch consists of the Presidential Cabinet, 10 ministers appointed by the President with the approval of the Nitijela. The public service is headed by a Chief Secretary, appointed by the President, who is responsible to the Cabinet for the general direction of the work of all departments and offices of government.

Formalized disaster risk management first entered the political arena of the RMI in 1987 with the passing of a National Disaster Management Plan. It became firmly entrenched 7 years later with the enactment of the Disaster Assistance Act, which provided for the establishment of a National Disaster Management Committee and a National Disaster Management Office located in the Office of Chief Secretary. The year 1994 also saw the passing of a Hazard Mitigation Plan, a National Disaster Manual, and an Airport Disaster Plan. A Drought Disaster Plan was passed in 1996, followed by the drafting of a revised National Disaster Management Plan in 1997. The most recent legislative activity on the DRM front was the development of a Standard Hazard Mitigation Plan in 2005.

Existing DRM arrangements have to date been heavily focused on the conventional approach to disaster risk management (i.e., preparedness, response, and recovery) with less attention being focused on the equally critical component of reduction. The NAP seeks not only to review existing DRM legislative and institutional arrangements but also to ensure a better balance between disaster management (response) and disaster risk reduction in RMI.

The Ministry of Internal Affairs is the administrative coordinator for local governments. Each inhabited island has a local council headed by a mayor. Local council activities include local police services, solid waste collection, and maintenance of local roads. Mayors report back to the Ministry of Internal Affairs every three months for administration purposes. District centers have their own locally appointed officials and police force. Funding for the district centers comes in the form of grants from the national government and revenues raised locally.

The judicial power of the Marshall Islands is independent of the legislative and executive powers and is vested in a Supreme Court, a High Court, a Traditional Rights Court, and District and Community Courts.

The most important RMI civil society organizations are local community organizations, including parents-teachers associations, sports clubs, women's clubs, and the very active churches (many of which also provide important school services). The RMI has a small number of NGOs, all based in Majuro, that provide an assortment of services from education to vocational training, to advocacy on women's issues. The NGO sector in RMI is however not particularly vibrant and plays a limited advocacy role. This is, in part, the result of dependence on government funding, as well as the pervasiveness of non-confrontational cultural norms.

In terms of national development policy and priorities, the Government charted the *Vision 2018: The*

Strategic Development Plan Framework 2003-2018 which establishes the overall framework of priorities for the RMI and sets the first segment of the Government's Strategic Development Plan for the next 15 years. It incorporates the broad national vision of where the people would like to be by 2018 in terms of sustainable development. It includes the long-term goals, objectives, and strategies developed through an extensive consultative process starting with the Second National Economic and Social Summit and then followed by extended deliberations by various working committees established by the Cabinet.

The second and third segments of the Strategic Development Plan will consist of master plans, which are mandated under the Vision 2018 and focused on major policy areas, and the action plans of ministries and statutory agencies. The NAP is an example of an inter-sectoral action plan. These master plans will show programs and projects together with the appropriate costing. It is also the intention for all atoll local governments to develop action plans tailored toward the achievement of the national vision.

The national goals for the RMI can be summarized as follows:

- Increased self-reliance,
- Renewed economic growth,
- Equitable distribution,
- Improved public health,
- Improved educational outcomes,
- International competitiveness, and
- Environmental sustainability.

Priority sectors for the RMI government are education, health, environment, and infrastructure development and maintenance. The NAP aligns itself both with the regional policy framework (i.e., the *Pacific Regional Framework for Action on Disaster Risk Reduction & Disaster Management*) and the national policy framework (i.e., Vision 2018 and its master and action plans). Although Vision 2018 was drafted before the recent attention to disaster risk reduction, it is felt within RMI government that its goals remain broad and flexible enough to accommodate the DRR emphasis without amendment.

Impediments. For the most part, while the enabling governance structures, policies, and legislation are necessary to avoid increases in risk exist, there are critical gaps, particularly in regulation and enforcement:

- ***Absence of land-use planning, zoning, and siting.*** At the national level, the enabling provisions may be in place, but implementation falls short at the local level. For example, in order to avoid further coastal degradation and reduce risks, the Coastal Conservation Act 1988 and the National Environmental Protection Act 1984 provide the enabling provisions, but local governments that are responsible for enacting ordinances for land-use zoning requirements have not done so. As a stop-gap, the regulations for environmental impact assessment in RMI have been used on selected case-by-case bases. The Coastal Management National Framework, approved by RMIEPA but not yet endorsed by the Cabinet, will hopefully provide a basis for filling the gap. In terms of fire risk, the lack of land-use planning and zoning has resulted in houses being built too close together in overly narrow streets, resulting in a major fire risk for parts of Majuro and Ebeye.
- ***Responsibilities often reside within bodies incapable of fulfilling their obligation.*** As an example, local Majuro Government is given the responsibility of collecting community solid waste for delivery to the dump managed by Majuro Waste Company. The system is undermined when the local government experiences financial problems.
- ***Absence of effective building codes.*** Poorly designed buildings exacerbate the risks from typhoons, storm surges, and fires. Building codes have not been en-

acted, despite having been drafted over a decade ago. There is currently no control over design and location of buildings once land is acquired. Mortgages obtained from private banks do not require adherence to specific building standards. Especially in urban areas, the lack of building codes has been increasing the potential for disaster.

Coordination among government agencies

Current situation. In terms of disaster risk management, coordination has been largely the preserve of the National Disaster Council (NDC) and its operational arm, the National Emergency Management and Coordination Office (NEMCO, formerly the National Disaster Management Office). The NDC is chaired by the NEMCO Chief Secretary whose office (CSO) has 3 deputies and 5 support staff and reports directly to the President. The NDC functions, as provided by the National Disaster Act 1994, relate largely to disaster response, not disaster prevention. In addition, with the recent attention to disaster risk reduction and the implementation of the NAP, a National Action Plan Implementation Unit (NAPIU) will be established under the NEMCO Chief Secretary. The NAPIU will be headed by a Deputy Chief Secretary and will convene a task force, chaired by the Deputy, comprised of relevant line agencies for NAP implementation.

The success of NAP implementation will depend heavily on the cooperation of, and coordination with, local government, civil society, and the private sector —the level at which risk reduction measures will be taken. For this reason, local government was engaged throughout the NAP development.

In terms of climate change, the responsibilities for coordination of both national and international obligations fell originally to the RMIEPA, established under the National Environmental Protection Act 1984. However, the RMIEPA has a small staff and budget for carrying out multiple responsibilities, including water quality monitoring, solid waste monitoring, public awareness, and coastal management. With the mounting number of international obligations and other factors, including those for the United Nations Framework Convention on Climate Change (UNFCCC), the Office of Environmental Planning and Policy Coordination (OEPPC) was established.

The OEPPC derives its legal mandate from the OEPPC Act 2003. The main duties of OEPPC include the following:

- Provide policy advice to the President and Cabinet;
- Ensure adequate attention is given to addressing the international commitments of RMI made through the international treaties;
- Ensure that activities arising from associated international conventions are linked to national priorities; and
- Collaborate with other government partners, NGOs, and communities in implementing environmental projects and programs.

These duties explicitly include and emphasize climate change and are guided by Vision 2018 "to assist RMI meet external and internal challenges and mitigate the threat to our sustainable development and livelihood and indeed our very survival from the effects of global warming/climate change on biodiversity, land degradation, and sea-level rise". During the 10-year period (2008-2018), the OEPPC has two prime objectives: (a) prepare a Climate Change Policy in collaboration with the RMI Energy Policy; and (b) prepare RMI Adaptation Strategies to Climate Change.

The OEPPC is now the focal point for climate change issues and the channel to the relevant international agencies and donors. It is located in the Office of the President. The OEPPC seeks international do-

nor support for projects and, if successful, coordinates their implementation across sectors.

Impediments and solutions. In general, one major impediment to coordinating DRR implementation has been the lack of attention given by NDC and NEMCO in the past to risk reduction (in contrast to disaster response and recovery). In order to effectively carry out their coordination role among relevant government agencies, this requires some re-orientation and up-graded skills within NDC and NEMCO, a process that began with the development of the NAP.

Seeking the synergies between disaster risk reduction and climate change adaptation is potentially hampered by the roles and responsibilities for the two areas of risk reduction allocated separately to NDC and OEPPC. Care needs to be taken to ensure close coordination between these two government agencies in order to identify mutual objectives and areas of collaborative activity.

There are two other major impediments to the implementation of the NAP that need to be overcome:

- ***Lack of resourcing and staffing of the NAP Implementation Unit.*** A critical operational impediment to the NAP, and therefore to mainstreaming and implementation, is the resourcing and staffing of the NAPIU. A strong NAPIU will be the key to NAP success. Without it, the coordination and direction of the various sector agencies will not be achieved. In particular, the support provided by a technical expert will be critical.
- ***A large disconnect between national government and governments, civil society, and the private sector at the local level.*** Many local councils, particularly in the urban areas, are broke and owe money. As a consequence, their neglected responsibilities for such critical services like solid waste management could lead to a potential health disaster. Local land owners have the power to hold sway over decisions regarding land use and have used that power to thwart efforts aimed at land use regulation, zoning, and building codes aimed at risk reduction. The national and local levels need to be better coordinated to obtain a common vision for risk reduction. In many respects, this will require government endeavor to extend the participatory approaches initiated during the development of the NAP into its implementation phase.

Coordination among donors and key stakeholders

Current situation. The RMI and the United States have a strong relationship of mutual assistance as encapsulated under the Compact of Free Association (COFA), which went into effect in 1986. Certain provisions of the COFA, including economic assistance, expired in 2001 and have been subsequently renegotiated for an additional 20 years commencing in May 2004. Under the COFA relationship, the United States provides guaranteed financial assistance administered through the Office of Insular Affairs in exchange for certain defense rights, including the lease of 11 islands on the Kwajalein Atoll. The RMI actively participates in all Office of Insular Affairs technical assistance activities and has unique access to many U.S. domestic programs, including disaster preparedness, response, and recovery programs through the Department of Homeland Security and the Federal Emergency Management Agency (FEMA).

With past arrangements expiring in December 2008, FEMA has underpinned RMI in terms of providing disaster response and recovery. The United States and the RMI will seek to reach an agreement to modify the arrangement for disaster response to include a greater role for USAID, as well as the United Nations. The transition from FEMA to USAID will require a review and amendment of existing protocols and operating proce-

dures between relevant agencies. Because USAID tends to concentrate more on training and capacity building, the implication of the transition is that RMI should take over responsibilities for DRM, including a greater incentive for disaster risk reduction. Under the amended agreement, the RMI will be able to request disaster assistance from USAID in a declared state of emergency, after utilizing the national Disaster Assistance Emergency Fund (established by the amended agreement as a first resource for disaster response), and requesting international assistance through the United Nations.

Apart from the United States, other key international development assistance partners include the Republic of China, Japan, the European Union, and the Asian Development Bank. In terms of the NAP, a full list of general and specific areas of interest of the members of the Partnership Network (the Partnership Capability Matrix) in relation to the implementation of the NAP is available from SOPAC and from NEMCO and should be referred to in identifying donor agencies and partners to help support NAP implementation.

The donors who have expressed interest in supporting the NAP include:

- **African, Caribbean and Pacific Group of States/ European Union Natural Disaster Facility within the SOPAC Community Risk Program** (Euro 1.868 million over 4 years commencing from 2008 for disaster risk reduction and DRM for 14 countries, including RMI). For those countries that have a National Action Plan, SOPAC will identify implementation targets. The purpose is to support NAP development and implementation. This commitment is to be executed by SOPAC.
- **AusAID NAP Facility with SOPAC Community Risk Program** (A$2.265 million over 4 years commencing from 2008 for disaster risk reduction and DRM for 14 countries, including RMI). For those countries that have a NAP, SOPAC will identify implementation targets. The purpose is support for NAP development and implementation. This is also to be executed by SOPAC and focused on direct implementation. A$765,000 was to be committed by June 2008.
- **SOPAC Community Risk Program** (Total FJ$6.5 million core annual program budget for 2008, out of which an initial F$50,000 is earmarked for the review of disaster plans and legislation activities of the RMI NAP). Other NAP activities and action would be considered by SOPAC (e.g., Comprehensive Hazard and Risk Management). Other SOPAC programs out of which support could come include Oceans and Islands Program (for bathythmetric and coastal mapping) and Community Life-lines Work Program (under Water Unit and Information and Communication Technology Unit for hazard maps and imagery).

Other possible players might include United Nations Development Program, United Nations Childrens' Fund, International Federation of Red Cross and Red Crescent Societies, and regional organizations such as Secretariat of the Pacific Community and Secretariat of the Pacific Regional Environment Program.

Impediments

- **Lack of donor assistance.** Some donors are not providing further assistance because the RMI is in arrears with outstanding loans.
- **Absence of a comprehensive donor coordination process.** This absence increases the risk of critical gaps going unaddressed and the danger posed by assistance provided out of sequence and not adding value or building on previous successes.

Planning and budgetary processes

Current situation. In general, the planning and budgetary processes across many sectors in RMI are poor-

ly carried out. As a result, it is difficult to get critical capital expenditures required for risk reduction explicitly targeted in the budget. According to one senior planning official, the problem is due to a combination of lack of willingness, awareness, and accountability, and lack of available funds (of the RMI recurrent budget about 90 percent funds personnel). Since performance-based budgeting is limited to only a few sectors of government, such as those receiving COFA support, personnel are generally not accountable. As a consequence, any available funds are dissipated and critical needs go unfunded.

The solid waste problem has reached crisis proportions because of deterioration of collection bins; the state of sanitation is similarly critical. The water sector has had no new capital expenditure, and the delivery of water in Majuro is now rationed to two days per week. There is only one water truck for emergencies for Majuro (for a population of 28,000) and no truck for Ebeye. The health sector faces real risks of epidemics, as identified in the NAP, especially of water-borne disease. The Health Ministry does not consider water quality its responsibility; water quality is currently within the purview of the RMIEPA (which is underfunded and under-staffed, with four staff to handle water quality monitoring in all of RMI).[5] The fire risk is extreme, especially in Majuro and Ebeye. For five years there has been approval for two fire trucks, which can be acquired with donor support, but they have not been purchased because of failure by government to appropriate the required 25 percent matching funds.

There are essentially no systematic planning processes for disaster. There is no testing of response mechanisms or assessments of critical facilities, which can underpin budgetary requests. With regard to fire risk, for example, the state of pumps, hydrants, access, and transport is not clearly known. Each year there is an appropriation of US$400,000 (half from the United States) for disasters. However, it is a stationary fund that is only drawn upon in the event of disaster (not for prevention or preparedness); if disaster does not strike, the fund accumulates (at present it stands at about US$2 million). There are efforts underway to modify the budgetary process so that the funds can be drawn down to a certain level for purposes of funding disaster prevention activities.

For local government, some funds are disbursed from the national government to local councils on an annual basis in relation to the size of the population being served; but council funds are derived largely from sales tax. Several of the northern atolls have sizable trust funds (up to US$120 million from the United States for nuclear weapons testing compensation). Additional funding for capital projects is sometimes allocated from donor funding or U.S. federal grants.

In terms of NAP implementation, the NEMCO Chief Secretary, whose office has jurisdiction of the NAPIU, prepares and presents the budget to the Cabinet with input from various committees. Thus, there is potentially a strong integration of planning and budgetary process for NAP-related actions and activities. At present an initial start-up budget is available to organize the NAPIU.

However, the larger problem overall pertains to the lack of strategic planning and performance-based budgeting in the majority of government agencies. Currently, only a few government agencies (like those that receive COFA funding, for example, the RMIEPA) develop strategic plans and have performance-based budgeting. Until this underlying deficiency is addressed, it is likely that main-

[5] The incidence of gastroenteritis now averages about 2,000 cases per year in Majuro; for Ebeye, with a population of about 10,000, the rate is 1,100-1,300 per year. Ebeye recently had a cholera outbreak, and there were cases of typhoid. The U.S. Center for Disease Control in Atlanta, Georgia, was obliged to visit RMI twice within the last several years.

streaming and implementation of risk-reducing activities and actions will be effectively or efficiently managed.

Impediments

- ***Lack of identified long-term support for sustained implementation of NAP.*** The NAP implementation planning is largely focused on externally supported technical assistance. The matter of sustainability needs to be addressed. The operational (recurrent) budget is already over-stretched and may undermine operational activities within the NAP. There are already inadequate resources available to support ongoing activities and no easily identified opportunities for new resources to support expanding government services.
- ***Absence of strategic planning and performance-based budgeting within government.*** Until some rigorous form of accountability is enforced, like performance-based budgeting, risk reduction in general and the NAP in particular will face serious implementation problems.

Implementation of actual risk-reducing measures

- **Current situation.** The current situation can be characterized by the state of on-going operational activities related to risk reduction, and by specific NAP-related projects.

For operational activities, there is limited success in implementing risk-reducing measures in RMI. The positive actions that are taken (e.g., in water quality monitoring, control of sand dredging, expansion of water storage facilities) tend to be swamped by the magnitude of the problems. The slow accumulated degradation of the natural and social systems is diminishing the resilience to natural and human-induced hazards. In some cases, the situation is actually quite dismal, which is illustrated by the following examples:

For droughts and diseases risks

- In Majuro Atoll, even in non-drought times, reticulated water is supplied intermittently, only two days per week. In Ebeye, there is intermittent supply on a community-wide basis. In the interim periods of low water pressure in the pipes, the water is often contaminated as a result of infiltration.
- The reticulated water system in Majuro has high levels of unaccounted losses. It is estimated that between the well field at Laura and the reservoir near the airport up to 66 percent of the flow is lost to leaks.
- Roof catchment tank systems are expanding throughout the atolls, but capacity for proper design and maintaining safe quality of water from such sources is not keeping pace. Cases of gastroenteritis are high and increasing, and Ebeye experienced a recent outbreak of cholera.

For typhoon, high surf and disease risks

- In Majuro Atoll, the coastal system continues to be degraded with dumping of solid waste.
- Reticulated sewage is disposed untreated. In Majuro, the pipe extends to a depth of 25 meters just over the edge of the reef flat but is reported to be damaged and leaking at the surf level.
- Septic tanks are not emptied, and widespread leakage in the coastal environment occurs frequently because of high water tables and pollutes the coastal and marine environment.

On the positive side, the improvements in forecasting of El Niño/La Niña rainfall conditions, issued from the Pacific ENSO Applications Climate Center in Hawaii, have proven to be beneficial in allowing preparation and adjustments to water supplies and usage. For example, for the 2003 drought, the impacts were reduced due to actions taken based on prior warning. The RMIEPA has had some success in implementing activities and strategies identified in its EPA Strategic Plan 2004-2007,

including development of the RMI Coastal Management National Framework, strengthening the GIS capacity, awareness raising, and conducting environmental impact assessments on development activities. Following the 1998 El Niño-related drought, the Government and FEMA began providing water tanks to outer island communities.

Several projects related to NAP goals are underway:

- ***European Union B-Envelope water supply.*** While the NAP is not yet endorsed by the Cabinet, there are already several objectives pertaining to NAP Goal 5, *Access to safe and adequate clean water at all times*, that are being implemented by the EU B-Envelope Fund (net Euro 935,000). The overall objective of this project is to improve the reliability of dry season and drought-period water supply to the urban and rural people of the Marshall Islands. The specific components of the project include:
  - Outer island household rainwater harvesting provision,
  - Urban rainwater harvesting provision,
  - Improved rural and urban rainwater harvesting management,
  - Improved drought yield of national airport runway rainwater harvesting,
  - Protection of Majuro's groundwater resources for future drought supply.

The partners in the implementation of the project include Ministry of Health, RMIEPA, Majuro Water and Sewerage Corporation, Public Works Department, Youth for Youth for Health, and Women United Together in the Marshall Islands.

- ***Rongelap Atoll local government, conservation, and sustainable development project.*** This initiative is being supported with the income derived from the Atoll's Trust Fund (which totals US$60 million from the U.S. nuclear testing compensation) along with US$2 million per year from an individual philanthropist. The project is taking a holistic approach to sustainable development of the island, which has a pristine marine environment and from which the inhabitants have temporarily been relocated. The activities include a marine research center, a marine sanctuary, aquaculture, and eco-tourism. This includes breeding of marine species. The research is expected to lead to commercial activities and, with eco-tourism, to economic diversification and self-reliance (relating to NAP Goal 7, *Reduce economic dependency of the outer islands*). The infrastructure has been built along with a number of houses, constructed to USDA risk standards for wind stress and minimum floor heights to reduce risks from typhoons (relating to NAP Goal 6, *Sustainable development of the coastal area*). Reverse osmosis desalination has been acquired, and rainwater catchment tanks are part of each housing development (relating to NAP Goal 5, *Access to clean water*). A proposal has been submitted for establishment as a World Heritage Site.

- ***Integrated Water Resource Management Project for Laura groundwater protection.*** Funding of US$0.5 million comes from GEF to implement the groundwater protection activity noted in the EU B-Envelope project noted above (relating to NAP Goal 5, *Access to clean water*).

- ***Pacific Hydrological Cycle Observing System Program.*** The program focuses on (a) working with the RMIEPA and Majuro Water and Sewer Company on several management issues and capacity building; (b) provide equipment for water quality management; (c) assist with the rehabilitation of the Laura lens and groundwater monitoring; and (d) support for outer Pacific Islands for water quality and assessment.

Gaps or impediments

- *Lack of incorporation of CCA in DRR.* In the projects noted above, there is no systematic consideration of present drought risk or the effects of future climate change and how it may affect risks to water supply. There are several water resources development initiatives (e.g., outer Pacific Islands rainwater harvesting, integrated water resources management of Laura lens), and yet there does not appear to be any future climate change scenario or short-term drought proofing included in the project design and planning. Therefore, there will be no specific consideration of climate change adaptation. The actions to be taken will not be explicitly "climate-proofed".
- *Land tenure system and power of landowners.* The JICA began a project to double airport water storage (from 32 million gallons); landowners opposed the project, and so it was put in abeyance.
- *Failure of local government to implement.* In the chain of connections from policy, planning, regulations, monitoring, enforcement, and action, implementation often appears to be stymied by the failure of local government to carry through on its responsibilities. For example, while the enabling environment for land use regulations and zoning has been available at the national level for quite some time, enactment, which is the responsibility of local government, has been hindered. ❖

Opportunities for Investment

From this RMI assessment, it is evident from the gaps and impediments that many opportunities for investment leading to the improvement of risk reduction can be identified. Indeed, the NAP and the ADB (2005) report both identify considerable priorities, strategies, and actions necessary for environmental improvement and hazard management, including risk reduction, for RMI.

This assessment highlights country status, gaps, opportunities, and barriers related to national policies, strategies, plans and activities with regard to the management of natural hazards in RMI. This focus extends to the enabling environment for a comprehensive risk management approach to natural hazards and the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. In most discussions among key government officials and other stakeholders, investment programs are prioritized and selected based on expectations of several criteria (costs, available funding, efficiency, expected benefits, institutional, financial, legal and related capacity).

The RMI and most of the Pacific island countries already have established policies, institutions, systems, and related structures to address DRR/CCA challenges. Several programs (NAPs, NAPAs, etc.) are ready to be enacted. However, there are significant gaps in the 5 key HFA priority areas discussed; additionally, while some efforts have been made to address certain issues, others (funding, staffing and related operational support) persist. High-yielding, short-term priority issues have been identified by several participants; however, it appears that more effort is needed to fully categorize such needs and decide upon appropriate corresponding short-, medium- and long-term programs.

The RMI policymakers, sector officials (in consultation with local stakeholders), and various donors and financial institutions identified the list of priorities. The Government could choose to pursue any of these options with its own resources, with support from the international donor community, and/or international financial institutions such as the Asian Development Bank and the World Bank. Grant funding for RMI is being mobilized from the Global Facility for Disaster Reduction and Recovery to support pilot programs, which could be leveraged to undertake some of the proposed investments, based on demand. Funding would be expected to support programs from 2009-11.

In narrowing the field of opportunities, this report has applied two additional sets of filters or criteria. The first set of criteria helps select those opportunities that achieve the following:

- Address risk reduction directly;
- Are likely to produce tangible results within three years;
- Are likely to have longer-term sustainable benefits; and
- Have in-country commitment, champions, and/or institutional arrangements to promote implementation.

With this set of criteria in mind, and with consultation and expert judgment, 6 priorities for investment were identified in RMI. These 6 investment opportunities, along with a summary of the rationale for each in relation to the above criteria and as linked to the assessment report's discussion, follow:

(1) ***Strengthening capacity of the National Emergency Management and Coordination Office,*** under which the NAPIU will operate, with support in form of technical assistance. The success of the NAP depends heavily upon ensuring that NAPIU has strong capacity for technical advice, leadership, and coordination. The NAP has garnered

significant in-country commitment having been produced by an extensive, inclusive process of consultation with local government, civil society, and the private sector. The institutional arrangements —placing the NAPIU within DRC/NEMCO under the Chief Secretary's Office within the Office of the President—give NAP implementation strong positioning within government. Within three years, the preliminary implementation plan should be advanced and set the stage for implementation of the longer-term action plan.

(2) ***Developing an information management system.*** Such a system does not currently exist. The actions under the NAP (and other DRR and CCA actions) require cross-sectoral, cross-governmental (national to local) collaboration and integration of effort. That effort requires a system of organization, storage, and sharing of data and information, including communication and knowledge sharing with outer Pacific Islands. Technically, such a system could be established well within a three-year period and, once established, would have long-term benefits in facilitating integrated action across agencies and sectors. To be successfully implemented, the information system should be strongly championed by NEMCO.

(3) ***Enhancing community-based awareness, education and participation in risk-reduction and resilience building.*** It is widely acknowledged in RMI that more engagement across all levels, from national decisionmakers to the outer island communities, must be encouraged. Participation of local government, communities, civil society, and the private sector are essential for DRR/CCA success. There is strong endorsement of this opportunity by the Disaster Risk Center—a likely champion for NAP —that views it as essential for the successful implementation of NAP. While building a complete bridge between the national and local level is a long-term process, substantial progress in building a strong foundation can be made in three years.

(4) ***Climate proofing new water supply developments.*** The RMI is poised to embark on a number of projects, especially with regards to bolstering water supply systems in order to reduce the risks from drought. These include both individual and community water-harvesting projects. However, in general, these projects are not taking climate variability and change explicitly into account in terms of designing to acceptable levels of risk. Here is an excellent opportunity, with minimal additional support required, to maximize the synergy between disaster risk reduction and climate change adaptation with actual on-the-ground risk-reducing measures. The climate-proofing measures would "add value" to efforts that are underway to enhance water supply systems. The timeframe for implementation is short, well within three years. The on-the-ground benefits however are long term and promote sustainable water resources in the face of future climate change.

(5) ***Reviewing and revising draft building codes.*** Revised codes should ensure that disaster risk reduction and climate change adaptation are incorporated explicitly. While RMI has had draft building codes for nearly two decades, local governments have never enacted them. The RMI government, as voiced by the NRC, the OEPPC, and the EPPSO, stresses the paramount importance of instituting building codes. While there has been past failure to enact draft codes, it is felt that changing circumstances are now more favorable for enactment, particularly if awareness raising and greater participation in disaster risk reduction and climate change adaptation are pursued. The reviewing and revising of draft building codes is contained with the NAP as an action item. The required timeframe is short, within three years, but the benefits, if enacted, are long term and sustainable in terms of resultant effects.

(6) ***Early warning response.*** This priority item includes assessing and identifying the gaps in warning systems, and reviewing and improving dissemination and public perception and response measures. This priority item in the NAP is also a key component of both the regional DRR and CCA frameworks for action. The recommended priority in terms of early warning is to focus on the communication and response measures that would reduce vulnerability, rather than focus on the physical warning system itself. This could be achievable with an operational pilot program within a three-year period and would set the stage for a longer-term, sustainable program.

These 6 opportunities for investment were then subjected to a second filter by asking the question: *Which of the opportunities are already or likely to be supported by other donors and agencies?* The intent of applying this criterion is to see where the World Bank can add value in a coordinated and harmonized manner in terms of other players in the region. Two of the 6 opportunities have support from other regional groups: Opportunity (3), *Awareness raising*, is slated to be taken up by SOPAC; and (6) *Early warning response,* has several interested donors, to be coordinated by SOPAC.

On this basis, there are 4 complementary projects that could be supported by the World Bank: (1) *Support to the NAPIU*; (2) *Development of the information management system*; (4) *Climate-proofing of new water supply systems*; and (5) *Updating of building codes*.

While the priorities listed above reflect a great deal of consultation and analysis, the impediments and gaps previously noted in the report could create serious obstacles if they are not addressed as part of the program preparation process.

In the tables of Annex A, each of these opportunities is expanded to provide preliminary information on indicative costs, timeframes, and first-order actions and tasks. This information is intended to be sufficient for the development of detailed proposals and should the World Bank wish to pursue these opportunities for investment. ❖

Annex A. Proposals for Support to RMI

Proposal	**M1 Support for implementation of the NAP**				
Country/sector	**Republic of Marshall Islands: Disaster Risk Management**				
Goal and purpose	**Implementation of the NAP through providing TA support to the NAP Implementation Unit**				
Scope	**National**				
Lead agency	**CSO with NDC NEMCO**				
Cost and duration	**US$400,000 over 18 months**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
All Hazards	Development of the NAPIU for implementation of the NAP	Lack of capacity and organizational arrangement to implement the NAP Absence of DRR/CCA technical expertise Absence of policy framework for DRR/CCA (Mandate of NEMCO is currently limited to disaster response functions) Absence of DRR/CCA culture and knowledge in national & local government	Establish the NAPIU, which is to lead the NAP implementation for the 3 years. The NAPIU is to be led by Deputy Chief Secretary who will provide leadership & coordination and links to NAP Task Force. Define staff TOR and recruit personnel to the NAPIU. Recruit Technical Expert for 18 months to support the NAPIU and the initial implementation of the NAP. Develop DRR/CCA policies and work with ministries and local government to build an enabling environment for mainstreaming DRR/CCA in RMI.	 360 40	June 2008 Sept 2008 Mar 2009

Continues

Annex A. Proposals for Support to RMI *Continues*

Proposal	**M2 Establish integrated hazards information system and tools (with GIS capability)**				
Country/sector	**Republic of Marshall Islands: Hazards advisors and sector users**				
Goal and purpose	**To inform and promote risk reduction decisions through information sharing and sound data management, analysis and presentation**				
Scope	**National**				
Lead agency	**CSO with NAPIU, EPA, Met Services, MWSC, R&D, MIMRA, EPPSO, IA**				
Cost and duration	**US$220,000 over 12months**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
Wind, storm surges SLR Climate change extreme events Coastal inundation and erosion Fire Droughts, Fresh and marine waters pollution Pandemics	Evaluate and map hazards. Assess risks and map vulnerability Map assets and assess critical infrastructure Monitor environmental changes and increased exposure to risks	Generally weak information management systems in most agencies (cf Meteorological Services) and no Information System Management policies. Most hazard information is still hard-copy based and of questionable standard. Limited capacity for information system management Weak hardware and software computing capacity Limited tools and models for resource managers	Provide TA support (8 person months) for development of an integrated hazards information system Develop and adopt a Hazards Information Policy addressing: • data sharing and availability • single GPS datum/projection for RMI • catalogue of data to be held • datasets to be made available digitally Assess data needs and products for DRR/CCA Identify long-term storage requirements, analysis tools, and mapping needs Acquire appropriate computer hardware, software, and high-speed Internet connection Support capacity building through populating the information system with available historical data and undertaking vulnerability mapping and risk modeling for climate change & risk prediction RMI Government to ensure sustainability through annual recurrent budget for data and image acquisition, hard/software maintenance and communication access costs.	160 30 30	3rd Qtr 2008 to 3rd Qtr 2009

Annex A. Proposals for Support to RMI *Continues*

Proposal	**M3 Climate-proofing water supply systems**				
Country/sector	**Republic of Marshall Islands: Water supply**				
Goal and purpose	**Achieve acceptable levels of water-supply risks, by explicitly incorporating drought issues, including additional risks from climate change, into new water harvesting systems.**				
Lead agencies	**EPPSO, with EPA, Weather Office, Min. of Internal Affairs, PWD**				
Cost and duration	**US$480k over 2 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Actions and tasks**	**Cost US$k**	**Time-frame**
Drought	Rain-water harvesting (residential and community)	Lack of design taking explicit account of present and future drought risks	Identify and establish collaborative arrangements with donors, government agencies, private sectors, and communities involved in water supply – pre-requisite to EU-supported RWH project	60	Year1, 3 months
			Develop and pilot a climate-proofing approach to a new water harvesting initiative, involving: 1. Assessing the system design with respect to risks of drought (present and future) 2. Consultation with water consumers and system designers concerning acceptable levels of risk 3. Assessment of options for reducing the risks	280	Year1-2, 14 months
			Build in-country capacity to implement the approach and tools	40	Year 2 2 months
			Incorporate the climate-proofing approach and methods into the wider program of water supply developments	100	Year 2 5 months

Annex A. Proposals for Support to RMI *Continues*

Proposal	**M2 Establish integrated hazards information system and tools (with GIS capability)**				
Country/sector	**Republic of Marshall Islands: Hazards advisors and sector users**				
Goal and purpose	**To inform and promote risk reduction decisions through information sharing and sound data management, analysis and presentation**				
Scope	**National**				
Lead agency	**CSO with NAPIU, EPA, Met Services, MWSC, R&D, MIMRA, EPPSO, IA**				
Cost and duration	**US$220,000 over 12months**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
Wind, storm surges SLR Climate change extreme events Coastal inundation and erosion Fire Droughts, Fresh and marine waters pollution Pandemics	Evaluate and map hazards. Assess risks and map vulnerability Map assets and assess critical infrastructure Monitor environmental changes and increased exposure to risks	Generally weak information management systems in most agencies (cf Meteorological Services) and no Information System Management policies. Most hazard information is still hard-copy based and of questionable standard. Limited capacity for information system management Weak hardware and software computing capacity Limited tools and models for resource managers	Provide TA support (8 person months) for development of an integrated hazards information system Develop and adopt a Hazards Information Policy addressing: • data sharing and availability • single GPS datum/projection for RMI • catalogue of data to be held • datasets to be made available digitally Assess data needs and products for DRR/CCA Identify long-term storage requirements, analysis tools, and mapping needs Acquire appropriate computer hardware, software, and high-speed Internet connection Support capacity building through populating the information system with available historical data and undertaking vulnerability mapping and risk modeling for climate change & risk prediction RMI Government to ensure sustainability through annual recurrent budget for data and image acquisition, hard/software maintenance and communication access costs.	160 30 30	3rd Qtr 2008 to 3rd Qtr 2009

Annex A. Proposals for Support to RMI

Proposal	**M4 Review, revise and promote building codes**				
Country/sector	**Republic of Marshall Islands: Settlements, infrastructure**				
Goal and purpose	**Achieve "climate-proofed" development by ensuring that new buildings and infrastructure follow standards that explicitly incorporate DDR and CCA to acceptable design levels.**				
Scope	**National**				
Lead agency	**CSO with NDC, NEMCO**				
Cost and duration	**US$200,000 over 2 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
All	Risk-reducing building and infrastructure design standards and codes	Draft building codes were never enacted and are out of date Obstruction at level of local government where building codes have to be enacted	Recruit TA support in order to: Review the draft building codes and identify potential areas for improvement and strengthening with respect to risk reduction. Develop preliminary set of options for revision covering range of hazards Hold consultative workshops with local governments and communities in order to incorporate stakeholder views and preferences Revise draft based on outcomes of consultation Identify key proponents of building codes within government and promote government approval	 20 60 40 40 40	 Year 1 1 month Year1 3 month Year 1 2 months Year 2 2 months Year 2 2 months

Annex B. Project Team and People Consulted

Project team

Alf Simpson	Consultant, Australia
Richard Warrick	Consultant, New Zealand
Supported by	
Mosese Sikivou	Manager, Community Risk Program, SOPAC

Persons consulted (Country visit, May 5-11, 2008)

Yumiko Crisostomo	Director, Office of Environmental Planning and Policy Coordination
Carl Hacker	Director, Economic Policy, Planning and Statistics Office

RMI Mayors

Wilson Note	Bikini Island
James Matayoshi	Rongelap Island
Danny Matthew	Utrik Island
John Kaiko	Utrik Island

Other officials

Jorelik Tibon	Deputy Chief Secretary (Chair), NAP Task Force
Jemi Nashion	Ministry of Finance
Imang Chong Gum	Ministry of Public Works
Alington Robert	Majuro Water & Sewerage Co.
Bermen Laukon	Majuro Energy Co.
George Lanwi	Police Commissioner, Department of Public Safety
Wilbur Heine	Ministry of Internal Affairs
Carl Hacker	Economic Planning Policy & Statistics Office (EPPSO)
Ronny Jacob	Ministry of Education
Clement Capelle	NEMCO
Justina Langidrik	Ministry of Health
Reginald White	Meteorologist in charge, Weather Service Office
Abraham Hicking	Water Quality Manager, Environmental Protection Agency
Casten N. Nemra	Chief Secretary, Office of the President
John Bungitak	General Manager, RMIEPA
Tommy Kijiner	Ministry Research and Development
Roger Cooper	Majuro Waste Co.

Bibliography

ADB (Asian Development Bank). 2005. *Republic of Marshall Islands: Country Environmental Analysis.*

ADB. 2004. *Pacific Region Environmental Strategy 2005-2009: Executive Summary.*

Bettencourt, Sofia, Richard Croad, Paul K. Freeman, John Hay, Roger Jones, Peter King, Padma N. Lal, Alan Mearns, Geoff Miller, Idah Pswarayi-Riddihough, Alfred Simpson, Nakibae Teuatabo, Ulric Trotz, and Maarten van Aalst. 2006. *Not If, But When – Adapting to Natural Hazards in the Pacific Islands Region – A Policy Note.* Pacific Islands Country Management Unit, East Asia and the Pacific Region, World Bank.

Chunting Xue. 1997. SOPAC Report.

GEF (Global Environment Facility). 2008. *GEF-Pacific Alliance for Sustainability - Program Framework.*

Geoscience Australia. 2008. *A Natural Hazard Risk Assessment of the Asia Pacific Region.*

Government of RMI. 2008. *National Action Plan for Disaster Risk Management 2008-2018.*

——. 2008. *Majuro Water Safety Plan (Draft).* Majuro Water & Sewerage Co.

——. 2006. *Climate Change Strategic Plan (2006).* OEPPC, Office of President

——. 2006. *RMI Coastal Management National Framework (draft),* RMIEPA.

——. 2005. *Standard Mitigation Plan 2005-2007: Final Draft.*

——. 2003. *Disaster Preparedness and Mitigation Act 2003.*

——. 2003. *Office of Environmental Planning and Policy Coordination Act 2003.*

——. 2001. *Vision 2018: The Strategic Development Plan Framework 2003-2018.*

——. 1988. *Coast Conservation Act 198.8*

——. 1987. *Planning and Zoning Act 1987.*

——. 1984. *National Environmental Protection Act 1984.*

Pratt, C.R., and Mitchell, J. 2003. *EVI Country Profile Review – Marshall Islands.* Miscellaneous Report 522. SOPAC.

SOPAC (Secretariat of the Pacific islands Applied Geoscience Commission). 2007. *Integrated Water Resources Management in Pacific Island Countries- A Synopsis.*

——. Nd. Various country diagnostic reports.

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**In bold, GFDRR Donors*

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

PAPUA NEW GUINEA COUNTRY ASSESSMENT

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

THE WORLD BANK

SOPAC

Acronyms and Abbreviations

CCA	Climate change adaptation
CTI	Coral Triangle Infrastructure (Plan of Action)
DAL	Department of Agriculture and Livestock
DEC	Department of Environment and Conservation
DL&PP	Department of Lands and Physical Planning
DMPGM	Department of Mineral Policy and Geohazards Management
DNPM	Department of National Planning and Monitoring
DRM	Disaster risk management
DRR	Disaster risk reduction
ENSO	El Niño Southern Oscillation
GEF	Global Environment Facility
GIS	Geographic Information System
HFA	Hyogo Framework for Action
HYCOS	Hydrological Cycle Observation System
NAP	National Action Plan
NARI	National Agricultural Research Institute
NDC	National Disaster Center
NDM	National Disaster Management (Act)
NGO	Nongovernmental organization
OCCES	Office of Climate Change and Enviromental Sustainability
PICCAP	Pacific Island Climate Change Assistance Program
PNG	Papua New Guinea
SOPAC	South Pacific Applied Geoscience Commission
SPC	South Pacific Commission
SPREP	Secretariat of the Pacific Regional Environmental Program
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UPNG	University of PNG

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Introduction

The World Bank policy note "Not If, But When" shows the Pacific island countries to be among the world's most vulnerable to natural disasters. Since 1950, natural disasters have directly affected more than 3.4 million people and led to more than 1,700 reported deaths in the region. In the 1990s alone, reported natural disasters cost the Pacific islands region US$2.8 billion (in real 2004 value). The traditional approach of "wait and mitigate" is a far worse strategy than proactively managing risks.

The Hyogo Framework for Action (HFA) 2005-2015 lists the following five key priority areas for action for ensuring preparedness and readiness to disaster risk reduction (DRR) and climate change adaptation (CCA) challenges:

(1) ***Ensure disaster risk reduction is a national and local priority with a strong institutional basis for implementation.*** Key components include:

- Strengthening national institutional and legislative framework resources for the development and implementation of disaster risk management policies, programs, laws, and regulations in all relevant sectors and authorities at all levels of administrative and budgets on the basis of clearly prioritized actions;
- Developing and tracking progress through specific and measurable indicators;
- Developing resources for risk management policies and programs;
- Promoting community participation.

(2) ***Identify, assess, and monitor disaster risks and enhance early warning.*** Key components include:

- Strengthening national and local risk assessments,
- Establishing institutional and community capacities for effective early warning,
- Developing and sustaining technical infrastructure and information management capacities for effective data collection and hazard analysis,
- Building cooperation mechanisms for analyzing regional and emerging risks.

(3) ***Use knowledge, innovation and education to build a culture of safety and resilience at all levels.*** Key components include:

- Strengthening networks and mechanisms for information management and exchange,
- Promoting inclusion of risk reduction in school and community education and training,
- Furthering research into risk and hazard analysis and cost-benefit analysis for risk reduction actions,
- Promoting public awareness to engage media and community interest.

(4) ***Reduce the underlying risk factors.*** Key components include:

- Integrating environmental and natural resource management with risk reduction,
- Strengthening safety-nets by improving social and economic development practices in health, food security, livelihoods and other sectors,
- Incorporating risk management into land-use planning and other technical measures.

(5) ***Strengthen disaster preparedness for effective response at all levels.*** Key components include:

- Strengthening institutional capacities and training and learning mechanisms to include risk reduction in all aspects of disaster management,
- Strengthening contingency and preparedness planning,
- Promoting community participation.

In reviewing the Communiqué of the 39th Pacific Islands Forum in Alofi, Niue (August 19-20, 2008), Forum leaders "reaffirmed the continued urgency of addressing the challenges posed by and the impacts of climate change as a regional priority" and "committed their governments to provide the necessary national resources and policy focus to addressing the challenges of climate change." The Secretariat of the Pacific Regional Environmental Program (SPREP), South Pacific Applied Geoscience Commission (SOPAC), South Pacific Commission (SPC), the University of the South Pacific, and others were asked to assist the Pacific island countries in working together and focusing on the following:

- Pursuing and implementing mitigation and adaptation measures;
- Mainstreaming human security issues;
- Improving preparedness for the impacts of increasing natural disasters through implementation of national action plans;
- Addressing the vulnerability of Pacific Islands to climate change and subsequent impact on people, land, water, food security, infrastructure, and natural resources;
- Continuing to work collaboratively to rationalize the roles of the various regional organizations and to harmonize donor engagement; and
- Improving the capacity of countries in the region to engage in the ongoing United Nations Framework Convention on Climate Change negotiations for a post-2012 global climate change agreement.

In several respects, the Niue Declaration is consistent with the overall HFA priorities. The main focus on climate change is expanded to some degree by reference to the vulnerability of the Pacific to natural disasters as well as the need for National Action Plans.

This report reviews the extent to which DRR and CCA activities have progressed in Papua New Guinea (PNG) in line with recent international declarations as well as those of Pacific leaders. It identifies consistencies and gaps or impediments with the HFA principles as a basis for identifying opportunities in line with the HFA recommendations. The review also takes into account other existing frameworks such as the Pacific Plan and the *Disaster Risk Reduction and Disaster Management Framework for Action 2005–2015: An Investment for Sustainable Development in the Pacific Island Countries*, adopted by the Pacific Forum in 2005. The focus is on DRR and CCA activities, as opposed to disaster management measures that prepare for, respond to, and recover from disaster events after they occur. While some specific sector activities are addressed in the assessment of PNG national and local government policies and institutional arrangements, the report does not provide a comprehensive summary of sector-by-sector activities. Instead, it refers to other reports that have covered this and complements these with suggestions for taking the necessary follow-up steps and actions.

The country assessment aims is to deepen the understanding of the gaps, opportunities, and needs at the national level toward stronger operational disaster and climate risk management in the Pacific islands and to link closely to other ongoing and future efforts by other donors and stakeholders, such as the SOPAC regional initiatives following the Madang Framework and the National Action Plans (NAPs), to ensure synergy and avoid duplication. The assessment tries to focus on practical, proactive measures that PNG can take to inform its national development policies and plans, and strengthen its capacity to reduce the adverse consequence of natural hazards such as storm surges and tsunami and others related to extreme weather, climate, and oceanic conditions.

This assessment highlights the current country status, gaps, opportunities, and barriers related to (a) national policies, strategies, plans, and activities in management

of natural hazards; (b) the enabling environment for a comprehensive risk management approach to natural hazards; and (c) the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. It also reviews and identifies the need for informed policy choices; improved decisions; and strengthened regulations, legislative and policy-level changes required to support proposed country-level activities through both country efforts and those of other stakeholders.

With respect to achievement of the first HFA priority area, while both international- and regional-level leaders have voiced strong support for appropriate DRR and CCA actions, there is clear evidence of systemic difficulties among many Pacific island countries in establishing and maintaining a viable enabling environment and promoting a cross-sector focus for DRR and CCA activities. PNG was among the first countries to adopt the HFA but has not been able to integrate its priorities into the country's disaster risk management (DRM) strategies. Available evidence shows that ad hoc and externally driven approaches have not provided satisfactory results so far, and HFA emphasis upon a strong government commitment, ownership, and action at all levels is one of the primary and early challenges to be surmounted in achieving the goals of the International Strategy for Disaster Reduction.

This PNG assessment report begins by explaining the context of the country in relation to disaster risk reduction and climate change adaption. It follows with sections on key country findings and detailed country assessment that focus on some vital components relevant to HFA achievement: overall legal, institutional, policy, and related framework; adopting and mainstreaming policies; data and knowledge; risk and vulnerability assessments; monitoring and evaluation; awareness raising and capacity building; planning and budgetary processes; and coordination within a sustainable framework. From this assessment, possible opportunities for addressing the identified gaps and needs within the HFA are presented in the final section. The proposals for future support are presented in Annex A. ❖

Country Context

PNG has a population of 6.3 million people, 80 percent of who live in rural subsistence communities. The country is located in the South West Pacific between latitudes of 1° and 12° south and, at 463,000 square kilometers, is the largest of the Pacific island states (Figure 1). It occupies the eastern half of the mainland island of New Guinea with three additional islands and over 600 lesser islets and atolls to the north and east. The main islands are volcanic in origin with rugged interiors up to an elevation of 4,496 meters.

The country has a national capital district and 19 provinces (8 coastal, 5 highland, and 6 island) administered by provincial governments. While the provincial governments have relative autonomy in their affairs, devolved functions often go unattended primarily because of provincial (human and financial) resource constraints. This results in the Central Government maintaining a strong presence. In the past, the Government created special "authorities" to try to address particular issues and to overcome perceived shortcomings in central and provincial bureaucracies. It now appears that these authorities are also being sidelined as key resources are transferred to more single-focus areas of activity via other channels.

Figure 1. Map of Papua New Guinea

Source: Asian Development Bank.

Customary landowners control 97 percent of the land while 3 percent is government-owned alienated land. While 1989 legislation (the Physical Planning Act) provides for land-use management of all land through national and provincial land boards, there appears to be little influence exercised on customary land use with only 2 percent (mostly government-leased land on-leased for development or mining purposes) subject to planning rules.

Over 80 percent of the population live in a rural environment and have traditionally been particularly susceptible to extremes of climate (rains and drought) related to the El Niño Southern Oscillation (ENSO). Evidence points to significant potential for increasing variability related to climate change, resulting in more frequent or more extreme weather-related events in some parts of the country.

PNG is particularly prone to natural disasters including earthquakes, volcanic eruptions, tsunamis, cyclones, river and coastal flooding, landslides, and droughts. The highlands, with 2.2 million people in many thousands of small villages, are subject to weather extremes of heavy rainfall and drought. Increasingly, landslides are occurring from population pressures on uncontrolled land use. The coastal areas and the many coral atolls are low-lying, and nearly 500,000 people in 2,000 coastal villages are vulnerable to weather extremes and inundation.

PNG experiences 2 to 3 national-level activations (and numerous smaller local activations) for disaster events per year, and in the past 15 years there have been 7 events of significance covering flooding, volcanic eruption, tsunami, landslide, and drought. The DRR planning is promoted through the National Disaster Center (NDC) within the Department of Pro-

vincial and Local Government Affairs; however, there appears to be little ongoing activity at this time. The CCA-related activities previously fell under the jurisdiction of the Greenhouse Unit within the Department of Environment and Conservation (DEC) but are now the responsibility of the recently created Office of Climate Change and Environmental Sustainability (OCCES), which reports to the Prime Minister's Office. The initial focus will be on carbon trade, though CCA policies are expected to be a part of the country's nascent overall climate change framework.

The key findings of the PNG assessment are summarized in the next chapter followed by the detailed assessment and identification of risk reduction opportunities. ❖

Key Country Findings

As the largest Pacific island country and one of the most exposed to hazards and potential impacts of climate change, PNG has precarious arrangements to manage or reduce the impact from this exposure. Effective and sustainable risk reduction cannot be achieved without clear governance with explicit allocation of accountabilities and government commitment that cuts across all at-risk sectors. Nor can it be achieved without an understanding of the hazards being addressed and the risks arising from them. In the absence of recovery support following a disaster, communities are forced to pick themselves up with meager resources and continue from where the disastrous event left them. Cycles of disasters in vulnerable communities negate government objectives to alleviate poverty.

Overall, this assessment report has made several key observations of DRR and CCA issues and their impact in PNG.

High-level exposure. The island country is highly vulnerable to hazards and climate extremes, and facing potentially greater variability and extremes due to climate change. An expected rapidly growing rural population (2.8 percent growth per year) will add stresses to land and water resources and increase exposure to hazards. Adding to this, a low-level recognition of hazards and marginal-level monitoring of hazards (except volcanic) and climate change leaves PNG with an inability to assess vulnerability or identify risk issues.

Information and coordination. Despite a good level of historical hazard data, it is difficult to access this information. Also, a lack of analytical tools and up-to-date data makes it difficult to follow trends. Low-level cooperation and coordination between government agencies, with strong silo effects and little information sharing, is exacerbated by weak information systems.

Provincial responsibility. Functions in disaster management, land use, and the environment have devolved to the provincial level, but an almost complete lack of resourcing and support in many areas hardly allows these functions to be fulfilled. It is reported that in only 4 of the 19 provinces could disaster management arrangements be described as other than nominal. A period of disaster management development (with a fledgling DRR component) up until 2006 resulted in a reasonable level of awareness among departments and provinces.

Decisionmaking. The National Disaster Center, which currently lacks government commitment, is not functionally effective and is increasingly marginalized in decisionmaking and advocacy. However, this weakened position puts the Government and PNG communities at risk since expectations remain for disaster management capability from the National Disaster Center. Despite externally driven administrative structures that have come and gone over 8 years for the coordination and development of CCA advice and business, none have resulted in any policy development or department commitment.

Human resource capacity and application. Despite a good level of DRR/CCA awareness at the principle-levels of government, there is still a lack of appreciation of how disaster risk reduction and climate change adaptation might impact a sector's activity or an individual's job. Consequently, there is little government-promoted DRR/CCA activity of any significance. And where there is adequate staff capacity within departments, the lack of resources, systems, and tools leaves staff with an inability to influence outcomes. Even with well-developed legislation in the areas of physical land use and the environment, there is little application and no effective involvement of other departments, according to reporting by departments with administrative responsibility.

Private sector involvement. Significant stakeholder/NGO activity provides for local disaster response capability as part of development programs. This activ-

ity has a future DRR/CCA focus but is currently preoccupied with disaster management issues. There is a national stakeholder/NGO coordination mechanism for responding to disaster events, which offsets the lack of commitment of the National Disaster Center. The PNG assessment team became aware of some climate change mitigation activity (which had commercial drivers), but there were no examples of adaptation or risk reduction in terms of private sector activity.

Food and water security. The National Agriculture Research Institute and the National Fisheries Authority, as well as other institutions, with support from NGOs and donors are undertaking climate hazard-related work in food and water security to reach the relative Millennium Development Goals. These institutions are lacking a champion, are under-resourced, and have limited capacity to promulgate their work.

Infrastructure. Construction experts brought several examples of infrastructure failures to the attention of the PNG assessment team. Weather events and inadequate attention to design parameters caused the failures in the examples.

Education and training. Despite capacity for DRR/CCA and hazard assessment curricula within the University of PNG (UPNG), government connections are weak and the capacity is underutilized.

Any proposals dealing with DRR/CCA issues must clearly show political and institutional commitments, without which there is little point in proceeding. Proposals must address the establishment of clear institutional frameworks and governance accountability across appropriate sectors and between levels of government. The political commitment in PNG has risen in response to the increased frequency and impact of extreme weather events in several parts of the country. The Prime Minister is now recognized as a champion for the disaster management agenda.

The CCA agenda must also be driven from the national level since there is no provincial structure. The opportunity exists to integrate the institutional arrangements for climate change adaptation and disaster risk management while maintaining separate programs as appropriate.

In the context of development programs, there are opportunities identified to support sector programs in the food and water security and fisheries, which have some relationship to potential climate change but which have not been initiated by climate change considerations. All have elements of technical development and promulgation of outcomes to communities. Any initiatives should be ideally linked with a governance framework development in a bottom-up/top-down context. Resources required for these initiatives are substantial, and cooperative arrangements through those sectors are needed.

The way forward is strongly dependent on the continued presence of an in-country champion to provide some basis for a sustainable outcome. Any initiatives should also result in capacity development throughout PNG. Further work is required to identify appropriate areas of activities that meet these criteria and for the development of project contexts with the appropriate sector. Any proposals should form the basis of a longer-term strategic commitment.

A summary of broad situations, gaps, and opportunities is shown in Table 1. The final chapter of this PNG report expands on these opportunities. ❖

Table 1. Summary of Key Gaps and Opportunities for DRR and CCA in PNG

Situation	Gap	Opportunities
There is a lack of commitment to hazard monitoring, vulnerability analysis, and understanding of risk to inform DRR and CCA activity.	There are insufficient monitoring networks; poor access to historical time-series data; and a lack of analysis tools, mapping, and risk assessment.	Refocus the hazard-related functions and enhance the capacity for improved monitoring, data analysis, and use of hazard information in DRR and CCA. Integrate hazard-related functions and development of vulnerability assessment skills.
Government policies on DRR and CCA are unformed, and coordination structures are ineffective leading to a lack of budget commitment to initiatives. The conditions for mainstreaming do not exist.	DRR and CCA are not priority areas for government commitment. Agencies with roles in these areas do not feel they can make a difference.	Assist with development of policy frameworks, identify champions, and facilitate DRR and CCA practice within and across agencies.
Existing arrangements for land use and environmental management are not being applied to address hazardous situations.	There is a lack of cooperation and coordination between agencies, as well as a lack of access to data and analyses to support measures.	Integrate the focus for CCA and DRR and establish policy frameworks and institutional structures and accountabilities for coordination.
There is a lack of commitment to the functions of the National Disaster Center and their provincial counterparts, leading to a marginalizing and isolation of their roles.	Disaster response arrangements are poorly structured and resourced leading to uncertain and delayed responses to events. There is ineffective advocacy and support for DRR activities.	Promote the championing of the National Disaster Center functions and support the strengthening of legislation, enabling environment, and institutional arrangements for DRM.
There are particular vulnerabilities with food and water security in the relatively short term related to climate extremes and variability associated with the ENSO. This is being exacerbated by land use pressures and potentially by climate change.	There is a lack of support from national and provincial levels, which results in local initiatives becoming unsustainable and failing.	Support programs to address these vulnerabilities and promulgate measures to reduce the risks.

Detailed Country Assessment

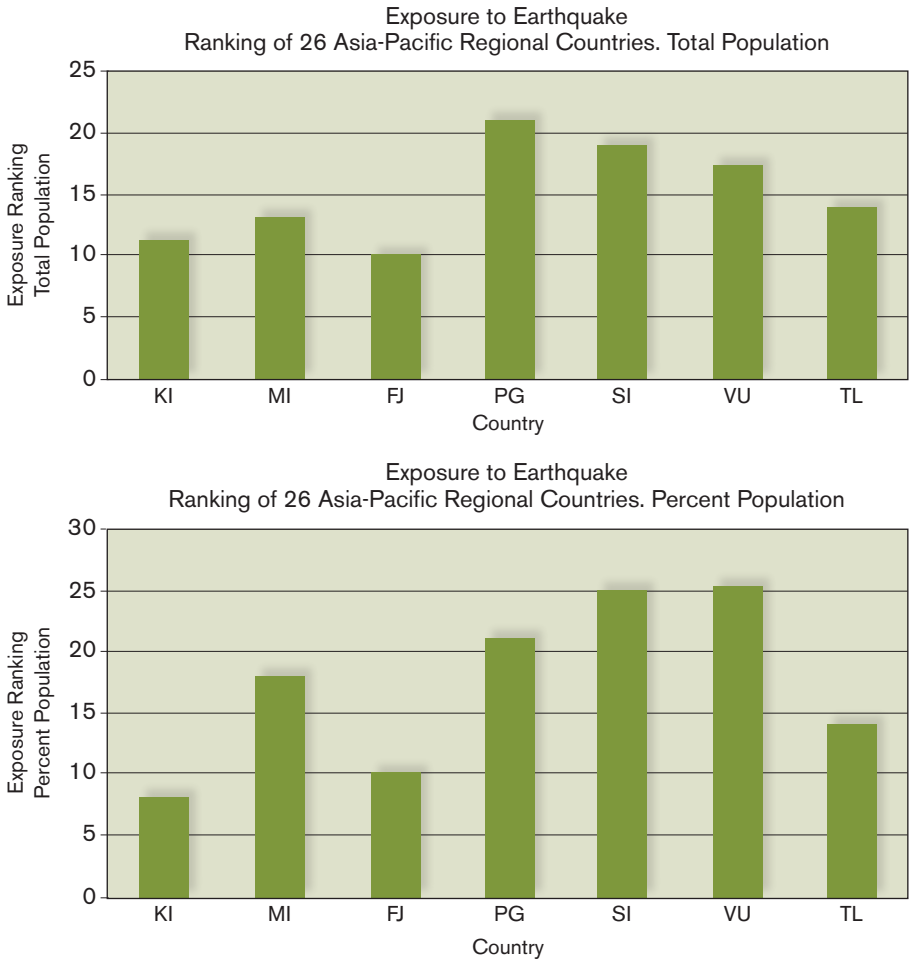
Earthquake and other hazard impact in PNG

A 2008 study of 26 Asia-Pacific regional countries by Geoscience Australia for AusAID shows that PNG ranked within the top 6 of these countries as having the highest percentage of population exposed to earthquake hazard, as well as having one of the highest total populations exposed to earthquake in the Asia-Pacific region (in absolute terms). PNG also ranked close behind the Philippines, Indonesia, and Vanuatu in having the highest percentage of population exposed to severe volcanic risk (Figure 2).

The economic effects of disasters in PNG have been severe and manifold in the past. Over the past 25 years, the country has had 508 earthquake-related fatalities, 9 deaths from volcanic eruptions, 2,182 from tsunami/wave surges, 47 from cyclones, 58 from flooding, 314 from landslides, and 98 from drought.

The East New Britain provincial capital of Rabaul was rendered nonfunctional by volcanic ash eruptions in 1994. And although the capital was moved to a new site at Kokopo, ash-falls are a continuing severe threat. In 1998, a localized but severe 10-meter-high tsunami devastated coastal villages in the Aitape-Sissano area

Figure 2. Exposure to Earthquake



Note: KI (Kiribati), MI (Marshal Islands), FJ (Fiji), PG (Papua New Guinea), SI (Solomon Islands, VU (Vanuatu), TL (Timor-Leste).
Source: Geoscience Australia (2008).

on the north coast of the mainland. More recently, a landslide on the Highlands Highway virtually paralyzed trade and fuel transport. Unexpected landslides are a threat due to the highly active major tectonic boundary; unexpected landslides are a short-notice threat to the second largest city in PNG.

Legislation and institutional framework

In terms of the country policy, legal, institutional, and overall DRR/CCA framework, the PNG Government took several steps. The DEC-administered *Environment Act 2000* provides for the regulation of environmental impacts from development, environmental protection, and national water resources management. It is a reasonably coherent document and provides for development of environmental policies. While not specifically addressing climate change, it includes climate as an element within which policies can be developed.

The *Physical Planning Act 1989*, administered by the Department of Lands, provides a strong enabling tool for managing land use to reduce hazard or climate change risk. It has the ability to apply to both customary and alienated land. About 97 percent of PNG land is customary land, and 3 percent is alienated. The Physical Planning Act has been applied to just 2 percent of customary land, which is subject to a government lease and on-leased for development purposes. Where land is subject to physical planning, it is a requirement that both environmental and hazard issues be addressed.

In limited situations where the Physical Planning Act has been applied, planning applications have reportedly not been referred to the relevant departments for hazard or environmental input, therefore it is doubtful if due considerations have been made. The Department of Lands noted that the Physical Planning Boards relied on the applicant's summary of impacts and often issues were overridden.

Similarly the Environment Act 2000 provides a satisfactory enabling environment for the management and control of activities contributing to environment, land, and water risks. However, the application of controls and conditions seems to be routinely neglected, placing significant risk on land stability and water management and use.

In 1998 a Climate Change Country Team was established with funding from the Pacific Island Climate Change Assistance Program (PICCAP) under the UN Framework Convention on Climate Change (UNFCCC). In November 2000 the PNG Initial National Communication was published. It was adopted under the UNFCCC in 2002. The focus of the Initial National Communication for adaptation purposes was on low-level coastal areas and the potential impacts of sea-level rise on inundation, food production, and coastal zone management. In 2000, the Initial National Communication made note of the following:

- The range of adaptation strategies to minimize and adjust to impacts of climate change does not need extensive, new interventions but should rather enhance current practices.
- The ability of PNG to adapt to climate change will depend on a fundamental shift in institutional, technological, and cultural factors associated with sound management practices and the mainstreaming of environmental considerations at planning and policy levels.
- Vulnerability assessment was needed to identify the degree of future risks induced by climate change, variability, and sea-level rise.
- The detection of climate change is still uncertain as it is based on current data sets, which have a short period of observations.
- There was an obvious need for a widespread climate network to effectively monitor climatic variables unique to this part of the world.

- There was a realization of the importance of climate change, and related programs would be coordinated and implemented to improve understanding of the science, impact, and adaptation measures of climate change and variability.
- There would be commitment to developing a range of adaptation measures through agriculture, land use, fisheries, and forestry.

There is no climate change policy, and until recently there has been no structure for cross-departmental co-ordination. The Government's Office of Climate Change and Environmental Sustainability reports to the Prime Minister's Office. The OCCES is staffed with 50-60 people comprising staff seconded from other departments and supported by a number of specialists. Its present functions include establishing a climate change policy and strategy to define and manage programs for land, water, biodiversity, reduced emissions, and climate change adaptation; and performing the role of the designated national authority. The Government's priority is on reduced emissions from avoided deforestation although the OCCES with assistance from donor partners is preparing a National Climate Change Framework that would highlight reduced emissions from several sectors as well as reduced vulnerability to climate change and the associated adaptation policy implications.

For DRR, the relevant legislation is the *National Disaster Management Act 1984* (consolidated to No 3 of 2004) (NDM Act). The document focuses on preparedness and response arrangements for disasters. It establishes the National Disaster Committee comprising department heads of government agencies with a role in disaster management. The Committee supervises the national state of preparedness, maintaining the National Emergency Plan, coordinating departmental relief actions through the National Disaster Center, and advising the Government on national emergency declarations. Currently the Committee is not engaged, and the Government has made recent emergency declarations without the Committee meeting.

The NDM Act establishes the National Disaster Center to serve the National Disaster Committee, coordinate disaster situations, and support provincial disaster management activities. The National Disaster Center supports provinces in planning and co-coordinating national relief and surveillance during disasters. The Center seems to be isolated from decisionmaking and does not access department resources. Its response function is limited to the extent that the Disaster Management Team, established by donors and stakeholders as a support body, has in recent times provided the disaster response coordination. The UNDP-chaired Disaster Management Team reports that during the November 2007 Oro floods (the largest in 20 years), the Team managed the relief response for 6 weeks until government resources were activated through the National Disaster Center.

A revision of the National Disaster Management Act has been drafted to clarify powers under the Act. However, much work is required on the initial draft to provide for explicit functions across agencies and sectors and to provide for a national focus on risk reduction. For several reasons, this work is not progressing as initially expected.

The National Disaster Center advises that the Disaster Management Plan 1987 is out of date and non-functional. The current operational document for response management is a 2003 National and Provincial Disaster and Risk Management Handbook. This Handbook includes significant elements of disaster risk management but the intended supporting policy (the *National Disaster Mitigation Policy* prepared in 2005) has not yet been adopted.

Other working arms of government have been established in the effort toward disaster risk management and climate change adaption:

- ***PNG Climate Change Working Team.*** This team, established in 2007 by the National Disaster Center as a risk reduction initiative under the chairmanship of University of PNG, met once but was not supported by DEC and has been overtaken by the DEC intention to establish an office for climate change.
- ***National Disaster Awareness and Preparedness Committee.*** This is a sub-committee of the National Disaster Committee set up pre-2003 to support activities of the National Disaster Center. It was chaired by the University of PNG, which was founded in 2006 to prepare provincial baseline data for planning purposes. While some residual activity on the baseline surveys continues, the meetings of the sub-committee have lapsed in recent times due to lack of support.
- ***Provincial Disaster Committees.*** The NDM Act establishes Provincial Disaster Committees comprising the Provincial Administrator and Provincial Department Heads and reporting to the Provincial Executive Council. The Committee prepares emergency plans for the province, co-ordinates relief operations during a disaster, and addresses hazards in provincial development plans. A Provincial Disaster Coordinator is appointed for all provinces. The National Disaster Center notes that some capacity exists in only 3 or 4 provinces (Morobe, East New Britain, Milne Bay, and maybe New Ireland), but in the remaining 15 provinces the Coordinators are grossly under-resourced to do their job, and none has a focus on addressing hazards or reducing risks. Coordinators appear to have good awareness of risk-reduction and climate change issues but did not recognize it as part of the job, perhaps because of unclear upstream messages.

Coordination among government agencies

The DRR coordination function is the role of the National Disaster Center (as part of its weakly mandated disaster risk management function). The National Disaster Committee is required to approve and report on the Center's annual work plan. With the functions of both the Committee and the National Disaster Center marginalized in recent times, there is little coordination or promotion of this function across government agencies.

The CCA policies are not yet in place and the OCCES, the mechanism for addressing the policies, was only recently established. While there has been activity between departments on climate change mitigation and carbon credits, there has been no capacity for adaptation activity and no coordination among government agencies in recent years.

The relatively little coordination effort highlights the urgent need for a well-articulated DRR/CCA integrated policy and clarification of the respective roles of the existing entities as these functions become more of a continuum (rather than distinct activities).

Over the years, the Government has taken several steps to create legislation, entities, and in some cases, guidelines to implement, monitor, and enforce the rules and regulations. In spite of these efforts, there continues serious deterioration in the performance of many of these entities; severe silo-restrictive relationships; lack of clear overall policies to inform strategic directions; inability to utilize available instruments and tools as designed; and continued difficulty of coordinating funding, policy, and institutional arrangements for DRR and CCA activities.

These are not insurmountable obstacles and can be reasonably addressed given the political and strategic commitment to do it. However, it is also important

to recognize that without commitment these issues are unlikely to improve—even if all of the funding aspects are addressed. Initiatives should therefore target a broader-based area.

In disaster risk management, the SOPAC process of the High-Level Advocacy Team has so far reportedly been unable to engage through the National Disaster Center to initiate support for the DRM National Action Plan because the internal conditions are not yet appropriate for this initiative. At the time when either the DRR or CCA initiative is commenced, the opportunity should be taken to promote the concept of integrated risk reduction with a single focus on hazard and climate change risk management. Given the separation of the external funding streams for these activities over the past 10 years, this concept will require a significant adjustment in donor attitudes as well as an integrated internal cross-sector commitment.

Coordination among donors and key stakeholders

The mechanisms for donors to engage with Government on hazard and climate change risk are weak; and apart from some programs for hazard monitoring, there have been few initiatives and little coordination between donors and stakeholders. Donors acknowledge this and have seen risk reduction as a regional issue. This is in contrast to initiatives for disaster management preparedness and response where donor and stakeholder coordination through the Disaster Management Team effectively weakened the functioning of the National Disaster Center. Attention to redress this situation is needed.

There appears to be incomplete but developing understanding on the part of donors of the crosscutting CCA issues (and their relationship to disaster risk reduction) particularly given the weak in-country institutional arrangements. Also, the absence of in-country DRR/CCA program development, leading to potential for donors to identify ad hoc initiatives for funding, is a problem. There is an apparent lack of donor coordination mechanisms and leadership both in-country and at the regional level for effective identification and sustainable support of CCA and DRR initiatives

Donors generally see a new and increasing CCA focus for the future and are apparently anticipating the need to identify and fund appropriate initiatives. The complexities around this are now being recognized as a crosscutting issue and the weak in-country institutional frameworks for engagement. With this circumstance, the need for donor and stakeholder coordination is becoming increasingly important for effective and sustainable support. This is a regional issue, and donor leadership will be needed.

One small but important element in focusing donor attention on DRR and CCA issues as priorities is to ensure that they are integral to the next government strategy paper (the mid-term development strategy). Previous national strategies have failed due to political instability, weak institutional capacity and arrangements, and lack of ownership and commitment. It appears that those things are still issues.

Planning, budgeting, and allocating

Poor planning and budgeting will have a detrimental impact on key assets for DRR/CCA activities available in PNG. For example, food and water security programs initiated after the 1997/98 droughts (occasioned by normal climate variability induced by ENSO) today suffer from lack of funding. The monitoring and understanding of how climate change may exacerbate future drought cycles has not advanced.

Planning and budgets are formulated at the business unit level and promoted through the budget process by their respective departments. For cross-sector ac-

tivities, individual departments are expected to budget for their separate components. There is little experience of cross-sector budget initiatives. In the future, departments and ministries must do some level of promotion if DRR and CCA initiatives are to get into the national budget stream.

Even in once well-functioning entities, there is a tendency toward increasing fragmentation and deterioration of quality in service. For example, apart from volcanic monitoring, there seems to be only nominal understanding of these hazards since monitoring has been reduced to marginal levels over recent years. While there is a significant body of historical data available, it is generally not easily accessible and tools for analysis and mapping are not available.

PNG Geological Department. The newly formed Department of Mineral Policy and Geohazards Management (DMPGM) addresses seismology with a staff of 9, volcanology with a staff of 16, and geotechnical issues with a staff of 7. The new Department inherits the policy and geohazard management functions from the previous Department of Mining following the formation of the Mineral Resource Authority early in 2008. The DMPGM has a policy unit focused on minerals policy and regulation. While there is no current geohazards management policy, the potential exists for its development.

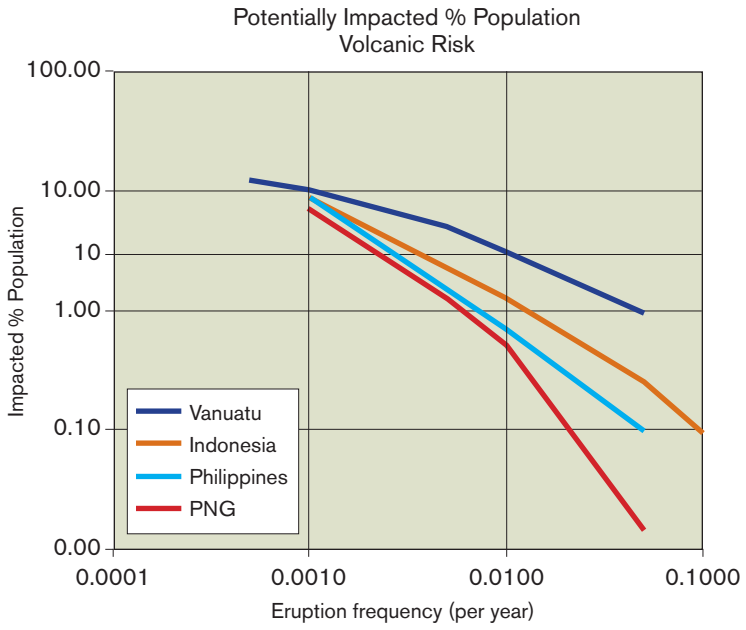
- ***Seismology.*** In the mid-80s there was a seismic network of 16 stations with both seismographs and accelerographs. The system has gradually run down and is now ineffective. There is a European Union funding proposal to install 6-10 new seismographs to resurrect the monitoring and assessment capacity. Adding accelerographs to these proposed installations would provide a capacity for identifying potential areas of high impact. The last major magnitude-8 earthquake was an event in the New Ireland region in 2000. Some of the highest seismic activity in the world has happened in parts of New Britain, New Ireland, and Bougainville.

- ***Volcanology.*** There are 16 active volcanoes in PNG—6 of them classified as high risk. Nine of the 16 are monitored in real-time. Monitoring and understanding of vulnerability have reduced the incidence of deaths from eruptions over the past 50 years. A relatively high percentage of the PNG population is exposed to volcanic eruption. Figures from an Asia–Pacific regional report by Geoscience Australia (2008) broadly imply that a collective PNG population of around 20,000 to 30,000 people is likely to be affected by the 1-in-100-year volcanic event or, in other words, face a 50 percent chance of exposure to volcanic eruption in a 70-year timeframe (Figure 3). The rapidly growing population is associated with the growing tourism, palm oil, and timber industries.

  The Geoscience Australia report points out that large eruptions in PNG occur at an average interval of 25 years or less, based on the 11 large eruptions there since 1800. West New Britain, where the frequency of eruptions is roughly 1 in 70 years, and other areas along the northern mainland coast have the highest volcanic eruption hazard. The report notes that New Britain has the highest concentration of calderas in the Asia–Pacific region, reflecting the long-term hazards faced by this region. The report also suggests that the Madang and Morobe provinces remain highly vulnerable to volcanic tsunamis such as the one produced by the 1888 collapse of the Ritter Island volcanic cone between New Britain and the PNG mainland, causing the destruction of many coastal villages.

- ***Geotechnical.*** The geotechnical unit covers landslides and slope stability, erosion (including coastal), and tsunami. This unit is severely depleted but makes use of Mineral Resource Authority

Figure 2. Potentially Impacted % of Population at Volcanic Risk



Source: Geoscience Australia (2008).

staff for emergency situations. While the previous geotechnical staff were transferred to the Mineral Resource Authority, the new DMPGM budget makes allowance for 7 new staff (unfilled at time of assessment reporting). Landslide potential is high over large areas of PNG, given the combination of the island's steep mountain ranges, volcanism, high seismicity, and high annual rainfall. Three of the world's largest landslides recorded in the last 120 year have occurred in PNG. In the Highlands area, intensified land use due to increasing population and increasing climate variability are adding to the problem. The Geohazards Australia report points out that the model developed as part of the World Bank Hotspot program ranks PNG among the countries with the highest landslide hazard profiles in the world.

Neither the geotechnical unit or the Department of Environment and Conservation give much attention to coastal erosion under existing climate variability or to the potential impacts of climate change. Both however acknowledge it is an issue. But since costal erosion is ranked with the landslide issue, there is little capacity to even start to address it. There is no "big picture" view of the geotechnical hazards. Overall the Geological Survey has the skills to provide hazard and vulnerability assessments but lacks the tools and policy commitment to undertake this work. On-going monitoring to inform future decisions is minimal except in the context of volcanoes.

PNG National Weather Service. The National Weather Service sits within the Department of Transport. In recent years, the Service has decreased from 107 positions to 66. The Service operates 3 observation networks. There is a network of 14 synoptic weather stations with data continuously contributing to the regional and international weather systems (including

the Pacific Islands Climate Prediction Project) through Melbourne. This network is roughly banded and provides only limited detail for local forecasting. Responses are thus mainly reactive rather than based on predictive information. A rainfall network of 57 gauges is operated with volunteers providing monthly records of 24-hour rainfall. This network had comprised 1,000 stations, but now its usefulness for monitoring rainfall trends across a country of highly complex terrain is seriously compromised. There is a 4-station synoptic network that includes measuring sea level and temperature as part of the Pacific Island Climate Prediction Program. There is also a Manus Island SEAFRAME station for sea-level and climate monitoring.

The National Weather Service is developing a seasonal predictive climate capability and has just commenced a monthly climate outlook providing 3- and 6-month predictions. However, the National Weather Service notes these predictions are based on coarse data and have limited geographic scope for the complex PNG topography.

Overall, the National Weather Service feels its monitoring network is falling below a credible level. Staff consider that the existing data systems are inadequate for detailed trend analyses. There is little ability to identify local climate change trends. Increasing climate variability (the threat of droughts and other extreme events) linked to the annual direction of the Southern oscillation is becoming a major concern for the Service.

Water Resource Management Branch. The Water Resource Management Branch within DEC is responsible for the management of national water resources under the Environment Act 2000. The Water Resource Management Branch undertakes river monitoring and the allocation of groundwater resources. The Branch is not adequately equipped to carry out these functions.

The Water Resource Management Branch reported that over the past 10 years river monitoring has reduced from 130 stations to less that 10 and that the national network was effectively closed. In March 2008 only 1 station on the Ramu River was fully effective, and 2 stations were to be reopened. Additionally, all 4 stations on the Laloki catchment were to be reopened by mid-2008 and a new station was to be constructed on the Goldie River. Some 4 to 6 representative regional stations will be required as part of the Pacific HYCOS project. A hydrological strengthening study undertaken in the late 1990s recommended a credible system of 72 stations was required nationally.

Although the historical record of hydrological monitoring in PNG is strong (going back to the 1960s with an emphasis on hydro-power project investigation), data digitizing, database development and analysis, and catchment-mapping capability is deficient. The Water Resource Management Branch reported that flood records have not been analyzed since 1997, and low-flow records do not exist to contribute to understanding potential drought conditions.

There is a draft Sustainable Water Action Plan in preparation arising from the SOPAC 2002 Pacific Regional Action Plan on Sustainable Water Management, but actions were not included in the 2008 budget and work plan of the Water Resource Management Branch. Proposals exist for the installation and system support of pilot HYCOS catchment monitoring, with support from the European Union through SOPAC. However, details and planning are sketchy and national commitment for on-going operation is lacking.

The PNG National Water Board serves urban areas outside Port Moresby and relies on the Water Resource Management Branch for what little hydrological information is available. Understanding of groundwater resources is limited. A limited study following the 1997 drought indicated the availability of

good groundwater capacity and quality. With surface waters increasingly coming under threat from rapid population growth and runoff and point source pollution, the National Water Board is concerned that previously plentiful water resources are now requiring active management. They say the available information and tools are not adequate for this—particularly given the potential climate change impacts that have not been quantified.

The 2007 SOPAC-managed report on Integrated Water Resources Management in Pacific Island Countries noted that only 20 percent of the rural population of PNG have access to an improved water supply and that, given the impacts of floods, droughts, and climate variability, there is an urgent need to apply integrated water resources management involving all stakeholders and focusing on catchment units. It noted there were institutional, legislative, operational, strategic, capacity, public consciousness, and resource-related barriers to overcome.

At this juncture, there are few indications that these issues are being acknowledged or adequately addressed at a strategic level within government. This situation can be significantly improved by programs aimed at enhancing the capacity of the Water Resource Management Branch to better meet it statutory obligations and service the needs of client bodies and civil society through the implementation of hydrological monitoring on an integrated catchment management basis.

Summary. Across PNG, core hazard understanding and on-going monitoring necessary to inform risk reduction initiatives, whether from disasters or climate change, is considered to be seriously deficient. While this is clearly understood within individual agencies (both hazard agencies and client agencies who have a need of the information), there is little acknowledgment of this issue at the Government strategic level. Identified aid programs to strengthen monitoring networks (European Union for seismic and HYCOS for hydrologic) will have little long-term impact if operating capacity and budgets and information systems with tools for analysis are not also addressed. There is a need for institutional strengthening to ensure hazard and vulnerability information is available to inform future risk reduction decisions.

Gaps

- ***Inadequate "big picture" understanding of the wide array of hazards to which PNG is subject.*** With degraded monitoring and analysis capability across all hazards, including potential climate change impacts, it is difficult to identify the allocation of appropriate resources on a priority basis. There is significant historical data available that could provide relatively quickly an overview to inform a minimum monitoring and vulnerability analysis program. This said, the relative short-term potential for drought conditions and the large population exposure to critical water shortage should be addressed as a matter of urgency.
- ***Unavailability of a common database system (GIS and dual transfer mode capable) for storing hazard monitoring data with access to analysis tools for identifying trends, vulnerabilities, and risks.*** All hazard sectors reported an inability to readily store and access monitoring data for analytical and mapping purposes.
- ***Shortage of adequate data monitoring networks to meet future needs for vulnerability and risk assessments.*** Across the range of geophysical, hydrological, and climatic hazards, the absence of data collection means future DRR/CCA efforts will be unfocussed unless concerted efforts are made to upgrade the networks.
- ***Absence of a hazard policy.*** Across the hazard sectors, there is a lack of clarity around the scope, purpose, and end use needs of monitoring and its relationship to environmental, resource, land use, and disaster planning and management purposes.

- ***Specifically there is insufficient understanding of the national water resource for urgently needed integrated water resource management.*** With a history of devastating droughts and the potential for climate change and population pressures to increase both the likelihood and severity of such future events, it is essential that water resource management be instituted and supplementary arrangements for supply be investigated and put in place where necessary.

Vulnerability and risk assessments

Following on the status of hazard monitoring, there is little government focus on risk and vulnerability assessment. A National Disaster Mitigation Strategy, drafted two years ago by the National Disaster Center, sets out a clear appreciation of the issues but sits unadopted by the PNG Government. It now needs support within the Government for its adoption and use.

Within the National Disaster Center there is a Risk Management Unit of 4 people with responsibilities for hazard information, training, public awareness, and risk reduction. The unit has developed a set of project proposals for reducing risk, but it was not made available to the assessment team and details are sketchy. There is no commitment to this either from the National Disaster Committee or individual agencies, and there is no budget provision. This is a fundamental governance issue where a structure exists for hazard risk reduction, but there is no policy or institutional commitment to make it effective.

At this juncture, there are few indications that these issues are being acknowledged or adequately addressed at a strategic level within government. This situation can be significantly improved by programs aimed at enhancing the capacity of the Water Resource Management Branch to better meet it statutory obligations and service the needs of client bodies and civil society through the implementation of hydrological monitoring on an integrated catchment management basis.

The responsibility for climate change adaptation now rests with the OCCES. But there is no CCA policy, and there was no effective government focus on it since the Initial National Communication of November 2000 was adopted under the UNFCCC in 2002. At this point there is understanding of the extreme incidence of climate variability across PNG but only generic understanding of how those extremes might be affected by climate change across the rugged and complex PNG topography.

In 2007 the National Disaster Center formed the PNG Climate Change Working Team to address climate change hazard risk issues. The team met only once, but the initiative did not advance after DEC announced plans to form an Office for Climate Change.

In the agriculture, fisheries, and forestry areas, there is awareness of drought, food security, and forest degradation issues, but analysis has been coarse and programs to address them are grossly underfunded. These were initiated after the 1997/98 drought associated with the last ENSO cycle and were established under the Millennium Development Goals rather than as climate change projects. It is the expectation of DEC that focus will come to these issues with establishment of the OCCES adaptation program.

Within the Environmental Science and Geography Department of the University of PNG, courses are offered in hazard and risk management, climate change variability and disaster reduction, remote sensing, integrated catchment and coastal management, and other related topics. There is also a UNICEF-funded Center for Risk Reduction. There is significant capacity to contribute to government initiatives, but government connections are not strong.

Gaps

- ***Extension of all the gaps under knowledge, data, and tools.*** Filling these gaps is a fundamental requirement for advancing concerted actions for risk reduction in the country both for climate change and disaster hazards.
- ***Separation between CCA and DRR in addressing risks and vulnerability.*** A split focus means dilution of advocacy, skills, and resources in an area struggling to get attention.
- ***Lack of connection with University of PNG.*** This means critical skills and resources are not being accessed.

Mainstreaming into planning, policy, legislation, and regulations

The separation (or silo effect) between departments and agencies and lack of co-ordination is endemic in PNG. Of concern in the evaluation of DRR and CCA linkages is that both governmental bodies and NGOs have noted that the National Disaster Center is marginalized within governmental operations. Further, government and nongovernment sector bodies point out that there is no co-ordination mechanism for climate change adaptation.

Mainstreaming of risk reduction efforts is not occurring. While land use legislation requires consideration of hazards and environmental impacts, for example, these inputs are not sought from the government hazard agencies or DEC in national or provincial land-use planning considerations.

As another example, design manuals for roads and infrastructure from the 1980s in use today are in need of upgrading for local conditions. The Department of Works advises that consultants make their own interpretation of design parameters often without reference to local hazard information. The DEC Water Resource Management Branch has not been approached by infrastructure consultants for hydrological data in the past two years. There are reports of new road developments being washed out by rainstorms or landslides—even for donor-funded projects that are specified to be risk and climate proofed. In the provinces, design manuals are not used at all. [Note: This situation is common across the region and could be addressed by the review and revision of appropriate engineering guidelines and building codes on a regional basis to ensure that risk and climate proofing of infrastructure and buildings is considered on a proper basis.]

In its policy note "Not If But When", the World Bank defines mainstreaming of risk management as the inclusion of natural hazards and climate change considerations into the following categories:

- National development plans and strategies and sectoral and spatial (including community-level) plans—with budget commitment;
- Policies, regulations and codes of practice—with enforcement; and
- Programs and projects—with appropriate hazard assessment and design.

It identifies prerequisites in the form of:

- ***Strengthening a national enabling environment*** by accountable performance budgeting; inter-sectoral coordination mechanisms; appropriate institutional set-ups; staff capacity and national champions; and enforceable legislation, standards, and codes; and
- ***Supporting decisionmaking*** with public awareness of initiatives; context-specific information targeted; relevant analysis, mapping, and risk evaluation instruments; and implementation support tools.

Putting these things in place is clearly a long-term, multi-faceted process with several possible starting

points. Any starting point should include strong national government support, some level of existing capacity and enthusiasm, and a commitment to a policy framework on which to build or enhance an institutional set-up.

There is currently no policy framework within the DRR or CCA areas to develop the planning and institutional arrangements to support these conditions for mainstreaming. Most of these needs were identified in the 2000 PNG Initial National Communication. None of them were explicitly identified in the Government Medium-Term Development Strategy 2005-2010. There are no coordinated initiatives in current sector budgets.

There is potential to develop an adaptation policy, which could address the above framework, including integration with other hazard risk reduction initiatives through the OCCES-prepared National Climate Change Framework.

Capacity in DRR context exists with a potential to grow. The Prime Minister has emerged as a champion to promote risk reduction initiatives although there has been a lack of commitment to a policy and institutional framework. There is more optimism now. The potential to facilitate the development of a framework by the National Disaster Center, which also covers the provinces, can be realized. The provincial arrangements should provide for both CCA and DRR activity in an integrated platform.

Gaps

- ***Conditions for mainstreaming of risk reduction activities do not exist and the Government is currently showing little commitment to this area.*** There has been a lack of acceptance by Government that disaster and climate change risk needs its attention. The recent establishment of an Office for Climate Change creates an opportunity to address this. The initiative itself is not a sufficient driver, and clear commitments and championing of risk reduction would provide a basis for starting. It is fundamental that sustainable risk reduction cannot be achieved without engagement and commitment from the Government.
- ***A dysfunctional disaster management arrangement under the National Disaster Center exacerbates the potential for mainstreaming.*** Until this is addressed, the conditions for addressing DRR issues will not exist.
- ***There is no evidence of the private sector filling these gaps and driving change in Government thinking on CCA and DRR issues.*** In the regulatory vacuum, which exists around these issues, the responsible departments report that the private sector is exploiting weaknesses in the system rather than filling the gaps.

Monitoring and evaluation

As indicated in the above discussion, there is no monitoring and evaluation of risk reduction activities in PNG relating to either disaster risk reduction or climate change adaptation.

Gap

- ***There is an absence of policy definition, commitment, and reporting requirements across agencies that addresses their role in addressing hazard and climate change risk.*** Development of policy for hazards monitoring and management, risk reduction, and climate change adaptation should include elements for monitoring and evaluation.

Awareness raising and capacity building

At the national level, there is adequate awareness of the disaster and climate change hazards among those departments encountered in this assessment and also at the provincial level. However, there was a

general sense that resources and skills available were inadequate to deal with them and little appreciation that they would impact a sector's activity or an individual's job. Exceptions to this existed within the hazards monitoring areas, the National Agricultural Research Institute (NARI), and the National Water Board where frustrations were expressed at the lack of resources to address the issues. There is a need for a greater understanding of the relationship between hazards and the practical means for starting to deal with them. This is a fundamental capacity issue, which needs to be dealt with at a pragmatic level.

Gaps

- ***Government strategy indicates no acceptance that disaster and climate change hazards represent substantial risks.*** Until there is policy commitment to addressing these issues, there is little scope for sustainable reduction activity or for engaging existing capacity in the University of PNG or NGOs.
- ***Practical understanding of risk reduction mechanisms is lacking.*** Any mechanism can be applied with varying degrees of complexity according to the level of information available. This applies to both DRR and CCA issues, but a pre-condition is the acceptance that the risk exists and can be influenced.
- ***A general capacity shortage exists for DRR and CCA initiatives, especially dealing with technical data analysis and vulnerability and risk assessments.*** Filling this gap is a fundamental requirement for advancing concerted actions for risk reduction in the country.

Implementation of actual risk-reducing measures

With a continuing weak government commitment to DRR and CCA activity and unsupportive structures and policies, there is little implementation being promoted, coordinated, or undertaken at the government level. Without a strong enabling environment or government or local authority partnership, civil society and private sector initiatives are likely to be unsustainable. Among potential initiatives identified by donors and stakeholders was a UNDP-sponsored Pacific Adaptation to Climate Change Project for lowland food security and sustainable land management under ENSO-induced drought conditions. [Note: this project has received funding approval from the GEF Pacific Alliance for Sustainability and will be the first significant project for PNG initiated as a CCA activity.]

The Gazelle Restoration Project was not initiated as a risk reduction activity. Following the 1994 Rabaul eruption in East New Britain, the Gazelle Restoration Project got started to rehabilitate the Gazelle peninsula in a joint effort where National and Provincial Governments worked to relocate and recover from a disaster. This World Bank-funded project (1999 to 2007) relocated the provincial capital from Rabaul to Kokopo and re-established infrastructure, social, and administrative services.

Two government research institutions have been involved with activities arising from climate variability following the 97/98 droughts and initiated under Millennium Development Goals. The National Agricultural Research Institute at Aiyura in the Eastern Highlands Province addresses food security under extremes of drought and excessive rain, and the National Fisheries Authority addresses sustainable inshore fishing under conditions of sea temperature rise and coral bleaching. While not initiated as CCA activities, both areas of activity relate to food security under extreme climate conditions and both are now grossly underfunded. These activities could be re-funded as CCA initiatives. Highlights of discussions with the assessment team and representatives of these institutions follow.

National Agricultural Research Institute. Low-level awareness across governmental bodies at the national, provincial, and district levels compounds the potential

threats to rural production and communities from climatic variability and change. The lack of adaptive responses especially in the areas of food production and the provision of safe water was seen as a major threat to the health and prosperity of rural communities. Local-scale initiatives under NARI address the looming rural water crisis by providing wells in villages. Some 36,000 villages in PNG are without secure water supplies. This is a potential disaster management issue.

The overarching role of NARI and programs in natural resources management, rice and grain, and integrated pest and disease management, which focus on climate risk reduction and food security, is to address the threat of extreme drought conditions in the highlands. The research being undertaken on reducing the risks to food security and on building resilience by broadening the range of foods produced in PNG has ramification for coastal lowland and highland provinces.

The NARI is dealing with funding constraints. Under consideration is the type of projects being proposed and level of funding being sought from governmental bodies and donors. There is a strong need for targeted donor support. The funding constraints are partially attributed to a logistical situation—NARI comes under the Department of Higher Education rather than the Department of Agriculture and Livestock.

Overall, NARI has already made a significant contribution in raising awareness and providing a simple tool to assist subsistence producers to reduce the risks arising from drought conditions in the highlands. Proposals have been prepared seeking funding to further the development and production of drought-resistant varieties of sweet potato. Awareness-raising activities in relation to water security have commenced but need considerable support to make an impact at all levels of civil society.

National Fisheries Authority. The National Fisheries Authority has overarching responsibility for managing the nation's fisheries. The management of fish stocks is articulated in the Fisheries Management Plan. Through the current plan, management is based largely on commonly used approaches that give emphasis to biological controls, including size of animals being taken, spawning cycles, and catch and effort data obtained from fishers and processors. Across the world such approaches have been criticized because they do not conserve stocks or contribute to the sustainability of specific fisheries. The failure of this commonly used approach is evidenced in PNG by the rapid decline in prawn and barramundi fisheries.

Among Pacific island countries there is wide acceptance that fish stocks need to be managed on a regional as well as a national basis. This recognition encompasses the threats to fisheries from over-fishing, climate variability (as evidenced by coral bleaching), and the degradation of the ecosystems that support the fisheries. The latter may be due to a combination of physical, chemical, and biological changes that lead to reduction or loss of habitat. In response to this situation with respect to coral bleaching, a regional Coral Triangle Infrastructure (CTI) Plan of Action is being put into place. The CTI Plan of Action embeds an ecosystem approach to management that can be implemented at the community level. The implementation of this Plan of Action requires donor input.

There is a current move by the National Fisheries Authority to change the management of fisheries to an ecosystem- and community-based approach. The Authority is aware of the risks from climatic variability and climate change to the nation's fisheries and the livelihoods of fishermen. The Authority views the community- and ecosystem-based approach as the most appropriate for reducing vulnerability and risk and for ensuring the sustainability of the nation's fisheries. Furthermore, this approach will contribute to attaining the 5 goals of the GEF-supported CTI Plan of Action: (a) introduce effective management sys-

tems for *priority seascapes*; (b) apply *ecosystem approach* to fisheries management; (c) expand and improve management and representation of effectively managed *marine protected areas*; (d) support *climate change adaptation* measures to sustain economic development and global services from vulnerable coastal and marine ecosystems; and (e) improve *threatened species status* in coastal and marine ecosystems.

The National Fisheries Authority recognizes that ecosystem-based management of fisheries is in the national interest. Also, the Authority has identified the Gulf of Papua prawn fishery, which is in decline, as needing an ecosystem-based management approach, primarily reducing risks due to impacts of climatic variability, extreme weather events, and climate change. These impacts, for example, include the loss of habitat due to shore erosion and degradation of mangrove communities or siltation due to flood discharges from degraded catchments. However, it has been recommended that 10 percent of the effort of the CTI Plan for Action (which embeds ecosystem management principles) be directed toward addressing climate change issues. This policy thrust is taken up in a proposal for a project that seeks to demonstrate the climate proofing of the Gulf of Papua prawn fishery.

In this context, community-based fisheries have been piloted and established in PNG and its neighboring countries. The inherent strength of community-based fisheries is that local-level management is owned and implemented by the local people. This approach requires the devolution of management powers back to the community. The first step in this process is to have the concept accepted by all resource mangers. The second is to utilize the biological and other information gathered from local fishermen to develop ecosystem-based management strategies that are specific to localities and implementable using local resources.

Community-based fisheries are being operated by NGOs. While this process is achieving outcomes, they have not been fully documented or assessed. The chief scientist of the National Fisheries Authority believes further pilots of community-based management of fisheries should be extended nationally and climate proofed in order to provide stronger implementation. This provides the impetus for a proposal on climate-proofing demonstrations of community-based fisheries management.

Gaps

- Hazard events continue to occur and cause harm and implementation of risk reduction measures continues to lack focus.
- Food security and sustainable management issues identified from the 1997/98 drought are likely to be exacerbated by climate change, and current resourcing is inadequate to deal with them – particularly given the next ENSO-induced drought could occur within the next 5 years.
- Limited resources hinder the activities of NARI and National Fisheries Authority.
- Limited capacity restricts promulgating the results of their programs. ❖

Opportunities for Investment

From the PNG country assessment, it is evident from the gaps and impediments that a wide range of risk reduction initiatives for investment can be identified. Due to the weak policy and institutional frameworks evident in PNG, opportunities for investment have been restricted in ways that contribute as follows:

- Reducing actual risk,
- Building on existing in-country capacity, and
- Supporting or informing sector risk reduction policy frameworks within country priority activities.

These are all conditions for sustainability. In addition, any initiative to be funded should have an identified senior-level government or political champion to promote the activity and ensure its implementation.

PNG already has established policies, institutions, systems, and related structures, as do many other Pacific island countries, to address DRR/CCA challenges. The National Action Plan and other programs have been prepared and awaiting implementation. Unfortunately, there are significant gaps in the 5 key HFA areas discussed in this report; while efforts have been made to address the gaps, funding, staffing, and related operational support remain untapped. Also, while some efforts are made to identify and address simple, high-yielding, short-term priority issues, it appears that more effort is needed to fully categorize such needs and decide upon short-, medium-, and long-term programs.

The priority list, identified by PNG policymakers and sector officials (in consultation with local stakeholders and donor partners), reflects a great deal of consultation, discussions, and analyses. The impediments and gaps noted in this report could still create serious obstacles if they are not addressed as part of the preparation process to implement the priority activities.

Following are the six priority areas identified as opportunities for investment in PNG:

(1) ***Develop a Coordinated Hazard Policy and Integrated Spatial Hazard Risk Information and Mapping System for PNG.*** The purpose of this initiative is to establish a clear hazard policy for PNG covering all hazards and to develop an integrated information system to put hazard monitoring onto a credible basis to provide for informing and promoting hazard and risk reduction issues. A champion would need to be identified in the Ministry of Mineral Policy and Geohazards Management with support from the National Weather Service and the Water Resource Management Branch. This initiative also includes entering historical hazard datasets and enhancing the proposed new EU-funded seismic network.

(2) ***Develop and promulgate a climate change adaptation policy framework.*** This initiative follows up on a request from DEC for support to establish the CCA policy framework for the new Office of Climate Change. It would strengthen the enabling environment for addressing climate change adaptation and provide the opportunity for linking to other hazard risk reduction issues across sectors. Discussions in country would be needed to confirm the commitment to this initiative.

(3) ***Disseminate drought-coping strategies to at-risk rural communities.*** This initiative is a companion to the previous initiative to address the substantial task of disseminating and distributing the material to many thousands of highland subsistence villages without which their vulnerability continues.

(4) ***Develop a water supply action plan for rural communities at risk from drought.*** This initiative addresses the potentially extreme water security issue in rural PNG during ENSO-induced drought conditions. It is acknowledged by the PNG National Water Board and involves a survey of the

issue and development of appropriate responses. Because of the uncertain scope and the need for a champion and supplementary donor funding, this initiative is set as a provisional proposal. This priority area however represents a seriously vulnerable situation.

(5) ***Support demonstration projects for climate-proofing community-based fisheries in vulnerable coastal areas.*** This initiative is for the development of a demonstration project for community-based fisheries and involves an evaluation and feasibility assessment of risk reduction techniques for climate-proofing community fisheries. Because the fisheries sector was not reviewed in this assessment to consider fully other regional initiatives, this initiative is set as a provisional proposal requiring further evaluation. It is nevertheless a potentially doable initiative.

(6) ***Support a demonstration project of an ecosystem-based management system for a prawn fishery.*** This initiative addresses the stressed prawn fishery in the Gulf of Papua where food security and livelihood risk are exacerbated by climate variability and change. Like priority areas 4 and 5, this initiative is a provisional proposal.

In Annex A, each of these opportunity proposals is expanded to provide preliminary information on indicative scope, costs, and times. Identified by national stakeholders to fill recognized gaps, the proposals encapsulate the priorities that could be supported by the World Bank and any development partner or could be added to existing or planned interventions.

There is also an opportunity for linkages with the planned World Bank-supported Productive Partnerships in Agriculture Project. Two activities have been identified with a total estimated cost of US$600,000:

- Increasing capacity for climate monitoring and the dissemination of climate information in the highlands (capacity building, technical assistance, equipment) where the effects of climate variability seem to be felt more severely because of high altitude;
- Increasing capacity for quarantine and surveillance of cocoa borer in East New Britain and Bougainville, the two main producing provinces (additional equipment, some technical assistance to improve planning, and contribution to the operating costs of the Quarantine Authority and the community-based surveillance network).

The opportunity also exists to re-cast the institutional framework for disaster risk management (including a mandate for disaster risk reduction) and provide for the integration of CCA arrangements. Such a framework would address functions, accountabilities, and relationships across agencies and sector groups and between levels of government and into communities. As with many of the listed proposals, there is no apparent champion at the government or senior officials level to support these issues.

Any initiatives should ideally link the development of governance frameworks, in-country capacity development, and on-the-ground activity in a bottom-up/top-down continuum. Activity could be initiated at the national or provincial level depending on where the support lay.

Further work is required to identify appropriate champions and groupings and areas of activity and for the development of project contexts with the appropriate sector. Any proposals should form the basis of a longer-term strategic commitment with sustainable support. ❖

Annex A. Proposals for Support in PNG

Proposal	**P1 Develop a Coordinated Hazard Policy and Integrated Spatial Hazard Risk Information and Mapping System for PNG**				
Country/sector	**PNG: Geohazards, Meteorology, Hydrology, Mapping**				
Scope	**National, Multi-department**				
Goal and purpose	**Inform and promote hazard and risk reduction issues through a coordinated hazard policy framework and with an integrated spatial hazard and risk information system**				
Lead agency	**Ministry of Mineral Policy and Geohazards Management with Geohazards Division, National Weather Service, Water Resource Management Branch, National Mapping Bureau, DL&PP, DEC, NDC**				
Cost and duration	**US$300,000 over 3 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Actions and tasks**	**Cost US$k**	**Time-frame**
River flood Cyclonic wind Storm surge Storm wave Tsunami Earthquake Volcano Landslide	Addressing hazard and risk issues across sectors as a matter of policy Having hazard and risk data accessible to sectors for planning and development purposes	Lack of policy commitment to hazard information Lack of a common geographic database across departments Inadequate basic climate and hazard data collection capabilities Lack of tools and capacity to assess risks Risk mapping not integrated into planning process	Provide technical assistance support to hazard departments to: • Establish a coordinated government policy on the collection and storage of hazard data, the development of vulnerability, risk and trend information and it presentation and sharing across sectors for planning and development purposes • Assess needs and develop an integrated spatial database with analysis tools and mapping capability • Identify requirements and acquire appropriate map and image bases for hazard mapping and land use management purposes for urban, rural, coastal and highland applications • Enter existing and historical datasets across all hazards and develop initial vulnerability and risk information Enhance seismometer network installation (EU funded) with installation of accelerogram equipment	60 160 80	3 months 12 months 2 years

Continues

Annex A. Proposals for Support in PNG *Continues*

Proposal	**P2 Development and promulgation of a Climate Change Adaptation policy framework.**				
Country/sector	**PNG: Institutional**				
Scope	**Strengthen the enabling environment for addressing climatic variability and climate change, through facilitating the development and implementation of a whole-of-government climate change adaptation policy framework for PNG.**				
Goal and purpose	**National**				
Lead agency	**DEC with Office of Climate Change and DNPM**				
Cost and duration	**US$600,000 over 1.5 years**				
Hazards targeted	**Risk reducing measures**	**Key Gaps/Barriers**	**Actions and Tasks**	**Cost US$k**	**Time-frame**
Cyclones and extreme storm events Storm surge Drought Flooding Hail damage Bushfires Seal level rise and erosion Saline intrusion in coastal streams and ground water Coral bleaching and Increased acidity of sea water		Absence of documented national CCA and DRR policy applicable at national, provincial, district and local scales. Limited professional capacity to develop and implement climate change adaptation policy and practice. Poor mechanisms to disseminate knowledge of the potential impacts of climatic variability, and climate change across governments.	Facilitate the collaborative development of a whole-of-government climate change adaptation policy framework across PNG linking to hazard risk reduction issues across sectors. Prepare awareness materials to: promulgate the policy; raise awareness and initiate capacity building initiatives. Disseminate information on the *'whole-of –government'* climate change adaptation policy to governmental departments and authorities, educational institutions, and the non-government sector Workshop the policy materials at national, provincial and district levels to: raise awareness of the links between disaster risk reduction and climate change adaptation; and enhance governmental and non-governmental capacity to address CCA-DRR issues.	150 50 50 350	Latter half of 2008 Latter half of 2008 2009 2009

Annex A. Proposals for Support in PNG *Continues*

Proposal	**P3 Disseminate drought-coping strategies to at risk rural communities**				
Country/sector	**PNG: Agriculture, Settlements**				
Scope	**Sustainable food production through equipping rural communities to cope with frequent and prolonged El Niño-induced drought events**				
Goal and purpose	**Drought prone rural communities**				
Lead agency	**NARI, DAL**				
Cost and duration	**USD$3 million over 3 years**				
Hazards targeted	**Risk reducing measures**	**Key Gaps/Barriers**	**Actions and Tasks**	**Cost US$k**	**Time-frame**
Severe drought conditions every 3 to 5 years brought on by El Niño events in the Pacific Ocean causing widespread food shortages in highlands, lowlands and islands regions.	Provide rural communities in drought-vulnerable districts with contingency measures to cope with intermittent or prolonged drought conditions,	Limited capacity for research information and technology transfer and dissemination via extension providers. Lack of resource centers in the drought-vulnerable districts. Limited preparedness for drought by farming communities. Worldwide shortage of contingency food supplies	Establish resource centers on existing NGO, CBO, school, and DAL bases in some 64 drought-vulnerable districts. Train and equip the resource center personnel to disseminate the drought-coping information, drought-tolerant cropping material, and other resources to their local communities. Provide communities in drought-vulnerable parts of PNG with information and training on drought-coping strategies: Adapt and demonstrate the implementation of these strategies (including crop irrigation and food processing and storage) to fit in with normal farming and household activities under different environmental conditions.	1,800 200 1,000	By end of 2011

Annex A. Proposals for Support in PNG *Continues*

Provisional Proposal	**P4 Develop a water supply action plan for rural communities at risk from drought**				
Country/sector	**PNG: Water, Settlements**				
Scope	**Water security in the face of climate change induced risks Identify and evaluate appropriate and culturally acceptable water-supply facilities for drought prone rural communities**				
Goal and purpose	**Drought prone rural communities without secure water supply**				
Lead agency	**PNG National Water Management Board, NARI, DEC**				
Cost and duration	**US$4.5 million over 3 years**				
Hazards targeted	***Risk reducing measures***	***Key Gaps/Barriers***	***Actions and Tasks***	***Cost US$k***	***Time-frame***
Major El Niño drought events similar to those experienced in 1997.	Develop an action plan to demonstrate the necessity and feasibility of water supply (potable and irrigation) provision in drought vulnerable regions. Detail the activities, costs and interventions required	Provinces and districts in PNG have not been classified according to their vulnerability to drought and associated risks. No prioritization of surface and ground water supplies for intervention purposes Adequacy and appropriateness of community water supply facilities have neither been demonstrated nor evaluated.	Survey drought prone regions of PNG in order to classify districts according to drought vulnerability. Identify and evaluate appropriate (drinking, household, and crop irrigation) and culturally acceptable water-supply facilities for rural communities Determine accessibility of ground water reserves and assess the feasibility of water supply provision to village communities. Use case/pilot studies to demonstrate and evaluate the suitability of different facilities		

Annex A. Proposals for Support in PNG *Continues*

Provisional Proposal	**P5 Support demonstration projects for 'climate proofing' community based fisheries in vulnerable coastal areas**				
Country/sector	**PNG: Fisheries, Settlements**				
Scope	**Sustainable commercial and community fisheries Reduce the risks to community based fisheries and fishers from climatic variability and change.**				
Goal and purpose	**Coastal communities**				
Lead agency	**National Fisheries Authority**				
Cost and duration	**US$1.12million over 3 years**				
Hazards targeted	***Risk reducing measures***	***Key Gaps/Barriers***	***Actions and Tasks***	***Cost US$k***	***Time-frame***
Extreme storm and cyclonic events Physical disturbance to or possible destruction of seagrass, mangrove, and coral habitats Sediment loads from catchment discharges Coastal flooding and droughts Coral bleaching Sea water Temperature changes Acidity of near-shore sea waters	Introduce community-based management of fisheries. Climate proof community managed fisheries in vulnerable coastal regions.	No research to determine the vulnerability of PNG fisheries to disasters and risks associated with climatic variability and change. Community based management of fisheries is still to be fully evaluated for PNG Procedures for establishing community-based fisheries are yet to be fully documented.	Assess the feasibility of establishing community based coastal fisheries. Evaluate the climate risk reduction techniques and benefits of community-based fisheries. Demonstrate and evaluate the suitability/ effectiveness of different approaches to 'climate proofing' community fisheries at selected coastal locations Evaluate and document the effectiveness of the Gulf of Papua demonstration project. Develop suitable roll-out strategies for the take up of' climate proofing' for community fisheries.	450 150 450 40 30	

Annex A. Proposals for Support in PNG

Provisional Proposal	**P6 Support a demonstration of an ecosystem management based prawn fishery project**				
Country/sector	**Fisheries**				
Scope	**Sustainable commercially and community fisheries** **Reduce the risks from climatic variability and change by having ecosystem-based management.**				
Goal and purpose	**Gulf of Papua prawn fishery**				
Lead agency	**National Fisheries Authority**				
Cost and duration	**US$1.35 million over 3 years**				
Hazards targeted	***Risk reducing measures***	***Key Gaps/Barriers***	***Actions and Tasks***	***Cost US$k***	***Time-frame***
Extreme storm and cyclonic events Sediment loads from catchment discharges Coastal flooding and droughts Coral bleaching Sea water Temperature changes Acidity of near-shore sea waters Physical disturbance to or possible destruction of seagrass, mangrove, and coral habitats	Introduce ecosystem-based management of fisheries. Climate proof ecosystem managed fisheries in vulnerable coastal and offshore regions.	No research to determine the vulnerability of PNG fisheries to disasters and risks associated with climatic variability and change. Limited evaluation of ecosystem based management of fisheries No documented procedures for establishing ecosystem based fisheries.	Assess the feasibility of establishing ecosystem based prawn fisheries. Evaluate the climate risk reduction benefits to the prawn fishing industry and fishers that could accrue from having ecosystem-based management of fisheries in the Gulf of Papua. Demonstrate the scientific basis, the mechanisms and processes to optimize institutional and stakeholder ownership of the implementation of ecosystem based management of prawn fisheries Evaluate and document the effectiveness of the Gulf of Papua demonstration project. Develop suitable roll-out strategies for the take up of ecosystem based management of prawn fisheries in PNG.	450 150 680 40 30	Year 1

References and Select Bibliography

AUSAID. 2009. Country Brief, Papua New Guinea 2009

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.* World Bank.

Dilley, Max, Robert S. Chen, Uwe Deichmann, Arthur L. Lerner-Lam, and Margaret Arnold. 2005. *Natural Disaster Hotspots; A Global Risk Analysis.* World Bank.

Catholic University of Louvain. 2009. *EM-DAT: OFDA/CRED International Disaster Database.* Brussels, Belgium.

Framework for Action 2005-2015: An Investment for Sustainable Development in the Pacific Island Countries Disaster Risk Reduction and Disaster Management; Building the Resilience of Nations and Communities to Disasters.

Hyogo Framework for Action 2005-2015: International Strategy for Disaster Reduction (ISDR) Priorities and Action Agenda 2006-2015 Supplementary for Mainstreaming Disaster Risk Reduction and Disaster Management.

Sikivou Mosese. 2008. *What Do Pacific Developing Member Countries Want from Catastrophe Insurance?* Pacific Islands Applied Geoscience Commission, National Catastrophe Risk Insurance Mechanisms for Asia and the Pacific, November 4-5, 2008. Tokyo, Japan.

Papua New Guinea Disaster Management Act 1984.

Papua New Guinea Environmental Planning Act 1978.

Papua New Guinea Australia Development Cooperation Strategy 2006–2010.

UNDP (United Nations Development Program). 2009. *Gaps and Opportunities for DRM Programming in Papua New Guinea.*

UNDP. 2007. *Human Development Index.*

UNISDR (UN International Strategy for Disaster Reduction). 2002. *Living with Risk: A Global Review of Disaster Reduction Initiatives.*

UNISDR http://www.unisdr.org/eng/mdgs-drr/national-reports/Papua-New-Guinea-report.pdf

World Bank. 2009. *(Draft) Pacific Catastrophe Risk Financing Initiative.*

World Bank. 2009. *The World Fact Book 2009.*

World Bank. 2005. *IBRD Interim Strategy Note for Papua New Guinea.*

World Bank. *The World Bank Draft Country Assessment Report, Papua New Guinea.*

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**In bold, GFDRR Donors*

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

SOLOMON ISLANDS COUNTRY ASSESSMENT

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

THE WORLD BANK

SOPAC

Acronyms and Abbreviations

AusAID	Australian Agency for International Development
CCA	Climate change adaptation
DM	Disaster management
DRM	Disaster risk management
DRR	Disaster risk reduction
EU	European Union
GEFPAS	Global Environment Facility Pacific Alliance for Sustainability
GIS	Geographic Information System
MME	Ministry of Mines and Energy
MECM	Ministry of Environment, Conservation, and Meteorology
NACCC	National Advisory Committee on Climate Change
NAP	National Action Plan (for DRM)
NAPA	National Adaptation Plan of Action (for CCA)
NDC	National Disaster Council
NDMO	National Disaster Management Office
NGO	Nongovernmental organization
NZAID	New Zealand Agency for International Development
PICCAP	Pacific Islands Climate Change Assistance Program
RAMSI	Regional Assistance Mission to the Solomon Islands
SIACC	Solomon Islands Alliance on Climate Change
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change

Contents

Introduction

The World Bank policy note "Not If, But When" shows the Pacific island countries to be among the world's most vulnerable to natural disasters. Since 1950, natural disasters have directly affected more than 3.4 million people and led to more than 1,700 reported deaths in the region (excluding Papua New Guinea). In the 1990s alone, reported natural disasters cost the Pacific Islands Region US$2.8 billion (in real 2004 value). The traditional approach of "wait and mitigate" is a far worse strategy than proactively managing risks. The Hyogo Framework for Action (HFA) 2005-2015 lists the following 5 key priority areas for action:

(1) Ensure risk reduction is a national and local priority with a strong institutional basis for implementation;
(2) Identify, assess, and monitor disaster risks and enhance early warning;
(3) Use knowledge, innovation, and education to build a culture of safety and resilience at all levels;
(4) Reduce underlying risk factors; and
(5) Strengthen disaster preparedness for effective response at all levels.

This assessment report represents a stocktaking exercise to review the extent to which disaster risk reduction (DRR) and climate change adaptation (CCA) activities have progressed in the Republic of the Solomon Islands. It identifies gaps or impediments that hinder achieving the HFA principles and identifies opportunities for future DRR/CCA investment that would be timely, cost-effective, and implementable within a three-year timeframe. The focus is on risk reduction, rather than post-disaster recovery and response. While some specific sector activities are addressed in the assessment of Solomon Islands national and local government policies and institutional arrangements, the Solomon Islands report does not provide a comprehensive summary of sector-by-sector activities. Instead, it refers to other reports that have covered this and complements these with suggestions for taking the necessary steps.

The goal of the report is to deepen the understanding in the gaps, opportunities, and needs at the national level toward stronger operational disaster and climate risk management in the Pacific islands and to link closely to other ongoing and future efforts by other donors and stakeholders (such as SOPAC regional initiatives following the Madang Framework and the National Action Plans) to ensure synergy and avoid duplication. The assessment focuses on practical, proactive measures that the Solomon Islands can take to inform its national development policies and plans and strengthen its capacity to reduce the adverse consequence of natural hazards and climate change, as it relates to risk reduction. The linkage of these two areas mainly includes managing the impacts of extreme weather events, variability in precipitation such as storm surges and sea-level rise.

This assessment highlights aspects such as the current country status, gaps, opportunities, and barriers related to (a) national policies, strategies, plans, and activities to manage natural hazards; (b) the enabling environment for a comprehensive risk management approach to natural hazards; and (c) the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. It also reviews and identifies the need for informed policy choices, improved decisionmaking processes, strengthened regulations, and legislative and policy changes required to support proposed country-level activities.

With respect to achievement of the first HFA principle, there is clear evidence of systemic difficulties among many Pacific island countries in establishing an enabling environment and promoting a cross-sector

focus for DRR and CCA activities. Since the available evidence shows that ad hoc and externally driven approaches have not provided satisfactory results so far, the HFA emphasis upon a strong government commitment and action is one of the primary and early challenges to be surmounted in achieving goals of the International Strategy for Disaster Reduction.

World Bank experience in countries with similar challenges shows that, while it is important to have a clear long-term vision, given the institutional, financial, and resource constraints, more modest "bottom up" approaches tend to have better results. Also, taking existing investment programs and incorporating simple key DRR/CCA elements demand relatively fewer efforts and resources and yield results that can lay the foundation for more complex, follow-up stages. Getting stakeholders to coordinate their activities in line with the Paris Declaration of Aid Effectiveness also appears to be relatively easier with such a modest starting point than with formal efforts aimed at overall "top down" coordination.

This Solomon Islands assessment begins by explaining the context of the country in relation to disaster risk reduction and climate change adaption. It follows with sections on the Key Country Findings and Detailed Country Assessment that focus on some key components relevant to HFA achievement: adopting and mainstreaming policies, data and knowledge, risk and vulnerability assessments, monitoring and evaluation, awareness raising and capacity building, planning and budgetary processes, and coordination. From this assessment, possible opportunities for addressing the identified gaps and needs within the HFA are presented in the final section. The potential opportunities for future support are proposed in Annex A.

Funding for this assessment was provided by the Global Facility for Disaster Reduction and Recovery (GFDRR), which is a partnership with the UN International Strategy for Disaster Reduction (ISDR) system supporting the Hyogo Framework for Action. Other partners that support GFDRR work to protect livelihoods and improve lives include Australia, Canada, Denmark, European Commission, Finland, France, Germany, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, USAID Office of Foreign Disaster Assistance, and the World Bank. ❖

Country Context

The Solomon Islands is a large archipelago comprised of 6 main islands (Guadalcanal, Malaita, Makira, Isabel, Choiseul, and New Georgia) and approximately 1,000 smaller islands. With a land area of 28,450 square kilometers, the Solomon Islands consists mainly of mountainous, heavily forested, volcanic islands and a few low-lying coral atolls (Figure 1).

The country is divided into 9 provinces, each with an elected Premier and Council and with a provincial administration. There is also a municipal administration for the capital of Honiara. While the strengthening of provincial administration is planned, at present it remains weak and largely controlled by central government in Honiara. At an estimated 507,000 (2008), the population of the Solomon Islands is growing at a rate of 2.8 percent per year. Forty-one percent of the population is below 15 years of age—a demographic situation that is increasing vulnerability to natural hazards.

Like Vanuatu, its neighbor to the south, the Solomon Islands has a high exposure to a wide range of geological, hydrological, and climatic hazards, including tropical cyclones, volcanic eruptions, earthquakes, tsunamis, landslides, floods, and droughts. Over the past 30 years there have been 6 major natural disasters (including 2 earthquakes—1 with an associated tsunami—and 4 tropical cyclones) directly impacting well over 100,000 people and causing over 100 deaths. The last disaster was the earthquake and tsunami that occurred on April 2, 2007, centered on the Western Province and with impact in Choisel Province. Fifty-two people died, and 6,000 homes and other buildings, including schools and hospitals, were damaged or destroyed. The cost of reconstruction is estimated at around US$100 million or 80 percent of the national recurrent budget. Only nominal budget provision was made for this in 2008.

Figure 1. Map of the Solomon Islands

Source: Asian Development Bank.

The Solomon Islands extends over 1,450 kilometers in a southeast direction in the western Pacific. The location of the Solomon Islands in the western Pacific places it in the tracks of tropical cyclones and under the influence of El Niño and La Niña cycles, which bring increased risks of droughts and floods, respectively. Future climate change threatens to exacerbate the risks posed from tropical cyclones as well as floods and droughts.

Various factors combine to make the Solomon Islands significantly vulnerable to this wide range of natural hazards:

- ***Weak economy and limited livelihood opportunities.*** Both the World Bank and the IMF rank the Solomon Islands in the lowest 20 percent of nations in terms of GDP per capita. With a gross national income (GNI) per capita under US$750, the Solomon Islands maintains a least developed country status. More than 75 percent of the labor force is engaged in subsistence/cash crop agriculture, with less than 25 percent in paid work. The cash economy is narrowly dependent on forestry, agriculture, fishing, and, more recently, an expanding tourism sector. While the economy has experienced good growth rates in recent years of around 7 percent averaged over 2004-2007, it was driven in large part by substantial aid flows and unsustainable logging.

This rather precarious economic situation exposes the country to considerable disruption and hardship in the event of natural disaster.

- ***Ethnic tensions and political instability.*** Ethnic tensions and civil unrest, particularly during the period 1998-2002, resulted in severe impacts on the economy and adversely affected social and political stability. The Solomon Islands Government was insolvent by 2002. At the invitation of the Government, the Regional Assistance Mission to the Solomon Islands (RAMSI), a multinational police-centered force organized by Australia, arrived in the country in 2003 to assist in restoring law and order and rebuilding the country's institutions, which had become largely non-functional. Renewed unrest and rioting occurred in April 2006 after the general election. Indications are that the current Government, which came to power early in 2008, has a more stable relationship both with communities and with the public service.
- ***Widely dispersed, inaccessible communities.*** The hundreds of islands in the country are spread over a vast maritime exclusive economic zone (EEZ) of 1.34 million square kilometers. Air transport services exist, but not all of the islands have airports; there are 35 airports, only 2 of which have sealed runways. Many islands have no roads at all; and on those islands with roads, the roads network is often very limited and in poor condition. There are only 34 kilometers of sealed roads in the country, out of a total of 1,360 kilometers. Rural areas do not have telephones or other modern communication facilities. Most areas of the country are therefore isolated and extremely vulnerable in the event of disasters.

In terms of disaster management arrangements, the National Disaster Council Act (1989), supported by the National Disaster Plan (1987), established a National Disaster Council (NDC). The NDC is supported by a National Disaster Management Office (NDMO) under the Ministry of Home Affairs. The NDC is reviewing the institutional framework for disaster risk management, and there are intentions to develop a National Action Plan (NAP) for Disaster Risk Reduction.

A new Climate Change Division, under the Ministry of Environment, Conservation, and Meteorology, will have CCA responsibility following a reorganization of the Climate Change Office in the Meteorological Service. An informal, multi-sectoral Solomon Islands Alliance on Climate Change (SIACC) has been replaced by a National Advisory Committee on Climate Change. A policy to frame the CCA activities will be prepared, and a National Adaptation Plan of Action (NAPA) for Climate Change is being developed. The institutional framework to support this is undeveloped, but there is the potential to connect into the proposed new DRM framework. ❖

Key Country Findings

Until recently the Solomon Islands Government has been pre-occupied with internal country difficulties and with political uncertainties. The structures of governance are therefore generally weak across all sectors with weak national planning and budgetary management. Within this environment, government focus on initiatives to reduce risk from hazards or climate change has been limited. Following the Initial National Communication on Climate Change (completed in 2001 but not submitted to the UNFCCC until 2004), the Government has shown limited attention to the issues it raised in the Initial National Communication and until 2008 has not budgeted resources toward DDR an CCA activities.

The NDC and NDMO have been responsible for preparedness and response, with the NDC largely leaving these functions to the NDMO. Cross-sector cooperation between the two offices has been limited. Activity in the area of climate change has been largely concentrated on meeting international reporting obligations. The advisory Climate Change Country Team set up in 1998 under the Pacific Islands Climate Change Assistance Program (PICCAP) to develop the Initial National Communication has been largely non-functional since 2001. In 2001 the Initial National Communication noted serious obstacles to its activities, including lack of full commitment of the Country Team, the lack of policy and enabling environment, the absence of an institutional framework and linkages for proper coordination, the unavailability of data and information, and the lack of skills and capacity. Lack of interest by the private sector was also observed. There has been little progress until now to address these issues apart from efforts to establish the SIACC and develop a NAPA.

The Solomon Islands has a moderate level of awareness but a low level of capacity and commitment to DRR and CCA initiatives across government as a whole. The country has been slow in developing the required governance structures, and DRR/CCA mainstreaming into policies, plans, legislation, and regulations has not occurred. There are major gaps and barriers that need to be overcome for effective DRR/CCA implementation, including:

- No facilities for organizing, archiving, accessing, and easily sharing data. Although considerable historical data are available, they are scattered among agencies and are poorly organized and archived.
- Absence of effective mechanisms for cross-sector collaboration and cooperation.
- Lack of capacity and tools to carry out data analyses, hazard mapping, and vulnerability and risk assessments.
- Absence of regulatory environment (including enforcement) to promote risk reduction activity.
- No mechanism for the mainstreaming of DRR/CCA-related issues into national and sector policies, plans, legislation, and regulations.
- Lack of monitoring and evaluation.
- Weak linkages among national, provincial, and community governance structures.
- Low priority assigned to DRR and CCA issues by the national planning and budgetary processes resulting in a low priority by donors.

These are significant obstacles to department or agency activity or private sector participation. There is neither evidence of private sector-supported DRR/CCA activity nor evidence of the sector seeking Government influence to strengthen an enabling environment. Rather, government officials report that the private sector generally exploits weak governance arrangements. During infrastructure re-instatement following the April 2007 earthquake/tsunami in Western and Choiseul provinces, external consultants did not

address risk reduction measures despite international funding policies calling for them. However, there are indications of change following lessons from the 2007 earthquake/tsunami. Also, the policy statements of the new Government from January 2008 stress DRR/CCA initiatives and infrastructure.

In 2008, as ethnic tensions and political uncertainties lessened, there were indications that disaster risk reduction and climate change adaptation were gaining traction in the Government, at least at the national level. These indications include:

- Establishment of a Climate Change Division within the Ministry of Environment, Conservation and Meteorology, with more staff and a higher profile of the CCA activities within government.
- Establishment of the National Advisory Committee on Climate Change (NACCC) as a cross-sector advisory group for preparing the NAPA.
- Increase staff of the NDMO located in each province to provide disaster management (DM) and DRR support, reflecting the recognition of DM/DRR as an important component of provincial capacity.
- The work, supported by SOPAC and AusAID, to review DRM institutional framework, leading to an expected rewrite of the NDC Act and the National Action Plan. Government is considering the integration of the DRR/CCA structures that would reinforce sector accountabilities and rationalize organizational arrangements for risk reduction activities.

These are positive indications of possible development of conditions for realistic risk reduction activities. With frameworks to be developed on the provincial and community level, current ad hoc civil society activities have a chance to become more sustainable.

This report has identified six priority areas where investment could prove effective in overcoming some of the constraints to strengthen DRR/CCA programs:

- Review of the volcanic hazard and establish volcano monitoring and early warning system;
- Establishment of an integrated hazards unit with information system, tools, and GIS capability;
- Development of the Guadalcanal flood plain management regime, as well as the monitoring and warning systems;
- Support of the Climate Change Division for development of a CCA policy, governance arrangements, and action plans;
- Support of the implementation and integration of the new institutional framework of the National Disaster Council, including CCA; and
- Undertake DRR activities and investments within priority sectors and at the community level.

These 6 opportunities for support are selective. They derive from a combination of priorities identified by the NDMO, the Climate Change Division, and other agencies of the Government of Solomon Islands. They were selected from a larger set of opportunities based on 4 criteria: (a) they directly involve risk reduction; (b) are likely to produce tangible results within three years; (c) are likely to have sustainable, longer-term benefits; and (d) have an identified in-country commitment, champion, and/or effective arrangement for implementation.

A summary of the country situation and the gaps or impediments to effective risk reduction, which justify the selection of these opportunities, is presented in Table 1. The last section of report elaborates more on these opportunities for investment. ❖

Table 1. A Summary of the Key Gaps and Opportunities for DRR and CCA for Solomon Islands.

Situation	Gap	Opportunities
Very high exposure and vulnerability to volcanic eruptions and tsunamis.	Lack information on volcanic hazard risks, monitoring capability, and integrated warning and response plans for at-risk areas.	***Review hazard and establish volcano monitoring & early warning system,*** including risk assessments for key volcanoes, identification and establishment of monitoring systems, training, and developing alert and response system.
Hazards advisors spread over three agencies and insufficient hazards and vulnerability information to underpin strategies, plans, and actions to reduce risks. Government considering the integration of hazards advice.	Lack of integrated hazard advice and capacity for analysis and assessment of vulnerabilities. Weak information management with limited capacity regarding information system management, hardware and software computing capacity, and tools and models for resource managers.	***Implement an integrated hazards unit for Solomon Islands, and establish an integrated hazards information system and tools (with GIS capability)*** by developing a Hazards Information Policy; assessing data needs; identifying storage requirements, analysis tools, and mapping needs; acquiring computer hardware, software, and high-speed Internet connection; and supporting technical capacity building
Solomon Islands are facing increasing flood hazards from growing settlements in flood plains.	Limited spatial knowledge of present and future risks of flooding and a warning and response system.	***Develop Guadalcanal flood plain management regime and warning system,*** including review of existing hazard maps and updating, including additional flood risks from scenarios of future climate change, development of flood warning and response system, and development of floodplain management plans.
The government of Solomon Islands has bolstered climate change by creating a new Climate Change Division and is addressing new explicit institutional arrangements and accountabilities for DRM including CCA.	Limited capacity within Government to progress policy development and implement arrangements regarding CCA.	***Support bringing together DRM and CCA arrangements in implementing the institutional frameworks and the appropriate elements of the NAPA and NAP (soon to be developed),*** in particular policy development, governance arrangements into provincial and community level, and capacity development.

Detailed Country Assessment

Knowledge, data, tools

The key hazards of the Solomon Islands include tropical cyclones, earthquakes, tsunamis, landslides, volcanic eruptions, floods, and droughts. Data and information on geological hazards are produced by the Geohazards Unit, climate data by the Meteorological Division, and streamflow data by the Water Resources Division.

In terms of climate-related hazards like tropical cyclones, floods, and droughts, the Meteorological Division is a key source of climate data and information in support of the Climate Change Division and CCA/DRR-related work. The Meteorological Division has 39 staff, most of whom are operational staff located in the provinces. Climate data required for hazard and risk assessments are potentially available from four sources:

(a) Stations operated by 6 staff that represent the current active formal monitoring capacity;

(b) Historical records from the defunct network of stations established during Colonial administration with effort to recover and digitize data going back to the 1800s;

(c) Defunct network of voluntary stations where efforts are underway to recover and digitize these data and to revive the voluntary network; 10 new gauges have been ordered, with the intention of eventually having a network of 150 voluntary stations; and

(d) Spatially interpolated climatologies for monthly temperature and precipitation, developed by the Centre for Resource and Environment Studies (CRES) at Australian National University) during the 1990s. The hard copies of these maps are held by Meteorological Division, but it is unclear whether the digital data files for these spatial climatologies still exist.

Flood hazards are perceived as a lesser but more common threat, with flooding occurring particularly in Guadalcanal, Malaita, and Makira. However, vulnerability to floods appears to be increasing as population pressures and urbanization creates pressure on low-lying land subject to river flooding. Streamflow data are collected under the Water Resource Division, but only two working stations are operational, on Santa Isabel and Malaita. Both are established for purposes of monitoring water resources and hydropower, not flooding. There were 4 other stations, now non-operational, for which data are still available (the oldest record dating back to 1965). Rainfall data are also collected at these stations; however, they are not shared with the Meteorological Division. Coarse-scaled flood hazard maps exist for northern Guadalcanal. The Meteorological Division issue flood warnings based on weather forecast and satellite data. Yet, neither monitoring for accuracy of the data nor impact assessments of the warnings on population is conducted. It was suggested that a weather radar capacity would improve the warning accuracy.

Landslide, particularly associated with tropical cyclones and earthquakes, is a widespread hazard in the Solomon Islands. Landslides account for most of the fatalities that have occurred during tropical cyclones in the past century. Understanding of the geological aspect of the landslides is sufficient but has not yet been translated into maps for purposes of vulnerability and risk assessments. Mapping of landslide hazards requires aerial photographs. Many of the aerial photographs date back to WWII, with better, updated sets held by the Ministry of Lands, Housing and Survey. With skills in place, it would be recommended to map landslide hazard areas in the Western Province.

Volcanic hazards represent a rare but potentially catastrophic event in terms of damage and loss of life. There have been 4 active volcanoes in the Solomon Islands—Kavachi and Simbu in the Western Islands,

Savo off Guadalcanal, and Tinakula in the Eastern Islands. Numerous eruptions were recorded in the 20th century, with no fatalities occurring. However, two large eruptions in the previous century, from Savo and Kavachi, resulted in death of an estimated 600 people (mostly from associated tsunamis). Honiara, which is only 20 kilometers away from Savo, is vulnerable to volcanic ashfall and tsunami. Thus, volcanic eruptions represent a low probability/high impact hazard; however, very little has been done to map the hazards or to reduce the risks.

In terms of earthquake hazard, there are data on seismic events dating back to the 1930s. There is only one seismology station established in the early 1960s as part of the global network. Two other stations are no longer operational, but their accumulated data are still available. Seismologic events are generally well understood, but more information at the provincial level is required for future analyses. An enlarged monitoring network is needed to understand seismic risks at the provincial scale. The priority should be given to compiling, analyzing, and mapping the information. At present, only two seismology technician staff are members of the Geohazards Unit. The capacity needs to be elevated in order to move from the general seismological analysis to the seismology of the Solomon Islands – a difference in scale and detail. Once this is accomplished, then improving the monitoring network should be the next step.

In general, a surprisingly large stock of existing data is available. However, its analysis is lacking. For DDR and CCA, these data are crucial for vulnerability and adaptation assessments, risk assessments, baselines for scenarios of climate change, and extreme climatic event analyses. The existing holdings are scattered and not well documented, both within and among sector agencies. Key staff members are often not aware of data and information availability since data does not seem to be clearly explained and easily accessible.

Gaps

- ***Lack of common focus for hazard management and skills development for hazard analysis and vulnerability assessment.*** Bringing the separate hazards departments into a common unit and developing skills and systems for an all hazards capability could prove beneficial. It is currently being considered by Government.
- ***Absence of centralized, systematic databases and retrieval systems for data on all hazards.*** There is need to trace, compile, collate, and systematize these data as a basis for analyses in support of DRR and CCA.
- ***Lack of procedures and protocols for reciprocal data sharing between sector agencies.*** Data, such as map bases and statistical data, are held within sectors and not shared readily.
- ***Alarming drop in number of continuous time-series records that include recent data.*** Monitoring networks have been severely degraded in the past 10-15 years, which created large gaps in time-series data; in the future it can impede trend, extreme event, and other analyses required for risk and vulnerability assessments. If this tendency continues, in 30 years no data for analysis would be available.
- ***With a few exceptions, hazard maps are unavailable at sufficient resolution scales for the purposes of DRR and CCA.***
- ***Difficulty in stimulating a pro-active attitude of staff working on natural hazards.*** With a new focus on risk reduction, this would change but a risk of capacity loss is involved, as long as there is no call for this information offered by the staff.

Vulnerability and risk assessments

While there is potentially a firm base for hazard mapping, the country is still facing substantial challenge in

adequately identifying its key vulnerabilities and risks, including mapping of the communities at risk and the timing of the hazards.

In disaster risk reduction, the NDMO, which has the primary role for disaster management, is only being introduced to the DRR. While it is recognized that vulnerability and risk assessments will be central to its activities, its current focus is to strengthen DM arrangements and develop capacity in the provinces. It has not yet provided the guidance to other sector agencies. This reflects the fact that DRR has not yet been included into policies, plans, and legislation, as well as relevant sector agencies activities.

The institutional framework for DRR, accountability, and connections among different agencies is being established. There are two challenges faced by the country and the donors: (a) commitment to establish an operational framework, and (b) donors' commitment to assist with funding of the capacity development required over the next three years and beyond.

In climate change adaptation, the situation is similar. With end-user interest lacking, the Meteorological Division has not taken a pro-active approach to vulnerability and risk assessment in support of active risk reduction. It has previously focused on coordinating vulnerability and adaptation assessments only at a broad-brush scale as needed, for example, for national reporting for the Initial National Communication to the UNFCCC. The new Climate Change Division, which takes over the CCA role from the Meteorological Division, will be responsible for the preparation of the Second National Communication and the development of the NAPA in the first instance. Climate change adaptation has not been mainstreamed into policies, plans, and legislation or into the relevant sector agencies. The opportunity exists to integrate this activity into the institutional framework being developed for DRM.

At present there are no "clients or end users" and therefore no demands for detailed risk profiles and vulnerability assessments to underpin DRR and CCA. The Meteorology Division (in MECM), Geohazards Unit (in MME), Water Resources Division (in MME), and other agencies could contribute to vulnerability assessments and risk profiles. The capacity, however limited, of these agencies for vulnerability assessment and risk profiles is not coordinated or focused. It would be beneficial to bring these hazards units together to build capacity; the Government is considering this as part of the institutional framework review for DRM.

Gaps

Existing gaps should be addressed to make available full vulnerability and risk assessments. These gaps include:

- ***Lack of commitment by end users who do not have risk reduction in their frame of priorities, regarding sectors, areas, and dimensions of vulnerability and risk needed to be addressed.*** For both DRR and CCA—and their areas of common concern—directions are required in government policies and institutional frameworks. Priorities need to be established with end-users.
- ***Unavailability of tools and models to transform data into vulnerability and risk assessments.*** Generally, expertise exists and should be used for development of tools and models to analyze and transform data into DRR/CCA-related products.
- ***Absence of a coherent, integrated entity with capacity, data, and knowledge to produce risk and vulnerability assessments.*** In the Solomon Islands, the capacities required to produce such assessments are spread over several agencies that do not communicate or interact easily. For example, the Ministry of Lands, Housing and Survey has GIS capability, but the Geohazards Unit has the knowledge and skills required to use GIS in creating credible haz-

ard maps. The capacity will be difficult to develop without an integrated entity.

Mainstreaming into plans, policy, legislation, and regulations

In 1998-2001 a Climate Change Country Team was established under PICCAP to prepare the Initial National Communication. After 2001, Country Team ceased to operate. The 2001 Initial National Communication noted that adaptation to effects of climate and sea-level change could only be implemented effectively if measures are taken to address wider development issues. These measures include:

- Development of a national policy framework,
- Capacity building and institutional strengthening,
- Public awareness and education.

Serious obstacles listed in the Initial National Communication addressed these issues, including only part-time commitment of the Country Team, lack of policy and any enabling environment, absence of institutional framework and linkages for proper coordination, unavailability of data and information, and lack of skills and capacity. Until now, there has been little progress to address these issues, and mainstreaming of CCA has not occurred.

In 2007 the SIACC, an informal coordination group, was formed. However, SIACC met only once, and in June 2008 the new Climate Change Division replaced it with a new NACCC comprising politicians and officials.

Initially, the Climate Change Division was responsible for preparation of the NAPA, which is now in draft form. The Division was also to address the development of a climate change policy, relevant legislation, and preparation of the Second National Communication. The policy development should lead to identification of cross-sector functions and accountability, and help mainstreaming CCA into departmental activities. Integration with the institutions developed for DRM would provide connection with provincial and local authorities and civil society activities in this area.

The DRR coordination is the responsibility of the National Disaster Council, which focuses on disaster management response. The NDC Chair observes more attention and importance shall be given to disaster risk reduction. To facilitate this, the institutional arrangements are being reviewed as part of the review of the National Disaster Act and the National Disaster Plan. In the meantime the NDMO is continuing capacity development and promoting awareness in the provinces.

Presently, CCA and DRR concerns are not integrated into Government plans or legislation; however, a good start has been made. Capacity needs to be raised to ensure further progress.

Gaps

- ***Insufficient capacity to establish policy framework and enabling environment for CCA.*** The CCA continues to be externally driven, with insufficient emphasis placed on developing explicit governance and institutional capacity to create the necessary enabling environments.
- ***Delayed commitment to implement the institutional framework for DRM and provide for its integration with CCA.*** The proposed arrangements are awaiting approval of the Cabinet.
- ***Lack of capacity to implement the frameworks, including at provincial and local levels, as well as to engage civil society.*** A three-year implementation program is required to give effect to the adopted frameworks.
- ***Non-sustained funding commitment to support the***

development and implementation of the frameworks both in-country and from donors to support these activities.

- *Inadequate national planning and budgetary processes to support the mainstreaming of risk reduction.*

Monitoring and evaluation

With the absence of risk reduction policies and frameworks there is no mechanism to monitor and evaluate DRR/CCA activities. In the institutional framework, which is being considered by the Cabinet, both DRR and CCA activities will be reported to the Government through the National Disaster Council chaired by the Prime Minister's Office.

Arrangements for review of risk reduction activities are being considered; detailed procedures will also need to be developed.

Awareness raising and capacity building

The National Disaster Council runs an annual Disaster and Risk Awareness Campaign through the NDMO with the participation of the Meteorological Service; the MME Geohazards and Hydrology Units; the Ministries of Health and Education, the Police, Search and Rescue; and several NGOs. The Campaign targets schools, villages, and the business sector and concentrates on hazard information, preparedness, and warning arrangements. The NDC Chair observed that risk reduction awareness programs shall be conducted in villages; recent recruitment and training of 10 staff in the provinces is intended to focus on disaster management and risk reduction awareness. Civil society will be involved in developing and delivering these programs.

Gaps

- *Lack of funding to support planned campaign.* To be effective programs need to be applied at the village level and continued every year. Required resources and coordination is significant to address 10,000 villages of the Solomon Islands.
- *Materials and content need to be developed.* Core frameworks need to be developed within which to coordinate NGO and civil society programs.

Governance and decisionmaking

The National Disaster Council Act (1989), supported by the National Disaster Plan (1987), established the NDC to overview arrangements and operations for DRM, with support of the NDMO, the NDC is reviewing the institutional framework for DRM. There are intentions to develop a National Action Plan for DRM.

A new Climate Change Division, under the Ministry of Environment, Conservation and Meteorology, has responsibility for CCA. A policy to frame these activities will be prepared, and a draft NAPA has been developed. The institutional framework to support this is in the process of development, and there is the potential to integrate CCA with the proposed DRM framework.

Disaster risk reduction is a responsibility of the National Disaster Council. Until now, planning has not taken into account risk reduction since disaster management has been the major focus. Renewed importance of DRR has resulted in a review of the National Disaster Act, which will incorporate DRR. A need to strengthen institutional arrangements for DRM across sectors and agencies and on the national, provincial, and local levels was recognized, especially after the April 2007 earthquake/tsunami in the western provinces.

The NDMO, the secretariat of the NDC, has trained 10 new regional disaster coordinators to be deployed

in the provinces as civil servants. The NDMO has increased its staff from 2 in 2005 to 15 in 2008. Five are based at the national office and 10 are new positions (one for each province). This increase in staff represents a significant Government commitment toward DRM. More staff training is planned. Provincial officers are responsible for helping provinces to develop their action plans; raising awareness; and, at the community level, providing training and helping communities to identify risks and respond to them.

The NDC is committed to establishing relations with the communities and across national agencies that in the past have not been engaged. The NDMO is also advocating a relationship between DRR and CCA. Increased funding—reflected in the hiring of new staff—reflects the commitment and growing awareness within the Government. However, at the level of national planning and budgeting, the processes and support to provide for mainstreaming and implementation has yet to be developed. Lack of budgetary support is a major impediment to DRR, as well as CCA.

To integrate DRR, the NDC needs to commit to the outcomes of the institutional review leading to the revision of the National Disaster Act and the National Disaster Plan and complete them by mid-2009. The NAP is also an important process to be carried out to establish the multi-sector three- and ten-year action plans for implementation. The NAP and the NAPA could be addressed within one institutional framework, an opportunity that should be encouraged.

Land use and building controls are limited. However, the institutional arrangements under consideration include a Risk Reduction Committee of the NDC, which would address these and other CCA issues.

In terms of CCA, the Meteorology Division was the focal point for climate change issues, including responsibility for the Second National Communication and NAPA. However, with its establishment, the Climate Change Division became responsible for these tasks. The Division has only two staff, clearly an inadequate number, but there is a budget commitment on the part of Government to increase this number to six.

The Climate Change Division operates under the Environment Act 1998. However, climate change is not explicit in the Act. This puts the Climate Change Division in a weak position. One of the priority tasks identified by the Division is to firm up its position and role with the development of a Climate Change Policy Framework, the intention being that the Framework would lead to the development of a stand-alone climate change act or policy. This would shore up the Division and give it a mandate, without which it could be left vulnerable and unsustainable, as has happened in the past. Under consideration is the inclusion of the CCA activity within the institutional framework of the National Disaster Council chaired by the Office of Prime Minister. This would strengthen its access to the senior levels of government and also provide arrangements through provincial government and civil society to the community level with the DRM arrangements.

Impediments

- ***Absence of CCA/DDR content in policy, legislation, and in the National Disaster Plan.*** Roles, functions, and accountabilities need to be provided for across sectors. These are included in the institutional arrangements under consideration but significant support will be needed for implementation. Integration of arrangements for DRR/DRM and CCA would strengthen the basis for both. Also under consideration is the integration of the hazards functions that would allow for a common skills set and focus for vulnerability and risk assessment.
- ***Weak policy commitment, and national planning and budgetary processes.*** The focus for DRR and CCA needs to be championed to get cross-sector support. Also a political champion is needed to get these is-

sues included in national planning and budgetary arrangements. The new institutional arrangements under consideration for the NDC would provide for this. There is political support for the inclusion of CCA processes within this. Development of specific CCA policy and coordination across agencies remains a need.

Coordination among government agencies

With regard to DRR, coordination between the NDC, NDMO, and other ministries (even though they are represented on the NDC) has not been well established. Other ministries have not committed to active DRR. It is not perceived to be a mainstream activity for them. The perception has been that DRR was led by NDC and Home Affairs. Upgrading the institutional framework, the legislation, and the National Disaster Plan is seen as a priority by NDC in order to strengthen DRM arrangements through provincial government and into communities, and to mainstream DRR into planning processes across government agencies. Detailed arrangements have been developed and are under consideration. Once a commitment is made a significant effort will be required to promote and implement the arrangements at both the national cross-sector level and at the provincial level to communities. A significant role is envisaged for NGOs and civil society implementing arrangements at the community level within the new institutional framework.

At provincial-level government, awareness and commitment is low. At this level Provincial Disaster Plans and Committees (comprised of officials) either do not exist or are non-operational. Only 3 of 10 provinces have committed office space. At this level, the focus, if any, is on DM arrangements and the issues of DRR are not rated. Provincial government perceives its mandate for DRM as weak and indeed the political arm does not have a function during disasters under the current National Disaster Plan. Provincial Premiers are keen to see the new institutional arrangements adopted, including a mandated role in the legislation. Awareness raising and capacity building are sorely needed, particularly for disaster risk reduction. There is US$600,000 in government money that has been committed to support the 10 provincial disaster coordinators who will establish provincial structures and perform mainstreaming and community outreach activities. Their AusAID-supported training has been completed and there is a European Union program to establish Provincial Disaster Coordination Centers in each province and municipality over the next 4 years.

With regards to CCA, the situation is much the same as with DRR. The coordinating cross-sector committee set up to develop the NAPA—the National Advisory Committee on Climate Change (formerly the Solomon Islands Alliance for Climate Change)—does not have a policy or legal basis to provide the incentive for an effective coordination role. The Climate Change Division has set a priority to establish a policy basis for its functions, which is needed before it can effectively perform a coordinating function. The Ministry of Environment, Conservation and Meteorology supports the CCA connection into the new NDC framework to bring CCA issues to the attention of government agencies and the Government at the proposed higher level.

Impediments

- ***Lack of commitment to the new institutional arrangements for the National Disaster Council, including CCA.*** Until there is formal commitment of Government to these arrangements, the rewrite of the legislation and the National Disaster Plan cannot proceed. Once legislation is formalized, there is a need for a substantial commitment to its implementation across sectors and through provincial government to communities.

- ***Without a workable policy agencies have no sense of obligation to CCA.*** Development of specific CCA policy, and amendment to the Environment Act, as necessary, will give effect to roles and functions of relevant agencies concerned with CCA
- ***Weakness within provincial government for DRM and CCA issues and lack of connection into communities.*** The roles of the Provincial Disaster Coordinators to establish the new provincial and community-level arrangements will need to be supported over the next 3 years and beyond. In this regard, the connection with NGOs and civil society will be essential.

Coordination among donors and key stakeholders

In-country donor activity in risk reduction (both for DRR and CCA) has been limited. AusAID has had a substantial program for disaster management development through the NDMO, and the EU is addressing disaster management facilities in the provinces. However explicit DRR activity is not raised by the Government as a priority and so does not enter discussions with donors.

Generally, donors view DRR as cross-cutting and regional in scope, and both AusAID and NZAID do not note it within their country framework. The CCA activity has been confined to support from UNDP toward the development of the NAPA without involvement of other funders.

There has been limited scope for coordination between donors in the forthcoming GEFPAS-funded activity, implementation of NAPA, and potential activity for DRM under the yet to be developed NAP. As this set of activity comes into focus, there will be a need for coordination between donors and stakeholders at both the country and regional level.

For NGOs the focus has been on preparedness and response in communities, but increasingly they see a role to support government in DRR/CCA activity. The NGOs are involved with the NDMO through the National Disaster Plan, and its redrafting will explicitly address their involvement with risk reduction activity. For CCA NGOs have representative membership on the NACCC.

Impediments

- ***The Government has not identified risk reduction as a country priority and so does not raise it in discussions with donors.***
- ***The Government views DRR and CCA activity as externally driven and has come to expect that it will be externally funded.*** It is important that expectations on countries are set out clearly and explicitly to avoid discussion being defaulted. Donors should be explicit about regional versus country perspectives for DRR.

Planning and budgetary processes

Current national planning and budgetary processes are weak, and risk reduction is not an element in the planning and budget control process. The activity is not mainstreamed either for DRR or CCA, and so it does not appear in national planning or budgeting.

It is useful to note that DRM and CCA issues appear in the Government Policy Statements of January 2008 for disaster management, climate, and infrastructure for the first time and indicate a changing attitude. It is also noted that a Medium-Term Development Strategy is being developed by the Ministry of Planning and Aid Coordination; and, arising from the institutional framework review, it is expected to address risk reduction issues.

Impediments

- ***Lack of champions at the political and senior govern-***

ment level. Indications are this may be changing.

- *Lack of awareness of specific issues and how to manage them.* Support to the NDC and awareness material for politicians would help build commitment.

Implementation of actual risk-reducing measures

In the CCA context, the last major activity completed was the Initial National Communications to the UNFCCC submitted in 2004. The Climate Change Country Team, which produced and completed the Communication in 2001, disbanded, and climate change issues were relegated to a two-staff unit within the Meteorological Division. There has been some activity commencing the development of the NAPA but otherwise little progress on CCA issues. Earlier this year this small unit transitioned into the new Climate Change Division with an agenda of 5 major activities: (a) developing the NAPA; (b) preparing the Second National Communication; (c) preparing a Climate Change Policy Framework (d) reviewing the Environment Act; and (e) formalizing the NACCC to oversee major initiatives, like the NAPA. The draft NAPA is being considered; and with funding committed, implementation is expected to follow.

In the DRR context, there have been some awareness programs, but the focus to date has been on developing disaster management capability. This is seen by the NDMO as a necessary precursor to addressing more intangible issues of risk reduction. In recent times Government focus has been elsewhere, but in the present atmosphere, there are indications of a willingness to address the governance issues of risk reduction.

The GEFPAS funding will commence for water development projects and for food production/security on low-lying atolls.
It is noted for the reconstruction of infrastructure, following the April 2007 earthquake/tsunami in the western provinces, that risk reduction considerations have not been a significant factor. ❖

Opportunities for Investment

From the above country assessment, it is evident that the Solomon Islands is in the initial stages of garnering widespread awareness of, and creating organizational arrangements for, DRR and CCA within its National Government. With ethnic and political tensions diminishing, some attention has been committed to strengthening disaster risk management arrangements. With this new focus comes the opportunity to initiate new DRM/DRR frameworks and the potential to integrate arrangements for CCA. The stage has been set with increased staff for the NDMO and the new Climate Change Division and the formation of cross-sectoral committees with their sights targeted on advancing the NAP and NAPA processes. With the adoption of the new institutional framework, significant support will be required in policy development and legislation for CCA, in the implementation of the framework through national agencies and provincial government and into communities with linkages to civil society, in information management and capacity development for vulnerability and risk assessment, and in on-the-ground activity implementing the NAPA and NAP.

As noted in the introduction, this country assessment highlights current country status, gaps, opportunities, and barriers related to national policies, strategies, plans, and activities regarding the management of natural hazards, as well as with the enabling environment for a comprehensive risk management approach to natural hazards. It also highlights the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. In most discussions among key government officials and other stakeholders, investment programs are prioritized and selected based on expectations of several criteria (costs, available funding, efficiency, expected benefits, institutional, financial, legal and related capacity, etc.).

The Solomon Islands and most of the Pacific island countries already have established policies, institutions, systems and related structures to address DRR/CCA challenges, and several programs (NAPs, NAPAs, etc.) have been prepared and are ready to be enacted. Unfortunately, there are significant gaps in the 5 key HFA areas discussed in this report; additionally, while some efforts have been made to address certain issues, others (funding, staffing and related operational support) persist. While efforts have been made to identify and address high-yielding, short-term priority issues, it appears that more effort is needed to fully categorize such needs and decide upon short-, medium and long-term programs.

Solomon Islands policymakers, sector officials (in consultation with local stakeholders) and various donors and financial institutitions compiled a list of priorities. The Government may choose to pursue any these options with its own resources, with support from the international donor community, and/or international financial institutions like the Asian Development Bank and the World Bank. Grant funding for Solomon Islands is being mobilized from the Global Facility for Disaster Reduction and Recovery (GFDRR) to support pilot programs which could be leveraged to undertake some of the proposed investments, based on demand. Funds are expected to support programs from 2009-11.

Consequently, there are many gaps and impediments to DRR and CCA that impede potential opportunities for investment leading to the improvement of risk reduction. In narrowing the field of opportunities, this report has applied two sets of filters or criteria**.** The *first set* favors those opportunities that achieve the following:

- Address risk reduction directly;
- Are likely to produce tangible results within three years;

- Are likely to have longer-term sustainable benefits; and
- Have in-country commitment, champions, and/or institutional arrangements to promote implementation.

With these criteria in mind, and with consultation and expert judgment, 7 priorities for investment were identified. These 7, along with a summary of the rationale for each in relation to the above criteria and as linked to the discussion in the body of the text, follow:

(1) ***Review hazard and establish volcano monitoring & early warning system.*** In terms of damage and loss of life in the Solomon Islands, volcanic eruptions are rare but high-impact risks. However, little has been accomplished with regard to hazard and risk mapping. The monitoring capacity is limited, and there is no alert and response system in the event of volcanic crisis. For 4 key volcanoes associated with the higher-risk situations, it is feasible to carry out the necessary risk assessments, establish monitoring systems, and conduct training in monitoring and maintenance within a 3-year period, with long-term sustainable benefits. The program should be strongly supported by NDMO.

(2) ***Establish integrated hazards information system and tools (with GIS capability).*** Despite an alarming drop in data collection in the Solomon Islands, there exist considerable historical data. But they tend to be scattered, disorganized, and often not analyzed and utilized effectively. In anticipation of the development of cross-sectoral, cross-governmental (national to local) collaboration and integration of DRR/CCA effort; and systematic system of organization, storage, and sharing of data and information, including communicating and sharing with outer islands, is required. Technically, such a system could be established well within a three-year period, and, once established, would have long-term benefits in facilitating integrated action across agencies and sectors. To be successfully implemented, the information system would have to be strongly promoted by NDMO and the Climate Change Division.

(3) ***Develop Guadalcanal flood plain management regime and warning system.*** The Guadalcanal flood plains are developing rapidly as population is attracted to urban settlements. This is exacerbating a significant flood hazard to expanding settlements, as evidenced by the flooding in 2005 and 2007, which displaced thousands of inhabitants. There is a paucity of river and rain gauges and thus no effective warning and response system, no hazard maps, and no zoning or land use management. A three-year program, which factored in future climate changes, would provide significant long-term benefits in preventing and reducing risk. This is supported and would be driven by the NDMO and implemented by Ministry of Mines and Energy along with the Meteorological Division.

(4) ***Support the Climate Change Division for development of a climate change adaptation policy, integration of governance arrangements through the NDC, and implementation of action plans.*** Government support for CCA is reflected in the decision to establish a Climate Change Division with expanded staff. In its formative stages of development, the Division requires a policy framework, along with significant awareness raising within relevant government agencies. These activities needed to underpin the NAPA process, to implement action plans, and to mainstream CCA into sectoral strategic planning and budgetary process. While staff numbers are being expanded, the expertise needs enhancing. There is the need for technical assistance and capacity building to get the crucial tasks underway. This is achievable within three years and would provide the foundation for sus-

tainable activities thereafter. The lead agency and promoter is the Climate Change Division.

(5) ***Support the integration and implementation of the new institutional framework for the NDC through national agencies and provincial government and into communities with linkages to civil society.*** Development of the NDC legislation is required to give effect to the framework, the new National Disaster Plan, and the integration with CCA. The establishment of the national and provincial structures of the framework requires facilitation and involvement of the member agencies in developing terms of reference, standard operating procedures, and implementation. Development of the framework for local arrangements and engagement with NGOs and civil society also requires facilitation and support over a three-year timeframe and on-going to establish capacity and momentum for sustainable risk reduction measures at the community level.

(6) ***Provincial and community awareness and disaster risk management education.*** There are large gaps among national government, provincial government, and communities where actions to reduce risk are largely implemented. Given the large geographical, cultural, and economic disparities that exist within the Solomon Islands, bridging these gaps will be a formidable task. It is generally agreed within Government that a critical first step is a concerted effort at awareness raising and education targeted at the provincial and community level. A pilot program is achievable within three years.

(7) ***Support the implementation of DRR activities and pilot investments in priority sectors and at community level.***

The above 7 opportunities for support were then subjected to a *second filter* by asking the question, *Which of the opportunities are already or are likely to be supported by other donors and agencies?* The intent of applying this second criterion was to determine where the World Bank could add value in a coordinated and harmonized manner through other players in the region. Opportunity (6), *provincial and community awareness and disaster disk management education,* fell into this category, at least in part. The EU program for provincial disaster centers includes provincial-level capacity building for disaster management and training and public awareness campaigns related to disaster coordination. On this basis, the 6 remaining priority activities can be viewed as complementary and therefore as opportunities for the World Bank to add value.

In Annex A, each of these 6 opportunities is expanded to provide preliminary information on, for example, indicative costs, timeframes, and first-order actions and tasks. This information is intended to be sufficient for the development of detailed proposals and terms of reference should the World Bank wish to pursue these opportunities for investment further. ❖

Annex A. Proposals for Support in Solomon Islands

Proposal:	**S1 Review Hazard and Establish Volcano Monitoring & Early Warning System**				
Country/Sector:	**Solomon Islands: Settlements**				
Goal and purpose:	**Settlements at reduced risk from volcanic events, through monitoring and early warning arrangements**				
Scope:	**Volcanic hazards in four areas.**				
Lead agency:	**MME, with NDMO - linked to sub-regional MVN initiative**				
Cost and duration:	**US$440,000 over 2 years**				
Hazards targeted	**Risk reducing measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
Volcanic eruptions Tsunami	Avoidance of high-risk zones Warning and evacuation	Lack of information on volcanic hazard risks Lack of volcanological monitoring capability Inadequate integrated warning and response plans for at-risk areas	Risk assessments for Savo, Tinakula, Kavachi, and Simbo volcanoes and identification of appropriate monitoring and warning regimes Establishment, as appropriate, of 2 permanent volcanic monitoring stations and 2 mobile systems incl. seismometers, probes, thermometers and gas monitoring equipments. Training in volcanic monitoring, equipment maintenance and data analysis Development of alert and response system for volcanic crisis.	80 300 20 40	June 2009 June 2010 Sept 2010 Dec 2010

Continues

Annex A. Proposals for Support in Solomon Islands *Continues*

Proposal:	**S2 Establish Integrated Hazards Information System and Tools (with GIS capability)**				
Country/Sector:	**Solomon Is: Hazards advisors and sector users**				
Goal and purpose:	**To inform and promote risk reduction decisions through information sharing and sound data management, analysis and presentation**				
Scope:	**National**				
Lead agency:	**Climate Change Division, NDMO with hazard advisors and sector users**				
Cost and duration:	**US$0.5M over 12months**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$M**	**Time-frame**
Wind, storm surges SLR Climate Change extreme events Coastal inundation and erosion Fire Droughts, Fresh and marine waters pollution Pandemics	Evaluate and map hazards Assess risks and map vulnerability Map assets and assess critical infrastructure Monitor environmental changes and increased exposure to risks	Generally weak information management systems in most agencies and no Information System Management policies. Most hazard information is still hard-copy based and of questionable standard. Limited capacity for information system management Weak hardware and software computing capacity Limited tools and models for resource managers	Develop and adopt a Hazards Information Policy Identify long-term storage requirements, analysis tools and mapping needs Acquire appropriate computer hardware, software and high speed Internet connection Support capacity building through populating the information system with available historical data and undertaking vulnerability mapping and risk modeling and for climate change & risk prediction Develop a hazards strategic plan and undertake capacity development within the hazards group including but not limited to: hazard mapping of key hazards, development of an integrated hazards information system with risk and vulnerability tools, undertaking risk and vulnerability assessments for identified sector clients Establish minimum requirements for the Solomon Is observation networks (particularly for the meteorological and hydrological monitoring) and progressively upgrade in conjunction with other regional program.	0.1 0.2 0.2	Year 1 Year 2 Year 3

Annex A. Proposals for Support in Solomon Islands *Continues*

Proposal:	**S3 Develop Guadalcanal flood plain management regime and warning system**				
Country/Sector	**Solomon Islands: Settlements, Hydrology**				
Goal and purpose:	**Sustainable settlements and land-use, by providing spatial flood risk information and a warning/response for a flood plain currently experiencing rapid development**				
Lead agency:	**MME with Meteorological Service and NDMO with Water, Meteorological Service**				
Cost and duration:	**US$0.7M over 3 years**				
Hazards targeted	***Risk reducing measures***	***Key gaps/barriers***	***Actions and tasks***	***Cost US$M***	***Time-frame***
Flooding	Early warning and evacuation Avoiding settlement in high risk zones	Limited spatial knowledge of present and future risks of flooding Lack of warning and response system	Review of the existing Guadalcanal Plain Flood Hazard Maps and update as required, including additional flood risks from scenarios of future climate change. Develop flood warning and response system, including: • Establish a telemetric river gauge and rainfall network for 3 rivers (Lunga + 2 others) incl. 2 stream gauges and 4 rain gauges per catchment • Develop network for communication and dissemination of warnings. • Develop local flood response and evacuation plans Develop floodplain management plans	0.1 0.5 0.1	Year 1/ 4 mths Year 2/ 9 mths Year 3/ 4 mths

Annex A. Proposals for Support in Solomon Islands *Continues*

Proposal:	**S4 Support the Climate Change Division for development of a climate change adaptation policy, governance arrangements and action plans**				
Country/Sector:	**Solomon Islands; multi-sector**				
Goal and purpose:	**A national climate change adaptation policy and action plan, by providing technical assistance to the Climate Change Division for effective development and timely government approval.**				
Scope:	**National policy**				
Lead agency:	**MECM, Climate Change Division departments**				
Cost and duration:	**US$0.2M over 2 years**				
Hazards targeted	**Risk reducing measures**	**Key gaps/barriers**	**Tasks**	**Cost US$M**	**Time-frame**
Climate-related hazards, including floods, droughts, tropical cyclones.	Multiple, according to hazard and sector at risk	Lack of capacity within government to progress policy development arrangements	Develop a whole-of-government policy on CCA identifying goals, roles, and accountabilities and integrated with NDC arrangements. Establish the Climate Change Division as the designated national authority Facilitate a government-level awareness program addressing the political and departmental level Support the implementation of the NAPA with actions identified across agencies – 2 months per year for 3 years	0.1 0.05 0.2	Year 1 Year 1 Year 3

Annex A. Proposals for Support in Solomon Islands *Continues*

Proposal:	**S5 Support the implementation and integration of the new institutional framework of the NDC including climate change adaptation**				
Country/Sector:	**Solomon Islands; multi-sector**				
Goal and purpose:	**An effective and sustainable set of arrangements for DRM and CCA through national agencies and provincial government and into communities with strong linkages to civil society.**				
Scope:	**National, provincial, and local arrangements for government, private sector and civil society**				
Lead agency:	**Prime Minister's Office as chair of the NDC, NDMO, and MECM, Climate Change Division**				
Cost and duration:	**US$0.3M over 3 years**				
Hazards targeted	***Risk reducing measures***	***Key gaps/barriers***	***Tasks***	***Cost US$k***	***Time-frame***
All hazards	Multiple, according to hazard and sector at risk	Commitment to the institutional framework, capacity at national and provincial levels and resource to provide sustained support	Develop the NDC legislation to give effect to framework and new National Disaster Plan Facilitate the establishment of national and provincial structures with members in developing terms of reference, SOPs and exercising–3 months technician assistance per year for 3 years Develop and implement the framework for local arrangements and support NGOs and civil society.	0.05 0.2 0.1	Year 1 Year 2 Year 3

Annex A. Proposals for Support in Solomon Islands

Proposal:	**S6 Undertake DRR activities and investments within priority sectors and at the community level**				
Country/Sector:	**Solomon Islands; multi-sector**				
Goal and purpose:	**Implement DRR activities and pilot investments in priority sectors and at community level**				
Scope:	**National, provincial and local arrangements for government, private sector and civil society**				
Lead agency:	**Prime Minister's Office as chair of the NDC, NDC, NDMO and MECM, sector ministries**				
Cost and duration:	**US$1.6M over 3 years**				
Hazards targeted	***Risk reducing measures***	***Key gaps/barriers***	***Tasks***	***Cost US$M***	***Time-frame***
All hazards	Multiple, according to hazard and sector at risk	Commitment to the institutional framework, capacity at national and provincial levels and resource to provide sustained support	Implementation of priority activities across sectors, levels of government, private sector, and at the community level, including but not limited to improving end-to-end early warning arrangements, developing and widely disseminating risk maps, undertaking provincial- and community-level DRM programs in conjunction with NGO and local community groups, encouraging private sector in DRR activities, and promoting sustainable use and management of ecosystems (including through better regulation of land-use), and reducing risk and vulnerabilities Support development and implementation of a wireless broadband communication network across 9 provinces to support DRM arrangements and early warning systems. Such a network would also support hazard observation monitoring networks, and rural development, livelihood, and welfare sector programs. The network would comprise up to 7 satellite-receiving stations and microwave spine systems with local village networks on a village ownership business model and be installed in association with technical co-sponsors.	0.1 0.8 00.7	Year 1 Year 2 Year 3

Annex B. Project Team and People Consulted

Project Team

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supported by	
Michael Bonte	SOPAC

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References and Select Bibliography

ADB (Asian Development Bank). 2007. Solomon Islands: Country Environmental Analysis.

ADB. 2004. Pacific Region Environmental Strategy 2005-2009.

GEF (Global Environment Facility). 2008. GEF-Pacific Alliance for Sustainability—Program Framework.

GEF/UNDP. 2006. Pacific Adaptation to Climate Change Program - Solomon Islands, Report of In-Country Consultations.

Geoscience Australia. 2008. A Natural Hazard Risk Assessment of the Asia Pacific Region.

Government of Solomon Islands. 2008. Policy Statements—Coalition for National Unity and Rural Advancement Government, January 2008.

Government of Solomon Islands. 2008. Budget Strategy and Outlook—Solomon Islands Budget 2008.

Government of Solomon Islands. 2008. Corporate Plan—Ministry of Environment, Conservation and Meteorology.

Government of Solomon Islands. 2001. Solomon Islands Initial National Communication under the UNFCCC—Submitted 2004.

Government of Solomon Islands. 1998. Environment Act 1998.

Government of Solomon Islands. 1989. National Disaster Council Act (Chapter 148).

Government of Solomon Islands. 1987. National Disaster Plan.

SOPAC. 2007. Integrated Water Resources Management in Pacific Island Countries- A Synopsis—and related Country Diagnostic Reports.

World Bank. 2006. Not If but When—Adapting to Natural Hazards in the Pacific Islands Region—A Policy Note. Washington, D.C.

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**In bold, GFDRR Donors*

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

TIMOR-LESTE COUNTRY ASSESSMENT

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

THE WORLD BANK

SOPAC

Acronyms and Abbreviations

AusAID	Australian Agency for International Development
CCA	Climate change adaptation
DRM	Disaster risk management
DRR	Disaster risk reduction
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
HFA	Hyogo Framework for Action
ISDR	International Strategy for Disaster Reduction
NAP	National Action Plan (for DRM)
NAPA	National Adaptation Plan of Action (for CCA)
NDES	National Directorate of Environmental Services
NDIEA	National Directorate of International Environmental Affairs
NDMD	National Disaster Management Directorate
NDRM	National Disaster Risk Management (Policy)
NGO	Nongovernmental organization
PPP	Purchasing power parity
TSA	Transitional Strategic Appeal – Reference UNDP 2008
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

Contents

Introduction

The World Bank policy note, "Not If, But When," shows the Pacific island countries to be among the world's most vulnerable to natural disasters. Since 1950, natural disasters have directly affected more than 3.4 million people and led to more than 1,700 reported deaths in the region (excluding Papua New Guinea). In the 1990s alone, reported natural disasters cost the Pacific Islands Region US$2.8 billion (in real 2004 value). The traditional approach of "wait and mitigate" is a far worse strategy than proactively managing risks.

The Hyogo Framework for Action 2005-2015 (HFA) lists the following 5 key priority areas for action:

(1) Ensure risk reduction is a national and a local priority with a strong institutional basis for implementation;
(2) Identify, assess, and monitor disaster risks and enhance early warning;
(3) Use knowledge, innovation, and education to build a culture of safety and resilience at all levels;
(4) Reduce underlying risk factors; and
(5) Strengthen disaster preparedness for effective response at all levels.

This Timor-Leste assessment represents a stocktaking exercise to review the extent to which disaster risk reduction (DRR) and climate change adaptation (CCA) activities have progressed in the island country. The assessment goes on to identify gaps or impediments to achieving the HFA principles and identifies opportunities for future DRR/CCA investments that would be timely, cost-effective, and implementable within a three-year timeframe. The focus is on risk reduction, rather than post-disaster recovery and response. While some sector-specific activities are addressed in the assessment of national and local government policies and institutional arrangements, the report does not provide a comprehensive summary of sector-by-sector activities. Instead, it refers to other reports that have done that and complements these with suggestions for taking the necessary steps.

The goal of the report is to deepen the understanding in the gaps, opportunities, and needs at the national level toward stronger operational disaster and climate risk management in the Pacific islands and to link closely to other ongoing and future efforts by other donors and stakeholders (such as the SOPAC regional initiatives following the Madang Framework and the National Action Plans) to ensure synergy and avoid duplication. The assessment focuses on practical, proactive measures that Timor-Leste can take to inform its national development policies and plans and to strengthen its capacity to reduce the adverse consequence of natural hazards and climate change, as it relates to risk reduction. The linkage of these two areas mainly includes managing the impacts of extreme weather events, variability in precipitation and storm surges, and sea-level rise.

This assessment highlights aspects such as the current country status; gaps, opportunities, and barriers related to (a) national policies, strategies, plans, and activities to manage natural hazards; (b) the enabling environment for a comprehensive risk management approach to natural hazards; and (c) the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. It also reviews and identifies the need for informed policy choices, improved decisionmaking processes, strengthened regulations, and legislative and policy changes required to support proposed country-level activities.

With respect to achievement of the first HFA priority, there is clear evidence of systemic difficulties among many Pacific island countries in establishing an enabling environment and promoting a cross-sector focus for DRR and CCA activities. Since the avail-

able evidence shows that ad hoc, externally driven approaches have not provided satisfactory results so far, the HFA emphasis upon a strong government commitment and action is one of the primary and early challenges to be surmounted in achieving the goals of the International Strategy for Disaster Reduction (ISDR).

World Bank experience in countries with similar challenges shows that while it is important to have a clear long-term vision, given the institutional, financial, and resource constraints, more modest "bottom up" approaches tend to have better results. Also, taking existing investment programs and incorporating simple key DRR/CCA elements demand relatively fewer efforts and resources and yield results that can lay the foundation for more complex, follow-up stages. Getting stakeholders to coordinate their activities in line with the 2005 Paris Declaration on Aid Effectiveness also appears to be relatively easier with such a modest starting point than with formal efforts aimed at comprehensive "top down" coordination.

This assessment begins by explaining the context of the country in relation to disaster risk reduction and climate change adaption. It follows with sections on Key Findings and a Detailed Country Assessment that focuses on some of the components relevant to HFA achievement: adopting and mainstreaming policies, data and knowledge, risk and vulnerability assessments, monitoring and evaluation, awareness raising and capacity building, planning and budgetary processes, and coordination. From this assessment, possible opportunities for addressing the identified gaps and needs in line with the HFA are presented in the final section. The proposals for future support are presented in Annex A.

Funding for this assessment was provided by the Global Facility for Disaster Reduction and Recovery (GFDRR), which is in partnership with the UN International Strategy for Disaster Reduction (ISDR) system to support the Hyogo Framework for Action. Other partners who support the GFDRR work to improve livelihoods and protect lives include Australia, Canada, Denmark, European Commission, Finland, France, Germany, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, USAID Office of Foreign Disaster Assistance, and the World Bank. ❖

Country Context

Timor-Leste lies in the Lesser Sunda Islands at the eastern end of the Indonesian archipelago. The 15,007 square kilometers of rugged terrain that constitutes Timor-Leste encompasses the eastern half of the island of Timor (Figure 1). Also included are the Oecussi (Ambeno) region on the northwest portion of the island of Timor and the islands of Pulau Atauro and Pulau Jaco. The western part of Timor (excluding the Timor-Leste enclave of Oecussi) is part of the Indonesian province of Nusa Tenggara Timur. Administratively, the country is divided into 13 districts with a highly centralized national government. The Government plans to develop capacity in the districts, but structures are weak and resources limited.

The 2004 national census estimated Timor-Leste's population at 925,000 (a 2008 ADB estimate is over 1 million). Dili, the largest city with a population of 51,000 in 2003, has experienced the influx of over 30,000 internally displaced people following the civil disturbances of 2006. In total, the crisis led to the displacement of 150,000 persons, with a number of the displacement camps sited on the vulnerable foreshore of Dili.

Figure 1. Map of the Timor-Leste

Source: Asian Development Bank.

The recent history of Timor-Leste has a significant relation to its economic and hazard vulnerability. It is one of the world's newest post-conflict nations, recognized as an independent democratic state in 2002. After a period of civil and militia disturbance that required major international intervention, the withdrawal of Indonesian authority was accompanied by the destruction of about 90 percent of the new nation's physical infrastructure, and the lack of human capacity with the technical and administrative skills necessary to rebuild a fledgling nation. The rebuilding process in all areas of public and private endeavor is continuing and is being delivered with considerable national spirit and governmental and community skill, despite insurmountable capacity issues.

In 2007 the country's GDP/PPP was estimated at about US$2,000 per capita, with unemployment estimated at about 50 percent. Agriculture, which accounts for about 80 percent of employment (with only 8.2 percent of arable land in the country), suffers from seed shortages, locust infestations, and poor weather conditions (UNDP 2008). Agricultural production, most of which is for local markets, is vulnerable to climatic variability, extreme weather events, insect and rodent infestations, and bacterial plant diseases

Timor-Leste possesses magnificent natural and cultural assets that contribute to the country's tourism growth. Ecotourism and diving-based tourist activities are making a significant contribution to the national and local economies. Tourism is seen as a potentially major area of economic development that could provide much needed employment. At the moment, due to the persistent challenges for Timor-Leste population and authorities, the country is affected by one of the highest levels of environmental degradation in the Asia Pacific Region.

Arguably, the economic viability of the country will be a key factor in assessing the nation's ability to respond

to disasters emanating from natural hazard and human conditions (food and water security, and public and personal health). The Asian Development Bank (ADB 2008) reports a deep systemic problem with food availability with 73 percent of households experiencing at least one month of low food consumption in 2008. Compounded by the effects of natural hazard disasters, socio-economic vulnerability is further challenged by low incomes in rural areas, high population growth rates, and pressures for rapid urbanization.

Timor-Leste is located in an area of high seismic activity and is exposed to earthquakes and tsunamis. Earthquakes are common and cause significant damage; where slopes are unstable, earthquakes can trigger extensive landslips with a negative impact on peoples' lives, livestock, roads, infrastructure, and property. Access roads and bridges are left impassable after regular damage from flooding, earthquakes, and landslips. Across the nation, pockets of housing are regularly destroyed and damaged. National resources are called upon almost weekly to provide emergency relief and shelter and to repair roads and infrastructure.

Seasonal monsoon rains and strong winds or cyclones besiege Timor-Leste and regularly damage and destroy homes, particularly in the rural areas. The country is affected by two sets of monsoonal conditions: the Northwest or wet monsoon that brings storms and flooding and the Southeast or dry monsoon that brings strong winds to the south of the island. Wet and dry seasons vary in length from the northern and southern zones as a product of the mountainous ridge through the center of the country. Timor-Leste has three climate zones that can be delineated on the basis of topography (northern coastal and lowland zone, mountain zone, and southern coastal and lowland zone).

The island of Timor is also greatly influenced by La Niña and El Niño climate events, with La Niña shortening the dry season to 1 to 2 months only (UNDP 2008). In early to mid-January and mid-February 2008, two active phases of extreme monsoonal storm activity associated with La Niña produced localized wind, flood, and landslide, impacting agriculture, roads, bridges, and private homes in all 13 districts of Timor-Leste. In the 2008 wet season, 3,600 houses were destroyed across all the districts. The long rainy season, combined with La Niña, triggered substantial efforts from the Government and the international community to improve risk reduction preparedness in the internal displacement camps in Dili and wider communities in all districts.

At relatively the same time of the catastrophic weather event (November 2007 to January 2008), three districts—Covalima, Bobonaro, and Oecusse—experienced a re-emergence of locust infestations, with a simultaneous infestation in Indonesian West Timor. The inability to quickly address the locust problem resulted in widely spreading and dramatically increasing damage. The recurrence of locust infestation caused crop failures, compounded by drought and flood. Adding to the severity, winds and landslides resulted in crop damage.

Climate change issues arising from increasing variability of climate extremes include (a) the potential for increasing food security problems, (b) increasing susceptibility of forests to degradation and related impacts on watersheds and slope stability, and (c) the extended incidence of diseases and increasing coastal vulnerability. Climate change is acknowledged to have the potential to exacerbate all weather-related hazards (including slow onset conditions such as drought). Scientific understanding of the nature and incidence of these changes in Timor-Leste remains very limited. ❖

Key Country Findings

Collectively, the socio-economic and socio-cultural conditions in Timor-Leste are key factors to be taken into account when considering how the nation can implement disaster risk reduction measures and address the challenges of adapting to climatic variability and change. Disaster risk reduction is a core theme in strategies for reducing the socio-cultural vulnerabilities that Timor-Leste has inherited.

The UNDP (2008) identifies main areas to be addressed by central and local authorities of the country:

- Build up their emergency preparedness and response systems (central and decentralized);
- Help the population to be better aware and to adopt mitigation behavior; and
- Put in place regional control, prevention, and cooperation mechanisms.

Just seven-years old, Timor-Leste, as a country after decades of conflict, has weak infrastructure, limited human and budgetary capacity, and enormous vulnerability to natural hazards, including the potential effects of climate change. In a short time, the Government has demonstrated its commitment to dealing with these issues by adopting the National Development Plan, the IV Constitutional Plan, and the Budget Plan. In 2008, it adopted an ambitious National Disaster Risk Management (DRM) Policy and is fulfilling its commitments to the United Nations Framework Convention on Climate Change (UNFCCC) by submitting the Initial National Communication, as well as developing a National Adaptation Program for Action (NAPA).

Despite Government commitment resulting in sound policy development and senior-level backing at department levels, the DRR/CCA activities are constrained by critical staff capacity at the middle operating levels of all Government departments. Planning for disaster risk reduction and climate change adaptation should recognize and accommodate this situation with pragmatic and sustained support to develop well-grounded and sustainable programs. Uncoordinated ad hoc programs ultimately result in little capacity development.

A review of evident risk reduction activities in Timor-Leste resulted in the following key findings:

(a) The country is very vulnerable to hazards— floods, landslides, drought, pests, earthquakes— but has little capacity for response. Countrywide response is centrally managed through the National Disaster Management Directorate, which is overburdened with frequent occurrences . Slow, centralized response exacerbates the impact of disasters.

(b) Government commitment and understanding of disaster risk reduction and climate change adaptation is strong, which is an encouraging start for an enabling environment. Limited acknowledgment of the needs for DRR/CCA application is a strong impediment.

(c) At the senior government official level, there is an acknowledgment of the need for external support within a 5-10 year program.

(d) Coordination across government agencies for disaster risk reduction and climate change adaptation is ensured by a policy framework and good capacity at the senior government level. However, the frameworks are recent; there is limited capacity for application, and limited arrangements for DRR/CCA coordination.

(e) There is limited capacity to deliver services within Government departments at the middle and junior levels. With over a decade of internal conflict, opportunities for education and training have been limited. However, enthusiasm to develop enabling environments and internal capacity is encouraging. It may require a 5-10 year period to develop full capacity.

(f) In addressing climate change adaptation, the National Directorate of Environmental Services (NDES) and National Directorate of International Environmental Affairs (NDIEA), as well as the important Meteorological Service face capacity limitations.

(g) District-level structures for disaster management are scarce. The NGO activity in some districts at the *suco* (village) level—focused on disaster management preparedness rather than disaster risk reductio—lack resources. There is no focus on climate change adaptation at the district level.

(h) Widespread social, infrastructure, health, and food vulnerabilities in Timor-Leste are exacerbated by hazard and climate risks, lack of capacity, and weak governance arrangements at the operating level.

(i) There is no credible monitoring or analysis of hazards and climate changes. The country continues to depend on information and warnings from Indonesia, Australia, and Japan.

(j) Many donors and NGOs are seeking to provide support. Apart from the Community-Based DRM Working Group, there appears to be little coordination among donors and no leadership mechanism.

(k) The profusion of donors and NGOs seeking responses to information requests and international reporting is met with skepticism. In the absence of greater stakeholder coordination, the available competent managers in government tend to devote time to responding to diverse queries, rather than planning and addressing emergency situations.

Risk reduction should focus on integrating disaster risk reduction into national policies and programs within effective and sustainable governance structures, rather than adding externally driven short-term projects when there is no internal capacity to engage with them.

The development of a pragmatic institutional framework for disaster risk management (involving government and stakeholder agencies across all levels) and the preparation of a coordinated 5-year program would give effect to the National Disaster Risk Management Policy. Such a program should embrace (a) development of legislation; (b) establishment of arrangements at the national, district, and village levels; (c) development of capacity at the organization and community level; (d) enhancement of hazard monitoring and analysis; and (e) development of disaster management and risk reduction plans across sectors and communities. For example, addressing the acute hazard risk from flooding for low-lying coastal villages adjacent to rivers through the adoption of simple river management measures following floods requires community-level planning.

The UNDP-supported National Adaptation Plan of Action for climate change adaptation will identify areas for activity over the next 18 months. In the meantime, assistance could be provided for professional and capacity development, as well as the development of NAPA and its coordination with DRR programs.

This assessment has identified the following four priority areas where investment is needed:

- Development of a simple policy and institutional framework and organizational mechanism for disaster risk management and climate change adaptation;
- Development of meteorological monitoring capability with data management, and analysis and forecasting systems and skills;
- Support for nongovernmental community-based DRM program at the district, sub-district, and village levels within a structured institutional framework;
- Development and support for a range of professional development initiatives for cross-sector staff

in areas of hazards, vulnerability assessment, and organizational management for disaster risk reduction and climate change adaptation.

Due to the plethora of vulnerabilities faced by the country and its weak capacity, the Hyogo Framework for Action, still needs to be applied in its entirety in Timor-Leste. While the first of the five HFA priority areas—ensuring risk reduction as a national and local priority, with a strong institutional basis for implementation—is being addressed, at least at the national level, the remaining priority areas, further discussed in the next sections, still require attention and resources.

A summary of gaps or impediments to effective risk reduction, and areas of opportunity for improvement are summarized in Table 1. A more detailed explanation of possible opportunities for addressing the identified gaps and impediments within the HFA are presented in the final section of this assessment report. Proposals for future support are presented in Annex A. ❖

Table 1. Summary of the Key Gaps and Opportunities for enhancing DRR and CCA for Timor-Leste

Situation	Gap or Impediment	Opportunities
Timor-Leste adopted a strong DRM policy position but has yet to establish an institutional framework to support development programs across sectors and levels of government into communities. For CCA, Initial National Communication has just been submitted and coordinating advisory committees to support the NAPA development over next 18 months are being established. Government sectors do not adequately support disaster response or risk reduction in their area of responsibility.	Lack of institutional framework to support DRM and CCA development programs across sectors and levels of government. Lack of coordinated DRM development program. Lack of CCA policy and advisory structures for coordinating CCA development and NAPA preparation.	**Provide support for the development** of a simple policy and institutional framework for DRM suitable also for CCA. Coordinate with the UNDP NAPA.
Diverse hazards and risks impose threats to human life, public and private infrastructure and property in Timor-Leste. Hazard monitoring and assessment is inadequate to support DRR and CCA activity.	No basic monitoring system is in place for metrological, hydrological, and geophysical data collection. Limited professional capacity to undertake monitoring and data analysis. Lack of central system for information management, storage, and access on geophysical, climatological, hydrological, and health hazards.	**Provide hazard information and monitoring support** from Australia and others, while local capacity is built. **Support the building of professional competency** in the meteorological, hydrological, and geophysical fields to ensure that Timor-Leste can build risk reduction measures based on scientific evidence. **Support the development of DRR and CCA knowledge and information systems** that reflect the emerging institutional needs and that can be accessed at district, sub-district, village, and community levels.
Risk reduction awareness and training programs have been initiated at district, sub-district, village, and community levels.	Awareness, attitudes and behavior towards DRR/CCA is limited at district, sub-district, village, and community levels.	**Strengthen community-based awareness and capacity building**, including education and efforts to change attitudes and behavior toward DRR/CCA and in building and maintaining resilience of environmental, social, and economic systems to reduce vulnerability.
Weather-related hazard risks (both rapid and slow onset) are creating vulnerability to food security and water supplies, which are likely to be exacerbated by increasing climate variability.	The nature and incidence of increasing climate variability in Timor-Leste is not well understood. Initial assessments are needed for informed CCA interventions.	**Develop and support a range of professional development initiatives** for DRM, CCA, and cross-sector staff in areas of hazards, vulnerability assessment and organizational management for DRR and CCA.

Detailed Country Assessment

Legal framework and policies, and their effectiveness

The broad responsibility for various aspects of vulnerability and risk assessments is spread across the Ministry of Social Solidarity and the Ministry for Economy and Development and their associated departments. Within the Ministry of Social Solidarity, the National Disaster Management Directorate (NDMD) is responsible to the Secretary of State for Social Assistance and National Disasters and the focal point for management of the overall response to catastrophic events. The National Directorate for Environmental Services (NDES) and the associated National Directorate for International Environment Affairs (NDIEA), within the Ministry for Economy and Development, are responsible for climate change adaptation and mitigation matters.

Both Directorates face a critical capacity issue in meeting their international commitments for climate change. The NDES lacks district structures to address local climate change issues.

The Government of Timor-Leste has clearly recognized the paramount importance of introducing a pro-active strategic and programmatic approach to planning for land, water, energy, health, and education in order to attain sustainable development. One of the outcomes of the strategic approach is the creation of the national Climate Change Focal Point in the NDIEA. The Ministry for Economy and Development is promoting the development of coordinated national and sector policies for addressing climatic variability and change. However, this still-developing initiative requires appropriate resources.

The commitments of the Government of Timor-Leste toward disaster risk management are embedded in the IV Constitutional Government Program of the Council of Ministers for 2007-2012. In this document, the Government identifies the following essential priorities to be addressed:

- Identification of risk zones,
- Creation of early warning systems particularly relating to rains and droughts,
- Development of human resource capacity in the area of disaster risk management,
- Ability to provide immediate response when disasters occur, and
- Establish inter-sectoral coordination mechanisms to respond to natural disasters.

The NDMD is responsible for implementing the program. In March 2008, the Government adopted the National Disaster Risk Management (NDRM) Policy, which covers a shift from traditional crisis response management to disaster, conflict, and climate change risk reduction. It provides general framework and activities of disaster risk management; and the integration of activities across all sectors addressing economic, social, and environmental development and strengthening community capacity and reducing vulnerabilities. Prepared with international support, the NDRM Policy is comprehensive and ambitious with the following objectives:

> To engage all levels of society; promote the integration of disaster management in different government development programs; improve disaster risk management in all sectors at all institutional and operational levels; achieve financial sustainability through the use of greater resources; and preserve our natural environment to guarantee peace for all Timorese people.

The NDRM Policy specifically provides for launching the Disaster Operation Center and Departments for Preparedness and Formation, Prevention and Mitigation, and Response and Recovery. Although the NDMD has recently doubled in size to 8 staff, it lacks the skills for disaster and risk management.

The NDMD director noted the difficulty in focusing on hazard reduction since the Directorate is continuously addressing local disaster-related problems. It is expected that the NDMD focus will be broader in 2009 with more resources available for district-level activities.

The NDRM Policy also provides for disaster management committees at district, sub-district, and village (or suco) levels. District Disaster Management Committees are given decisionmaking responsibilities during disasters. District Administrators are designated as District Disaster Coordinators during these periods. At the sub-district level, the Sub-District Administrator and suco chiefs and village leaders are assigned the responsibilities.

Representing strong Government commitment, the NDRM Policy establishes an Inter-Ministerial Commission for Disaster Risk Management. This Commission comprises 12 ministers and vice secretaries of state, as well as agency representatives from the Red Cross, United Nations, and civil society. Plans for the Inter-Ministerial Commission are to meet twice annually to oversee the introduction of the policy and the accountability of relevant departments and other DRM-invested bodies. The Commission would also meet during disasters to provide political oversight and direction.

The success of the NDRM Policy will depend on the focus of the Inter-Ministerial Commission, which is still in a formative stage. Reportedly the formation of the Commissions suffers from lack of departmental commitment although it has strong political support. This support was reiterated at a meeting with the Secretary of State for Social Assistance and National Disasters who noted that in 2008—a difficult year in terms of the size of disaster events—the responses of the Ministries for Agriculture and Infrastructure had been inadequate, particularly in terms of allocated budgets in response to activities. The new NDRM Policy is expected to clarify responsibilities of the departments.

A pragmatic institutional framework (involving government and stakeholder agencies across all levels) could give effect to the NDRM Policy. Such a program would include the development of legislation; the establishment of simple but explicit arrangements at the national, district, and suco (village) levels; support to the development of capacity at the organization and community level; the enhancement of hazard monitoring and analysis; and the development of disaster management and risk reduction plans across sectors and communities.

In the area of climate change adaptation, policies and institutional arrangements are being established. The Ministry of Economy and Development, through the NDES and NDIEA, submitted the first Initial National Communication in 2008 and established several thematic working groups to oversee the commencement of climate change planning.

The Initial National Communication of January 2008 is a starting point for addressing climate change adaptation in a coordinated manner. It notes nominal CCA activities in water supply and sanitation, agriculture, forestry, and food security, and some emissions mitigation activities. But still a range of gaps and challenges remain to be tackled, including the following:

- Lack of environmental policy;
- Incomplete environmental laws and regulations;
- Weak enforcement of the existing environmental regulations and laws;
- Lack of climate change regulations;
- Lack of experts specializing in climate change;
- Lack of climate change activities undertaken by the country in the past;

- Limited climate data and other meteorological data;
- Limited equipment for collecting meteorological data;
- Limited human resources to undertake climate change impacts assessment; and
- No climate change data on impacts, vulnerability, and adaptation options.

The Government of Timor-Leste is acutely aware of these issues and has included them in the Annual Action Plan of the Ministry of Social Solidarity (contained in Budget Paper No 1 of the General Budget of the State 2008). An aim of the Action Plan would be to include institutional and systemic development of the National Directorate of Disaster Management and the development of an efficient Disaster Management Service for reducing disaster risks in Timor-Leste. This is consistent with both the National Development Plan and the IV Constitutional Government Program. It shows political support and the policy commitment to disaster risk management.

The Government of Timor-Leste is a signatory to the Kyoto Convention. The Initial National Communication, prepared pursuant to UNFCCC requirements, indicates the nation's situation with respect to greenhouse gas emissions and provides a broad assessment of the vulnerabilities to climate change and adaptation measures that may be taken.

One of the CCA Thematic Working Groups is developing a NAPA with UNDP support and Global Environment Facility (GEF) funding. Development of the NAPA over an 18-month period would evaluate climate change risks and identify prioritized adaptation activities across a range of sector working groups, including the National Disaster Management Directorate.

The NAPA project development document sets out an organizational structure for the process under a National Project Director within the NDIEA. The structure comprises a Project Steering Committee, a Project Working Committee, a Project Implementation Unit headed by a National Project Coordinator, and 6 sectoral working groups. The Minister/Vice Minister of Economy and Development chairs the Project Steering Committee with Minister and Secretary of State representation from key CCA-related ministries and directorates. The Project Working Committee, comprising director-level officials, oversees the program and provides for cross-sector coordination. The 6 sectoral working groups address food security and agriculture, water quality and accessibility, forests coastal ecosystems and biodiversity, human health, human settlement and infrastructure, and natural and human-induced disasters. Mechanism for DRR/CCA coordination is reportedly lacking with limited departmental support at the operational level.

The objectives of the NAPA project include establishing the institutional structure, assessing district-level vulnerability to climate variability, identifying key CCA measures, developing proposals for priority activities, and preparing the NAPA document.

The project structure that is being established provides the basis for oversight and coordination of a wide range of organizations to make assessments of climate change vulnerability at the district level. The following constraints point to the need for a very pragmatic approach in defining the scope of achievable outcomes:

- Limited internal understanding of the climate data, which implies that external support will be needed to provide the core analysis for vulnerability assessments.
- Reported lack of capacity within many departments contributing to the sector working groups. New

programs should be part of existing programs.

- Lack of technical support for the national- and district-level assessments of vulnerability. Procedures will need to be supported toward a consistent outcome.
- Lack of district structures in the NDES and NDIEA. The project will depend on existing structures in other sectors (e.g., health, disaster management, agriculture, forestry, social) for inputs at the district level and community level. An institutional framework from the national to district to community level can be reinforced in disaster risk management and climate change adaptation.

Integrating disaster risk reduction and climate change adaptation into policy and planning as well as legislation and regulations is seen as a long-term common goal by the NDMD, the UNDP, and representatives of other national and international NGOs working on disaster management.

Many of the CCA impediments are similar to those for disaster risk management, including the lack of technical capacity within the NDES and NDIEA and more particularly within the other departments of the sectoral working groups, the lack of policy and legislative development, and the lack of program development. In the development plan, the NAPA should address many of these issues.

Gaps

- ***Lack of legislation to support the NDRM Policy.*** The Secretary of State for Natural Disasters and Social Assistance observed that legislation to support the functions and obligations of the NDRM Policy, particularly to reinforce the areas of cross-sector coordination and the risk reduction function, is much needed.
- ***Lack of an institutional/governance framework for disaster risk management for procedures across sectors and levels.*** Such a framework is necessary to give effect to the NDRM Policy, which extends to community level and would provide for the development of capacity and support to the community. Such a framework would also provide for integration with climate change adaptation.
- ***Lack of professional capacity in the middle levels of government.*** This is reportedly an issue across all departments and at the district level. The Secretary of State for National Disasters and Social Assistance identified a need for an on-going programmatic support over at least 5 years.
- ***Lack of technical capacity.*** The Secretary of State for Natural Disasters and Social Assistance noted that the need for technical assistance support and provisions to ensure the transfer of skills to relevant counterparts in these areas.
- ***Limited consideration of DRR/CCA integration into policy, plans, legislation, and regulations.*** In the period when Timor-Leste is rebuilding its state structures, there is an opportunity to initiate new policies, plans, and legislation early this process.

Inter-government and agency coordination

The two sectors responsible for vulnerability and risk assessments—the Ministry of Social Solidarity and the Ministry for Economy and Development—report having good working relations. However, cooperation is at the working group formation stage, and integration is not being considered. Both sectors also report major capacity issues and difficulties in getting other government agencies actively involved.

With responsibility for disaster risk management, the Inter-Ministerial Commission for Disaster Management is expected to coordinate government activities. One of its functions is to allocate areas of activity and responsibility to the various departments and agen-

cies. The NDRM Policy sets broad functions at the district, sub-district and suco administration levels, and the NDMD is tasked with promulgating and implementing the policy and decisions of the Inter-Ministerial Commission. While there are significant capacity issues to constrain the activity arising from both the NDRM Policy and the NAPA development, the potential exists to coordinate this work. If coordination is successfully handled, it could provide for continuing development of policies and legislation, along with community strengthening DRR and CCA activities, through potentially a 10-year program.

In the area of climate change adaptation, the NAPA administrative structures are centered on the ministerial-level and secretary of state-level Project Steering Committee and 6 sectoral working groups. The effectiveness of these arrangements (that have no policy or legislative mandate to act with contributing agencies) for coordinating agency involvement has yet to be tested, but capacity considerations and reported experience indicate relatively low expectations. The CCA policy and internal resourcing structures are less developed than for disaster risk management, and many agencies will be expected to contribute to both areas.

Neither disaster risk reduction nor climate change adaptation have been addressed in district and sub-district planning. Although there appears to be understanding at the district level, neither human resources nor funds adequately reflect the scope and implications of hazards and risks as part of the normal operations of the district, sub-district and suco (village) administrations. The next step in DRM improvement is an institutional framework to allocate departmental functions (or develop them on the lower administrative levels) and to allocate functions and accountabilities explicitly to agencies. It is also a pre-requisite to provide for effective government agency coordination and DRM integration into policies and plans.
The National Disaster Management Directorate is attempting to establish capacity in the districts to assist with climate events but the continuous call on their resources to provide relief is presenting a situation desperately in need of coordinated and sustained support.

Gaps

- ***Limited inter-governmental coordinating mechanisms to ensure whole-of-government involvement in disaster risk reduction and climate change adaptation.*** This reflects the status of the re-establishment of the governmental processes. Government officials are aware of the need for coordinating mechanisms and are actively seeking donor support to address the issue.
- ***There is a need for a policy discussion to consider the integration of DRR and CCA initiatives*** and to establish a form of integration that meets the needs of each. Such a discussion should be based on DRM and NAPA development with technical assistance from the DRR, CCA, and governance perspectives.

Planning and budgetary processes

The Government appears to have a well-structured national development planning and state budget process, and there is evidence of strong political and senior official commitment to it. The rigor and efficacy of the arrangements will be evaluated; but at present there still appears to be a lack of mid-level organizational commitment and poorly defined and developed institutional frameworks in the planning and budgetary processes.

The general state budget (dated December 18, 2007, refers to the Second National Development Plan) was set up to consolidate the Government's vision on the reduction of vulnerability to disaster and risk The budget documents draw attention to the priority— he environment, reforestation and prevention of natural

disasters—of the 4th Constitutional Government program. This priority is addressed under Program Area 5, *Infrastructure and Improving Living Conditions*. Such a priority could be given action with the assistance of land-use zoning maps and vulnerable area mapping to help address disaster risk reduction and climate change adaption in the context of natural and human-induced hazards. Considerable efforts in basic data collection will be essential to underpin such efforts.

A 15-month institutional strengthening program (US$1.5-million) supports the NDMD. The International Organization for Migration is the executing agency, which, while making good progress on strengthening office programs and connections into the districts, observes the lack of technical DRM capacity that is limiting the value of the program. In these circumstances cross-sector advisory committees and working groups are unlikely to be internally effective and externally driven outcomes are likely to face implementation difficulties. Likewise, multiple short-term support projects are unlikely to generate internal capacity and sustainable commitment.

The generally sound policy development should be matched by delivery outcomes, which are now limited but can be addressed by a simple and clearly accountable institutional framework, as well as a long-term development program supporting internal capacity development.

The overwhelming plethora of issues the Government is presently facing limits the allocation of internal DRR and CCA resources. There is a significant risk of the NAPA project becoming an externally driven initiative. The Government is clearly concerned about the development of DRM and DRR arrangements throughout its districts; this issue is addressed in a platform of its National Development Plan and in a comprehensive policy. An internally driven initiative could be promoted by bringing together the DRR and CCA activities, the development of DRM arrangements and capacity within a coordinated governance framework. This requires both internal and external funding between international agencies and donors to allow and facilitate this development.

Knowledge, data, tools

Timor-Leste is a new nation in the process of building its structures, including the ones to provide for disaster risk management and climate change adaptation. Within the government, the understanding of constraints to national development posed by geophysical, climatic, and hydrological hazard and risks across sectors and communities is growing. However, the severe lack of data, tools, and capacity to quantify and interpret those risks is limiting to the potential means for integrating the knowledge into policy, analysis, strategy, and development planning and decisionmaking.

The National Directorate of Meteorology and Geophysics has a primary responsibility for the collection, collation, and analyses of meteorological and geophysical data. The Director of Meteorological Services sees the expansion of climate data monitoring as a high priority. This will entail long-term objectives needing donor support and technical advisory, including:

- Re-establishing a meteorological network, such as the provision and training of observers;
- Recovering, digitizing, analyzing, and storing data that was collected under previous administrations (Portugal and Indonesia); and
- Developing professional capacity in the meteorological forecasting and climate risk fields.

There are no hydrological monitoring stations operating in Timor-Leste. The impact is a lack of coherent and comprehensive set of data and information covering the national situation for water resources and

water-related risks, such as floods and droughts. Government officials believe that measures are being initiated to remediate the situation.

With regards to climatological information, the variability and extremes of rainfall are central to understanding the flood, drought, and water supply risks facing the country. The Dili Airport is the only fully operational meteorological station in Timor-Leste. The only rainfall intensity data coming from the Dili Airport are not representative of a country with highly diverse terrain. The Dili airport station is operated with the assistance of the Australian Bureau of Meteorology. The data is collected, processed, and analyzed for forecasting and for airport operational purposes. The Ministry of Agriculture and Arborculture also collects rainfall data, which is forwarded to the Australian Bureau of Meteorology. The National Directorate of Meteorology and Geophysics does not collect these materials. Management of these and other historic data in a computerized database is needed, as well as automatic pluviometric rain gauges sited strategically in priority catchments.

Long-term records from a geographically representative set of rainfall and temperature recording stations are needed to build a picture of climatic variability and change. Such records are not available for Timor-Leste. Historic data may be available for some district-level rainfall stations from a more expansive pre-Independence network operated under the Portuguese and Indonesian administrations. Data from these historic stations should be sourced, acquired, collated, digitized and analyzed as essential to any new local weather data-recording and climate-monitoring network.

Earthquakes pose significant risks across Timor-Leste, and the broad seismic hazard recorded in past studies and experience is reasonably well understood. However, this understanding is not derived from comprehensive data since neither seismic hazard maps nor an earthquake-monitoring network are available in Timor-Leste. Staff of the National Directorate of Meteorology and Geophysics understood that donors would provide assistance for establishing a seismic monitoring network. Earthquake measurements and seismic data are available from the Badang Meteorolic Geophysica in Jakarta and Japan.

The coastal communities of Timor-Leste are at risk from tsunami. Despite recognition of the risk, no governmental bodies in Timor-Leste have accurate data on tsunami occurrence. Some information may be available from the Governments of Portugal and Indonesia and other neighboring countries. In common with other Pacific countries, Timor-Leste has an opportunity for a paleo-tsunami study and collection of oral histories.

Cyclone tracking and early warning information is available from the Australian Bureau of Meteorology and other international bodies calculating the frequencies of cyclonic events. However, due to lack of additional data and professional capability within Timor-Leste to undertake analysis, the Director of the Meteorological Service cannot provide full risk estimation and evaluation. The limited professional capacity is illustrated by the fact that there are no trained meteorologists in the emerging Bureau of Meteorology; four meteorological observers work at the airport and four geophysical staff in the Bureau with support of six administrative staff.

Neither systematic tidal measurements nor sea-level rise monitoring are carried out for Timor-Leste in any port of the Pacific or Indian Ocean. The monitoring is necessary to gather knowledge of the long-term implications of sea-level rise on the coastal systems of the country.

Overall, minimal monitoring or data analysis is being conducted. Although data collection is taken

into consideration, lack of resources and professional capacity is prohibiting quick improvement. Hazard management in Timor-Leste relies on support of limited climatological, hydrological, and geophysical information. Thus, future risk assessments are severely limited. Its affect will be realized in carrying out projects that are intended to mainstream climate proofing into national and district planning and development policy and projects, such transport infrastructure and other construction works for tourist resorts and related facilities. Despite severely limited capacities, the Ministries of Infrastructure and Economy and Development are slated to rectify this situation according to government officials.

Some initial disaster hazard mapping has been undertaken. The GIS-based material is available from UNDP, however, the maps cannot be reproduced in the NDMD. The maps indicate the types of hazard and geographic distribution of areas at risk. "Hot spots" are highlighted and areas for priority ranking in relation to potential disasters are easy to identify. In 2008, the UNDP provided simple maps on areas that were prone to flooding.

Scarce information exists on the general biophysical conditions of Timor-Leste showing land forms, soils, slope, and vegetative cover. Also, no socio-economic assessment of populations, land use, and infrastructure at risk is available. Such information needs to be collected, systematically geo-referenced, and digitized for application to spatial analyses of hazard risks faced by urbanized and non-urban areas.

At the national level, the understanding is high for needed emergency response to earthquakes, cyclones, and floods, and their impact on the country's development. The underlying causes of food and water security are also well understood. However, there is a severe lack of environmental health epidemiological data and limited capacity to collect and analyze the necessary information to enable appropriate risk assessments to be included in the disaster management processes. This situation requires priority action.

Gaps

- ***Lack of technical capacity in the areas of hazard monitoring and assessment*** at three levels: (a) basic capacity development to take full advantage of available information from neighboring countries and enhance those relationships, (b) enhancement of the in-country monitoring to provide for basic differentiation of regional monitoring and for early warning, and (c) capacity development to provide for hazard data analysis and projection.
- ***Lack of capacity to understand and process core climate data and provide continuing collection of DRM and CCA data.*** This need should be addressed in short term, including in the development of the NAPA; bi-lateral arrangements and support will be required.
- ***Loss of climate and hydrological monitoring network*** due to the destruction of monitoring and collection systems throughout the Timor-Leste. With the exception of Dili Airport, there is no equipment for the systematic collection of climatological data, no hydrological network, and no seismic monitoring.
- ***Lack of tidal data and systematic monitoring of sea-level rise.*** The standardized collection, collation, and electronic storage of tidal records as part of the systematic measurement of water-level oscillation is essential for determining and monitoring the changes in sea level that could be attributed to global warming.
- ***Lack of historical time-series data for risk assessments*** due to the removal of data records from the country. Lack of data provided by climatological, hydrological, and geophysical systems inhibits analyses of frequency and magnitude of extreme events.

- ***Lack of spatially distributed data sufficient to construct hazard maps at a scale appropriate for planning and risk reduction.*** For climatic data, especially rainfall, there is a need for spatial interpolation to fine resolution. The lack of spatially interpolated baseline climatologies limits the ability to analyze scenarios of climate changes for the purposes of climate-risk, impact, and adaptation assessments.
- ***Lack of adequate data monitoring networks to meet future needs of climate vulnerability and risk assessments.*** Across the range of geophysical, hydrological, and climatological hazards, the absence of data collection capability will negatively influence disaster risk management and climate change adaptation. Concerted efforts are necessary to review and re-establish an enhanced network.
- ***No procedures or capacity for systematic and consistent collection of disasters damage and loss data.*** The lack of disaster impact data is a constraint to economic analyses of the benefits of disaster risk reduction and climate change adaptation. Evaluation of benefits and costs of risk reduction, and therefore investments by government and donors, requires systematic procedures and appropriate institutional support. This deficiency is recognized, and donor assistance to remediate the situation will be welcomed.
- ***Lack of current and comparable land use and socio-economic data and information at appropriate sub-district, suco, and town scales.*** This is required to accurately assess the costs of responding to catastrophic events and the recovery phases where infrastructure and housing needs repair or replacing.
- ***Lack of capacity and data to undertake health risk analysis.*** This is an important type of data for disaster management and response procedures at national and district scales.

Vulnerability and risk assessments

Timor-Leste faces a wide range of natural and human-induced hazards, comparable to the situation of Papua New Guinea and Vanuatu. Natural hazards include earthquakes, landslides, tsunamis, tropical cyclones, storm surges, floods and tidal-induced back-flooding, droughts, bushfire, and coast erosion. Risks stemming from these hazards are further exacerbated by:

- Climatic variability;
- Increasing population;
- Development of settlements and infrastructure at vulnerable sites in rural, urban, and coastal locations; and
- Sea-level rise and coastal retreat.

Government departments and the nongovernment sector share a sound understanding of the risks and their implications, as well as a strong commitment to address these issues using national, international donor, and nongovernment sector resources. However, no assessments are available to estimate the following:

- Degrees of risk,
- Number of communities at risk in specific locations,
- Key infrastructure at risk and its location, and
- Socio-economic implications of the risks.

As reported by UNDP and NDMD officials, the Government of Timor-Leste is facing serious challenges in assessing the national impact of disasters and all different types of disaster events across all 13 districts at various times of the year. Primary among impacts is crop damage caused by monsoonal winds, floods, and landslides. Also, crop failure coinciding with dry periods between plantings and locust infestations are not uncommon. Root causes for disaster and conflicts are inextricably linked to recovery issues. Recovery issues include food insecurity, lack of access to water, fragile livelihoods, volatile public

security, psycho-social conditions such as trauma, lack of communications, lack of environmental sustainability, justice, and governance issues (UNDP 2008). Insufficient institutional and budget execution capacity to implement interventions in those areas are limiting the country's development.

UNDP concludes that new measures should address the following:

- Capacity strengthening and community-based disaster risk management,
- Prevention and mitigation measures,
- Preparedness and response, and
- Delivery of post-disaster recovery services.

In the area of climate change adaptation, preliminary assessment of climate change vulnerabilities and adaptation options are required on a district-by-district basis. It should be carried out as part of the on-going NAPA process.

As noted above, the biggest impediment to the development of detailed risk and vulnerability assessments and maps is the lack of climatological, hydrological, and geophysical data. Digital elevation models are essential for assessment of some hazards, like coastal and river flooding, bushfires, tsunamis, and sea-level rise. This need is clearly recognized by the NDMD and further actions are considered to supplement existing coarse resolution maps with high-resolution mapping of vulnerable areas across the country. The NDMD officials suggested that this activity would require outside support.

Gaps

- ***Lack of vulnerability and risk assessments and maps required to plan and implement DRR and CCA activities, and lack of models and tools for analyzing and interpreting data for purposes of vulnerability and risk assessments, risk profiles, and mapping.*** Filling this gap is a fundamental requirement for advancing concerted actions for risk reduction in Timor-Leste. Even when data are available, the lack of tools and human capacity prohibits the data to be translated into usable information.
- ***Lack of identified priorities for vulnerability and risk assessments.*** Timor-Leste has only started building its vulnerability and risk assessment capabilities. While sector priorities were identified in the NAPA project document, a systematic prioritization of hazards for the populations, infrastructure, and areas at-risk—the hotspots—is a basis for developing vulnerability and risk assessments to support town planning and rural development.

Monitoring and evaluation

No systematic monitoring and evaluation of risk reduction efforts is available in Timor-Leste. In the area of disaster risk reduction, the 2008 NDRM Policy provides for the integration of DRM activities into plans and development programs across all sectors. The Policy notes a need for setting targets and outcome measures; however, it is too early to evaluate its implications.

In the area of climate change adaptation, the monitoring and evaluation framework is even less developed with no policy document; the cross-sector coordination arrangements are being established. The NAPA development document provides for the establishment of monitoring and evaluation mechanisms over 18 months within UNDP and GEF procedures. This is also the time when integration of CCA with DRM consideration could be considered.

Gaps

- ***Lack of monitoring and evaluation reporting with mechanisms to promote improvement.*** There is an opportunity to build these measures into emerging governance arrangements and integrate DRR/CCA measurement parameters. This will depend

on the provision of appropriate DRR/CCA technical/governance support.

- ***Lack of an institutional framework for DRM within which development planning and evaluation parameters can be set across sectors and levels.*** Such a framework is necessary to give effect to the NDRM Policy that extends to the community level. It would provide for CCA integration, which lacks a district-level structure within the Secretariat for the Environment.

Filling these gaps is fundamental, from moving beyond uncoordinated, ad hoc activities to measuring progress and providing for future program adjustment based on outcomes.

Awareness raising and capacity building

As an emerging post-conflict nation, Timor-Leste is facing limitations across all sectors in professional, technical, and administrative capacity. Discussions with officials of the NDMD, the Ministry for Environment, the European Union, as well as UNDP, AusAID, and NGOs, indicate that there are substantial systemic problems in developing professional and technical expertise needed to build DRR/CCA capacity. Specifically, areas where the country has weakest capacity include:

- Monitoring environmental conditions such as weather and stream flows;
- Knowledge of the theory and practice of disaster management and climate change;
- Data analysis and interpretation for vulnerability and risk assessments.

For Timor-Leste in its development as a new country, the most profitable strategic approach is to build long-term professional and technical capacities and competencies rather than simply recruiting people to fill immediate job vacancies without ensuring adequate pre-employment and continuing professional development. Having been identified as a high priority by public and nongovernmental bodies, capacity building could be tackled head on if external consultants were used to build in-country capacity, to carry out the work and prepare for further applications. As a stakeholder observed in discussions, "We want people to work with us, not for us."

For years the NDMD has been conducting a public hazard and preparedness awareness program. It distributes information on risks and climate change disasters. The program involves training and awareness building of personnel within government departments, as well as district and sub-district officials. The awareness and training has also involved schools, church groups, and community-based organizations. Although no outside funding has supported the activities, training had been provided to some 700 people over the past 4 years. However, with limited resources, just 4 of the 13 districts could be considered to have reasonably benefitted from the program. There is an expectation that the NDMD will receive budget support for 2009 activity in 4 districts. Planning is underway and resources are to be mobilized to extend the activities to additional districts before rolling the program out nationally.

The assessment team visited the District of Ermera where district administrators demonstrated a high degree of understanding of hazards and disaster management and an awareness of climate change issues. However, no resources to provide support or travel to communities on a regular basis were available.

The NGOs are playing an important role in addressing the environmental health dimensions of disaster response. Some NGOs provide DRM support at the district and sub-district level of 9 districts. Other

NGOs are establishing district and community programs for disaster management development in some districts. These activities would benefit from a national and district institutional framework since until recently NGO activities had limited connection with the NDMD. The connections have been strengthened with adoption of the NDRM Policy but have not been formalized. The NGOs have a positive view of the NDRM Policy; however, they considered it optimistic and perhaps not strong enough to penetrate into the communities. The NGOs have recently established a connection with the NDMD coordinating body for community-based DRM activities. The NGOs would welcome development of a DRM framework to work together with the Government within a coordinated 5-year program.

Many NGOs prepared proposals for funding in 2008 (UNDP Transitional Strategy Appeal). The DRM component of this totals US$5.8 million in 11 projects over 18 months; the funding status is unknown.

Gap

- ***Lack of institutional and planning framework for coordination of capacity development across national, district, and community levels is a strong impediment to development of DDR and CCA activities.*** Sustainable capacity development at the district and community levels requires an institutional framework with allocated functions and procedures for each program. It is also useful to have a longer-term (5-year) development plan within which short-term projects can be more effective. Ad hoc, 6-month projects, which attempt to provide community DRM solutions, proved unrealistic. As proven in other countries, comprehensive programs take several years to be developed.

Coordination among donors and key stakeholders

With the multitude of issues faced by Timor-Leste, many donors, stakeholders, and NGOs are active in the country. Coordination of funding for DRR/CCA activities is however lacking. There is widespread acceptance among donors and stakeholders of the usefulness of some form of integration between these activities. An agreement among donors and key stakeholders would be required to facilitate the processes necessary to differentiate activities within an integrated framework.

The UNDP plays a significant role in coordinating NGO activities, as evidenced in the 2008 Transitional Strategy and Appeal through which it supports national responses to humanitarian and recovery needs of internally displaced people and vulnerable communities and strengthens disaster management in Timor-Leste. The UNDP pursued 67 short-term projects totaling US$33.5 million. This included US$5.8 million for 11 DRM initiatives. The UNDP is also addressing development of National Recovery Policy and Disaster Operation Centers at the national and district levels.

While the Transitional Strategy and Appeal might be perceived as too optimistic in its scope and timing, it could provide the basis for development of a coordinated and sustained program over a minimum of 5 years. Such a program should run in parallel with the emergency assistance and humanitarian recovery programs recognizing national and community priorities, as well as limited absorptive capacity. In the area of climate change adaptation, UNDP is helping prepare the NAPA for Timor-Leste.

The European Union plays a significant role in rural development and infrastructure. It encounters difficulty in mobilizing internal interest in the

programs, due to low capacity issues. The European Union also sees a need for better coordination among donors and government agencies. In addition, the Asian Development Bank could fund infrastructure programs with elements of disaster risk reduction; however, the scale of the programs has not yet been addressed.

AusAID provides significant DRM support to the NDMD. Additionally, NGOs coordinate community initiatives through the Community-based DRM Working Group. Various programs, such as FAO food production and distribution assistance, are needed to boost food security, especially in areas that are also vulnerable to extreme weather events (floods and droughts).

Both the NDMD and the Environment Directorates appeal to donors to move beyond short-term project support to addressing capacity development in line with the Government priorities.

Gap

- ***There is a need for better recognition and coordination of the long-term development needs on a programmatic basis and processes to facilitate DRM and CCA funding within an integrated framework.*** The issue is addressed in the country; leadership from the donors and stakeholders will help facilitate the outcome. ❖

Opportunities for Investment

This Timor-Leste assessment highlights the current country status, gaps, opportunities and barriers related to national policies, strategies, plans, and activities with regard to the management of natural hazards. It also focuses on the importance of an enabling environment for a comprehensive risk management approach and the capacity to undertake such an approach by strengthening institutional arrangements, human resources, public awareness, information, and national budget allocations.

The country assessment shows that Timor-Leste is facing many critical issues and is severely limited in its internal capacity to address them effectively. Many donors, stakeholders, and NGOs are contributing to a wide range of activities that require government interaction. The Secretary of State for Natural Disasters and Social Assistance stresses that help is needed at a technical and governance level to develop internal capacity. On-going engagements and relationships are necessary to embed institutional and capacity development over a 5-year period or longer. Officials of the Ministry of Economy and Development working on climate change echo this call. Both agencies note the importance of the Government providing for appropriate counterparts for development. Programs therefore should be established and conducted at a level and pace appropriate to the counterpart capacity available. In some areas, such as the Meteorological Service, external technical support will be needed to establish the basis for monitoring. In these areas, programmatic bi-lateral support might be most appropriate.

The Secretary of State for Natural Disasters and Social Assistance has identified the following needs for assistance in implementing the NDRM Policy. The Government could choose to pursue these options with its own resources, with support from the international donor community, and/or from international financial institutions such as the Asian Development Bank and the World Bank.

- Technical assistance support for development of the DRM institutional framework and legislation—potentially World Bank funded.
- Technical assistance support for DRM planning across government sectors and, associated, technical assistance for vulnerability assessment—potentially World Bank and donor funded.
- Technical assistance support for hazard monitoring, data management and mapping—potentially supported by a bi-lateral arrangement.
- Professional development of staff in areas of hazards, vulnerability assessment, and organizational management for DRM—potentially donor/stakeholder sponsorship for targeted professional development programs both internal and external.
- Support for the development of district and subdistrict structures and capacity for DRM—potentially donor and stakeholder support for NGO activities within a structured framework.

In narrowing the field of project opportunities for Timor-Leste, the assessment team considered the needs identified by the Secretary of State and other activities discussed in the assessment. In the area of climate change adaptation, the UNDP-supported development of the NAPA will need specific support in policy and regulatory development, and planning and project management. Professional development support for national capacity development is an area of immediate attention, as outlined in the UNDP-supported National Capacity Development Action Plan for Global Environmental Management (February 2007). Administrative coordination mechanisms through thematic and sector working groups are unlikely to succeed without institutional mechanisms for integration of DRR/CCA activities. Technical assistance is required to support the community-based DRM activity that is tackling local-level vulnerability such as river management measures for reducing flood

risk to low lying coastal villages adjacent to short flood prone rivers. Donor funding in needed for a paleo-tsunami study and collection of oral histories that could be undertaken in collaboration with the National University.

From all these considerations the following four opportunities for investment are proposed for consideration:

(1) ***Development of a simple DRR/CCA institutional and policy framework and organizational mechanism, which allows for activities to be differentiated within an integrated framework.*** The framework would allocate functions and accountabilities across agencies and sectors and establish institutional relationships and procedures for disaster risk management, disaster risk reduction, and climate change adaptation. The program would include development of legislation; establishment of arrangements at the national, district, and suco (village) levels; development of capacity at the organization and community level; enhancement of hazard monitoring and analysis; and development of disaster management and risk reduction plans across sectors and communities. The arrangements would be driven by Government priorities

(2) ***Development of meteorological monitoring capability with data management, analysis, and forecasting systems and skills.*** This would allow for initial analysis of available hazard data and programmatic support to reinforce monitoring networks and develop internal capacity. It would most appropriately be provided through a bi-lateral development arrangement.

(3) ***Support for NGO community-based DRM programs at the district, sub-district, and suco levels within a structured institutional framework as developed in priority.*** This could include technical support for developing river management practices to reduce future flood risk to low-lying communities adjacent to short flood prone coastal rivers. This would integrate the community-based DRM programs into the proposed institutional framework and become part of a programmatic, capacity development initiative.

(4) ***Development and support for a range of professional initiatives for cross-sector staff in areas of hazards, vulnerability assessment and organizational management.*** This would provide a programmatic commitment to capacity development for staff across sectors within CCA and DRM programs and would include both internal and external initiatives.

These priority areas are set out as 4 proposals in Annex A. These are intended to provide preliminary information on required actions and tasks, as well as their indicative costs. While these priorities reflect a great deal of consultation and analysis, the impediments and gaps previously noted in the report could create serious obstacles if they are not addressed as part of the program preparation process. ❖

Annex A. Proposals for Support in Timor-Leste

Proposal	**TL1 Support the development of a practical policy and institutional framework and organizational mechanism for DRM and CCA to provide the basis for coordinated development of capacity**				
Country/sector	**Timor-Leste; multi-sector**				
Goal and purpose	**An explicit and sustainable set of arrangements for developing DRR and CCA capacity through national agencies, districts and into communities with strong linkages to civil society.**				
Scope	**National, district and local arrangements for government, local government and civil society**				
Lead agencies	**NDRMIC, NDMD and Ministry of Economy and Development with NDES/NDIEA**				
Cost and duration	**US$240,000 over 3 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
All hazards	Multiple, according to hazard and sector at risk	Commitment to the institutional framework, capacity at the national and district levels, and resources to provide sustained support	Develop institutional framework for DRM across sectors and levels allocating functions, accountabilities and arrangements, including CCA	40	Year 1 2 months
			Develop legislation to give effect to the framework and the new national disaster plan	50	Year 1 3 months
			Facilitate the establishment of national and provincial structures with members and NGOs in developing terms of reference, statements of purpose, and exercising – 3 months technician assistance per year for 3 years	150	Years 1-3
			Support NGOs in implementation of the framework for local arrangements and civil society		

Continues

Annex A. Proposals for Support in Timor-Leste *Continues*

Proposal	**TL2 Development of meteorological monitoring capability with data management, analysis and forecasting systems and skills**				
Country/sector	**Timor-Leste; multi-sector**				
Goal and purpose	**An established capacity for meteorological monitoring and the generation of information responsive to the needs of key sectors established capacity for meteorological monitoring and the generation of information responsive to the needs of key sectors.**				
Scope	**National**				
Lead agencies	**Meteorological Services, in liaison with other agencies**				
Cost and duration	**US$250,000 over 3 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
All hazards	Availability of meteorological information	Capacity, equipment, skills for analysis and forecasting	Build capacity of local Met Services through technical assistance, training, and provision of equipment	100 150 250	Year 1 4 months Years 2-3 6 months Years 1-3

Proposal	**TL3 Support for non-governmental community-based disaster risk management program at the district, sub-district and village levels**				
Country/sector	**Timor-Leste; multi-sector**				
Goal and purpose	**Consolidation of existing arrangements for developing DRR and CCA capacity and activities within districts and into communities**				
Scope	**District, local government and civil society**				
Lead agencies	**NDMD and Ministry of Economy and Development with NDES/NDIEA**				
Cost and duration	**US$1 million over 3 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
All hazards	Multiple, according to hazard and sector at risk	Emerging community-based DRM programs need strengthening	Strengthen institutional arrangements for government support to community-based DRR activities. Support NGOs and local communities in the implementation of community-based DRR activities	200 800	Years 1-3

Annex A. Proposals for Support in Timor-Leste

Proposal	**TL4 Development and support for a range of professional development initiatives for disaster risk management, climate change adaptation and cross sector staff in areas of hazards, vulnerability assessment and organizational management for disaster risk management and climate change adaptation.**				
Country/sector	**Timor-Leste; multi-sector**				
Goal and purpose	**Increased understanding of DRR and CCA in key agencies and increased skills of key staff**				
Scope	**National, district and local government, civil society**				
Lead agencies	**NDRMIC, NDMD and Ministry of Economy and Development with NDES/NDIEA**				
Cost and duration	**US$250,000 over 3 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Tasks**	**Cost US$k**	**Time-frame**
All hazards	Multiple, according to hazard and sector at risk	DRR and CCA management skills in key agencies and sectors	Identify priorities for DRR and CCA management skills development in key sectors	100	Year 1 4 months
			Develop and implement training programs	150	Years 2-3 6 months
			Improve organizational management	250	Years 1-3

Annex B. Project Team and People Consulted

Project team

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Peter Waterman	Consultant Australia
Supported by	
Darian Clark	AusAID

Persons consulted (Country visit, June 9-12, 2008)

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References and Select Bibliography

ADB (Asian Development Bank). 2008. *Timor-Leste: Country Environmental Analysis.*

Bettencourt, Sofia, Richard Croad, Paul K. Freeman, John Hay, Roger Jones, Peter King, Padma N. Lal, Alan Mearns, Geoff Miller, Idah Pswarayi-Riddihough, Alfred Simpson, Nakibae Teuatabo, Ulric Trotz, and Maarten van Aalst. 2006. *Not If, But When – Adapting to Natural Hazards in the Pacific Islands Region – A Policy Note.* Pacific Islands Country Management Unit, East Asia and the Pacific Region, World Bank.

EU (European Union). 2008. *Food Security Baseline Survey of Liquica and Bobonaro Districts: EU NGO Food Security Program for Timor-Leste,* Care Osterreich

GEF (Global Environment Facility). 2008. *GEF-Pacific Alliance for Sustainability - Program Framework.*

Geoscience Australia. 2008, *A Natural Hazard Risk Assessment of the Asia Pacific Region.*

Government of Timor-Leste. 2007. *National Capacity Development Action Plan for Global Environmental Management.* NDES.

Government of Timor-Leste. 2008. *Timor-Leste Initial National Communication under the UNFCCC* – Submitted 2008.

Government of Timor-Leste. 2008. *National Disaster Risk Management Policy.* NDMD.

Government of Timor-Leste. 2007. *IV Constitutional Government Program of the Council of Ministers 2007-2012.*

Government of Timor-Leste. 2008. *General Budget of the State 2008 – Budget Paper No 1*, Ministry of Finance.

Government of Timor-Leste. 2008. *Masterplan for the National Directorate of Meteorology and Geophysics 2009-2012.*

UNDP (United Nations Development Program). 2008. *Timor-Leste - Transitional Strategy and Appeal 2008.* A Consolidated Plan to Support National Response to Humanitarian and Recovery Needs of Internally Displaced People and Vulnerable Communities and Strengthen Disaster Risk Management in Timor-Leste.

UNDP. 2007. *Environmental Governance Support Program: Final Report.*

UNDP. 2007. *UNDP Project Document, UNDP-GEF Enabling Activities Project- National Adaptation Program of Action to Climate Change for Timor-Leste.*

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**In bold, GFDRR Donors*

Reducing the Risk of Disasters and Climate Variability in the Pacific Islands

REPUBLIC OF VANUATU COUNTRY ASSESSMENT

GFDRR
GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY

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Acronyms and Abbreviations

AusAID	Australian Agency for International Development
CBDAMPIC	Capacity Building for the Development of Adaptation Measures for Pacific Island Countries
CCA	Climate change adaptation
DRR	Disaster risk reduction
GDP	Gross domestic product
GEF	Global Environment Facility
HFA	Hyogo Framework for Action
LDC	Least developed country
M&E	Monitoring and evaluation
MLNR	Ministry of Lands and Natural Resources
NACCC	National Advisory Committee for Climate Change
NAP	National Action Plan
NAPA	National Adaptation Program for Action
NDMO	National Disaster Management Office
NZAID	New Zealand Agency for International Development
PICCAP	Pacific Island Climate Change Assistance Program
SOPAC	South Pacific Applied Geoscience Commission
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VUV	Vanuatu Vatu (currency)
UNFCCC	United Nations Framework Convention on Climate Change

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Figures and Tables

Introduction

The impact of natural disasters and their potential to increase as a result of climate change have received greater attention in recent years. With an onset of strategies, action plans and frameworks have been put in place internationally. At a regional level, the strategies address this growing concern about the risks of disasters and the uncertain hazards from climate change. In 2005, the *Hyogo Framework for Action (HFA) 2005–2015* identified the following 5 priorities for action:

(1) Ensure risk reduction is a national and a local priority with a strong institutional basis for implementation;
(2) Identify, assess, and monitor disaster risks and enhance early warning;
(3) Use knowledge and innovation to build a culture of safety and resilience;
(4) Reduce underlying risk factors; and
(5) Strengthen disaster preparedness for effective response at all levels.

Building on the HFA priorities for action, the Pacific Island Forum in 2005 adopted the *Disaster Risk Reduction and Disaster Management Framework for Action 2005–2015: An Investment for Sustainable Development in the Pacific Island Countries*. Consistent with HFA, the Forum-adopted Framework for Action reflects increasing national and regional commitment to disaster risk reduction (DRR) and disaster management, in support of sustainable development.

The 2006 World Bank policy note, "Not If, But When," highlights the vulnerabilities to natural disasters in the Pacific Region, and describes the human and monetary costs of disasters over the past 50 years. The policy note advocates for a merger or closer interaction of climate change adaptation (CCA) and disaster risk management (DRM), as well as integration of these issues into economic and operational planning processes.

At the national level, a number of countries embarked on strategic planning activities to address DRR and CCA. Vanuatu is the only Pacific island country to have completed both a National Plan of Action (NAP) for DRR and a National Adaptation Program of Action (NAPA) for CCA.

This assessment draws on these past analyses and assesses the extent to which DRR and CCA activities have progressed in Vanuatu. It identifies the gaps or impediments to risk reduction, taking account of the HFA principles as a basis for identifying opportunities for progressing risk-reduction initiatives. The assessment also takes into account other existing frameworks such as the *Pacific Plan* and the Pacific Forum-adopted *Framework for Action 2005–2015*. The assessment focus is on risk reduction (as opposed to disaster management measures to prepare for, respond to, and recover from disaster events when they occur). The initiatives can be in the areas of better understanding hazard information (to inform DRR and CCA activities), strengthening the enabling environment (to improve risk reduction focus and activity in-country) or on-the-ground activities (to actually reduce risk).

The assessment covers how disaster risk reduction and climate change adaptation have been managed in Vanuatu with a view to identifying measures for improvement. Specific sector activities are addressed as they were encountered, but the assessment does not set out to provide a comprehensive summary of sector-by-sector activities. Other reports have done that and are referenced as appropriate.

This assessment highlights aspects such as the current country status, gaps, opportunities and barriers related to (a) national policies, strategies, plans, and activities to manage natural hazards; (b) the enabling environment for a comprehensive risk management approach to natural hazards; and (c) the capacity to undertake such a comprehensive approach, including institu-

tional arrangements, human resources, public awareness, information, and national budget allocations. It also reviews and identifies the need for informed policy choices, improved decisionmaking processes, strengthened regulations, and legislative and policy changes required to support proposed country-level activities.

The focus on government arrangements arises from clear evidence of systemic difficulties through many Pacific island countries in establishing an enabling environment and cross-sector focus for DRR and CCA activities. The evidence is compelling that sustainable and systematic risk reduction activity (i.e., on other than an ad hoc and externally driven basis) will not occur without government commitment at least at a policy and regulatory level. This principle is expressed in HFA priority (1), though in Vanuatu's case the Government has demonstrated its commitment. It is also clear that governance frameworks have been neglected in efforts to date and that the preconditions for mainstreaming identified by the World Bank's "Not If, but When" are largely missing.

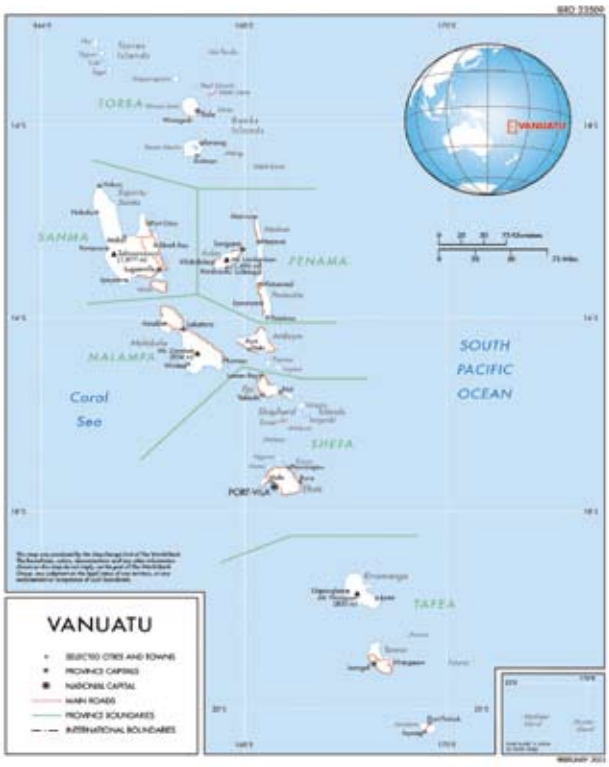
The Vanuatu assessment begins by explaining the context of the country in relation to DRR and CCA impact. It follows with sections on key country findings and detailed country assessments that focus on some components relevant to achievement of the HFA: governance and mainstreaming, planning and budgetary processes, data and knowledge, risk and vulnerability assessments, monitoring and evaluation, awareness raising and capacity building, and coordination. From this assessment, possible opportunities for addressing the identified gaps and impediments within the HFA are presented in the final section. The proposals for future support are presented in Annex A. ❖

Country Context

Vanuatu comprises around 80 islands with a total land area of 12,300 square kilometers spread over some 1,300 kilometers in a north to south direction, between latitudes 12° to 23° south and longitudes 166° to 173° east (Figure 1). The current population is estimated to be 215,000, of which 80 percent live in rural villages on the 7 islands of Efate, Espiritu Santo, Tanna, Malekula, Pentecost, Ambae, and Ambrym.

Vanuatu faces a full range of geologic and climatic hazards. The islands are located in a seismically and volcanically active region and have high exposure to geologic hazards, including volcanic eruptions, earthquakes, tsunamis, and landslides. Recent disasters include the November 1999 Penama earthquake and tsunami that affected about 23,000 people and the 2002 Port Vila earthquake that caused structural and infrastructure damage.

Figure 1. Republic of Vanuatu



Source: Asian Development Bank.

Vanuatu is also subject to climatic variability and extremes. Vanuatu's latitude places it in the path of tropical cyclones, making it subject to cycles of El Niño and La Niña, which increase the risks, respectively, of droughts and floods. Future climate change and sea-level rise threaten to exacerbate the risks posed from tropical cyclones, coastal and river flooding, coastal erosion, heavy rainfall events, and droughts. Recent climate-related disasters include Cyclone Prema in 1993, which caused damages estimated at US$60 million.

Overall, the country is extremely vulnerable to natural disasters. According to the Commonwealth Vulnerability Index—based on (a) the impact of external shocks over which an affected country has little or no control and (b) the resilience of a country to withstand and recover from such shocks—Vanuatu ranks as the world's most vulnerable country out of 111 developing countries assessed. Due to this high vulnerability, Vanuatu is still accorded UN-listed least developed country (LDC) status despite a per capita GDP above the LDC threshold.

Adding to Vanuatu's physical characteristics, other conditions contribute to the country's vulnerability:

- ***A narrow economic base and a weakly developed economy.*** While small-scale agriculture provides a living for 65 percent of the population, 65 percent of GDP is generated by the service sector. Agriculture and a small industry sector accounts for about 25 percent and 10 percent of GDP, respectively. The local market is small. The growing tourism sector, with 60,000 visitors (in 2005) mainly around Port Vila, is the main foreign exchange earner. This narrow economic base makes the cash economy particularly vulnerable to disruption by natural disasters.
- ***Weak inter- and intra-island communication and transport networks.*** Many areas lack national radio reception. Well-developed road transport exists only near population centers (just 111 kilometers of roads

are sealed), mostly on the larger islands. While air service is daily to the main islands, there are only 5 airports with sealed runways (out of 29 in total).

- ***Wide dispersal of land over island country.*** The 80 islands that comprise Vanuatu are spread over a maritime exclusive economic zone of 680,000 square kilometers. Many areas of the country are isolated and therefore extremely vulnerable in the event of disaster.

In recent years Vanuatu has embarked upon a comprehensive reform program to strengthen its national and provincial governance arrangements and in 2005 adopted a Priority Action Agenda for cross-sector reforms. These reform initiatives have resulted in a willingness to address issues across sectors and on a sectorwide basis. While substantial capacity issues exist, planning is progressing on this basis.

Vanuatu completed a National Action Plan (for DRR) in 2006 and a National Adaptation Plan of Action (for CCA) in 2007. The NAP is approved by the Council of Ministers (with a budget approval but no budget appropriation) and awaits donor support for implementation of the Provisional Indicative Implementation Program at US$3.77 million). The NAPA contains 5 priority projects. Activities from 3 of them are included in the NAPA implementation project to be co-financed by the Least Developed Country Fund and the European Commission.

The NAP and NAPA can be considered foundation blocks for this country assessment. This assessment can be distinguished from other efforts by being focused squarely on risk reduction in the context of current hazards and future climate change, particularly as regards the synergies between them. The main intent is to identify a set of opportunities for short-term investment (e.g., less than or equal to 3 years, in first instance) that will fill critical gaps and that promise to make headway in reducing risks. The key findings of the Vanuatu country assessment are presented in the following section. ❖

Key Country Findings

In a general comparison to most Pacific island countries, the Vanuatu Government has a heightened level of awareness and appreciation of the constraints to sustainable development posed by its particularly high level of exposure to geological, hydrological, and climatic risks. This is evident across a range of ministries and departments. As a consequence, there appears to be a willingness to work across sectors to address areas of common interests in risk reduction. It is also reflected in the fact that Vanuatu has taken up the challenge of producing the Pacific Region's first NAP and NAPA and has established a National Task Force and National Advisory Committee for Climate Change (NACCC), relatively strong advisory teams for driving the national agenda. It has also demonstrated some readiness to adjust governance structures and planning arrangements in order to enhance the chances of successful implementation of DRR and CCA actions. Overall, Vanuatu has shown demonstrable actions:

- Expressed commitment to follow through with DRR and CCA planning and strategies;
- Well-coordinated, cross-sector planning, especially as fostered by NACCC in the CCA context, which has prompted sector strategies and 5-year plans being developed by sector agencies;
- Good appreciation of the synergies between DRR and CCA commonalities;
- Softening of the "silo effect" at national government level, with a willingness of members to work within the NACCC and National Task Force in a coordinated, cross-sectoral fashion;
- Reasonable understanding of some hazards (e.g., volcanic hazards);
- Evidence of elements of mainstreaming, especially with regard to CCA implementation, into national policies, plans, and strategies of government agencies.

Despite consistency with HFA priority (1), especially through the commitment shown by the Government to support DRR and CCA inclusion, these positive attributes are tempered by severe limitations, especially with regard to the disconnection among national, provincial, and community levels of governance; and an absence of departmental follow-through to commit sector plans for DRR and CCA inclusion in national planning documents, budget appropriations, and donor support. This assessment identified 2 additional gaps that are also related to HFA priorities (2) and (3): lack of technical knowledge and hazard data and risk and vulnerability assessments and the capacity to perform them.

There are several gaps in the implementation of risk-reducing activities—HFA priority (4)—although appropriate interventions have been identified in the NAP and NAPA. The expected funding for the NAP has not materialized, setting back its implementation. On the other hand, selected priorities from the NAPA are to be implemented with resources from the Least Developed Country Fund and European Commission.

This assessment has identified 4 priority areas where investment could prove effective in overcoming some of these constraints in order to strengthen disaster risk reduction and climate change adaptation. They seek to provide targeted added value for implementing the actions set out in the NAP and NAPA and elsewhere, and include:

- Risk mapping to support town planning and village development,
- Support to the NAP implementation and the potential to integrate with CCA arrangements,
- Promote DRR and CCA in the tourism sector for Vanuatu,
- Support for Ministry of Lands and Natural Resources in reforming land-use policy and regulation.

These 4 opportunities for investment are selective, not comprehensive. They are derived from a combination

of priorities identified from the NAP and NAPA and through consultations with the National Task Force, the NACCC, and various agencies of the Government of Vanuatu. The 4 items were finally selected having met specific criteria: (a) directly involve risk reduction; (b) are likely to produce tangible results within 3 years; (c) are likely to have sustainable, longer-term benefits; and (d) have an identified in-country commitment, champion, and/or effective arrangement for implementation. As well, they mainly address the issues associated with HFA priorities (1), (2), and (4). A summary of the country situation and the gaps or impediments to effective risk reduction, which justify the selection of these opportunities, is presented in Table 1.

Table 1. Summary of Situation, Gaps and Opportunities for investment in DRR and CCA for Vanuatu

Situation	Gap or Impediment	Opportunities
Expansion of towns and villages is occurring without regard to geologic and climatic risks.	Methods and capacity for risk mapping are not integrated into town planning and village developments.	***Risk mapping to support town planning and village development***, a demonstration project for sustainable hazard risk-reduction (including CCA), involving identification of vulnerable areas and providing essential capacity building in risk mapping to guide land-use zoning for urban and rural environments.
The NAP has been approved and the Provisional Indicative Implementation Program developed, but has not started due to a lack of funding commitment.	Capacity and resources are required to establish the Program Management Unit for implementing the first 3 years of the NAP.	***Support to the NAP implementation,*** especially by establishing an integrated program management unit and through capacity building.
Few initiatives are underway to ensure that development is undertaken in a sustainable manner regarding disaster and climate risks. Tourism is seen as a pilot.	Lack of development of risk assessments and guidelines for tourism development and siting.	***Promote DRR and CCA in the tourism sector for Vanuatu,*** including the development of risk profiles (including both DDR and CCA) and guidelines for sustainable development of the tourism sector and their pilot application.
Vanuatu has weak land use regulations and little control over land use that exacerbate disaster risks. Ministry of Lands and Natural Resources is reforming policy and developing strategic plans.	Lack of capacity with the Ministry of Lands and Natural Resources to mainstream DDR and CCA into policies, plans, and regulations. Requires external assistance to build that capacity.	***Support for Ministry of Lands and Natural Resources in reforming land-use policy and regulation,*** especially in building capacity for mainstreaming DDR and CCA into land-use policies, strategic plans and regulations.

Refer to the final section and Annex A for more details on these opportunities for investment in Vanuatu.

A follow-up workshop in Vanuatu to discuss an earlier draft of this assessment was hosted by the NACCC on February 25, 2009. The general conclusion from these consultations was that, based on the recommendations in the NAP and NAPA, a long-term program (about 10 years) to address DRR and CCA issues would be appropriate for Vanuatu but should be implemented in phases given the country's capacity constraints. The first phase could address important cross-cutting issues not included in the NAPA implementation project, such as strengthening the policy, legal, and institutional DRR and CCA frameworks; mainstreaming disaster and climate risk at different

levels of government; and strengthening analytical, monitoring, and communications capabilities.

The consultations also identified a second set of more immediate on-the ground risk reduction activities from the NAP and other sources, which could be supported if additional resources become available and adequate local capacity exists. These opportunities address the HFA priorities (4) and (5) and are summarized below. ❖

HFA priority	Opportunities
(4) Reduce underlying risk factors	Prepare country wide hazard risk maps.
	Identify key infrastructure for strengthening (roads, bridges, buildings, water storage facilities, etc.).
	Establish and enforce appropriate building codes.
	Develop a renewable energy strategy to reduce energy risk.
(5) Strengthen disaster preparedness for effective response at all levels	Develop early warning system.
	Strengthen the disaster response mechanism including links to provincial levels.

Detailed Country Assessment

Governance and decisionmaking

CCA legislation. The most relevant CCA legislation is the Environmental Management and Conservation Act 2002. It addresses biosecurity, conservation, and development. While providing for formal environmental impact assessments for development, the Act is nonspecific in terms of climate change adaptation. The Environment Unit with 2 staff within the Ministry of Lands and Natural Resources (MLNR) administered the Act. It is intended that the Environment Unit become a Department with a director and 6 staff.

CCA national policies and structures. There is a draft Climate Change Policy from 8-10 years ago, which led to the development of the NAPA. Adopted by the Government in June 2007, the Policy is awaiting endorsement from the United Nations Framework Convention on Climate Change (UNFCCC).

The NAPA identifies four sectors—Agriculture and Food Security, Sustainable Tourism Development, Community-based Marine Resource Management, and Sustainable Forestry Management—to receive some support through the Least Developed Country Fund. Other funding will depend on sector ministries promoting budget requests through the Government budget process or from new sources of external funding.

Work on climate change is coordinated through the NACCC. The NACCC comprises department heads, is chaired by the Director of the Meteorological Service (as the focal point), and reports to the Council of Ministers. The Director-General of the Ministry of Land, Mines, and Energy is also a major champion of the NACCC initiatives.

A core team of technical officers drawn from the member departments gives support to the NACCC. In its role, the NACCC coordinates activities among departments, reports to the Council of Ministers, and addresses international reporting obligations. It allocates and promotes activity through responsible departments that are expected, through their respective ministries, to obtain budget and donor support. To date, sector activity is still at the planning stage, and any budget commitment for implementation will follow with project development.

Up to about a year ago, there had been a reactive approach to issues and an absence of cross-agency coordination and mainstreaming. The NACCC has recently promoted the development of some long-term sector strategic policies with a follow-up of 5-year action plans. An example of this is the MLNR-developed Draft National Water Strategy of January 2008. This draft strategy takes a sectorwide approach. It creates a new focus on sector stewardship and regulation, including devolved roles to the provinces, and provides for water resource management for the first time. It includes establishing an expanded network through the Hydrological Cycle Observing System (HYCOS) and development of a Geographic Information System database. Implementation will depend on funding, and capacity will be a constant constraint.

The MLNR has also developed a long-term strategy for energy and planned for a strategic land reform policy. This would be followed with a 5-year action plan to link land use regulation across all islands and develop land use zoning maps and vulnerable area mapping. The focus would be on countrywide programs that are practical and achievable, moving toward risk reduction. The programs had cross-sector support at the Director-General level, and work was required to get agreement on how the programs should be done. Significant funding and resource support would be required, but their emphasis was on assistance that could work with in-country resources to develop capacity.

Complementing this renewed commitment to coordination and pro-active planning is a focus on developing functions, roles, and capacity at the provincial

level to support community initiatives. Such functions do not exist at the provincial level. Activities, which have been undertaken, are ad hoc rather than part of a mainstreaming focus.

CCA summary. The CCA governance arrangements are relatively well developed. There is a recent change toward pro-active planning across departments, reaching ultimately into provincial government. There is a high degree of commitment across departments to this strategic-level cooperative planning, but there is a significant challenge in carrying it through to the development of sector plans and budgets and to implementing arrangements. There are opportunities for supporting this commitment, but it is essential to build on the growing sense of in-country self determination and capacity building.

DRR legislation. The National Disaster Act 2000 is the relevant DRR legislation focused on preparedness and response arrangements for disasters. While the Act includes a definition of prevention, it is nonspecific about requirements and powers for addressing prevention measures. The Ministry of Internal Affairs through the National Disaster Management Office (NDMO) administers the legislation. The National Disaster Management Office has a staff of 3; its function is to implement the strategies and policies of the National Disaster Committee, which may include prevention measures. However, the National Disaster Management Office has no powers to require other agencies to act on any identified prevention measures. The governance arrangements for disaster management are being reviewed at the national level and should include explicit structures, accountabilities, and connections for cross-sector arrangements. Provisions should extend to the provincial and local levels.

DRR national policies and structures. The National Disaster Plan 2004 is the primary policy document derived from the National Disaster Act 2000. The Plan endeavors to establish a governmentwide prevention framework, but is too mired with confusing accountabilities and unworkable structures to accomplish this. The 2006 NAP addresses these issues in a 10-year action plan to give effect to all aspects of disaster risk reduction and disaster management across government agencies and across all levels of government.

The policies and actions were incorporated in 2006 into the Vanuatu national medium-term planning framework as a Supplementary Priority Action Agenda for disaster risk reduction and disaster management. In early 2007 the Government also adopted a disaster management framework and flowchart that offered the basis for developing new legislation, a new disaster management plan, and new government organizational arrangements. The NAP is the mechanism giving effect to the implementation of all relevant DRR policies.

In August 2007 the Government adopted a 3-year Provisional Indicative Implementation Program (2008-2010) as the means to implement the NAP. The Government committed VUV25million (US$250,000) toward its implementation subject to discussions with donors on supporting full implementation of the Provisional Indicative Implementation Program at a cost of US$3.3 million. Full funding is still awaiting agreement between the Government and donors. In place within the Program is a steering committee and program management unit to assist in the NAP implementation.

The Ministry of Internal Affairs supports a National Task Force for disaster management and disaster risk reduction. The National Task Force comprises representatives of departments with a role in disaster management and disaster risk reduction and is co-chaired by the Directors of the Meteorological Service and the National Disaster Management Office. The Task Force reports to the Reference Group comprising all

director-generals of ministries and chaired by the Director-General of the Prime Minister's Office.

Discussions with the assessment team and the Director-General of the Prime Minister's Office confirmed the Government commitment to the policies. The Director-General was keen to identify means for progressing the implementation and felt the Government had made the necessary commitments. Concerned that mechanisms for donor discussions had not progressed, the Director-General noted the cross-cutting nature of the initiative and recognized that donors may find it difficult to engage on a co-funding basis. The Director-General did believe that co-funding was appropriate given National Action Plans were to be implemented across the region.

DRR summary. The current legislative, policy, and organizational structures for disaster risk reduction are weak. There are new Government-adopted policy initiatives in the form of the Supplementary Priority Action Agenda, the NAP, and the Provisional Indicative Implementation Program, all of which are currently unfunded. Despite this, there is enthusiasm across sectors for the National Task Force, and some sector activity is being undertaken arising from the still unfunded NAP. While the National Task Force is temporarily in abeyance, there is a mechanism available for coordination across departments.

The intention exists to review the National Disaster Act, the National Disaster Plan, and the organizational arrangements of the National Disaster Management Office to strengthen disaster management arrangements and to provide explicitly for addressing disaster risk reduction as a mainstream activity. Work on the SOPAC-supported national arrangements for disaster risk management has been undertaken and draft arrangements are being considered. The opportunity exists to extend this to the provincial and local arrangements and to integrate CCA arrangements

Impediments

- ***Lack of funding for the on-going NAP implementation.*** Reasons for this include uncertainty around the process for obtaining funding commitment, a passive stance from the Government in seeking funding both at the regional level and in-country through donor discussions, and the absence of a sustainable regional funding mechanism.
- ***Absence of budget commitment from the Government for initiating the NAP implementation plan.*** Donors do not see the Government giving this priority and do not see risk reduction as an in-country priority but rather as a regional issue. There is a need for discussion at the country, donor, and regional level to resolve a way forward.

Planning and budgetary processes

Planning and budgets are formulated at the department level and promoted through the budget process by their respective ministry. For cross-sector activities, the lead department is expected to promote the overall initiative, but individual departments need to budget for their separate components. Except for times of disaster when appropriations are made on a needs basis, there is little experience of cross-sector budget initiatives. In future, ministerial-level promotion will be important to move DRR and CCA initiatives into the national budget stream.

Cabinet decisions do not automatically lead to budget appropriation since priorities change. There is little monitoring of the budget process. When donor funding is required, the process becomes even more difficult unless the initiative is in an area supported by both the Government and the donor. Regarding DRR and CCA support, donors are indicating that their allocations will be made from a regional perspective. Mechanisms for co-funding initiatives from a regional perspective do not exist at the present time.

Impediments

- Lack of championing by the lead ministry and by Government;
- Regional perspective of donors for DRR and CCA support;
- Absence of a co-funding mechanism at the regional level for in-country initiatives.

Mainstreaming into plans, policy, legislation, regulations

There is a strong cooperative mechanism for climate change adaptation through the NACCC, which is promoting the development of coordinated national and sector policies. This has developed as a result of championing of the issues by the Director of Meteorology and the MLNR Director-General. This resulted in the cross-sectoral NAPA being adopted in June 2007, and sector action plans being initiated. However, departments and ministries have not yet promoted these action plans for Government budget appropriation.

The national DRR coordination mechanism is the DRM National Task Force, which prepared the NAP in 2006. The NAP provides for the development of policies and legislation that will create the enabling environment for mainstreaming through a 10-year program. The National Task Force is in abeyance waiting for funding from the national budget and through donor contribution. Because of lack of sponsorship, a Council of Ministers' commitment of VUV25 million to initiate the NAP Program Management Unit did not reach the appropriation commitment and so did not reach donors for consideration of the broader package. For their part, in-country donors said they would not have considered it a priority for bilateral funding but were aware of it as a regional issue.

The National Planning Office in the Department of Social and Economic Planning did have a role of monitoring budget development with regard to Government decisions. The Planning Office did have DRR and CCA items on their monitoring checklist but did see it as a departmental responsibility to promote. The monitoring function was transferred to the Prime Minister's Office. Given the Council of Ministers' commitment of funds, the Director-General of the Prime Minister's Office was disappointed at the general lack of interest in the issue at the department and donor level and also at the regional level.

There was no addressing of DRR or CCA items at the provincial-level planning. This issue is recognized in the CCA policies being developed and is contained in the DRR-focused National Action Plan.

On the positive side, there is significant opportunity for DRR and CCA alignment through the common membership of the National Task Force and the NACCC, including the Director-General of the Ministry of Meteorological Services, who chairs both coordinating bodies.

Gaps

- Departments not championing risk reduction programs for budget appropriation;
- Absence of monitoring of Government decisions in relation to the planning and budget process; and
- Government not placing priority on DRR/CCA areas in discussions with donors, and donors seeing these issues as regional and not a priority for in-country funding.

Knowledge, data, tools

Generally, there is an appreciation of the constraints to development posed by geophysical and climatic risks across sectors. However, there is a severe paucity of data, tools, and capacity to quantify those risks and to interpret them in a manner that allows risk reduction

to be integrated explicitly into development planning and decisionmaking.

For water resources and water-related risks, such as floods and droughts, for example, there are currently only 6 hydrological monitoring stations that are operational, 2 on Efate and 4 on Santo. These were established for water supply and hydro-power purposes and in support of mining developments and not for long-term monitoring for risk assessment (2 stations were removed after they were no longer needed for immediate development purposes). Yet, flooding is recognized as a major hazard, particularly in peri-urban Vila (Mele and Teuma) and Luganville (Sarakata R), and the risks are increasing with the growing population. Long-term hydrological data to underpin risk reduction in such areas do not exist. Moreover, the hydrological (and other) data, both digital and paper, were destroyed by fire in 2007. Efforts are underway to retrieve data from SOPAC and other regional and national databanks, but the retrieval will only be partial.

The variability and extremes of rainfall are central to understanding the flood, drought, and water supply risks facing the country. There is limited availability of rainfall intensity data and analyses of extreme rain events. Nonetheless, there are few rainfall stations in Vanuatu. The monitoring network, once quite extensive prior to the country's independence, has dwindled. There is only 1 automated weather station and 8 manual rain gauges, with 3-hourly readings and reporting of daily rainfall. There is a proposal for 60 manual stations (for 10 provinces), which would need VUV3 million (US$30,000) for installation and VUV5 million (US$50,000) annually for operations.

In terms of volcanic hazards, there are 9 active volcanoes, which are characterized as low-probability, high-impact hazards. However, there is only 1 permanent volcano monitoring station (on Tanna). There is limited water sampling of crater lakes at Ambae, Ambrym, and Tanna and no ability to provide 24/7 warning. There is a proposed NZAID-funded project (NZ$1 million over 10 years but not yet approved) to establish a volcanic monitoring network on 9 volcanoes with 20 automated/telemetered stations providing real-time data. Vanuatu's Institute for Research and Development has a volcano research project (Euro 2 million). Use is being made of internationally available monitoring data for volcanoes and earthquakes, but the data have limited scope for country-specific application.

Earthquakes are recognized as posing significant risks across the islands of Vanuatu. There is a reasonable understanding of the broad seismic hazard from past studies. However, there is lesser-detailed understanding that depends on data. There is a seismic hazard map available for greater Vila area but not for other population centers such as Luganville. In terms of seismic earthquake monitoring, there was a 3-station network on Efate, but it is dysfunctional due to the fire in 2007 (one accelerometer was also lost).

There is an historically, well-recognized, extensive tsunami risk for coastal communities throughout Vanuatu. The data on tsunami occurrence is sparse. There is a proposal for a paleo-tsunami study and collection of oral histories, but funding can only be made available for a small pilot project.

Cyclone tracking data are available to calculate frequencies but fall short of full risk estimation and evaluation due to lack of additional data and capability. Sea-level monitoring is carried out in Port Vila and Luganville as part of SEAFRAME, but the observational record is still quite short.

Overall, only minimal monitoring or data analysis is being conducted, and ongoing data collection is not happening. There is little hydrological work supporting hazard management, making future risk as-

sessments severely limited. This will be an issue for projects underway, such as the Millennium Challenge Account projects, which intend to climate-proof infrastructural developments.

Gaps

- ***Paucity of historical time-series data for risk assessments.*** This is due both to loss of data records and to degradation of data monitoring and collection systems throughout the country. This insufficiency of data inhibits analyses of frequency and magnitude of extreme events and applies across the board to climatological, hydrological, and geophysical systems.
- ***Lack of spatially distributed data sufficient to construct hazard maps at scales appropriate for planning and risk reduction.*** For climatic data, especially rainfall, the network of station data is too sparse for useful spatial interpolation. The lack of spatially interpolated baseline climatologies limits the ability to apply scenarios of climate change for purposes of impact and adaptation assessments.
- ***Absence of adequate data monitoring networks to meet future needs for vulnerability and risk assessments.*** Across the range of geophysical, hydrological, and climatic hazards, the absence of data collection will have repeated complications in future DRR and CCA projects unless concerted efforts are made to upgrade the networks.
- ***No procedures or capacity for systematic, consistent collection of damaged and loss data following disasters.*** The consequence of the lack of impact data is a constraint to economic analyses of DRR and CCA benefits and to evaluation of benefits and costs of risk reduction and subsequent investments in DRR and CCA programs by government and donors.

Vulnerability and risk assessments

More than most other Pacific island countries, Vanuatu faces a wide range of hazards, including earthquakes, landslides, tsunamis, volcanoes, coastal erosion, tropical cyclones, floods, and droughts. The latter four are likely to be affected in future by climate and sea-level changes and by an increasing population and development in urban and coastal locations (which largely coincide).

Despite these risks and the fact that there is a moderately high level of awareness and commitment at the national level for risk reduction, the understanding and assessments available are only rudimentary with regard to the degrees of risk, who is at risk, and where is the risk. Preliminary scoping of climate change vulnerabilities and adaptation options on a province-by-province basis has been carried out as part of the NAPA process. For example, there are no tsunami hazard maps available other than a single scenario inundation map for the Greater Vila area. While there is some information on areas prone to flooding based on past events, there are no detailed flood maps that could underpin the development of flood risk and land-use zoning. For most volcanoes, there are volcanic hazard maps, largely derived from general understanding of specific volcanic hazards. A National Water Strategy Plan has been prepared proposing risk assessments and vulnerability mapping. This work has not commenced, and there is very little capacity to undertake it.

As noted, the biggest impediment to development of risk and vulnerability assessments and maps is the lack of climatic, hydrological, and geophysical data. Digital elevation models are also essential for some hazards (e.g., for coastal and river flooding, tsunamis); this need is clearly recognized and steps are underway to supplement existing coarse resolution maps with high-resolution digital elevation models for vulnerable areas of the country. In addition, socio-economic information on at-risk populations, land use, and infrastructure is patchy and not systematically geo-referenced and digitized for spatial analyses of hazard risks.

Responsibility for various aspects of vulnerability and risk assessments is spread across several sectors and their associated ministries and departments. The Ministry of Meteorological Services has primary responsibility for climate-related data and analyses and sees the expansion of climate data monitoring as a high priority. The Ministry of Lands and Natural Resources has clearly recognized the paramount importance of introducing a pro-active strategic and programmatic approach to land, water, and energy planning, which includes incorporating risk reduction. The Land Reform Policy under development will lead to a 5-year action plan that will include land-use zoning maps and vulnerable area mapping, addressing both DRR and CCA issues. Considerable efforts in basic data collection will be essential to underpin these efforts.

Gaps

- ***General absence of vulnerability and risk assessments and maps required to plan and implement DRR and CCA activities.*** Filling this gap is a fundamental requirement for advancing concerted actions for risk reduction in the country.
- ***No sense of identified priorities for vulnerability and risk assessments and mapping.*** With a few exceptions, Vanuatu is starting from "square one" with regards to vulnerability and risk assessments. While sector priorities were identified in the NAPA, there now needs to be a systematic scoping and prioritization of hazards in relation to at-risk populations, infrastructure, and areas—*hotspots*—as a basis for developing vulnerability and risk assessments in support of town planning and rural development.
- ***Unavailability of models and tools for analyzing and interpreting data for purposes of vulnerability and risk assessments, risk profiles, and mapping.*** Even for the use of available data, there is a lack of tools (and human capacity) to convert them into information required for DRR and CCA impact.

To a considerable extent, these three related gaps are acknowledged and addressed in the NAP and NAPA. With the country's keen interest to pursue, the NAPA has sector-based CCA projects that all include vulnerability and risk assessments.

Monitoring and evaluation

In general, there is no systematic monitoring and evaluation (M&E) of risk reduction efforts in Vanuatu. There are efforts to assess damages in post-disaster situations, but these are largely ad hoc and are not harmonized across hazards or carried out in such a way that would allow systematic post-audit evaluation of long-term DRR programs or projects. In accordance with the Madang Pacific Regional Framework for Action 2005-2015, the NAP recognizes the need for M&E for such purposes.

The NAP has incorporated it as an integral component of the Provisional Indicative Implementation Program for the first 3 years of the 10-year national action program. The NAPA for Vanuatu does not incorporate M&E as an element of any of its 5 priority projects. It is expected that M&E will be included with any implementation plan for the NAPA.

Gaps

- Absence of M&E reporting mechanisms with feedbacks to promote improvement; and
- Undeveloped evaluative criteria and indicators appropriate for M&E at national, sectoral, provincial, and community levels.

Filling these gaps is fundamental for ensuring that the risk reduction is a self-adjusting, dynamic, and sustainable process, as applied to both disaster risk reduction and climate change adaptation in a harmonized fashion. It would be important for reporting to ensure consistency with regional and international procedures and criteria.

Awareness raising and capacity building

The National Disaster Management Office has had a public hazard and preparedness awareness program for a number of years principally run as the annual National Disaster Day with support from the Meteorological Service and the Ministries of Education and Health. However resources are limited and provide for only one province to be covered each year through the schools and some communities.

One-day workshops are also run for government and provincial officers on cyclone season preparedness. The Geohazards Section within the Department of Geology, Mines, and Water Resources runs awareness programs across the country from time to time. Risk reduction and CCA awareness is being added to these programs, but guidance on practical application is limited.

Within the Ministry of Education there is an element of disaster risk reduction and management being discussed for potential inclusion in nationwide curriculum development, and there is potential support from UNESCO for treating Vanuatu as a pilot application. This focused project would not include climate change adaptation at this stage.

As with most Pacific island countries, Vanuatu has inadequate human resource capacity, generally across all sectors, and there are problems in retaining expertise once the capacity is adequate. For Vanuatu, these deficiencies are most acute in the technical areas of knowledge gathering, data analysis, and interpretation required for vulnerability and risk assessments. The limited capacity may prove to be a major constraint in plans to expand staff, partly to deal with DRR and CCA issues in certain ministries (e.g., the Ministry for Lands plans to expand from 2 to 7 staff).

Capacity building is a high priority of many ministries —a point echoed by the NACCC and the National Task Force that deal with CCA and DRR issues, respectively. Capacity development is 1 of 8 major components in the NAP (representing 7 percent of the budget for the Provisional Indicative Implementation Program over the first 3 years) and an integral part of each of the 5 priority projects identified in the NAPA. One strategy is to use external consultants but not to do the tasks at hand; rather they would build the in-country capacity to carry out the work, thus ensuring retention of capacity for further applications.

Gaps

- ***Insufficient sustained awareness-raising activities, especially those directed at provincial and community levels.*** Applying to both DRR and CCA activities, filling this gap would be an important step in strengthening the linkages between national, provincial, and community levels of governance, which at present are rather disconnected.
- ***A general shortage of capacity for DRR and CCA, especially in the areas dealing with technical data analysis and vulnerability and risk assessments.*** Filling this gap is a fundamental requirement for advancing concerted actions for risk reduction in the country.

Because these gaps are well recognized and are built into the NAP and NAPA, donor funding and implementation of the NAP and the NAPA projects would presumably jumpstart the much-needed improvements in awareness raising and capacity building for Vanuatu.

Implementation of actual risk-reducing measures

There are some success stories with regards to risk reduction in Vanuatu. Under the CCA rubric, the following NACCC-overseen projects were successfully implemented:

- ***Pacific Island Climate Change Assistance Program (PICCAP, 1997-2001).*** Funded by UNDP-GEF,

this was a regional enabling activity designed to build capacity for national communications to the UNFCCC. Under PICCAP, the NACCC successfully engaged training in vulnerability and adaptation assessment and implemented countrywide awareness-raising activities.

- ***Capacity Building for the Development of Adaptation Measures for Pacific Island Countries (CBDAMPIC, 2002-2006).*** This CIDA-funded, SPREP-executed demonstration project aimed to mainstream adaptation into sustainable development at community and national levels. Vanuatu was one case study. Under the project, a village (Tegua) was relocated to avoid recurrent flooding and future sea-level rise, and rainwater harvesting was implemented (Paama). At the national level, activities included mainstreaming into national plans and environmental impact assessments; development of draft climate change policy; and establishment of the Climate Change Core Team, the technical arm of the NACCC.
- Development of the ***National Adaptation Plan of Action (NAPA, 2004-2007).*** Funded by the UNDP and GEF, the NAPA was endorsed by the Council of Ministers in 2007.

Projects that are currently in progress or in development include:

- ***Vanuatu Climate Change Adaptation Project (VCCAP),*** funded by AusAID, takes the lessons and capacity developed under CBDAMPIC and replicates the process elsewhere.
- ***Second National Communications to the UNFCCC (SNC)*** is funded by UNDP and GEF.
- ***Pacific Adaptation to Climate Change project (PACC),*** funded by GEF, includes climate proofing of coastal infrastructure for Vanuatu.

The above projects all involve guidance and coordination under the NACCC. The Millennium Challenge Account project, another CCA effort, is aimed at climate proofing infrastructure.

With regard to disaster risk reduction, the NAP was developed in 2006 as a 10-year plan to progressively develop capacity for disaster management arrangements and for DRR mainstreaming across sectors and throughout Government. A 3-year Provisional Indicative Implementation Program has not commenced due to lack of a funding mechanism. While some ad hoc initiatives are being undertaken (particularly in health), the NAP has effectively stalled. Within the Provisional Indicative Implementation Program is the establishment of a steering committee, a program management unit, and an organizational structure for a disaster management unit. These are prerequisites for on-going development of the Provisional Indicative Implementation Program and the NAP.

Gaps

For Vanuatu, the gaps leading to the eventual implementation of risk-reducing activities are embodied in the NAP and the NAPA, along with identified priority areas for funding. Vanuatu is the only country in the Pacific that has completed both a NAP and NAPA and, from the perspective of gap identification, is one step ahead of most countries.

Coordination among government agencies

The DRR coordination mechanism is the National Task Force for Disaster Risk Management, which has been inactive due to funding uncertainties. Coordination among agencies is not occurring and development of disaster risk management is stalled

The CCA coordination mechanism is the NACCC, which has led to the preparation of the NAPA and the identification of initiatives within the Ministry of Lands and Natural Resources. With funding for the

NAPA implementation from the GEF Pacific Alliance for Sustainability, the coordination role of the NACCC will strengthen and should include M&E elements. The opportunity exists to integrate implementation of disaster risk management and the NAP, gaining strength from the NACCC arrangement.

Impediments

Stalled commitment to implementation of the NAP. If the activity for disaster risk management loses energy, it could get left behind. This would mean development of provincial and local arrangements would remain slow and would be unavailable for the development of local-level CCA initiatives. The opportunity exists to integrate DRR and CCA arrangements with advantages for both.

Coordination among donors and key stakeholders

The relatively little in-country bilateral donor support to either DRR or CCA initiatives was due on one hand because sector plans were evolving from the broader-based National Task Force and NACCC and on the other hand because the Government had not raised DRR and CCA issues as priorities for engagement with donors in-country. Donors felt the mechanisms for engagement with the National Task Force and the NACCC were weak, reflected in their lack of involvement in preparation of the NAP and the NAPA.

AusAID, NZAID, and the European Union are significant regional-level funders. These major donors see this as appropriate for the cross-sectoral and cross-cutting nature of both DRR and CCA issues. However, that makes in-country engagement and implementation problematic for programs that by their nature need funding for 10 years or more. Particularly since AusAID and NZAID in-country saw their focus as sectoral, the DRR and CCA issues did not register significantly in their decisionmaking.

The UNDP is engaged in a small pilot community-based program for creating resilient communities. Red Cross has an involvement on the NACCC and with the National Disaster Management Office and is looking to use its connections with communities and provinces to improve communications at the national level.

Impediments

- *Government is not raising these issues as priorities for engagement with donors in-country.* As noted previously, this is partly a result of a Government expectation of regional funding. Discussion is needed between the parties to address this.
- *Sector plans for CCA initiatives are not yet developed.* The basis for concrete discussion with donors and for coordination will come with the development of explicit sector plans. ❖

Opportunities for Investment

From the Vanuatu country assessment, it is evident from the gaps and impediments that many opportunities for investment leading to the improvement of risk reduction can be identified. The NAP and the NAPA alone identify a considerable array of priorities, strategies, and actions necessary for environmental improvement and hazard management, including risk reduction, for Vanuatu.

This assessment highlights country status, gaps, opportunities, and barriers related to national policies, strategies, plans, and activities with regards to the management of natural hazards. This focus extends to the enabling environment for a comprehensive risk management approach to natural hazards and the capacity to undertake such a comprehensive approach, including institutional arrangements, human resources, public awareness, information, and national budget allocations. In most discussions among key government officials and other stakeholders, investment programs are prioritized and selected based on expectations of several criteria (costs, available funding, efficiency, expected benefits, institutional, financial, legal, and related capacity).

Vanuatu and most of the Pacific island countries have established policies, institutions, systems, and related structures to address DRR/CCA challenges. The NAP, NAPA, and several other programs have been prepared and are ready to be enacted. However, there are significant gaps in the 5 key HFA priority areas. While some efforts have begun to address certain issues, those of funding, staffing, and related operational support persist without concrete plans. Several participants in the assessment process have identified high-yielding, short-term priority issues; but this selection requires more effort to fully categorize such needs and decide upon appropriate corresponding short-, medium-, and long-term programs.

Vanuatu policymakers, sector officials (in consultation with local stakeholders), and various donors and financial institutions identified the list of priorities. The Government could choose to pursue any of these options with its own resources, with support from the international donor community, and/or international financial institutions such as the Asian Development Bank and the World Bank. Grant funding for Vanuatu is being mobilized from the Global Facility for Disaster Reduction and Recovery to support pilot programs, which could be leveraged to undertake some of the proposed investments, based on demand. Funding would be expected to support programs from 2009-11.

In narrowing the field of project opportunities, the assessment team applied two additional sets of filters or criteria. The first set requires the projects to meet the following filters:

- Address risk reduction directly;
- Produce tangible results within three years;
- Have longer-term sustainable benefits; and
- Have in-country commitment, champions, and/or institutional arrangements to promote implementation.

Screened by this first set of criteria and with additional consultation and expert judgment, five priorities for investment were identified. These five project opportunities follow, along with a summary of the rationale for each in relation to the above criteria and as linked to the assessment.

(1) ***Risk mapping to support town planning and village development.*** This project entails developing hazard and risk mapping capabilities through facilitating piloted hazard and risk mapping exercises for the town of Luganville and for the Shefa provincial area of Port Vila, Mele, and Teouma. In the first instance, the benefits of this project would extend to issues of land-use planning and regulation and would therefore inform the land use policy

framework and strategic plans being developed by the Ministry of Lands, Water, and Energy. In the longer term, such capacities are required for sustainable development in rapidly growing regions of Vanuatu.

(2) ***Support to the integration of the NAPA and NAP implementation.*** It is clear that, subject to funding, the Vanuatu Government is committed to moving forward with the NAP, has a reasonable understanding of the connections between DRR and CCA, and is being pro-active in integrating efforts across sectors. However, the success of NAP depends heavily on its management unit to act as both the champion and driver of the process. This is currently the weak link, and it lacks the resources and capacity to do so. With funding now committed to the implementation of the NAPA, the opportunity exists to integrate arrangements to manage the implementation of the NAP and the NAPA in a way that adds value to both areas—the NAP through development of a provincial and local arrangement and the NAPA through the strength of its coordination function for Government.

(3) ***Promoting DRR and CCA in the tourism sector for Vanuatu.*** As explained in the NAPA, tourism developments are proliferating in Vanuatu, mostly in coastal locations with little regard for hazards and reducing risk and no regard for potential climate change effects. Sustainable tourism and coastal land use therefore depend, in large part, on the systematic reduction of those risks. The key elements of this potential project are contained within the tourism project outlined in the NAPA and therefore have been endorsed by the Council of Ministers. However, this proposed project is not as extensive as that contained in the NAPA. It is much more focused and is narrowed to a more manageable set of activities, which are considered "do-able" in a shorter timeframe, with a high chance of success. Nonetheless, it still contains a focus on (a) the development of risk profiles and assessments of existing tourism facilities (with the potential for extension to other sectors by way of example); (b) the development of guidelines for future tourism developments; and (c) a component involving pilot applications to demonstrate DRR and CCA benefits for the industry as a whole.

(4) ***Awareness raising and education to foster links between national, provincial, and community governance, planning, and implementation.*** There are large differences between the rural and urban Vanuatu. About 80 percent of the population lives in rural villages, largely on a subsistence basis with limited employment opportunities, while the cash economy is centered primarily in Port Vila and Luganville. The economic and social differences compound the large gaps or disconnections between national, provincial, and community levels of organizational arrangement. This is a major impediment to implementation of systematic risk reduction at local level. Programs of awareness raising and education have been identified during the NAP and NAPA processes as fundamental to bridging these gaps and fostering links between the organizational levels. A timely project would involve development of the content, approaches, and procedures for effectively and efficiently achieving this goal through pilot projects, in the first instance.

(5) ***Support for Ministry of Lands and Natural Resources in reforming land-use policy and regulation.*** The Ministry of Lands and Natural Resources is undertaking a land reform program, including the development of a land use policy linking all the islands, followed by a set of strategic plans for implementing the policy. Land-use zoning will be a central tenet of the policy and strategy, and DRR and CCA components will be central aims of land-use zoning. However, the capacity is deficient in terms of both technical skills for hazard and risk mapping, as well as mainstreaming in

policy and plans. This proposed project provides technical support at a critical time to build the required capacity and to facilitate key components.

These 5 opportunities for investment were subjected to a second filter by asking the question, *Which of the opportunities are already, or are likely, to be supported by other donors and agencies?* The intent of applying this second filter was to determine where the World Bank could add value in a coordinated and harmonized manner in relation to other players in the region. One of the 5 opportunities fell into this category: Project (4), *Awareness raising and education*, which might be conducted by SOPAC. On this basis, the 4 remaining priority projects can be viewed as complementary and therefore as opportunities for the World Bank to add value. Two of these activities have been included in the NAPA implementation project: (1) *Risk mapping* and (5) *Support for the Ministry of Lands and Natural Resources*.

In Annex A, each proposed opportunity is expanded to provide preliminary information on indicative costs, timeframes, and first-order actions and tasks. This information is intended to be sufficient for the development of detailed proposals and terms of reference should the World Bank wish to pursue these opportunities for further investment. ❖

Annex A. Proposals for Support to Vanuatu

Proposal	**V1 Risk mapping to support town planning and village development**				
Country/sector	**VANUATU: Lands, Hydrology, Development planning**				
Scope	**Land-use planning in Luganville (Santo) and the Mele-Teouma Plains (Efate); demonstration**				
Goal and purpose	**Sustainable hazard risk-reduction as part of the land-use planning and zoning, through identifying vulnerable areas and providing essential capacity building in risk mapping to guide land-use zoning for urban and rural environments**				
Lad agency	**Ministry of Lands and Natural Resources with Geohazards, Rural Water Resources, Meteorological Service, Municipalities, French, Vanuatu, and Mele Red Cross Societies, Ports, SOPAC**				
Cost and duration	**US$600,000 over 3 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Actions and tasks**	**Cost US$k**	**Time-frame**
Riverine flooding Storm surge/wave Tsunami Earthquake Flash flooding Polluted/high groundwater table	Appropriate risk-mapping methodologies developed for urban and rural areas Land-use practices and infrastructure improved to reduce risk High-risk zones avoided in communities Local capacity to manage disasters improved	Lack of basic climate and hazard data collection capabilities Lack of capacity to assess risks Lack of knowledge on land use management Risk mapping not integrated into planning process	Support a demonstration program for the communities of Luganville and the Mele-Teouma Plains to: • Identify and map all hazards including potential changes in climate variability • Assess vulnerabilities and engage with communities in assessing risks • Establish development zones and other risk mitigation measures for community assets and infrastructure • Develop disaster management arrangements and warning arrangements for flooding and storm surge Include measures in provincial and district plans Monitor and evaluate on-going effectiveness	320 160 120	Year 1 Year 2 Year 3

Continues

Annex A. Proposals for Support to Vanuatu *Continues*

Proposal	**V2 Support to the NAP implementation and its integration with arrangements for CCA, the NAPA.**				
Country/sector	**Vanuatu: DRM/CCA Cross Sector**				
Scope	**Establishment of the DRM arrangements through the initial implementation of the NAP and integration with arrangements for CCA**				
Goal and purpose	**National**				
Lad agency	**Dept of Internal Affairs, with National Task Force and NDMO, NACCC and Meteorological Service**				
Cost and duration	**$300,000 over 2 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Actions and tasks**	**Cost US$k**	**Time-frame**
All hazards	Establish structures for integrated DRM/CCA in Vanuatu Provincial and local structures will benefit CCA initiatives Implement the on-going elements of the NAP	Lack of capacity to manage initial set up and implementation of the NAP including the establishment of DRM arrangements	Address issues of integration of arrangements for DRM and CCA and establish a management structure for implementation of the NAPA and NAP Support the TA role over two years to facilitate the initial implementation. Address funding issues for the on-going implementation of the NAP	300	Years 1-3

Annex A. Proposals for Support to Vanuatu *Continues*

Proposal	**V3 Promote DRR and CCA in the tourism sector for Vanuatu**				
Country/sector	**VANUATU: Tourism**				
Scope	**Sustainable tourism, through reducing risks to tourism facilities**				
Goal and purpose	**Coastal locations; demonstration**				
Lad agency	**National Tourism Development Office with NACCC, Meteorological Service**				
Cost and duration	**US$475,000 over 3 years**				
Hazards targeted	**Risk reduction measures**	**Key gaps/barriers**	**Actions and tasks**	**Cost US$k**	**Time-frame**
Cyclonic wind and storm surge Flooding Coastal erosion Drought/water supply Tsunami	Avoidance of high-risk zones within coastal areas Modify infrastructure design to reduce risks Early warning and evacuation Coastal management to enhance natural resilience Alternative energy and water supplies (e.g., rain-water harvesting). Water and waste-water management	Limited knowledge concerning hazard/risk zones Risk issues not mainstreamed into tourism and development policies, plans and regulations. Contingency/evacuation plans not developed, low awareness Lack of knowledge and awareness to minimize coastal impacts Lack of awareness of benefits and costs of water management alternatives	Prepare hazard risk profiles for a range of existing tourism facilities for key areas, including exposure to climate change related risks in order to understand the extent of risk exposure. Develop a development guideline for future tourism developments to address this risk exposure (which has the potential to severely impact the industry nationwide). The guideline should address: • Requirements for risk analysis and risk treatment for tourism developments including building code requirements, coastal zone management etc. • Contingency/evacuation plans for tourism developments and enhancing awareness. • Procedures and guidelines for beach management and conservation and for monitoring • Alternatives for managing water supply and demand in variable and changing climate Promulgating application of the guidelines in order to demonstrate the benefits of DRR and CCA to tourism developments and to promote nation-wide application.	75 250 150	Year 1 2.5 months Year 2 8 months Year 3 4 months

Annex A. Proposals for Support to Vanuatu

Proposal	**V4 Support for Ministry of Lands and Natural Resources in reforming Land-Use Policy and Regulation**				
Country/sector	**VANUATU: Lands**				
Scope	**Land-use policy and regulation addressing risks arising from climate change and natural hazards**				
Goal and purpose	**National, land management**				
Lad agency	**Ministry of Lands and Natural Resources**				
Cost and duration	**US$480,000 over 3 years**				
Hazards targeted	***Risk reduction measures***	***Key gaps/barriers***	***Actions and tasks***	***Cost US$k***	***Time-frame***
Earthquake Landslide Tsunami Cyclonic wind Storm surge Storm wave Groundwater pollution Riverine flooding	Land use zoning	Lack of capacity within Ministry Lands in the development of land-use regulations Lack of regulatory mechanisms to address land-use in the face of natural hazards in a holistic manner Incomplete hazard risk mapping of Vanuatu Customary land tenure systems	Develop a strategic framework for a land-use regulatory regime related to risk, including provincial and community consultation Develop and implement an action plan to meet the needs of the project. Develop land-use policy framework and link all Vanuatu islands in a common regulatory regime. Championing, adoption and demonstration through a pilot zoning program on one island Carry out provincial and community awareness and implementation program	120 (5 months) 40 (2 months) 120 (6 months) 120 (6 months) 80 (4 months)	3rd Quarter 2008 2009 2010 1st Quarter 2011

References and Select Bibliography

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, and Maarten Van Aalst. *Not If, But When: Adapting to Natural Hazards in the Pacific Island Region.* Washington, D.C.: World Bank, 2005.

Dilley, Max, Robert S. Chen, Uwe Deichmann, Arthur L. Lerner-Lam, and Margaret Arnold. *Natural Disaster Hotspots; A Global Risk Analysis.* Washington, D.C.: World Bank, 2005.

EM-DAT: OFDA/CRED International Disaster Database. Catholic University of Louvain, Brussels, Belgium. 2009.

Framework for Action 2005-2015: An Investment for Sustainable Development in the Pacific Island Countries Disaster Risk Reduction and Disaster Management; Building the Resilience of Nations and Communities to Disasters.

Global Fund for Disaster Risk Reduction, *Vanuatu Country Assessment*

Government of Vanuatu. *National Disaster Plan 2004.*

Government of Vanuatu. *Supplementary PAA (Priorities and Action Agenda). 2006.*

Government of Vanuatu. *Provisional Indicative Implementation Program (PIP) 20082010.* 2007

Government of Vanuatu. *National Adaptation Program of Action.*

Government of Vanuatu. *Priorities and Action Agenda 2006-2015: An Educated, Healthy and Wealthy Vanuatu.* Department of Economic and Sector Planning, Ministry of Finance and Economic Management (Medium Term Development Plan). June 2006

Government of Vanuatu. *National Disaster Act No. 31 of 2000.*

Hyogo Framework for Action 2005-2015: International Strategy for Disaster Reduction (ISDR) Priorities and Action Agenda 2006-2015, Supplementary for Mainstreaming Disaster Risk Reduction and Disaster Management.

Sikivou Mosese. *What do Pacific Developing Member Countries Want from Catastrophe Insurance?* Pacific Islands Applied Geoscience Commission, National Catastrophe Risk Insurance Mechanisms for Asia and the Pacific, November 4-5, 2008, Tokyo, Japan.

The World Factbook 2009.

UNDP Human Development Index 2007.

UNDP Country Background 2009.

UNISDR, Living with Risk: A Global Review of Disaster Reduction Initiatives 2002.

World Bank. *(Draft) Vanuatu National Action Plan (for Disaster Management), Country Risk Profile.* Prepared the World Bank and SOPAC under the Pacific Catastrophe Risk Financing Initiative

World Bank. *(Draft) Pacific Catastrophe Risk Financing Initiative 2009.*

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