Climate Investment Funds

PPCR/SC.11/4
October 11, 2012

Meeting of the PPCR Sub-Committee
Istanbul, Turkey
November 1, 2012

Agenda Item 4

STRATEGIC PROGRAM FOR CLIMATE RESILIENCE FOR PAPUA NEW GUINEA

PROPOSED DECISION

The PPCR Sub-Committee, having reviewed the document PPCR/SC.11/4 *Strategic Program for Climate Resilience for Papua New Guinea*, a country participating in the Pacific Regional Program,

a) endorses the SPCR as a basis for the further development of the project foreseen in the strategic program and takes note of the requested funding of USD 25 million in grant funding;

b) recognizes that the quality of the proposed project will be a significant factor in the funding to be approved by the Sub-Committee when the project is submitted for approval of PPCR funding;

c) approves a total of USD 750,000 in PPCR funding as a preparation grant for the one investment project proposed in the SPCR to be implemented by ADB;

e) takes note of the estimated budget for project preparation and supervision services for the investment project and approves a first tranche of USD 196,958 as a first tranche of funding for MDB preparation and supervision services for the project; and

f) requests the Government of Papua New Guinea and the ADB to take into account written comments submitted by Sub-Committee members by November 15, 2012, in the further development of the program.

Papua New Guinea

MINISTRY OF FINANCE AND TREASURY
Office of the Minister

4 Floor Vulupindi Haus, Waigani Drive
P.O. Box 542, Waigani, NCD, Papua New Guinea

Tel: (675) 327 7342, (675) 3128812
Facsimile: (675) 312 8804

15th of June, 2012

Ms. Patricia Bliss-Guest
Program Manager
Administrative Unit
Climate Investment Funds
World Bank, 181 8 H Street NW, MC5-522
Washington D.C. 20433, USA
Fax: (202) 522-2937
Phone: (202) 458 1-801

Dear Ms. Patricia Bliss-Guest,

SUBJECT: PAPUA NEW GUINEA'S PROPOSAL FOR THE STRATEGIC PROGRAM ON CLIMATE RESILIENCE.

The Government of Papua New Guinea (GoPNG) is pleased to submit the proposal for Strategic Program for Climate Resilience (SPCR) for consideration by the PPCR sub-committee. The proposal is a culmination of extensive collaboration and consultation with a broad range of stakeholders within the Private, Public, Communities, Women and other NGO sectors. These consultations where held by the PPCR Joint Missions from May 2010, September 2011, November, 2011 and March, 2012.

GoPNG Development Budget, which is funded domestically, stands at US$1.4B annually. The development projects range from critical infrastructure to community health projects, economic livelihood, schools, and water and sanitation projects. The PPCR will pave the way to significantly influence the process in which the climate change risk impacting GoPNG's development initiatives are adequately addressed and subsequently add substantial value to the efforts in ensuring climate resilient development. GoPNG's PPCR proposal ultimately focuses on poverty reduction and the country's goal to achieve sustainable development goals.

In view of GoPNG's position not to apply for loans specific for climate change, PNG has sincerely excluded the loan component but may revisit it in future. Furthermore, we are pleased to learn that the expert reviewer endorsed by PPCR Sub-committee has positively evaluated the SPCR for Papua New Guinea. Please find attached the review and a note that describes how the suggestions and recommendations from the review have been considered in the final document.

The GoPNG will be following closely the pending email decision and sincerely hope for the submissions approval as it ties intricately with the government medium to long term implementation strategies.

HON. PETER O'NEILL, CMG, PRIME MINISTER
Minister for Finance & Treasury

VARIGINI BADIRA
ACTNG EXECUTIVE DIRECTOR, PPCR FOCAL POINT – OFFICE OF CLIMATE CHANGE AND DEVELOPMENT
SECRETARY - DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Papua New Guinea's *Strategic Program for Climate Resilience*

1 June 2012

Contents

Summary of **PNG`s Strategic Program for Climate Resilience**

ABBREVIATIONS

ADB	Asian Development Bank
CCA	climate change adaptation
CCDS	Climate Compatible Development Strategy (also known as CCDP)
CCIP	Climate Change Implementation Plan (ADB document)
CIF	Climate Investment Funds
CROP	Coordinating Regional Organisations of the Pacific
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	civil society organization
DCD	Department of Community Development
DEC	Department of Environment and Conservation
DISP	District Support Implementation Program
DMPGM	Department of Mineral Policy and Geohazards Management
DNPM	Department of National Planning and Monitoring
DoT	Department of Transport
DoW	Department of Works
DPCCT	Development Partners Climate Change Taskforce
DRR	disaster risk reduction
DSP	Development Strategy Plan
EA	executing agency
GDP	gross domestic product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
HDI	Human Development Index
IA	implementing agency
ICCAI	International Climate Change Adaptation Initiative (of the Australian Government)
IEPNG	Institute of Engineers PNG
MDB	multilateral development bank
MTDP	Medium Term Development Plan
NAC	National Airports Corporation
NCCC	National Climate Change Committee
NCCCC	National Climate Change Coordinating Committee
NEC	National Executive Council
NGO	nongovernment organization
NIAP	National Interim Action Plan for Climate Compatible Development
NMSA	National Maritime Safety Authority
NPC	National Planning Committee
NPM	National Program Manager (for PPR Phase I)
NRA	National Roads Authority
NSPF	National Strategic Planning Framework
OCCD	(National) Office of Climate Change and Development
PIP	public investment plan
PMU	project management unit
PNG	Papua New Guinea
PNGCCI	PNG Chamber of Commerce and Industry
PNGNWS	PNG National Weather Service
PPCR	Pilot Program on Climate Resilience
PRIF	Pacific Regional Infrastructure Program
REDD	Reducing Emissions from Deforestation and Forest Degradation
RTSM	regional technical support mechanism
SABLS	Special Agricultural Business Lease
SCF	Strategic Climate Fund
SLM	Sustainable Land Management
SNC	Second National Communication (to the UNFCCC)
SOPAC	Pacific Islands Applied Geoscience Commission (Division of SPC)
SPC	Secretariat of the Pacific Community
SPCR	Strategic Program for Climate Resilience
SPREP	Secretariat of the Pacific Regional Environment Programme
TSMIC	Transport Sector Monitoring and Implementation Committee
TSSP	Transport Sector Support Program (of AusAID)
TWG	technical working group
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WBG	World Bank Group

Summary of PNG`s Strategic Program for Climate Resilience		
1. **Country/Region**:	Papua New Guinea	
2. **PPCR Funding Request (in $ million):**:	*Grant:* $25 million	*Loan:-*
3. **National PPCR Focal Point**:	Varigini Badira, Director Adaptation Office of Climate Change and Development (OCCD) Ministry of Environment	
4. **National Implementing Agency** (Coordination of Strategic Program)**:**	Office of Climate Change and Development Department of National Planning and Monitoring Ministry of Finance and Treasury	
5. **Involved MDB**	Asian Development Bank	
6. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	PPCR – Focal Point : Daniele Ponzi (ADB)	TTL: Anne Witheford (ADB)

Description of SPCR

The Papua New Guinea (PNG) Strategic Program for Climate Resilience (SPCR) will achieve "transformational" change by supporting implementation of PNG's national strategies, outlined in its Vision 2050, Development Strategy Plan (DSP), Medium Term Development Plan (MTDP), Public Investment Plan (PIP) and Climate Compatible Development Strategy (CCDS), to make PNG's development investments climate resilient, or to facilitate "climate compatible development" in PNG's own terms. The overall outcome of the SPCR will be the enhancement of PNG's resilience to climate change through improved access to resources, knowledge, and tools and climate resilient infrastructure at the national, sectoral, district, and community levels. These are prerequisites for effective social development, food security, and overall poverty reduction. PNG's SPCR will support achievement of these key pillars for climate resilient development.

In seeking this transformation, the SPCR will address key impediments facing PNG's current efforts to implement Vision 2050, DSP, MTDP, PIP, and CCDS. These include (i) inadequate resources (human, technical, financial) at national, provincial, district, community, and sectoral levels to mainstream climate change risk management; (ii) inadequate knowledge and tools for mainstreaming climate change risk management in key sectors (food security, health, critical infrastructure); and (iii) poorly designed infrastructure that is susceptible to climate change impacts.

The SPCR will complement (not duplicate) major climate change adaptation (CCA) initiatives ongoing and planned in PNG. It is based on a clear analysis of the value that can be added to CCA work in the country. The SPCR will also, through linkages with the Pacific Regional SPCR (approved by Pilot Program on Climate Resilience (PPCR) Subcommittee 30 April 2012) promote collaboration between PNG stakeholders and other Pacific countries and regional organizations.

(a)Key Challenges Related to Vulnerability to Climate Change/Variability

PNG is sensitive to such natural hazards as coastal flooding, inland flooding, landslides, and drought. Significant risks are posed by climate change to the PNG environment, economy, and population, including from natural disasters worsened by climate change and gradual shifts in climatic conditions. Climate change will disrupt daily life, cause damage to assets and infrastructure, destroy livelihoods, endanger cultural and ecological treasures, and kill or injure people. Analysis suggests that the average cost of coastal flooding could increase from $20 million per year to $90–$100 million by 2030 and the economic loss due to malaria from $130 million to $210–$250 million per year, due to the interaction of climate change with the increased value of assets at risk as a result of economic growth. It has been calculated that cost-effective adaptation measures could avert 65%–85% of these losses.[1]

In March 2010, in order to implement key goals outlined in the country national development strategy (*Vision 2050*), PNG's Office of Climate Change and Development (OCCD) led the development, through a broad-based consultative process, of *Climate Compatible Development Strategy for Papua New Guinea* (CCDS) that outlines key measures that will "shape development to be more climate resilient". With the preparation of the CCDS and related strategies and the establishment of the OCCD, substantial progress has been made at the policy and strategy level, and a commitment has been given to fast-track pilot programs in the future. Nonetheless, the real task of implementing climate change adaptation at the operational level is yet to begin. Climate risk management is still to be integrated into policy, planning, and budgetary processes. There is limited understanding of climate risks and a lack of technical capacity to integrate climate risk management into planning processes. Further, there is no evidence of significant training at national, sectoral, or provincial/local levels to provide this capacity, although the consultations revealed a strong desire for the PPCR to support such efforts. Legislation (*Climate Change Authority Act 2012*) is currently being finalized to provide OCCD with legal powers to undertake its role and also to set up a sustainable climate change financing framework – both priorities under *Vision 2050*. However, considerable capacity building will be needed in OCCD if the new legislation is to be implemented in a timely and effective manner. It is by addressing these priority areas that SPCR can best support the mainstreaming of climate change adaptation into PNG's national climate resilient development program as

[1] *Climate Compatible Development Strategy for Papua New Guinea* (CCDS).

(b)Areas of Intervention—Sectors and Themes

This SPCR proposes provision of support through three components. The components will be mutually reinforcing and will together achieve the purpose of the SPCR. First, through support provided under component 1 (build climate resilient communities by strengthening their capacity to address priority climate change risks), PNG will develop capacity for climate change vulnerability mapping and develop early warning systems and community emergency preparedness training. Component 1 will also establish a climate change financing framework which will support priority CCA interventions in vulnerable communities. Second, through support provided under component 2 (address threats to food security from climate change impacts by piloting adaptation measures in vulnerable communities), PNG will pilot food processing, preserving, and storage systems and ecosystem-based, climate resilient fisheries management. Third, through support provided under component 3 (strengthen approaches to design, construct, operate, and maintain selected ports/wharves/jetties and associated infrastructure to improve the resilience of vulnerable social and economic support systems to climate change impacts), PNG will pilot an enabling framework for climate proofing of critical ports/wharves/jetties and develop a pool of trained, qualified personnel who are capable of mainstreaming CCA in infrastructure development planning and implementation.

(c) Expected Outcomes from Implementation of the SPCR

Key outcomes are:

1. Establishment of a pool of trained and qualified specialists to support climate change risk management mainstreaming activities at national and sectoral levels and within vulnerable communities.
2. Legal establishment and effective operation of PNG`s Climate Change Trust Fund, and the establishment of a small grants program to support priority adaptation projects for farmers, fisherfolk, and vulnerable communities, in particular women.
3. Coastal fisheries that are more resilient to impacts of climate change.
4. Critical infrastructure less vulnerable to impacts of climate change and disasters.
5. Vulnerable communities in remote islands and atolls made more resilient to climate change risks.

Expected Key Results from the Implementation of the Investment Strategy (consistent with PPCR Results Framework and Core Indicators)	**Success Indicator(s)**
Component 1 – Building Climate resilient Communities	• Community climate change vulnerability maps, adaptation plans, and risk management strategies developed in vulnerable Islands • Community-based early warning systems established in 20 vulnerable communities and islands • PNG`s Climate Change Trust Fund legally established and operational • Small grants program under a Climate Change Trust Fund, providing $5 million to priority community adaptation projects and early warning systems • Community adaptation plans implemented in 20 vulnerable communities • Community-based measures implemented to reduce health risks associated with climate change
Component 2 – Addressing Climate Change Risks to Food Security	• Food processing and storage facilities built in 7 vulnerable districts and replicated in 10 other vulnerable communities with financing from small grants of the Climate Change Trust Fund • Community climate resilient fisheries pilot programs established in 5 vulnerable communities
Component 3 – Climate resilient Infrastructure	• Five Ministry of Finance staff trained in climate change risk management and climate change considerations integrated into national budgets • Five persons obtain university-level degree in climate change risks management • “Enabling framework” for climate proofing critical coastal and island infrastructure established in PNG Ports Corporation • Critical ports, roads, and other infrastructure climate proofed

7. **Project and Program Concepts under the SPCR:**

Project/Program Concept Title	MDB	Requested PPCR Amount ($ million)[2]			Expected co-financing ($)	Preparation grant request ($)	Total PPCR request ($ million)
		TOTAL	Grant	Loan			
Component 1 – Building Climate resilient Communities	ADB	9.75	9.75			750,000	9.75
Component 2 – Addressing Climate Change Risks to Food Security	ADB	7.25	7.25				7.25
Component 3 – Climate resilient Infrastructure	ADB	6	6				6
Project Management	ADB	2	2				2
	TOTAL	25	25				25

8. **Timeframe** (tentative) – Approval Milestones

Components 1 – 3: Project Preparation Grant Agreement signed between Government of PNG and ADB by August 2012; Detailed project preparation August 2012–January 2013; ADB Board approval February 2013; Grant Agreement signed between Government of PNG and ADB March 2013.

9. **Key National Stakeholder Groups involved in SPCR design**[3]

Ministry of Finance, national climate change focal points, national sector agencies, vulnerable communities (Rigo Island, Gabagaba Ornamental Fish Project), civil society (OXFAM, CARE, University of PNG, Salvation Army, Women in Agriculture Development Foundation, National Agricultural Research Institute (NARI), PNG Chamber of Commerce and Industry, PNG Business Council, World Vision, Institute of Engineers PNG (IEPNG), PNG Ports Corporation, Water PNG, Mama Graun, Bootless Lavadae Reforesting Ass Inc. Aqua Marine Committee, Centre for Environmental Law and Community Rights (Papua New Guinea), Wildlife Conservation Society, United Church, GEF Small Grants Program.

10. **Other Partners involved in Developing PNG`s SPCR**

Pacific Islands Forum Secretariat (PIFS), Secretariat of the Pacific Regional Environment Programme (SPREP), Secretariat of the Pacific Community (SPC), Forum Fisheries Agency (FFA), Australia (Australian Agency for International Development [AusAID] and Department of Climate Change and Energy Efficiency), United Nations Development Programme (UNDP), Pacific Regional Infrastructure Facility (PRIF).

[2] Includes preparation grant and project/program amount.

[3] Other local, national, and international partners expected to be involved in design and implementation of the strategy.

INTRODUCTION

Based on recommendations of an Independent Expert Group, Papua New Guinea (PNG) has been selected as one of the countries to participate in the Pilot Program for Climate Resilience (PPCR), which is part of the Strategic Climate Fund (SCF), a multidonor trust fund within the Climate Investment Funds (CIF). The Pacific PPCR has four components: country activities in three countries (PNG, Samoa, and Tonga) and a regionwide component. The PPCR will provide financing through the multilateral development banks (MDBs) to support programs in the selected pilot countries. Proposals for PPCR funding will be prepared jointly by the recipient country and the relevant MDBs.

The goal of the PPCR is to help countries transform to a climate resilient development path, consistent with national poverty reduction and sustainable development goals. In its nature as a pilot program and supporting learning-by-doing, PPCR implementation ultimately aims to result in an increased application of knowledge on the integration of climate resilience into development. The PPCR will complement, and go beyond, currently available adaptation financing to provide finance for programmatic approaches to mainstream climate resilience in development planning, core development policies, and strategies.

PNG has been provided a technical assistance grant in the sum of $500,000 under Phase 1 to undertake the design and development of this Strategic Program for Climate Resilience (SPCR), which builds upon the comprehensive, inclusive and country-driven process used to develop PNG's Climate Compatible Development Strategy (CCDS) (March 2010). The CCDS summarizes current and future threats from climate change and related hazards, and outlines measures and specific actions to address such threats. The proposed investments in the SPCR build on and help implement selected priorities identified in the CCDS through a national consultative planning process.

1. BACKGROUND AND RATIONALE

1.1 Country Context

Geography and Socioeconomic Situation

PNG occupies the eastern half of the rugged tropical island of New Guinea, sharing a border with the Indonesian province of West Papua to the west. Australia sits to the south of PNG, the Solomon Islands to the east, and the Federated States of Micronesia (FSM) to the north. PNG is located in the so-called "Pacific Ring of Fire" and has active volcanoes and significant earthquakes and mudslides, and its coastal areas are prone to tsunamis and floods. Apart from the island of New Guinea, the country has four large islands (Manus, New Ireland, New Britain, and Bougainville) and some 600 small islands lying between the Coral Sea and the South Pacific Ocean. The total land area is 465,000 square kilometers (km^2). It has an exclusive economic zone of 2.4 million km^2, which encompasses 17,000 kilometers of coastline and almost 2,000 coastal villages, with a rural population of nearly 500,000 people. Communities in PNG have developed more than 800 languages as well as unique customs and traditions, in part due to the isolation that results from the country's rugged terrain.[4]

[4] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

Figure 1: Papua New Guinea

PNG's mainland has one of the most rugged terrains in the world, possessing a central mountain range which is highly dissected, with the highest peak rising to 4,350 meters (Mt. Wilhelm), while the smaller islands include high volcanic mountains and low lying coral atolls. Ecosystems range from mountain glaciers to humid tropical rainforests, swampy wetlands, and pristine coral reefs. Much of the terrain is characterized by steep gradients, fast flowing rivers, and swamps, with some parts of the country subject to active volcanic activities, landslides, and tidal waves. The rugged terrain, unique and rich biodiversity, and range of environments, cultures, languages, and the legacies of former colonial powers have heavily influenced the development of the country. PNG is a country of considerable biodiversity, estimated to contribute 5%–7% of global biodiversity.[5] However, although biodiversity is outstanding with many species endemic, much of the land and habitats has been modified by erosion and land clearing, mainly from traditional agricultural systems and timber harvesting. PNG is rich in natural resources, including gold, copper, timber, agricultural products, and—most recently—oil and natural gas. About one fifth of the land is subject to inundation. Of the country's total land area, about 58% is subject to strong or severe erosion, with a further 18% permanently inundated or regularly flooded. Up to 200,000 hectares are cleared annually for traditional agriculture.[6]

[5] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[6] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

PNG has an estimated population of 7.06 [2011] with annual growth of 2.8% (2009–2011)[7]. Overall population density is low, although pockets of overpopulation exist. Only approximately 270,000 people are employed in the formal sector; the rest are in non-formal employment, most in semi-subsistence farming.[8] Few people who commence school continue on to tertiary education. Despite its vast natural wealth, PNG is a very poor country, with 37% of its population living in poverty. Approximately 40% of the population enrolls in schools; 5.5% of babies born will die before reaching the age of two. The average life expectancy is 57 years. PNG is not expected to meet any of the Millennium Development Goals by 2015, and is ranked 137 out of 169 countries in the 2010 Human Development Index (HDI) compiled by the United Nations Development Programme (UNDP).

PNG's gross domestic product (GDP) growth was estimated at 7.1% in 2010, marking almost a decade of uninterrupted expansion, averaging 4.4% annually. This resource-rich economy benefited from the start of construction on a $15 billion liquefied natural gas project and recovery in global commodity prices. In 2010, industry, including minerals, grew by an estimated 9.3% and was the major contributor to GDP growth. Services expanded by an estimated 8.5%, while agricultural output rose by 3.5%.[9] Although the economy has experienced sustained economic growth, the direct contribution of the mineral resources sector to reducing poverty is limited. Few of the country's poor depend directly on mining, and the links between mining and the rest of the economy are underdeveloped.

The economy is highly dualistic in nature, consisting of (i) a large-scale export sector based on natural resources (minerals and petroleum, timber, fish, and tree crops) supporting a small urban formal sector and the public sector; and (ii) a semi-subsistence rural economy supporting more than 85% of the population. Relatively high per capita GDP is associated with exports and incomes generated from minerals and petroleum sectors and the contribution of aid. While broadly distributed access to the natural resource base provides the basic needs of people, it does not translate to real growth per person. Agriculture (oil palm, coffee, and cocoa) continues to be the most important source of GDP for the country. Together with forestry and fisheries, it contributes 28% of GDP and around 13% of total export earnings. The mining and petroleum sectors contribute 26% to the overall GDP. Mining of mainly copper, gold, and silver and petroleum constitute the major export earnings for PNG. About 85% of the population, those in the transitory phase between the subsistence and cash economy, have a per capita income of less than one third of those in the urban sector.[10]

Land currently set aside for food and cash crop production in the country accounts for about 30% of the country's total land area.[11] Land currently in the food production cycle amounts to 6.6% of total land area. Cash crops, such as copra, coffee, cocoa, rubber and oil palm, as well as subsistence agriculture, based on root crops, sustain about 85% of the population. Large amounts of vegetables and fruits are produced in the highlands, but inadequate transport and marketing infrastructure limit the supply to highly populated urban centers. As

---

[7] ADB. *Basic Statistics 2012*. .

[8] ADB. *Basic Statistics 2012*.

[9] FAO. 2010. *Fishery and Aquaculture Country Profiles: Papua New Guinea*.

[10] ADB. *Country Operations Business Plan : Papua New Guinea 2012–2014*

[11] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

these crops are highly perishable and suffer from variable product quality, there are high postharvest losses. Around 8% of farmers are wholly dependent on subsistence food production for survival. Subsistence agriculture accounts for about 45% of total agricultural output.[12]

Fishing is widespread, mostly for local consumption. Coastal and inland fisheries are mainly of a subsistence nature, with inland fisheries now mainly based on aquaculture. Providing limited domestic employment, the offshore tuna fishery provides an annual harvest of over 250,000 tons.[13]

Transport services rely heavily on roads as well as inter-island and coastal shipping; air transport is used for long-distance passenger travel. There is no rail transport. Currently, there are 25,000 kilometers of roads in the country, out of which national and provincial roads cover 7,000 kilometers. For the many small, dispersed, and isolated population centers, the difficult terrain has severely constrained the provision of road-based services, especially to rural areas of the country. Such constraints are of major concern to the Government and population of PNG because the opportunities for selling agricultural surpluses domestically depend crucially on access to markets, all-weather roads, and costs being at reasonable levels.

Customary landowners hold 97% of the country's total land area[14], giving them considerable and unique rights governing extraction of resources and compensation claims. Natural resources and environmental management is highly complex in PNG given the difficult terrain, the diverse cultural heritage, including the complex customary system of land tenure, exacerbated by several tiers of government bureaucracy and shortage of skilled manpower.

Vulnerability to Climate Change and Natural Disasters

Climate. PNG's climate is influenced by the vast Pacific Ocean and the adjacent large land masses of Australia and Asia. The climate and weather pattern of PNG is also heavily influenced by its proximity to the equator. The biannual east–west circulation of warm air masses, weather patterns of nearby Australia, and the variable topography of the country with high mountain ranges all exert an influence.

From June to October, prevailing southeast trade winds act as a medium for dry air movement responsible for dry conditions. From December to April, the major influences are northwest monsoons originating in Asia. This airflow transports moist humid air, enhancing precipitation. This is also the cyclone season. In between the two seasons are months where the wind regimes are less dominant. These are referred to as transitional months.

The PNG Weather Service has 14 established meteorological observation stations networks around the country. The data and information from the network provide some understanding of the climate and weather from the atoll islands, coastal provinces, and hinterlands, and highlight trends attributable to climate change.

---

[12] UNDP/SPREP. *Pacific Adaptation to Climate Change Papua New Guinea :Report of In-Country Consultations.* 2007

[13] FAO. 2010. *Fishery and Aquaculture Country Profiles: Papua New Guinea*

[14] FAO. 2010. *Fishery and Aquaculture Country Profiles: Papua New Guinea*

Climate Change and Climate Variability. PNG's *Initial Communication to the United Nations Framework Convention on Climate Change (UNFCCC)* (2000) reported that the country's climate and weather patterns indicate increasing vulnerability to climate change:

- Both temperature and precipitation trends in PNG resemble global and regional trends of high rainfall intensity events and prolonged droughts.
- Increases in the mean near surface temperatures, especially over the last 25 years, appear to be above the global mean.
- The increase in mean minimum temperatures has been greater than that of the mean maximum temperatures since 1970 (Figure 2).

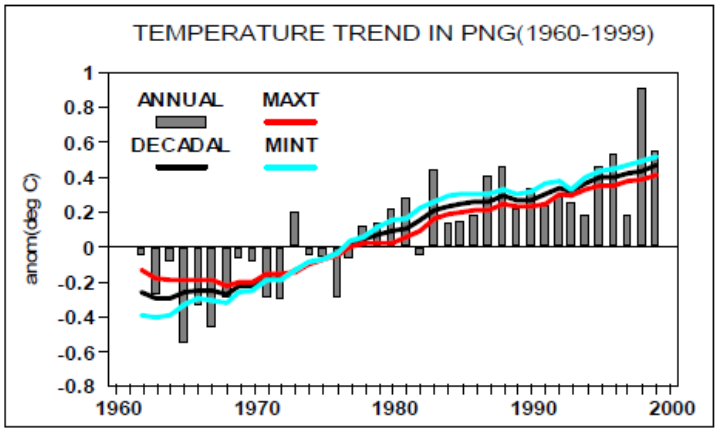


Figure 2: Temperature Trends in PNG, 1960–1999

- Dry season patterns exhibit weakening La Nina impacts during the dry season, and this weakening is influencing the weak dry conditions, implying longer decadal phases of dry conditions (Figure 3).

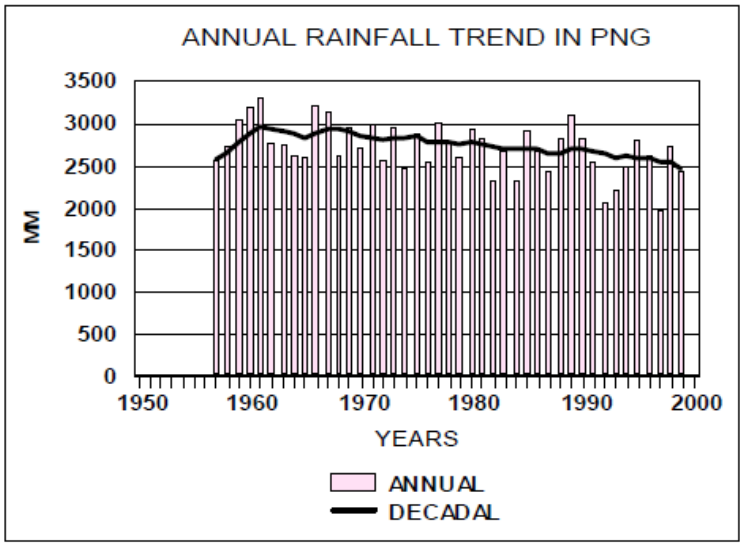


Figure 3: Annual Rainfall Trend in PNG

There is already relative sea-level rise around the country, but this is strongly influenced by El Nino and La Nina signals. A significant increase in sea level is projected over the next century.[15] There has been an increase of 0.5°C in mean near surface temperatures; since

[15] Tsunamis and earthquakes are also important signals in the region that have influenced sea level rise and water levels in most coastal and island provinces. The 1998 tsunami and earthquakes in

the mid-1970s much of this increase could be attributed to the rapid increase in minimum temperatures rather than traditional maximum temperatures.

PNG lies just outside the main tropical cyclone belt within the Southwest Pacific region. Tropical cyclones hit the country at the rate of about one cyclone per year.

Building on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, the publication *Climate Change in the Pacific* (2011) is a comprehensive, rigorously researched, peer-reviewed scientific assessment of the climate of the western Pacific region. Supported by various agencies of the Australian Government including the Commonwealth Scientific and Industrial Research Organisation (CSIRO), country reports were prepared for each of the Pacific countries, including PNG. These indicated that

- surface air temperature and sea‑surface temperature are projected to continue to increase (very high confidence);
- annual and seasonal mean rainfall is projected to increase (high confidence);
- intensity and frequency of days of extreme heat are projected to increase (very high confidence);
- intensity and frequency of days of extreme rainfall are projected to increase (high confidence);
- incidence of drought is projected to decrease (moderate confidence);
- tropical cyclone numbers are projected to decline in the southwestern Pacific Ocean basin (0–40ºS, 130ºE–170ºE) (moderate confidence);
- ocean acidification is projected to continue (very high confidence); and
- mean sea-level rise is projected to continue (very high confidence).

The vulnerability assessment in PNG's *Initial National Communication to the UNFCCC* states:

> *The natural environment throughout PNG is extremely fragile and highly vulnerable to both natural and human impacts. During the last 50 years or so, increasing pressures on the resources are intensifying the country's exposure to extreme events such as natural hazards like cyclones, droughts, earthquakes and tsunamis. In addition to these threats and pressures to the environments of PNG are the expected changes that may arise from climate change and climate variability, which will likely further exacerbate these impacts and deplete the resources that are most essential for basic life support systems*.

The impacts of this vulnerability are summarized in PNG's *Initial National Communication to the UNFCCC* as follows:

Coastal Resources. PNG's coastline, coastal villages, and rural coastal population are vulnerable to sea-level rise and other weather-related manifestations of climate change. The main impacts will be inundation of coastal wetlands and foreshore areas and death of corals, which will weaken the coral reefs as barrier protection systems. Additionally, loss of wetlands and freshwater sources is expected due to seawater intrusion, and flooding of coastal lands will lead to displacement of communities, resulting in aggravated social problems. The permanent or periodic inundation of deltaic flood plains, swamps, and low-lying areas could

---

the country generated large waves and storm surges that devastated the Aitape and Rabaul coastal areas and islands displacing many coastal communities and causing loss of lives.

affect up to 50% of the Papuan coastline and 10% of the northern shorelines (for a 1 meter sea level rise – IPCC's highest estimate). Approximately 4,500 kilometers of the total 17,100 kilometers of shoreline are expected to be moderately to severely inundated, affecting up to 30% of PNG's population.[16] In addition, there is a danger that some very low-lying islands, including barrier islands, will be completely submerged. There is evidence that this is already occurring in the outer lying atoll islands of Mortlock, Tasman, and the Duke of York islands.

Coastal Infrastructure. Increased incidence of flooding will cause loss of and damage to coastal infrastructure, including roads, marine installations, and urban centers, such as the coastal settlements of Hanuabada, Vabukori, and Koki in Port Moresby. Large parts of Lae's industrial and residential areas, and other low-lying towns, such as Kieta, Kimbe, Madang, and parts of Rabaul are likely to be affected.[17]

Coral Reefs. A large proportion of PNG's shoreline is protected by both barrier and fringing coral reefs. Coral reefs are known to be sensitive to increases in surface ocean temperatures, which cause coral bleaching and death from the loss of zooxanthellae (the algae that sustain them). The inundation of reefs, combined with increased surface water temperatures and possible increased sedimentation and turbidity from shoreline erosion could also contribute to reef mortality.[18] The loss of vital coastal defenses provided by barrier reefs and mangrove communities will heighten the impacts of coastal flooding. As breakwaters, coral reefs provide a vital wave energy dissipation function and their loss would result in increased coastal erosion.

Mangroves. Increased incidents of storms will change the mangrove range through accretive or erosive action of the waves.[19] The loss of mangrove system integrity will have adverse effects on subsistence welfare of local villagers living in or near such mangrove areas.

Fisheries. Climate change will have the greatest effect on coastal fisheries that are already stressed through overexploitation and environmental degradation. Many nursery grounds for commercially important fish and shellfish are located in shallow waters near the coast and within mangrove systems that will be impacted from sea-level rise and increased incidence of storms and coastal flooding. Changes in ocean temperatures and ocean acidification will affect the range and migration patterns of offshore fish stocks.[20]

---

[16] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[17] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[18] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[19] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[20] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

Water Resources. PNG's water resources have been gradually depleted due to rapid industrial and resources development, population pressure, forestry, and agriculture expansion. Climate variability will affect water quantity/quality and the hydrological cycle owing to fluctuations in rainfall intensity and changes in evapo-transpiration. This will most acutely affect the more than 200 inhabited low-lying islands and coral atolls where communities rely on groundwater lenses for supply of freshwater, both for human consumption and for gardening. These lenses will be affected by saltwater intrusion from rising sea levels and leakage during storm surges, causing shortages of freshwater.[21]

Human Health. Climate change will affect agricultural production, fish catches, and food security. Direct effects from climate change are expected to include increases in the incidence of vector-borne and water-borne diseases. Changes in the incidence of ciguatera fish poisoning are likely due to increased sea surface temperature and reef disturbance, causing people to modify their diet or decrease their protein intake, affecting household budgets, lifestyle, and health. In terms of health risks, women, children, and the elderly among the village-based population are more susceptible than the male population. Only 20% of rural inhabitants have access to safe water and sanitation services, contributing to water-borne disease and making PNG most vulnerable to cholera outbreaks.[22] Indirect impacts on human safety would occur if storms damage and destroy health centers and related infrastructure, thereby disrupting essential health services.

Agricultural Production and Food Security*.* Agricultural production will be impacted by climate change and climate variability, with crop yields influenced by inter-annual variations in weather, nutrient status of soils, and temperature. Climate change will affect soils primarily through changes in soil moisture, soil temperature, and soil organic matter content. Increased climate variability will affect the incidence and range of pests/diseases and invasive species, which will affect agricultural production and costs. Increases in temperature will result in rapid post-harvest deterioration of crops, while increased incidence of flooding will result in crop losses in inundated lands. Increased carbon dioxide will enhance weed growth, which could adversely affect yields. With 85% of PNG's population reliant on subsistence agriculture, climate change presents a significant threat to food security, livelihoods, and the well-being of the population.[23]

Social Impacts*.* There is a strong inverse correlation between the levels of socioeconomic development of the coastal provinces of PNG and the extent to which they will be affected by climate change.[24] Provinces expected to be most affected by sea level rise include Western, Gulf, West and East Sepik, Manus, New Ireland, Bougainville, and Milne Bay, some of which are least developed, have communities likely to suffer the greatest loss of land and other socioeconomic disruptions due to impacts from climate change. In addition, issues of resettlement will be compounded because of the strong inherent customary land tenure system. In instances where resettlement is an option, the financial and cultural (dislocation) costs are likely to be high.

---

[21] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[22] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[23] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

[24] Papua New Guinea's *Initial National Communication to the UNFCCC* (2000)

PNG's *Climate Compatible Development Strategy* (CCDS) recognizes the sensitivity of PNG to natural hazards, such as coastal flooding, inland flooding, landslides and drought. The CCDS has highlighted the significant risks posed by climate change to the PNG environment, economy, and population, including from natural disasters enhanced by climate change and gradual shifts in climatic conditions. The CCDS has stressed that these will likely "disrupt daily life, cause damage to assets and infrastructure, destroy livelihoods, endanger cultural and ecological treasures, and kill or injure people." Analysis in the CCDS suggests that the average cost of coastal flooding could increase from $20 million per year to $90 million–$100 million by 2030 and the economic loss due to malaria from $130 million to $210 million–$250 million per year, due largely to the interaction of climate change with the increased value of assets at risk as a result of economic growth. It has been calculated that cost-effective adaptation measures could avert 65%–85% of these losses.

1.2 Overview of existing Development Plans and Programs

National Approach to Climate Change Adaptation

Since 2007, efforts have been undertaken to incorporate CCA considerations into national development, primarily at the national strategic level. In December 2007, the National Executive Council (NEC) of PNG, on advice from the National Planning Committee (NPC), made a decision to develop a framework for a long-term strategy, *The Papua New Guinea Vision 2050* (Vision 2050), which is derived from the *National Strategic Plan Framework* (NPSF), was endorsed by the Government and national leaders in September 2008. The concepts and strategic direction in the framework were rigorously tested during a three-month comprehensive public consultation program in which 89 districts were visited. Vision 2050 incorporates the National Government's Strategic Directional Statements that will drive development initiatives over the next 40 years. Developed through a broad-based consultative process, Vision 2050 is underpinned by seven strategic focus areas, which are referred to as pillars.

One of the pillars is "Environmental Sustainability and Climate Change." The pillar outlines the following CCA related goals:

1.17.9.2 Assist the majority of Papua New Guineans to become resilient to natural and human disasters and extreme environmental changes.
1.17.9.3 Establish a Sustainable Development Policy in all sectors, especially forestry, agriculture, mining, energy and oceans by 2015.
1.17.9.4 Develop mitigation, adaptation and resettlement measures in all climate change impacted provinces by 2015.
1.17.9.10 Provide 100 percent of weather and natural disaster monitoring systems in all provinces.
1.17.9.11 Integrate environmental sustainability and climate change studies in primary, secondary and national high school curricula.
1.17.9.12 Establish an Institute of Environmental Sustainability and Climate Change.

Vision 2050 also states that critical measures must be implemented to prevent the erosion of climate security, including through viable food production and personal health, which must be assured.

PNG's *Development Strategic Plan* (2010–2030) is guided by the National Constitution and is the first of two 20-year development plans to translate Vision 2050 into concise directions for economic policies, public policies, and sector interventions. Climate change is a cross-

cutting theme in the plan, which includes the goal to “Adapt to the domestic impacts of climate change and contribute to global efforts to abate greenhouse gas emissions”. Strategic directions to achieve this goal as outlined in the plan are shown in Table 1.

Table 1: Strategic Directions - Climate Change Goal in PNG's *Development Strategic Plan* (2010–2030)

Key indicators	Baseline information	Issues	2030 target/ objective
PNG risk transfer and adaptation initiative	Very little resources available	Pacific island coastal communities could incur a direct cost of US$1.4 billion per year due to sea-level rise, resettlement and relocation of climate refugees and further costs due to drought and changes in precipitation.	Adequate level of resources available
Number of meteorological stations	14 (2008)	Extended periods of drought, loss of soil fertility and degradation as a result of increased precipitation will negatively impact on agriculture and food security, particularly in subsistence agriculture and cash crops.	89+ (at least one in every district)
Greenhouse gases	No comprehensive renewable energy program (2007)	Emissions per head are highest in developed countries. However emissions per head are rising rapidly in developing countries as a whole because of their rapid economic growth and their increasing share of energy intensive industries.	Increase investments in clean energy (section 4.11)
Number of tide monitoring stations	2 (2009)	A lack of sea level data would undermine planning efforts for adaptation and mitigation.	20
Climate change research	Limited	Lack of research has impeded the understanding of the implications of climate change for PNG. A strong awareness and education program will ensure people know about the impacts of climate change and thus enable them to build resilience to counter the impacts.	Well resourced
Multi-temporal remote sensed satellite image coverage	1 database system	There is a lack of monitoring of the natural and human built environment. This is needed to enhance planning, monitoring and reporting systems. Vulnerability, risk and cost benefit analysis can be undertaken through this.	20 database systems
Mangrove planting initiative	10,000 seedlings in 2009	The mangroves area in the Pacific islands is expected to decline by between 1% and 13% due to temperature increases of between 2°C and 4°C respectively.	50,000 seedlings

PNG's *Medium Term Growth Plan* (5 year plan 2011–2015) is the first of four rolling 5-year development plans to implement the Development Strategic Plan. The emphasis is on developing governance and institutional capacity along with essential infrastructure and policies required for PNG to advance productivity and improve the quality of life.

In March 2010, in order to implement key goals outlined in *Vision 2050*, PNG's Office of Climate Change and Development (OCCD) led the development, through a broad-based consultative process, of a Climate Compatible Development Strategy for Papua New Guinea (CCDS) that outlines key measures that will "shape development to be more climate resilient". The CCDS commits the Government to implement climate-compatible development, starting with the following priority actions:

- Climate change mitigation, adaptation, and low-carbon growth need to be incorporated into national development planning. Policies in other sectors will also have to be reviewed to ensure they are climate-compatible.
- Further research and analysis will be required in some areas, such as developing a comprehensive greenhouse gas inventory and enhancing understanding of climate risks.
- Many aspects of climate-compatible development require existing institutions to develop new capacities and ways of working. International support will be necessary to help develop these capacities.

- A new institution will have to be created to take charge of climate change policy at the heart of government in the post-Copenhagen reality. This office will be the Office of Climate Change and Development, replacing the Office of Climate Change and Environmental Sustainability. A high priority for this institution will be to develop a monitoring, reporting, and verification (MRV) system; fund disbursement mechanism; and benefit-sharing models that ensure benefits accrue equitably to resource owners.
- Pilot programs will be required to enhance the knowledge base, identify the most effective institutional arrangements, test the new policies, and build capacity.
- A large-scale consultation exercise will need to be launched to involve local communities and landowners in critical elements of the strategy, especially arrangements for benefit sharing.

The vision outlined in the CCDS (Figure 4) is climate-compatible development that has the potential to broaden the base of PNG's economy and reduce reliance on natural resource exports while enhancing the earning power of smallholder farmers and forest communities. Climate-compatible development will contribute to food security by enhancing agricultural productivity and to rural development through small-scale electrification, infrastructure development, and service provision.

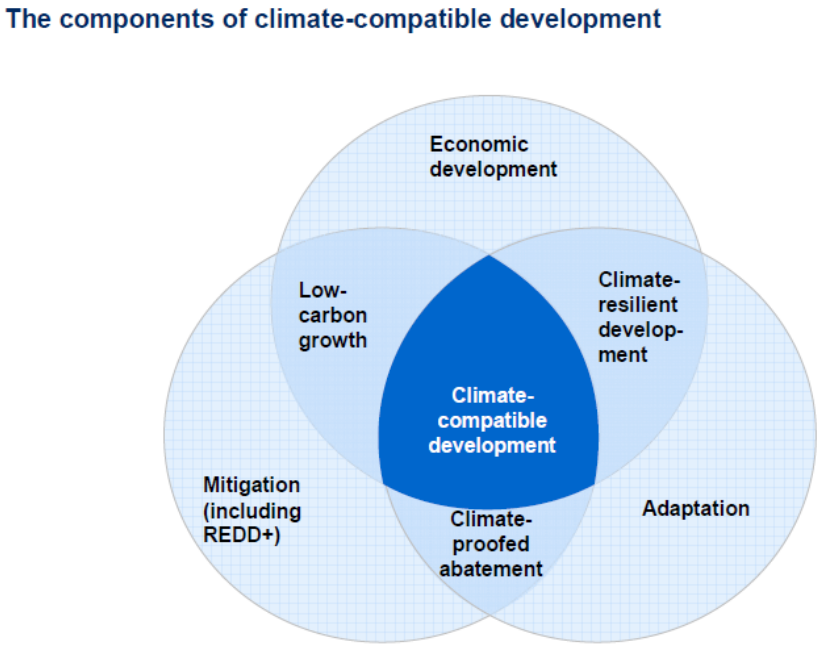


Figure 4: Components of Climate Compatible Development

With the preparation of the CCDS and related strategies and the establishment of the OCCD, substantial progress has been made at the policy and strategy level, and a commitment has been given to fast-track pilot programs in the future. This has enabled key priorities to be identified and a National Interim Action Plan for Climate Compatible Development (NIAP) to be developed (Annex 1). PNG also has a well-developed institutional framework for mainstreaming CCA (Annex 2). While this institutional framework is an important aspect of the effort to achieve operationalization of PNG's CCA plans and strategies, limited knowledge, tools, and capacity exist to undertake climate change risk management.

Assistance from development partners

The Government of PNG is the principal source (70%) of financing for development in the country. The largest source of external support for development assistance is from the Australian Government, followed by the Asian Development Bank (ADB)[25] and World Bank. The Government of PNG will continue to play the principal role in facilitating the transformation to climate compatible development as articulated in Vision 2050 and the CCDS, with international development partners playing a key role in providing strategic input in the form of resources and guidance. Most importantly, through continued cooperation on climate change programming that has been fostered under the Phase 1 PPCR process, international development partners will be better able to support OCCD and others responsible for climate change programming in PNG.

The European Union (EU) is supporting integrated water resources management and food security through support to the National Agricultural Research Institute in adaptation of agricultural technologies to climate change. UNDP-Global Environment Facility (GEF) is providing support to the Sustainable Land Management (SLM) program and the promotion of food security through the Pacific Adaptation to Climate Change (PACC) program.

Other donors and nongovernment organizations (NGOs) supporting climate change programs include the United States Agency for International Development (USAID), Japan International Cooperation Agency (JICA), Government of Finland, Wildlife Conservation Society, and Conservation International. In parallel with the donor programs, PNG is also receiving support from multilateral development bank (mainly World Bank and ADB) funded and implemented programs. The World Bank is assisting several programs, including building a more disaster and climate resilient transport sector, and a recently announced agricultural project building climate resilience in the sector. ADB is implementing major infrastructure projects incorporating climate proofing initiatives and a health sector capacity building program. Annex 3 provides an overview of the main development partner initiatives on CCA.[26]

Even given PNG's internal resources and the abovementioned external assistance, the country's current capacities and resources are still inadequate to deal in a systematic and integrated way with the challenges PNG faces from known vulnerability to climate change impacts. Hence, the design and implementation of PPCR supported investments will require close coordination with all development partners to ensure complementarity and avoid duplication of effort.

1.3 Participatory Process and Ownership in Developing the SPCR

Following PPCR guidelines, design of the SPCR was based on a participatory approach, emphasizing country-led ownership and collaboration of government, civil society (including the private sector and NGOs especially gender), communities, and development partners. All stakeholders have a distinct and critical role to play in the planning and implementation of CCA efforts; however, resources and capacity are limited, indicating that further support is needed. In PNG, both inland and coastal communities are affected by climate change and

[25] See section "Role of ADB" below.

[26] ADB, 2009. Mainstreaming Climate Change in ADB's Pacific Regional Department Climate Change Implementation Plan (2009-2015)

have different concerns and needs. The private sector[27] has an important role to play in ensuring that businesses respond to the challenges of climate change themselves, while recognizing that there are opportunities in providing CCA goods and services to communities and government. The SPCR planning process discussed these differing concerns, needs, and roles and these are reflected in the proposed SPCR investments. Annex 4 provides further details and a list of persons consulted.

The SPCR was developed through an extensive broad-based national consultative process. The process included assessments by sector thematic working groups, community consultations, a series of focus group meetings, and national consultative workshops that included representatives from key government agencies, vulnerable communities, civil society, and development partners and built upon the inclusive and country-driven process used to develop PNG's CCDS. The consultative process highlighted where the PPCR program could best support PNG's current national approach to CCA, including mainstreaming climate resilience into development planning.

Against this context, a five-step process was followed to identify systematically the priority areas for PPCR support. The steps and their outcomes were as follows:

- **Step 1: Stocktaking** of (a) policy, legal, and institutional frameworks for CCA planning and management in PNG (see Annex 2); and (b) current and proposed climate change programs and projects in PNG and the Pacific region (Annex 3). This step highlighted the range of development partner programs being provided to PNG and the need for improved donor coordination and national capacity building to better assist OCCD and other national agencies responsible for climate change programming.

- **Step 2: Assessment of Climate Change Risk** to estimate, evaluate, and rank climate change risks affecting individual vulnerable communities and sectors (Annex 5). The assessment used a multiple criteria analysis[28] to identify the priority climate change risks shown in Table 2. The assessment refined the vulnerability assessment undertaken by OCCD during the development of the CCDS and served to provide, for the first time, a ranking and rationalization for priority action.

[27] Initial discussions were held to engage the private sector through the International Finance Corporation (IFC), but local resources in PNG limited their ability to participate in SPCR development consultations and missions.

[28] The following criteria were considered by stakeholders to assess and prioritize climate change risks: magnitude of impacts; timing of impacts; persistence and reversibility of impacts; likelihood (estimates of uncertainty) of impacts and vulnerabilities, and confidence in those estimates; potential for adaptation; distributional aspects of impacts and vulnerabilities; and importance of the system(s) at risk.

Table 2 : Summary of Climate Change Risks Prioritized by Thematic Working Groups

Event Risks	Outcome Risks	Ranking of Risks (9 highest)
Sea-level rise and storm surge	Loss of low-lying coastal land on islands and atolls (Ahus, Catrets, Duke of York, Nissan, Siassi)	9
Increased incidence of extreme events	All private and public infrastructure impacted	8
Changes in rainfall patterns – increased flooding	Soil erosion and landslides	8
Changes in rainfall patterns – increased intensity of rainfall	Decreased crop yield affecting food security	7
Changes in rainfall patterns	Food security and the viability of fishing communities ((impacts on fish migration, fish nurseries, and fish stocks)	7
Sea-level rise and storm surge	Inundation of sago, mangroves, and other low-lying coastal agricultural land affecting food security	7
Changes in rainfall patterns (compounded by poor sanitation)	Increase in water-borne diseases (cholera, dysentery, diarrhea, and typhoid)	7
Sea-level rise and storm surge	Coastal service infrastructure and utilities damaged or destroyed	6
Sea-level rise and storm surge + increased precipitation	Increase in incidence of vector-, water-borne diseases	6
Changes in local and national temperatures regimes	Changes in agriculture yield and food security	6
Increased climate variability	Increase in pests and diseases, affecting natural resources and biodiversity	6

- **Step 3: Assessment of Capacity for Adaptation** focused on vulnerable sectors and communities and involved three elements: a household survey; an assessment of national capacity for adaptation (sectoral, community, gender, civil society, household); and a community, civil society and gender issues study (Annexes 4 and 6).

  The household survey highlighted risks concerning access to water in remote Islands, food security, the need to provide vulnerable communities with a social safety net in the form of micro-insurance and microfinance to address risks from climate change extreme events (floods, drought, landslides, crop damage, loss of fishery) affecting subsistence agriculture/fishery production, and the need for community-based early warning systems, community-based vulnerability/hazard mapping, and community risk management frameworks. Access to "fast start" financing for community-based adaptation projects was also identified as a priority. Insights from the national adaptive capacity assessment and community, civil society, and gender issues study served as the rationale to anchor an allocation of PNG's SPCR capacity building and community-based investments in component activities that target women, civil society, the private sector, and other vulnerable segments of society.

  The assessment of PNG's capacity for adaptation also highlighted the considerable progress made in implementing Stage 1 adaptation measures. However, while Stage 2 and Stage 3 adaptation measures have commenced they require considerable work and resources, with a priority focus on mainstreaming efforts in vulnerable communities and sectors, and building capacity for climate change risk management at the local level and in the private sector, which to date has not benefited from meaningful capacity building under the CCDS. The need to integrate climate change considerations into infrastructure design, building codes, and physical/coastal planning processes was identified as an urgent priority. Broad-based capacity building was also identified as a critical need.

- **Step 4: Definition of Priority Action Needs/Investments** was undertaken by stakeholders to ensure that proposed SPCR investments meet priority needs, support implementation of Vision 2050 and CCDS, and address current exposure to climate extremes/variability in vulnerable communities and sectors through targeted on-the-ground measures and capacity building. The priority investment options were documented and circulated to development partners and regional agencies to identify possible areas of overlap with programs that are currently being developed or implemented. Once feedback on proposed investment options had been received (Annex 3), stakeholders determined which gaps and priority needs could best benefit from SPCR support. Notably, climate change impacts on food security are one of PNG's priority risks/concerns, and a number of development partners are working to address impacts on agricultural production. However, a gap was identified in building climate change resilient fisheries at the community level. It was considered by stakeholders that PPCR investments could best be applied to address this priority gap.

- **Step 5: Resilience Assessment** was undertaken to ensure that proposed SPCR investments promote and enhance resilience in vulnerable communities, sectors, and nationally. The proposed investments were cross-checked against five "resilience" criteria. Does investment: (a) reduce exposure and sensitivity to priority climate risks? (b) enhance adaptive capacity at community, sectoral, and/or national levels? (c) enhance resilience of ecosystems? (d) enhance resilience of critical infrastructure? (e) have a positive impact on social capital, the quality of basic services, and natural resources that provide essential environmental services? The proposed investments met the majority of these criteria.

For the design of implementation modalities and to ensure sound, transparent, and timely management of PPCR programs and funds, the Government of PNG, MDBs, development partners, and regional organization representatives identified effective implementation arrangements, including the need for a program management unit (PMU). The need for a PMU was confirmed during the Second Joint Programming Mission in Port Moresby, 13–16 March, 2012.

1.4 Rationale for PPCR Support

PNG has considerable national government resources in the form of a government-financed annual $2.3 billion development program. However, PNG's significant vulnerabilities and limited knowledge capacities and tools for utilizing these resources require a systematic approach to piloting climate change and disaster risk resilience building.

Despite country commitment and the existence of a sound national strategy—the CCDS—the real task of implementing CCA at the operational level is in its infancy and climate change risk management is still to be integrated into policy, planning, and budgetary processes. Moreover, there is limited budget to meet even current priority development needs, let alone the cost of adaptation. The challenges are exacerbated on account of limited understanding of climate risks and a lack of technical capacity to integrate climate change risk management into planning processes. Further, there is no evidence of significant training at national, sectoral, or provincial/local levels to address this capacity constraint, although consultations held as part of developing the SPCR revealed a strong desire for the PPCR to support such efforts. In response to identified needs, legislation (*Climate Change Authority Act 2012*) is currently being finalized to provide OCCD with legal powers to undertake its role and also to set up a sustainable climate change financing framework—both priorities under Vision 2050. However, considerable capacity building will be needed within OCCD if the new legislation is to be implemented in a timely and effective manner. It is by addressing these priority areas that SPCR can best provide support to facilitate the mainstreaming of CCA into PNG's national climate resilient development program as defined in Vision 2050 and the CCDS. Accordingly, the implementation of the PNG SPCR will

- provide support for enhanced resilience to climate change for the Government's $1.2 billion annual investments under the District Support Implementation Program through appropriate adaptation measures, including building capacity of provincial/district governments and state-owned enterprises";
- build on the work already undertaken in PNG in integrating climate risk resilience into national planning processes;
- build on ongoing development partner supported national programs, and will scale-up and leverage climate change financing and investments; and
- provide best practices knowledge products and lessons learned for sharing with other Pacific countries.

The SPCR will undertake cost-effective interventions through 'enabling' and 'enhancing' activities. Their main effect on reducing climate change-related damages and risks will be based on public and private adaptation projects that are enabled and enhanced by activities supported under the SPCR. The SPCR components will facilitate both planned adaptation resulting from deliberate policy decisions, and spontaneous adaptation resulting from autonomous households and communities that can benefit from better access to information and funds. As such, these components will have a positive impact on the adaptation results

of private initiatives by facilitating market efficiency in solving adaptation challenges, and of public initiatives by providing authorities with the tools they need to design, plan, and implement their adaptation strategies.

Sustainability of SPCR interventions is critical if the PPCR is to achieve its long-term objectives. Fundamental to the sustainability of SPCR investments in PNG is the fact that the Government is the principal source (70%) of financing for development in the country and has demonstrated a high level of commitment to climate compatible development. The proposed SPCR interventions will support PNG's Climate Compatible Development Strategy (CCDS) and will become part of the national budgetary process (see section 2.5) that supports implementation of Vision 2050 through the Development Strategic Plan (2010–2030) and public investment plan (PIP). By providing much needed support for capacity building at the national, provincial, district, sectoral, and community levels, and for the tools for informed decision making on climate change risk management, SPCR investments will create a pool of expertise and knowledge to ensure the timely, effective, and sustainable implementation of PNG's CCDS.

ADB has a major role in PNG as a key development partner. Current ADB programming includes the PNG Highlands Region Improvement II project, which is improving accessibility to ports, markets, and livelihood opportunities through improved transport infrastructure and services, providing reliable access to domestic and international markets for rural produce (road drainage design is considering, and allowing for, higher rainfall as an impact of climate change); and the Town Electrification Investment Program, which is improving power supply to provincial urban centers. These programs provide ADB with experience in mainstreaming climate change considerations into government programs. The Pacific regional SPCR will complement the efforts of the PNG SPCR, through the support of the Council of Regional Organisations of the Pacific (CROP), by providing additional capacity support to implement the PNG pilot activities and by replicating lessons learned and best practices from PNG to other Pacific countries.

2. PROPOSED SPCR INVESTMENT PROGRAM AND SUMMARY OF COMPONENTS

2.1 Overview of Proposed SPCR

The SPCR builds on the achievements of the 'design and capacity building' undertaken during Phase 1 of the PPCR. Under Phase 1, the Government of PNG and other stakeholders had the opportunity to identify, through a formalized process, the impediments to integrating climate change adaptation into development planning and budgetary processes, and the enabling activities that will facilitate this change. Further, government, civil society, and private sector technicians and managers were trained to undertake semi-quantitative risk and capacity assessments and understand the language of and approaches used to develop CCA strategies.

The SPCR, building on the Phase 1 preparatory and design process, will achieve "transformational" change by supporting implementation of PNG's national strategies, outlined in its Vision 2050, DSP, MTDP, PIP, and CCDS to make PNG's development investments climate resilient, or to facilitate "climate compatible development" in PNG's own terms. The overall outcome of the SPCR will be the enhancement of PNG's resilience to climate change through improved access to resources, knowledge and tools and climate resilient infrastructure at the national, sectoral, district and community levels. These are prerequisites for effective social development, food security and overall poverty reduction. PNG's SPCR will support achievement of these key pillars for climate resilient development.

In seeking this transformation, the SPCR will address key impediments facing PNG's current efforts to implement Vision 2050, DSP, MTDP, PIP, and CCDS. These include

- inadequate resources (human, technical, financial) at national, provincial, district, community and sectoral levels to mainstream climate change risk management;
- inadequate knowledge and tools for mainstreaming of climate change risk management in key sectors (food security, health, critical infrastructure); and
- poorly designed, located or inadequately maintained infrastructure that is susceptible to climate change impacts.

SPCR support will be provided through three component activities as shown in Table 3.

Table 3: SPCR Components

Component	Activities	SPCR Support
1	Building climate resilient communities	Build climate- resilient communities by strengthening their capacity to address priority climate change risks
2	Addressing risks to food security	Address threats to food security from climate change impacts by piloting adaptation measures in vulnerable communities
3	Developing Climate resilient infrastructure	Strengthen the approaches to design, construction, operation and maintenance of selected ports/wharves/jetties and associated infrastructure to improve the resilience of vulnerable social and economic support systems to climate change impacts

Each component will address the key impediments noted above and listed in the schematic diagram (). The three components will be mutually reinforcing and will together achieve the purpose of the SPCR. As PNG's national strategies and agencies are focused on decentralizing to the district and provincial levels, the SPCR will also attempt to build resilience to climate change risks at those levels.

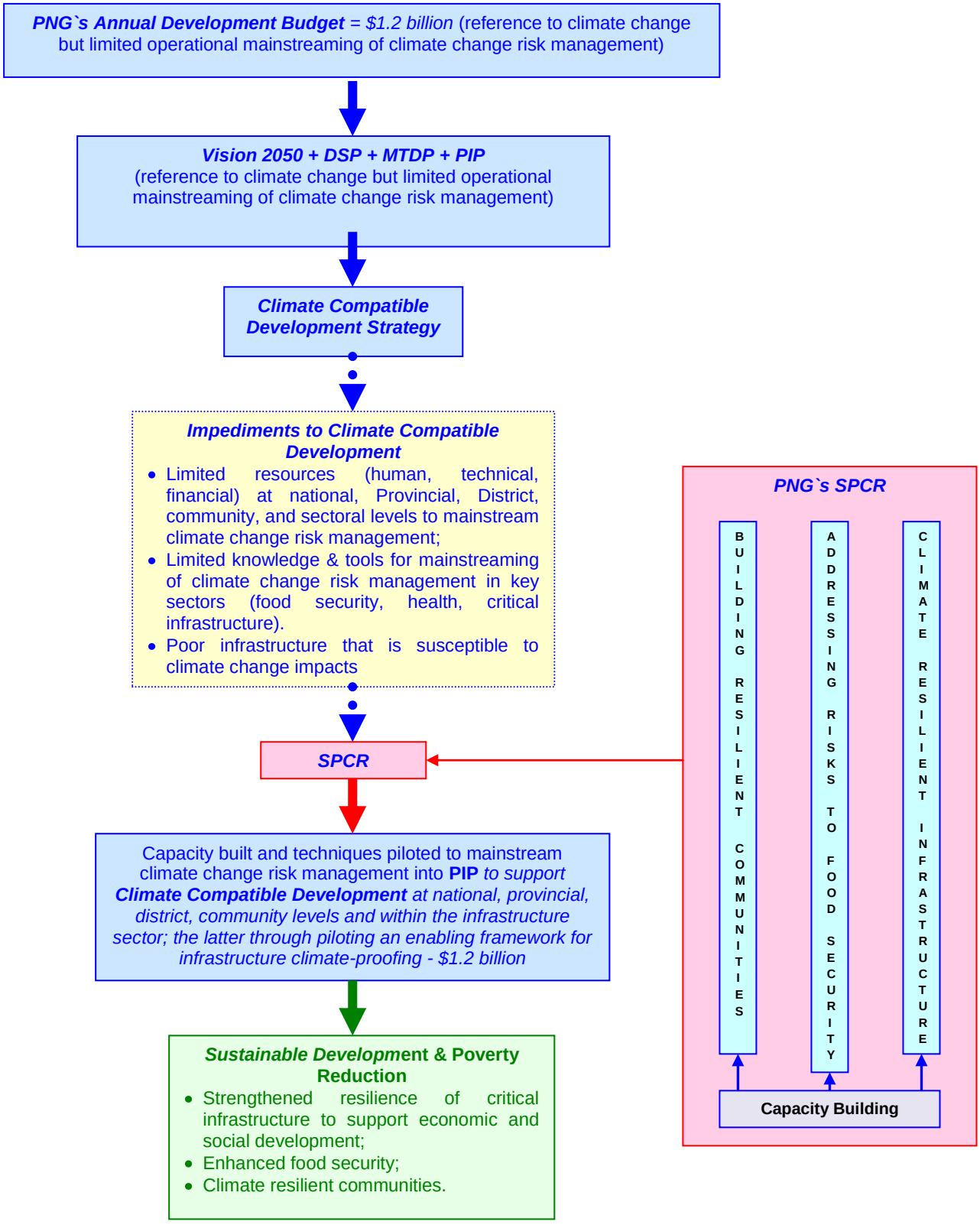

PNG`s Annual Development Budget = $1.2 billion (reference to climate change but limited operational mainstreaming of climate change risk management)
Vision 2050 + DSP + MTDP + PIP (reference to climate change but limited operational mainstreaming of climate change risk management)
Climate Compatible Development Strategy
Impediments to Climate Compatible Development
Limited resources (human, technical, financial) at national, Provincial, District, community, and sectoral levels to mainstream climate change risk management;
Limited knowledge & tools for mainstreaming of climate change risk management in key sectors (food security, health, critical infrastructure).
Poor infrastructure that is susceptible to climate change impacts
SPCR
PNG`s SPCR
BUILDING RESILIENT COMMUNITIES
ADDRESSING RISKS TO FOOD SECURITY
CLIMATE RESILIENT INFRASTRUCTURE
Capacity Building
Capacity built and techniques piloted to mainstream climate change risk management into PIP to support Climate Compatible Development at national, provincial, district, community levels and within the infrastructure sector; the latter through piloting an enabling framework for infrastructure climate-proofing - $1.2 billion
Sustainable Development & Poverty Reduction
Strengthened resilience of critical infrastructure to support economic and social development;
Enhanced food security;
Climate resilient communities.

Figure 5: SPCR Overview

The greatest risk to the sustained success of PNG's CCDS is from the limited in-house capacity in OCCD to assist provincial/local governments and vulnerable communities to manage pressing climate change risks. Community vulnerability mapping under the SPCR will only provide value if such maps can be integrated into the local area physical planning process to guide development planning and inform the design of coastal defenses and community resettlement plans. SPCR investments under Component 1 could be undermined if capacity building under the GEF-funded SLM project does not result in the establishment of an effective physical planning capacity at the provincial and district levels. It is proposed that SPCR investments address these risks by expanding and broadening the pool of CCA experts at the provincial, district, and community level, and in civil society.

High rural illiteracy amongst subsistence farmers/fishers presents a considerable risk to proposed SPCR investments under Component 2. The inability of subsistence farmers/fishers to access resources (human, technical, financial) needed to replicate successful management practices/techniques would present a considerable risk to the sustainability of SPCR investments if not for the access to such resources through the small grants program of the Climate Change Trust Fund being established under Component 1.

The principal risks that need to be addressed under Component 3 are the high turnover of qualified and trained staff in the public sector and state-owned enterprises, such as PNG Ports Corporation, which consistently undermines capacity building and sound programming initiative,s such as those proposed under the SPCR.

Summary of Components

The priority investments for support under PNG's SPCR are described below. Further details on the components are in Annex 7. They are based on priority risks and needs identified by stakeholders during the SPCR planning process (Annex 2), including inputs received from development partners and regional agencies outlining which priority needs are being supported under ongoing or planned projects, and consultations with the Government and other stakeholders to identify priority areas that still remain unfunded.

2.2 Component 1: Building Climate Resilient Communities

Objectives

The overall objective is to build climate resilient communities by strengthening capacity to address priority climate change risks.

Outputs/Outcomes

Outputs from Component 1 include:

- training materials and programs on community vulnerability mapping and adaptation planning;
- vulnerability maps for vulnerable communities on all atolls and islands;
- Climate Change Trust Fund and community grants program to support priority adaptation measures within vulnerable communities and sectors;
- community-based early warning systems in vulnerable communities;
- community emergency preparedness training material and programs;

Key outcomes are:

- the establishment of a pool of specialists (at the national, sectoral and community levels) -with complimentary input from the regional pool of experts established under the Pacific SPCR- supporting CCA mainstreaming activities;
- Improved access to and use of information and climate change risk management tools for vulnerable communities;

resulting in improved levels of preparedness and reduced levels of risk to climate change impacts amongst vulnerable communities.

Activities

Component 1 will support the following activities, which will be underpinned by a range of capacity building activities, including training and scholarships (see also Annex 7 which includes details on key indicators and baseline, anticipated activities, and investment costing).

.

- Training of and assistance to pilot vulnerable communities on low-lying islands and atolls to undertake **community climate change vulnerability mapping and adaptation planning.** Community adaptation plans developed through this process will define viable adaptation options, and may include relocation—develop or improve existing relocation plans (land ownership); addressing social-cultural, socioeconomic, and health issues; and viable coastal defenses (soft and hard engineering options), including land reclamation
- Establishment of the **Climate Change Trust Fund** (with funds raised from market-based instruments[29] that will not raise the local tax base and that shall be external to government revenue) to support the financing of priority CCA (and mitigation) projects[30] in vulnerable communities and sectors. SPCR will also provide $5 million in seed money to **establish a small grants envelope of the Climate Change Trust Fund** (modeled on the GEF Small Grants Program) to provide sustainable "fast start" financing that can be accessed by vulnerable communities to implement community adaptation plans and early warning systems developed under this component.
- Development of **community-based early warning systems** and the design and implementation of **community emergency preparedness training** and capacity building programs in island and community climate change committees.
- Support pilot activities in the trained pilot vulnerable communities to **determine the best mechanisms to address climate change health risks related to increases in water- and vector-borne disease.**

[29] Possible market based instruments that are being considered are a percentage of the LNG royalties that will be collected by government when the LNG development comes on stream in 2013. See also further detailed examples in Annex 7.

[30] SPCR seed resources (US$5 million) into the Trust Fund will only be used for adaptation programs.

2.3 Component 2: Addressing Climate Change Risks to Food Security

Objectives

The objective is to address threats to PNG's food security from climate change impacts by piloting adaptation measures that can be replicated in other vulnerable communities (see also Annex 8 which includes details on key indicators and baseline, anticipated activities, and investment costing).

Outputs/Outcomes

Outputs from Component 2 include:

- training materials and programs on food processing, preserving, and storage and the development of climate resilient fishery at the community level;
- food processing, preserving, and storage systems in seven vulnerable districts;
- climate resilient fishery in vulnerable communities.

Key outcomes are strengthened capacity and improved access to resources to address climate change risks to food security in vulnerable communities.

Activities

Component 2 will support the following:

- Design/establishment of pilot **food processing, preserving, and storage systems** in seven vulnerable districts and expansion of existing systems in food processing (downstream processing, postharvest technology, food preservation), as well as preservation and distribution of planting material. This activity will be undertaken in collaboration with other initiatives (UNDP/FAO, EU, and the SPC Regional Centre for Pacific Crops and Trees).

- Undertake **ecosystem-based climate resilient fisheries management** in pilot vulnerable communities, including measures to reduce pollution of water and coastal resources; promotion of climate change risk management awareness and sustainable fishing practices; monitoring impacts of climate change on fishery resources; establishing restocking programs; and improving storage, processing, and marketing of fish produce.

The capacity building elements of this component include training for vulnerable communities and NGOs to design/establish pilot food processing and preserving techniques and storage systems, undertake ecosystem-based climate resilient fisheries management, and develop tools and training modules based on lessons learned.

2.4 Component 3: Climate Resilient Infrastructure

Objectives

The objectives are to strengthen the design, construction, operation, and maintenance of selected ports/wharves/jetties and associated infrastructure in order to improve the resilience of vulnerable social and economic support systems to climate change impacts while climate proofing existing critical infrastructure (see also Annex 9 which includes details on key indicators and baselines, anticipated activities, and investment costing).

Outputs/Outcomes

Outputs from Component 3 include:

- Climate Change Risk Management Policy and strategy for the PNG Ports Corporation and Provincial/District Governments;
- site specific climate change risk models and vulnerability assessments for the ports/wharves/jetties and associated infrastructure under the management of the PNG Ports Corporation and Provincial/District government;
- revised building codes and engineering design criteria relevant to the design, location, building, operation and maintenance of ports/wharves/jetties (and associated infrastructure) to address climate change risks based on site specific climate change projections;
- training materials and programs for engineers, architects, developers and planners on the climate proofed building codes relevant to ports/wharves/jetties (and associated infrastructure);
- training materials and programs on climate change risk management for PNG Ports Corporation staff;
- training materials and programs on climate change risk cost / benefit analysis for Department of Treasury, Department of Finance and Planning, Office of Rural Development and Implementation, and Department of Transport;
- climate change risk cost / benefit analysis for PNG Ports Corporation assets and operations;
- climate change risk management education and awareness materials and training programs for PNG Ports Corporation and Provincial/District Government;
- climate change risk financing for ports infrastructure.

The key outcome is critical coastal infrastructure that is less vulnerable to impacts from climate change and disasters.

Activities

The main component 3 activity is the establishment of an “enabling framework” for climate proofing ports/wharves/jetties (and associated infrastructure) and integrating climate change risk management into the day-to-day operations of the PNG Ports Corporation and within provincial/district government, thereby establishing a risk management framework that can be replicated in other key infrastructure agencies. PNG Ports Corporation currently manages all ports, wharves, and jetties in PNG, but since becoming a state-owned enterprise has embarked upon a program to divest responsibility for wharves and jetties to the provincial and district governments. SPCR interventions will support the assessment of climate change risks on ports, wharves, and jetties, and build capacity in PNG Ports Corporation and at the provincial/district levels to manage effectively the risks associated with such critical infrastructure.

The capacity building elements of this component include design/implementation of climate change risk assessment/management capacity building and training programs (supported by scholarships) for Departments of Treasury, Finance and Planning, the Office of Rural Development and Implementation, and the Department of Transport to support the integration of climate change risk management into national, sectoral, provincial, and district budgetary processes relating to the climate proofing of infrastructure. This component may blend PPCR resources with ongoing ADB projects including Loan 40173-01-PNG Highlands Region Improvement II and Loan 2242/2243-PNG Road Upgrading Sector Project.

2.5 Budget

Total budget for PNG's SPCR is $25 million (grant). Allocations by component are summarized below.

Table 4: Component Budgets

Component Activities	Budget Allocation ($ million)
Component 1	
Training of and assistance to pilot vulnerable communities on low-lying islands and atolls to undertake community climate change vulnerability mapping and adaptation planning**.**	2.00
Establishment of a Climate Change Trust Fund and provision of $5 million in seed money to establish a small grants envelope of the fund.	5.10
Development of community-based early warning systems and the design/implementation of community emergency preparedness training and a capacity building program in climate change risks management within island and community climate change committees.	1.00
Pilot activities to determine the best mechanisms to address climate change health risks related to increases in water- and vector-borne disease.	1.65
Component 1 Total	**9.75**
Component 2	
Design/establishment of pilot food processing, preserving, and storage systems in seven vulnerable districts and expansion of existing systems in food processing (downstream processing, postharvest technology, food preservation), and preservation and distribution of planting material.	3.00
Establishment of pilot ecosystem-based climate resilient fisheries management in pilot vulnerable communities.	4.00
Capacity building, which includes training for vulnerable communities and NGOs to design/establish pilot food processing and preserving techniques and storage systems, undertake ecosystem-based climate resilient fisheries management, and develop tools and training modules based on lessons learned.	0.25
Component 2 Total	**7.25**
Component 3	
Establishment of an “enabling framework” for climate proofing ports/wharves/jetties (and associated infrastructure) and integrating climate change risk management into the day-to-day operations of the PNG Ports Corporation and in provincial/district governments.	4.50
Capacity building, including design/implementation of climate change risk assessment/management capacity building and training programs (supported by scholarships) for the Department of Treasury, Department of Finance and Planning, Office of Rural Development and Implementation, and Department of Transport to support the integration of climate change risk management into national, sectoral, provincial, and district budgetary processes relating to the climate proofing of infrastructure.	1.50
Component 3 Total	**6.00**
Establish and staff a project management unit to implement the SPCR.	2.00
Total Budget	**25.00**

2.6 Implementation Arrangements, Coordination, and Results Management

National SPCR and Regional SPCR linkages

The national PPCR components will be the main drivers, with relevant regional activities selected to support them by efficiently providing technical support and by synthesizing and communicating the lessons learned and best practices for the benefit of all countries in the region, especially those that are outside the scope of national PPCR pilots.

The Pacific regional SPCR builds upon work undertaken by PNG—with technical support provided by the Secretariat of the Pacific Community (SPC), the Secretariat of the Pacific Regional Environment Programme (SPREP), and the Pacific Islands Applied Geocience Commission (SOPAC, a division of SPC)—to support transformation to a climate resilient development path. The analytical processes and stocktaking exercises undertaken for the preparation of PNG's SPCR have identified particular activities that need to be implemented at the local, provincial, sectoral, and national for timely and effective transformation to a climate resilient development path. Based on this analysis, SPCR supported work in PNG will aim to

- demonstrate climate change risk management mainstreaming approaches at the community level,
- promote climate proofing of ports/wharves/jetties (and associated infrastructure), and
- provide best practice examples of mainstreaming climate change risk management that can be replicated and expanded through the regional SPCR using piloting and demonstration methodologies.

The regional SPCR will build on capacity building technical assistance to be provided by CROP agencies under the national PPCR program in PNG that supports

- community vulnerability mapping and adaptation planning, tied to the development of community-level, early warning systems that are to be integrated into PNG's physical planning processes;
- integrating CCA and disaster risk management (DRM) into land-use planning processes;
- integrating CCA and DRM into the operations of key infrastructure agencies and climate proofing the assets (ports/wharves/jetties and associated infrastructure); and
- integrating CCA and DRM into fisheries management to address urgent food security issues.

A principal synergy between the national and regional PPCR programs is the establishment of a regional technical support mechanism (RTSM) consisting of a pool of CCA experts who can be deployed in support of national and regional PPCR activities. The regional experts are to be financed under the national PPCR programs to provide immediate support to the national PPCR programs in PNG, Samoa, and Tonga. The RTSM will develop a network of experts from a range of organizations, including CROP agencies, who will work together to provide services to support the effective implementation of the three national PPCR programs on a needs basis and in a cost-effective way. The experts' network will advise on appropriate resource opportunities, strategic approaches, and technical assistance, and provide, where necessary, support in developing project concepts and proposals, preparing reporting requirements, and in project monitoring and evaluation. This support will be particularly relevant for PNG, Samoa, and Tonga, to overcome extreme capacity constraints and reduce transaction costs in mobilizing and effectively implementing CCA financial and technical resources.

The Pacific regional SPCR will also support priority CCA capacity building needs identified by PNG, namely for the establishment of an effective climate change financing framework to implement urgent climate change adaptation measures at the community and national level, and for civil society.

Management of SPCR Components

OCCD and the Department of National Planning and Monitoring (DNPM) will be responsible for overall coordination of SPCR implementation across Government, and for overall SPCR program monitoring and oversight. DNPM will ensure policy compatibility of the SPCR with the CCDS and DSP and ensure integration into the PIP process. The Department of Treasury will have responsibility for the grant agreement financing arrangements and will receive the grant funds in order to provide them to the recipient agencies. The Department of Finance will have oversight of project accounts and related reporting. OCCD will report to the National Climate Change Committee of Cabinet (NCCCC) to provide regular reports on SPCR implementation and administration. The Climate Change Steering Committee (Secretary-level) will provide guidance on SPCR implementation to OCCD/DNPM. The technical working groups (TWGs) will provide technical input during SPCR implementation from other agencies at the working level. Existing government–nongovernment partnership mechanisms (technical working committees formed on an issue by issue basis) will ensure that non-State actors, such as civil society and private sector, are able to fully participate in SPCR implementation.

An SPCR program management unit (PMU), separate from but working in close collaboration with the Global Facility for Disaster Reduction and Recovery (GFDRR) Steering Committee located in OCCD, will be established, with individual consultants[31] for the PMU engaged under the Asian Development Bank (ADB) *Guidelines on the Use of Consultants*. The PMU will be located in OCCD, work closely with DNPM and infrastructure agencies and local authorities, and focus on implementation of the SPCR and mentoring of counterpart government staff, as well as public outreach and awareness on the SPCR program. The PMU will coordinate with the two GFDRR Project PMUs located in the Department of

[31] Disciplines and expertise will be determined during detailed project preparation and may include: Program Manager/climate change adaptation specialist; training specialist; climate change infrastructure specialist; physical planner; procurement specialist; accountant/book-keeper.

Agriculture and Department of Works, respectively, to avoid duplication. Operational details will be finalized during detailed project design.

The SPCR will be integrated into the national planning process. According to the PNG Constitution, each fiscal year the National Budget comprises estimates of finance proposed to be raised and estimates of proposed expenditure by the Government for the fiscal year. Expenditure is defined through government revenue, grants, and loans. The Public Finance Management Act (PFMA) states that any development assistance from development partners or financiers, including the SPCR, be stated in the appropriation bill and approved as development assistance under the PIP component or the development budget component of the National Budget. The responsible agency must guide the Departments of Treasury, Finance, and National Planning and Monitoring, on the SPCR, and incorporate it through the Appropriation Bill to be passed in parliament, thus ensuring the SPCR is protected and safe-guarded by the necessary legal instrument as an Act of Parliament via the National Budget. The PFMA legally ensures the reporting and monitoring process of programs within the National Budget. The National Budget has two components: (a) recurrent expenditure and (b) development expenditure or the PIP. The SPCR will be presented in the PIP so that it is protected by an Act of Parliament and subject to the PFMA.

Role of ADB

ADB programming in support of the PNG Government's development strategy has provided ADB with an understanding of the challenges and opportunities of working in PNG. ADB has a strong development partnership with the Government. Current ADB programming under its transport investments for roads and ports, as well as town electrification and rural health development, provides a clear understanding of the challenges involved in mainstreaming climate change considerations into government operations. Technical assistance to climate proof transport and power assets contributes to this understanding. These various interventions provide an opportunity to strengthen the capacity of various government departments, at the national, provincial, and local levels, by introducing climate change considerations into planning and budgeting processes.

ADB developed the Climate Change Implementation Plan (CCIP) for the Pacific in 2009. It defines the strategic program for mainstreaming climate change considerations into country programming. In pursuing CCIP objectives, ADB has supported the piloting of practical adaptation measures in the Pacific, including pioneering initiatives aimed at building climate change risk management capacity at the community level.

ADB has been operationalizing CCA and DRM for some years—both internally in ADB operations and in country programming— and has developed within ADB operations the tools, institutional frameworks, and approaches to mainstream CCA. In PNG, there is an opportunity in the context of this SPCR to draw on this knowledge to assist the Government to mainstream climate change considerations into its development operations based on lessons learned in developing the climate change enabling framework within ADB and its country programming. ADB's constructive relationship with the Government positions it well to work with the Government to introduce these elements into national planning processes.

ADB, through the SPCR planning process, has begun to foster improved coordination on climate change programming among development partners. The SPCR implementation program will consolidate this coordination process in order to rationalize and deliver effective coordination on CCA programming.

ADB's on-the-ground presence in Port Moresby through a resident mission underpins its strong relationship with the Government and development partners. This relationship facilitates quick responses to issues of mutual interest, as well as knowledge sharing.

Roles of Development Partners and Regional Organizations

Other donors and international agencies will continue to be consulted during PNG's SPCR implementation to ensure alignment with existing and planned donor programs, and incorporation of lessons learned to future climate change programs being developed for PNG and the region. These organizations were consulted during development of the SPCR and will continue to be engaged during day-to-day discussions on the implementation of specific program components and through existing national and regional mechanisms, such as PNG donor roundtable meetings, Pacific Climate Change Roundtable, and regional Development Partners for Climate Change meetings.

SPCR Results Management and Knowledge Management

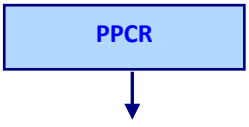
The program's Results Framework is attached as Annex 10. This is a strategic framework that summarizes the expected overall results, indicators, baseline, targets, and means of verification of the project. A detailed design and monitoring framework, including outcomes and outputs, for each component will be developed during the detailed project preparation stage of the project.

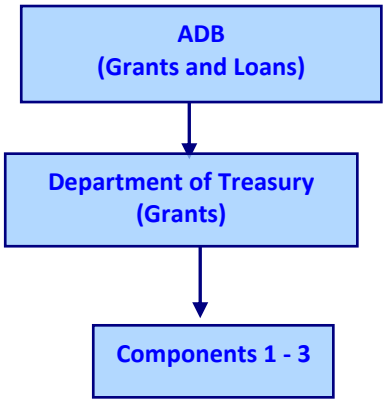
The preliminary Results Framework presents the overall impact of the SPCR with its component projects. The impact is increased resilience of PNG to climate change risks. To support the achievement of impact, the three components address the challenges PNG faces in implementing a programmatic approach to address climate change risk management. The expected outputs of these components are (i) building climate resilient communities, (ii) strengthened resilience to food security risks from climate change, and (iii) climate resilient infrastructure.

SPCR investments incorporate a commitment to improved data capture and analysis -in particular geospatial- for improved management of physical planning and sharing lessons (e.g. in country and with regional initiatives). This will be critical for monitoring progress and results. SPCR implementation activities will be documented – on SPCR websites maintained by Government of PNG and under the Pacific SPCR – for dissemination of best practices and lessons learned to other Pacific Island Countries, including participating PPCR countries, and SIDS. The Government of PNG will provide periodic reports to CIF and share lessons learned with other countries through CIF instruments such as the CIFNet website, PPCR pilot country meetings, and regular engagement with other Pacific countries under the regional track SPCR program. PNG will also share lessons internally learned during SPCR implementation through periodic workshops and focus group meetings with key stakeholders to take stock of progress. Detailed information on specific knowledge management activities will developed during detailed project design.

Fund flows

The following table summarizes the proposed flow of funds for approved SPCR investments.





3. PROJECT PREPARATION GRANT

The SPCR proposes a comprehensive package of technical assistance and capacity building activities to be financed under the PPCR. The request for the project preparation grant is attached as Annex 11.

Annex 1

Key Priorities of the National Interim Action Plan for Climate Compatible Development (2011–2015)

The Papua New Guinea (PNG) Government has approved a National Interim Action Plan for Climate Compatible Development (NIAP). The following gives an overview of the NIAP, the priorities, and how it is implemented.

OFFICE OF CLIMATE CHANGE AND DEVELOPMENT (OCCD)

The OCCD plays a secretariat role in the National Climate Change Committee (NCCC) and is tasked with coordinating and facilitating all climate change interventions in PNG as per the Corporate Plan of the Office. All climate change interventions are guided by the NIAP. There are 7 priority interventions identified in the NIAP.

- Institutional changes and capacity building
- Strategy and policy development
- Monitoring, reporting and verification
- Models for compensation and benefit sharing
- Consultation and communication
- Funding
- Implementation and coordination for pilot initiatives and programs in mitigation and low-carbon growth, and adaptation initiatives.

The OCCD was founded in March 2010 by Cabinet decision 54/2010. Over the past 24 months the office has achieved significant progress in the following areas:

(i) **Strategy and Aspirations***:* Developed guiding documents.

- Created the fact base i.e., quantified PNG's greenhouse gas emissions and evaluated and quantified climate change threats for PNG.
- Developed the first Climate Compatible Development Strategy (CCDS).
- Completed the Interim Action Plan to guide the activities of OCCD in the next 3 years.

(ii) **Funding**: Securing long-term climate change funding.

- Developed a systematic approach to tap into all available international climate change funds from bilateral and multilateral development partners.
- Secured K60 million ($26.57m) of funds in cooperation with other departments from the United Nations REDD, Japan, Australia, Global Environment Fund (GEF), GIZ, and the European Union (EU).
- Further K90 million ($39.85m) of proposals currently in the pipeline, including Adaptation Fund, Asian Development Bank (ADB), British Foreign and Commonwealth Office (FCO), Pilot Program for Climate Resilience (PPCR), World Bank Forest Carbon Partnership Facility (FCPF) and Forest Investment Program (FIP), and United States Agency for International Development (USAID).
- However, disbursement of funds will only start in late 2012 and early 2013. In the meantime, OCCD will require significant funding support through the Government budget.

(iii) **Office Set Up**: Created OCCD and NCCC in a record time of 5 months.

- *Recruiting*: Hired all professional staff within 5 months and remaining staff by end of 2010.
- *Governance Structure*: The NCCC has been created and chaired by the Chief Secretary. The Ministerial Committee will be chaired by the Deputy Prime Minister and Minister of Climate Change.
- *Performance Management*: Developed a comprehensive evaluation grid to review the performance of OCCD staff and conducted 'firm but fair' semi-annual evaluations of all staff, which result in immediate rewards and also consequences.
- *Capability Building*: Developed a tailor-made capability building program to ensure that all staff acquire the respective skills needed, including quarterly training workshops and bi-weekly training sessions.

(iv) **Consultation**: Started a broad based national consultation effort.

- *TWGs:* Created technical working groups (TWGs) for all important content topics (e.g., REDD+; monitoring, reporting, and verification [MRV]; agriculture and Special Agriculture and Business Leases *[*SABLs]; and mangroves) to ensure support at the working level from other departments, industry, nongovernment organizations (NGOs), and development partners.
- *Provincial Consultation:* Organized 7 provincial consultation events, including provincial and local level governments, churches, NGOs, and PNG society
- *Additional Consultation Efforts:* To reach the broader public, the Office has conducted multiple other consultation events and channels that allow them to reach large parts of the PNG population and also the international community. These activities include regular email newsletters, the OCCD homepage, which has been operational since June 2011, school engagement sessions and University student-led awareness programs.

(v) **Adaptation**: Start implementing first measures against coastal flooding

- *Coastal Early Warning System:* Together with Digicel, OCCD created a Coastal Early Warning System in a private-public-partnership. This system was successfully tested during the tsunami caused by the Japanese earthquake in March 2011. More than 300,000 SMS were sent to Digicel subscribers at the coastline.
- *Mangroves*: Took stock of existing mangrove planting/rehabilitation activities to protect coastal communities
- *Seawalls*: Secured funding for detailed feasibility studies to protect PNG's economic centers against coastal flooding.

(vi) **REDD+**: *Conducted detailed analysis of SABLs and created key documents*

- *SABLs*: In March 2010, the Climate Compatible Development Strategy identified SABLs as the largest source of future greenhouse gas emission due to the large scale conversion of forest. This concern triggered intensive research into the topic of the SABLs and OCCD compiled a solid fact base of the magnitude of the problem. Based on this fact base, OCCD started to obtain the buy-in from relevant stakeholders to review the SABLs in more detail.
- *Key Documents*: Developed key documents such as the REDD+ roadmap, REDD+ project criteria, FPIC guidelines, etc.

Important priorities for 2011/2012:

- *Climate Change Act*: Finalize and pass a climate change act as the legal framework for all climate change related activities in PNG.

- *Corporate Plan*: Launch the Corporate Plan.
- *Pilot Projects*: Start pilot projects jointly with other departments, NGOs, and private sector.
- *Consultation*: Continue consultation, especially with provinces.
- *Governance Structure*: Launch the Ministerial Committee, chaired by the deputy prime minister, and the International Advisory Board.
- *International Negotiations*: Participate in international negotiations, e.g., the 17th Conference of the Parties (COP17) in Durban; and ongoing discussion in PNG, e.g., monthly development partners' forum.

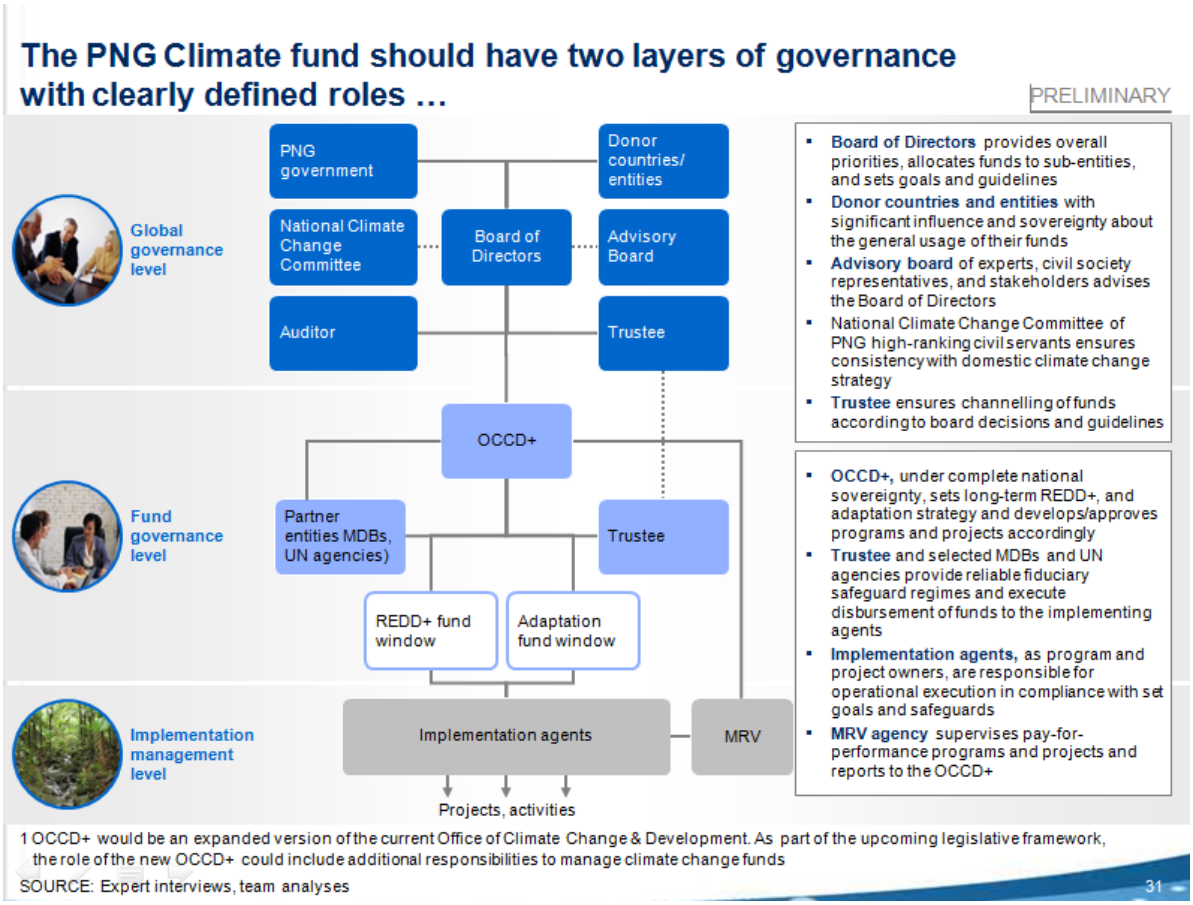
PROJECTS UNDERWAY

1. Climate Investment Fund – Pilot Program on Climate Resilience, World Bank Funded and Implemented by ADB
2. AusAID - Bilateral support for NGO community-based adaptation activities; Wildlife Conservation Society - Strengthen the ability of vulnerable island communities to adapt to climate change (Manus).
3. AusAID - Regional funding for NGO community projects; The Nature Conservancy - Building resilience in communities and their ecosystems (Manus and New Ireland).
4. Pacific Adaptation to Climate Change (PACC) - Pilot site in PNG (Kivori, Central Province) relocated to higher ground due to detection and evidence of sea level rise and storm surges impacts.
5. OCCD small grants projects: Dry stone wall pilot project, partnering Wildlife Conservation Society (WCS) in Andra, Manus, Central and Western Highlands, Wahgi River
6. Coral Triangle Initiative (CTI)–USAID activities in Manus and Kimbe: coastal resource management and mangrove planting and vulnerability assessment
7. African, Caribbean, and Pacific Observatory on Migration (IOM/ACP) - Migration and relocation due to climate change, case studies
8. Global Fund on Disaster Risk Reduction - Project Building a More Disaster and Climate Resilient Transport Sector.
9. Japan (JICA) 2012–2014: Building a More Disaster and Climate Resilient Transport Sector project.
10. South Pacific Regional Environment Programme (SPREP) under the FINPAC Project (Finland–Pacific project on reducing vulnerability of PICs livelihoods to the effects of climate change).
11. AusAID - Bilateral support for NGO community-based adaptation activities; Conservation International - Boosting traditional approached to food security in PNG (Milne Bay).
12. AusAID - Regional funding for NGO community projects; Live and Learn - Food security through adaptation to climate change (WNB).
13. The EU climate change project implemented by the National Agricultural Research Institute (NARI) "Adaptation to Climate Change Associated Risks."
14. USAID grant to the SPC to enhance food security through capacity building and pilot demonstration projects. The project will also support SPC's Climate Ready Crop Collection program in identifying food crop genotypes that have climate resilient traits.
15. AusAID-supported CTI will strengthen marine management generally in PNG and across the Pacific region.
16. Korea International Cooperation Agency (KOICA): Malaria and Vector-Borne Disease in Eastern Highlands and Central Province.

OCCD has coordinated and facilitated the implementation of these activities through relevant and appropriate agencies.

PNG CLIMATE CHANGE TRUST FUND

OCCD has undertaken consultations both internally and external on the need for and modality to set up a trust fund, as shown in the following diagram.



MONITORING and EVALUATION

The monitoring of annual activities of programs and projects is done through the specific requirements outlined by the Finance Management Act, grant agreements, and the NCCC, including quarterly progress reports from OCCD to all partners, development partners' reports, day- to-day monitoring reports to the director, reports from technical working group, mid-term/annual review, and audit.

COMMUNICATION STRATEGY

- Awareness Raising
- Website, Facebook,
- Newsletters, e-newsletters
- Brochures
- Posters
- Drama

- TV and radio programs
- Meetings: Stakeholders – committees, communities, donor roundtable.

CHALLENGES AND WAY FORWARD

There are numerous challenges faced by the OCCD in delivering its program and coordinating all the different activities that are underway or planned. The following highlight key challenges:

- capacity building and policy reforms
- donor coordination and harmonization
- stakeholder coordination and harmonization
- consistency in participation
- Paris declaration on aid effectiveness
- procurement policies [implementation plan].

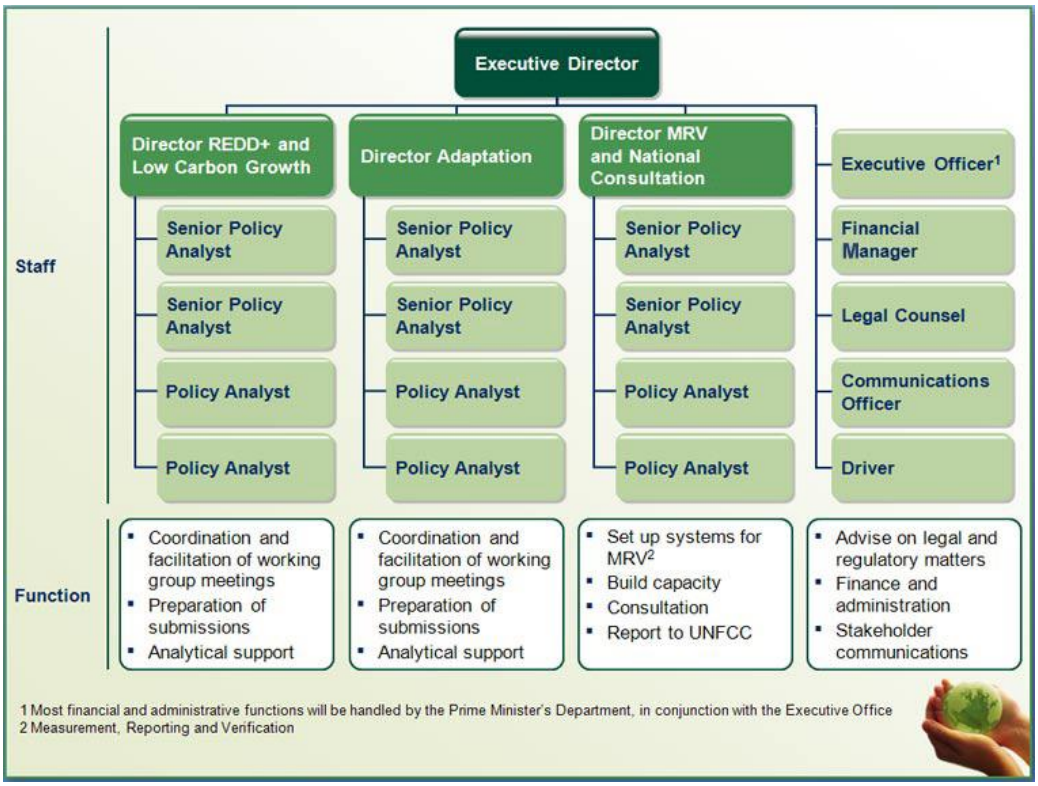
Annex 2

Institutional Framework for Mainstreaming Climate Change Adaptation

The Office of Climate Change and Development (OCCD) was established in September 2010 and replaced the former Office of Climate Change and Environmental Sustainability (OCCES) that was abolished by Cabinet in 2009. OCCD, with 20 staff, is the coordinating agency for all climate change related policy and actions in PNG, and the designated National Authority under the United Nations Framework Convention on Climate Change (UNFCCC) which the country signed in June 1992 (ratified March 1993). The OCCD comprises three divisions: (REDD+ and Low Carbon Growth Adaptation; Monitoring, Reporting, and Verification (MRV); and National Consultation), each headed by a director (Figure A1).

Figure A1: Organizational Structure of the Office of Climate Change and Development

Organizational Structure of OCCD



OCCD's mandate is derived from the Cabinet decision in 2010 which specifies that

- National Climate Change Committee (NCCC) and the OCCD as its Secretariat take full responsibility and exclusive responsibility to coordinate and facilitate policies, initiatives, and actions under Pillar Five of *Vision 2050.* Pillar Five of the seven key pillars outlines the vision for environmental sustainability and climate change;
- OCCD engages and involves all stakeholders to build a common vision and pathway on action to tackle climate change;
- OCCD works in close collaboration with, and in support of, other departments and agencies to achieve these goals.

The current area of focus for the OCCD is completing a detailed analysis of three climate change threats (coastal flooding, inland flooding/landslides, and impacts on human health) to identify viable adaptation measures.

The NCCC coordinates a whole-of-government approach to climate change. The NCCC's objective is to decide on climate change action and policy in PNG, with OCCD acting as its Secretariat and the coordinating agency. The NCCC is complemented by a ministerial committee and advisory board with membership drawn from individual and national experts to provide independent advice. The NCCC brings together sector heads of all government departments/agencies that are affected by climate change and is chaired by the Chief Secretary, PNG's highest ranking public servant. The NCCC comprises

- →Department of Agriculture and Livestock
- →Department of Environment and Conservation
- →Department of Foreign Affairs
- →Department of Justice
- →Department of Lands and Physical Planning
- →Department of National Planning and Monitoring
- →Department of Personnel Management
- →Department of Petroleum and Energy
- →Department of the Prime Minister and National Executive Council
- →Department of Treasury
- →National Fisheries Authority
- →Office of Climate Change and Development
- →PNG Forest Authority.

The advisory board provides independent advice to the NCCC and consists of national and international climate change experts. The ministerial committee is chaired by the Prime Minister and attended by senior members of the National Executive Council (NEC), including the ministers of Treasury and Finance, National Planning, Foreign Affairs, Environment and Conservation (DEC), Forestry, Agriculture and Livestock, the Attorney General, and others as may be necessary. The ministerial committee oversees the Government's activities with respect to Pillar 6 of the Vision 2050 on Climate Change and Environmental Sustainability, gives direction and guidance to the OCCD, the DEC and the technical working groups (TWGs) on the development of policies and pilot programs and potentially legislation. The committee also ensures that policies, procedures, and legislative instructions are transparent and conducive to climate-compatible development, and advises the NEC on the suitability of experts for inclusion on the Climate Change Advisory Board or boards. The committee facilitates consultation with the ministerial sector committees and determines final proposals to be made to the NEC on climate change policy, legislation, and institutions.

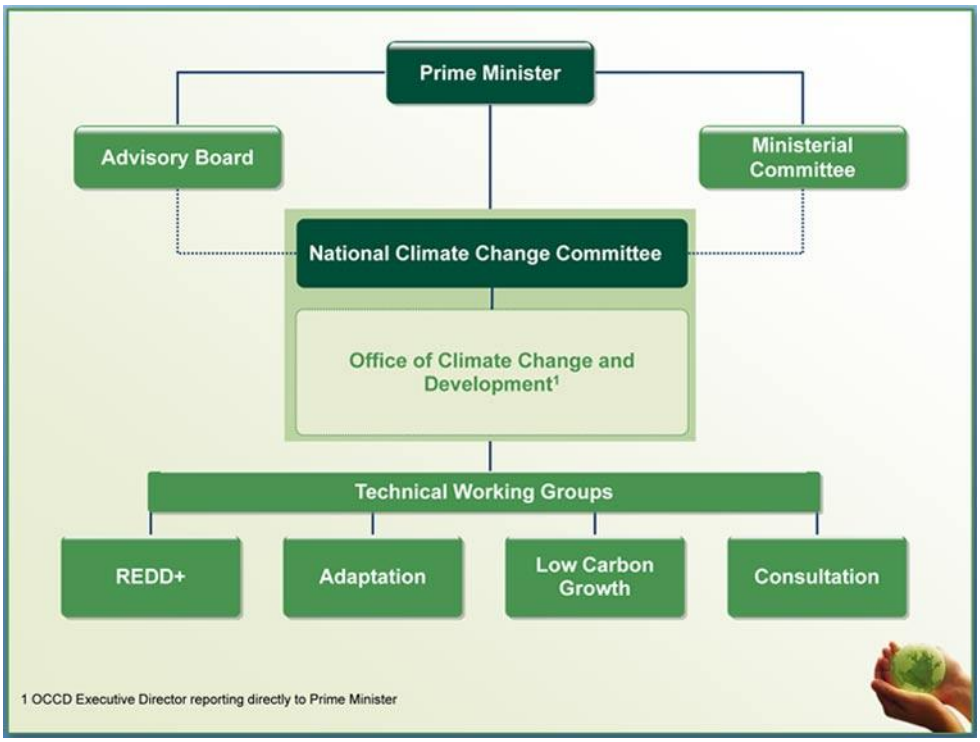
The OCCD ensures multi-stakeholder participation and input through the TWGs, which comprise government departments, the private sector, civil society, and development partners to ensure that a broad range of perspectives is considered in the OCCD's work. There are currently four TWGs, of which those on REDD+ and Adaptation and Low-Carbon Growth have met regularly since 2010 to guide OCCD's work on climate change.

Additionally, a Development Partners Climate Change Taskforce (DPCCT) has been established with members drawn from both development partners and senior staff across government agencies, including agencies represented on the NCCC and the adaptation TWG, to facilitate improved development partner coordination on climate change programming. Development partners invited to attend the DPCCT are:

- Asian Development Bank
- Australia
- European Union
- Japan
- New Zealand
- United Nations Development Programme
- United Kingdom
- World Bank Group.

PNG's Strategic Program for Climate Resilience (SPCR) was developed through a broad-based consultative process with input and guidance provided by this existing institutional structure, shown below.

Governance Structure



Annex 3

Overview of the Main Development Partner Initiatives on Climate Change Adaptation

Extensive consultation with development partners was undertaken throughout the Strategic Program for Climate Resilience (SPCR) planning process. These included discussions with the World Bank Group, International Finance Corporation, Asian Development Bank resident mission, United Nations Development Programme, Australian Agency for International Development, and others. Discussions focused on ensuring donor harmonization on climate change adaptation work in PNG to ensure that SPCR investments addressed gaps in existing donor programs in accordance with priority needs identified by PNG, and for the SPCR to work within existing institutional structures and constraints, recognizing the importance of whole-of-government implementation, and building on current and pipeline development projects and programs identified during the SPCR planning process.

The main development partners on climate change adaptation and their projects are shown in Table 1, providing significant detail on the activities that are underway in PNG and their objectives. Table 2 provides the development partner responses to the proposed interventions needed to address priority risks as identified by stakeholders during the SPCR national consultative process. In addition, Table 2 highlights work that is currently underway by the PNG Government, which includes activities that may require further support from development partners and SPCR activities. Table 3 lists all the development partners that have been involved in various consultations and workshops throughout the development of the SPCR.

Table 1: Stocktaking on Current and Proposed Projects/programs on Climate Change Adaptation being Implemented by Development Partners

Program/ Project Title	Descriptions/Objectives	Begin and End Date	Budget	Development Partner/s
Loan 40173-01-PNG Highlands Region Improvement II	The proposed investment program will result in improved accessibility to ports, markets, and livelihood opportunities and travel time savings. Improved transport infrastructure and services which would provide reliable access to domestic and international markets for rural produce and communities, are critical to (i) restarting and building economies through access to international and domestic markets, (ii) fostering private sector development and rural income opportunities, (iii) reducing urban drift, and (iv) restoring basic social services in rural areas to increase health and educational achievements. Road drainage design shall consider high rainfall. Climate change adaptation will be considered where roadside drainage has to be adjusted or retrofitted.	2010–2018	US$750 million	ADB US$400 million GoPNG US$150 million Others US$150 million
Loan 2242/2243-PNG Road Maintenance and Upgrading(Sector) Project	The proposed investment program will establish a sustainable road system in the Highlands Region that will enable maximum use of its natural and human resources for the development of the Highlands Region and the country. This will contribute to export-driven economic growth, fostering rural development, reducing poverty, good governance, and promotion of agriculture, forestry, fisheries and tourism on a sustainable basis. The investment program will result in improved accessibility to ports, markets, and livelihood opportunities and travel time savings. The improved road network will reduce transport costs in the region. The project will incorporate adaptation measures into planning.	2000–2010	US$63 million	ADB:US$53 million GoPNG US$10 million

Town Electrification Investment Project No:41504-01 - Improving Road User Charges and Private Sector Participation in Road Development - Bridge Replacement for Improved Rural Access	The proposed investment program will improve power supplies in provincial urban centers through replacement of high-cost diesel power generation with sustainable renewable energy power generation. The investment program will include (i) construction of about six run-of-river hydropower plants, (ii) construction of transmission systems to connect provincial centers, and (iii) capacity building within the power utility and communities. Climate adaptation aspects have been taken into consideration for the three project areas: Autonomous Region of Bougainville, West New Britain, and Oro Province. Climate proofing of transmission lines have been considered. Extending the Socioeconomic Benefits of an Improved Road Network to Roadside Communities	Jan 2011–Dec 2016	US$120 million US$150 million	ADB US$120 million. ADB
Community Water Transport Project (Phase 2)	Improved conditions for commercial activities, lower costs for families, and better hygiene through the use of reliable and sustainable piped water in towns - Project preparation support only (Source – ADB. *PNG COBP 2012-2014)*	2010-2014	US$40m	ADB
Forest Conservation Program	Japan assists the efforts of the GoPNG in forest conservation through grant aid and technical training programs. Projects forming part of this program are (i) forest preservation projects, (ii) capacity development on forest resource monitoring with a climate change perspective, and (c) training programs in forest conservation related issues.	2009–2013	US$7 million	Japan
Building a more Disaster and Climate Resilient Transport	Proposed	2012--2014		Japan

Sector				
Building a more Disaster and Climate resilient Agriculture	Proposed	2012--2014		Japan
Integrated Water Resources Management Support to NARI for Adaptation of agricultural technologies to climate change			US$3.9 million	EU (SOPAC) EU
Forest Law Enforcement , Governance and Trade Programme (FLEGT)				ADB
Communication -Climate monitoring network				ADB
International Climate Change Adaptation Initiative (ICCAI) Bilateral support for two NGO (Wildlife Conservation Society and Conservation International) community based adaptation activities	 Wildlife Conservation Society - Strengthen the ability of vulnerable Island communities to adapt to climate change (Manus) and Conservation International - Boosting Traditional Approached to Food Security in PNG (Milne Bay)	2008–2013 2011–2013	A$328.2 million A$2.5 million	AusAID AusAID

Regional funding for two NGO (Live and Learn and The Nature Conservancy) community projects	Live and Learn - Food Security through Adaptation to Climate Change (WNB) and The Nature Conservancy - Building Resilience in Communities and their Eco-systems (Manus and New Ireland)	2011–2012	A$1.7 million	AusAID
Pilot Program on Climate Resilience (under Climate Investment Funds)	PPCR supported by Australian to integrate climate resilience into national or sectoral development planning		A$40.0 million	ADB, World Bank, and Australian Government
Pacific Adaptation Strategy Assistance Program	Strengthening the capacity of countries to assess their vulnerability to climate change and develop evidence based adaptation strategies		A$12.0 million	Australian Government
Pacific Climate Change Science Program	Education and awareness on Climate Change through workshops and training in climate modeling tools and climate prediction for government institutions such as PNG weather service		A$20.0 million	Australian Government

Pacific Climate Change Leaders Program	Aims to build a group of leaders with a better understanding of climate change		A$3.0 million	Australian Government
Coral Triangle Initiative	Strengthening in-country tropical marine management		A$1.7 million	Australian Government

ADB = Asian Development Bank, AusAID = Australian Agency for International Development, EU = European Union, GEF = Global Environment Facility, GoPNG = Papua New Guinea Government, NGO = nongovernment organization, SOPAC = Pacific Islands Applied Geoscience Commission.

Table 2: Pilot Program on Climate Resilience Papua New Guinea – National Priorities

The following table is a direct output from the Pilot Program on Climate Resilience (PPCR) National Consultative Workshop Held on 16–18 November 2011

Event Risks **and Outcome Risks** *(as defined by National Stakeholders)*	**Ranking of Risks** *(9=highest, 6=lowest)*	**Proposed Intervention** *(as identified by National Stakeholders)*	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future?**
1*. Sea level rise and storm surge:* Loss of low-lying coastal land on islands and atolls under or close to sea level (Carterets, Duke of York, Nissan, Siassi, Ahus)	**9**	Train and assist vulnerable communities on low-lying islands and atolls in undertaking climate change vulnerability mapping and adaptation planning (*see ADB SGA pilot project in Cook Islands for methodology* - regional technical assistance [RETA] 6420). Adaptation plan to determine viable options, including • relocation - Develop or improve existing relocation plans; • addressing social /cultural/socio economical/health issues (land ownership); • viable coastal defenses (soft and hard engineering options). Provide sustainable financing that can be accessed by vulnerable communities to implement community adaptation plans and early warning systems. Train and build capacity within community climate change committees.	**AusAID -** Bilateral support for NGO community-based adaptation activities: Wildlife Conservation Society - Strengthen the ability of vulnerable Island communities to adapt to climate change (Manus). **AusAID** - Regional funding for NGO community projects: The Nature Conservancy - Building Resilience in Communities and their Eco-systems (Manus and New Ireland). **Pacific Adaptation to Climate Change (PACC)** pilot site in PNG Kivolu has relocated to higher ground due to high detection and evidence of storm surges impacts. At the new site though the community is facing water issues and droughts which affected food security. PACC is addressing the food security sector in PNG and trained on vulnerability and adaptation planning

			and socioeconomic assessment at the pilot site, Kivori. Storm surge and sea level rise is covered in the assessment as it causes flooding of arable agricultural lands.
2. *More severe weather events:* All private and public infrastructure impacted	**8**	Undertake capacity building program to climate proof priority infrastructure agencies and assets including: ➢ Policy development (from the National Level down to sector level); ➢ Vulnerability assessment of infrastructure assets; ➢ Research and development of climate proof design standards; ➢ Training and human resources development in climate change risk management ; ➢ Sustainable financing for climate proofing infrastructure; ➢ Initiate climate- proofing of infrastructure assets using appropriate technologies (hard and soft engineering). Pilot with PNG Ports Corporation and climate proof ports.	The **World Bank** has recently launched its project *Building a More Disaster and Climate Resilient Transport Sector* (FY 2012-2015, US$ 2.7M). An agreement was signed with the government on Dec 7, 2011. This Project has three main subcomponents: (i) Establishing a system for hazard risk assessment, (ii) Supporting three national agencies (Geo-Hazards Management Division, National Maritime Safety Authority, and National Weather Service) with necessary equipment for strengthening data collection, and (iii) Small pilot works to demonstrate effective mitigation of transport hazard risks. The Hazard Risk Assessment in future will be expanded to include other infrastructures. Note also the several large **ADB** loan

			projects assisting the PNG Infrastructure sector that are listed in the PNG stocktaking (Annex 8b to Interim Report). The PNG stocktaking also lists Japan **(JICA)** as planning for 2012 – 2014 the 'Building a more Disaster and Climate Resilient Transport Sector project. Note that JICA has indicated (email from Yoshiki Takahama of 13/12/11) that a response will be forthcoming…perhaps chase up. **SPREP** under the FINPAC Project is looking at further upgrading met services to provide climate change and met service information to vital productive sectors. This is of great relevance to adaptation planning.
3. *Changes in rainfall patterns:* Increased flooding, causing soil erosion and land slides	**8**	See intervention for vulnerable communities under Stage 1 Capacity Building (12 below)	**SPREP and FINPAC**
4. *Changes in rainfall patterns:* Increased intensity of rainfall, resulting in decreased crop yield and affecting food security	**7**	Improve crop diversification, land use, and farming techniques to introduce climate and pest resilient crops, facilitate access to markets, and improve food preservation, storage and processing. Undertake pilot in one priority district with a view to replication lessons learned and best practices to other vulnerable areas*.*	**AusAID -** Bilateral support for NGO community based adaptation activities: Conservation International - Boosting Traditional Approached to Food Security in PNG (Milne Bay). **AusAID** - Regional funding for NGO
5. *Sea level rise and storm*	**7**		

***surge*: Inundation of sago, mangroves, and other low-lying coastal agricultural land, affecting food security**			community projects: Live and Learn - Food Security through Adaptation to Climate Change (WNB). The **World Bank** launched in October 2011 its project *DRM/CCA project in the Agriculture Sector* (FY 2012-2015, US$ 1.7M). This Project has three main subcomponents as follows: (a) Assessment of Climate Vulnerability and Disaster Risks in the Agricultural Sector including commodity specific studies. (b) Feasibility Study for Agricultural Risk Insurance for Smallholder Farmers, and (c) Pilot projects demonstrating risk management and adaptation in the agriculture sector. The **EU-supported** project being implemented by the National Agricultural Research Institute (NARI) 'Adaptation to Climate Change Associated Risks' aims to improve the food production capacity of smallholder farming communities in areas where precipitation deficits and / or excesses and soil salinity problems are becoming significant threats to agricultural production and productivity.

			USAID has provided a grant to the SPC to enhance food security through capacity building and pilot demonstration projects. The project will also support SPC's Climate Ready Crop Collection program in identifying food crop genotypes that have climate resilient traits. The PNG stocktaking also lists Japan **(JICA)** as planning for 2012 – 2014 the 'Building a more Disaster and Climate Resilient Agriculture Sector project. Note that JICA has indicated (email from Yoshiki Takahama of 13/12/11) that a response will be forthcoming…perhaps chase up. **PACC** is working in Kivori, Central Province to address changes in rainfall pattern and looking at underground irrigation as an adaptation option to be implemented. **SPREP and FINPAC** through upgrading of met services and tailored to the needs of sectors.
6. *Changes in rainfall patterns:* Impacts on fish migration, fish nursery and fish stocks, affecting food security and the viability of fishing communities	**7**	Undertake ecosystem-based climate resilient fisheries management in pilot vulnerable community, including o measures to reduce pollution of water and coastal resources;	There is possibility that the impact of Climate Change on the Fishery subsector will be studied and policy recommendations made under the **World Bank-supported** Agriculture

		○ promotion of climate change risk management awareness and education within vulnerable fishing communities; ○ promotion of good fishing practices; ○ monitoring program to determine climate change impacts on fishery resources; ○ aquaculture, coral nursery and fishery restocking programs; ○ microfinance and micro-insurance programs for fishes.	Project mentioned above. The **AusAID**-supported Coral Triangle Initiative will strengthen marine management generally in PNG and across the Pacific Region.
7. *Changes in rainfall patterns:* Poor sanitation, causing an increase in water-borne diseases (cholera, dysentery and diarrhea, and typhoid)	**7**	Undertake a pilot in Manus Province to determine best mechanisms to address water and vector–borne disease, including through: • Initial study/evaluation of international and local best practices/technologies to address water and vector borne disease; • Design and installation of suitable location-specific (island areas) climate proof water supply and sanitation systems – which should also address water shortages, sea-level rise and coastal inundation issues; • Education and awareness programs in support of the installation/maintenance/operation of appropriately designed and site suitable systems; • Improve supply of and access to appropriate medicines to combat vector and water-borne diseases; • Build capacity within district and community level health services to undertake climate	**PACC** is hoping to access other funding to address sanitation and water related issues in the Kivori area. Health was a major issue identified in the assessments particularly availability of clean water for consumption.
8. *Sea level rise and storm surge and increased precipitation:* Increase in incidences of vector/water-borne diseases	**6**		

		change risk management; • Expand preventative health care services and information. Monitoring and evaluation of situation concerning water and vector borne disease incidents at the beginning of the pilot and establish monitoring/evaluation programs to document any improvements, with a view to replication lessons learned to other high risks areas.	
9*. Sea level rise and storm surge* - Coastal service infrastructure and utilities damaged or destroyed	**6**	See Risk 2 above	Refer also description of the **World Bank**-supported CCA/DRM project in Risk 2 above
10. *Changes in local and national temperatures regimes* – Changes in agriculture yield and food security	**6**	See Risks 4 and 5 above	Refer also description of the **World Bank**-supported CCA/DRM project in Risk 4/5 above **PACC** is addressing such changes in temperature regimes in the work it is carrying out at the pilot site Kivori.
11. *Increased climate variability* – Increase in pests and diseases on natural resources and biodiversity	**6**	Undertake ecosystem-based climate resilient agriculture and biodiversity management in pilot vulnerable community, including ○ community based vulnerability assessment and biodiversity risk mapping to determine and locate on a site specific basis vulnerability of biodiversity to climate change risks; ○ in situ biodiversity conservation/management programs and integrated pest management program; ○ establishment of pest monitoring and eradication programs;	The **World Bank**-supported Agriculture sector project will carry out in-depth studies on the impact of climate and disaster risks for major Agricultural commodities such as Cocoa, Coffee, Coconut, Oil Palm, and likely food crops and fishery subsector. Moreover, the project also has provisions for small grant pilots which will based on the outcomes of the specific studies. These

		○ awareness programs.	pilots are meant for demonstrating effective risk management and adaptation in the agriculture sector. Some examples of potential pilot projects are- Supplying of improved planting material (nurseries) to farmers, Developing and supporting farmers network to disseminate climate and disaster data, Supporting rotational planting of crops, and Testing of climate resilient varieties of crops. **SPREP and FINPAC**
Capacity Building Issues *(as identified by National Stakeholders)*	**Priority Capacity Building Issue**	**Proposed Interventions** *(as defined by National Stakeholders)*	**Any International Partner or CROP Agency Working on this Issue or Proposed in Future?**
12. STAGE 1 Capacity Building a. Sensitization and building awareness of climate change impacts and risks at national and local levels and within vulnerable sectors and population groups. b. Building climate monitoring and analytical capacity c. Building adaptation planning capacity at national and local levels and within vulnerable sectors and vulnerable	**Priority** – Build adaptive capacity in vulnerable communities and in infrastructure sector and finance sector	**Vulnerable communities** - Train and assist vulnerable communities in undertaking climate change vulnerability mapping and adaptation planning (*see ADB SGA pilot project in Cook Islands for methodology* - RETA 6420) and integrate community vulnerability maps and adaptation plans into Sustainable Land Use Planning process and national land use policies and plans. Develop community based early warning systems based on community vulnerability mapping. Provide sustainable financing that can be accessed by vulnerable communities to implement community adaptation plans and early warning systems. Train and build capacity within community climate change	Enquire from UNDP, FAO, IFAD as to whether community and district level vulnerability mapping and adaptation planning can be integrated into Sustainable Land Use Plan project under GEF 4 or GEF 5. The **USAID**-supported ADEPT project will provide Technical Assistance and training to enhance PNG's capacity (along with other countries in the region) to access international climate change adaptation funds. **PACC** training on vulnerability and

population groups d. Undertake a vulnerability and adaptation assessment		committees. Establish, train and build capacity of District Climate Change Officers to develop district level land-use plans and early warning systems built upon community vulnerability mapping and adaptation plans that can be integrated into district and national land-use plans. **Infrastructure sector** - See Risk 2 above **Insurance/finance sectors** – Establish micro-insurance and microfinance schemes to provide social safety net for vulnerable communities including farmers and fishers. Train and build capacity in insurance and finance sectors to evaluate and manage climate change risks as part of microfinance and micro-insurance program. Establish Regional Risk Insurance facility modeled on the Caribbean Catastrophic Risk Insurance Facility. Ministry of Finance – Build capacity within Ministry of Finance to mainstream climate change risk management into national accounts and budgetary processes. Establish arms-length Climate Change Trust Fund (not part of Government national revenue or accounts) to provide sustainable source of financing for priority adaptation measures and to relieve pressure on national accounts.	assessment and socioeconomics using the PACC SEA-PACC guide.
13. STAGE 2 Capacity Building a. Integration of risk assessment and management in the design of infrastructure projects b. Integration of risk assessment and management in the urban planning process c. Climate proofing engineering design criteria and building codes d. Integration of climate change risk assessment and adaptation management in financial and insurance sector e. Integration of climate change risk and adaptation into formal and informal education programs f. Develop and elaborate appropriate and integrated plans for water resources and agriculture g. Integration of climate change risk assessment and adaptation management into	**Priority** – Integration of risk assessment and management in infrastructure, urban planning process and insurance/finance sectors		The sub component Establishing a system for hazard risk under the **World Bank**-supported CCA/DRM project in Transport includes building capacity to analyze and apply the results to transport sector planning and investment. Further, the pilot works component is aimed at demonstrating effective mitigation of transport hazard risks which will also be used as learning by Department of Works at the provincial and national levels. The design and construction methodology used for the pilot projects will be carefully documented to help the government prepare standard design and construction guidelines for increasing disaster resilience in national roads. **PACC** does have some experience working with other countries such as Cook Islands to develop the Storm Surge Calculator.

sectoral policies and programs, and national development strategies h. Establish capacity building measures to support adaptation planning measures at local and community level i. Establish capacity building measures to support adaptation risk assessment and management measures within vulnerable sectors, including financial sector j. Establish capacity building measures to support risk management and adaptation planning measures within vulnerable population groups			
14. STAGE 3 Capacity Building a. Mainstreaming of climate change adaptation that results in the shift of responsibility for climate change adaptation from single ministries or agencies to all sectors of government, civil society and the private sector b. Climate change risk assessments being undertaken for all new infrastructure projects	**Priority** – Integration of risk assessment and management in infrastructure, urban planning process and insurance/finance sectors	a. to h. - See Capacity Building program outlined in Stage 2 Capacity Building above.	Activities under both Agriculture and Transport Sector CCA/DRM projects supported by **World Bank** would provide useful tools to multiple ministries: for mainstreaming across sectors, performing CC Risk Assessment for newer infrastructure projects; revising design and building codes; and application for EWS. **PACC** has developed climate change, water and food security policies in

c. Assimilation of adaptation activities within development budgets d. Climate change risk assessment and management a formal part of urban planning processes and vulnerability atlases developed and used to inform urban growth e. Climate change relevant engineering design criteria and building codes used for infrastructure design and construction f. Lending and insurance programs have adequate risk management measures in place g. Climate change risk and adaptation a formal part of the education curricula in formal education and profession education programs h. Vulnerability atlases used as part of early warning systems for disaster management i. Health service delivery made resilient to stressors caused by climate change impacts and population made more resilient to climate change health impacts.		i. - See Risk 7 and 8 above. j. - Develop Pilot Program on Climate Resilience Monitoring and Evaluation program	collaboration with countries and Partners. In PNG a drought plan will be developed for the Kivori area which can be broadened to include other regions.

j. Undertake monitoring and evaluation, and amend ongoing adaptation measures, policies and programs as necessary			

ADB = Asian Development Bank, AusAID = Australian Agency for International Development, CCA/DRM = climate change adaptation/disaster risk management, CROP = Council of Regional Organizations of the Pacific, EU = European Union, FAO = Food and Agriculture Organization of the United Nations, FINPAC = Finland–Pacific project on reducing vulnerability of PICs livelihoods to the effects of climate change, GEF = Global Environment Facility, JICA = Japan International Cooperation Agency, NGO = nongovernment organization, IFAD = International Fund for Agricultural Research, PACC =Pacific Adaptation to Climate Change, SPREP = South Pacific Regional Environment Programme, USAID = United States Agency for International Development.

Table 3: List of Development Partners Consulted

Name	Title	Organization	Phone		Email
Anne Witheford	Project officer	ADB, HQ	632 6367		awitheford@adb.org
Steve Blaik	Senior Urban Development Specialist	ADB, HQ	632 6738		sblaik@adb.org
Daisuke Mizusawa	Infrastructure Specialist	ADB, HQ	632 6762		dmizusawa@adb.org
Jiangfeng Zhang	Senior NRM and Agriculture Economist	ADB, HQ	632 5162		jzhang@adb.org
Daniele Ponzi	Lead Environment Specialist	ADB, HQ	632 6746		dponzi@adb.org
Loreta Rufo	Environment Officer	ADB, HQ	632 1986		lrufo@adb.org
Cinzia Losenno		ADB, HQ			closenno@adb.org
Charles Rodgers		ADB, HQ			crodgers@adb.org
Jay Roop	Senior Environment Specialist	ADB, HQ	632 5631		jroop@adb.org
Hasan Masood	Lead Project Specialist	ADB, HQ	632 6818		hmasood@adb.org
Maria Cadahia	Program Officer	UNDP	71811499		Maria.cadahia@undp.org
Caroline McGann	Program Manager	AusAID	72017801		caroline.mcgann@ausaid.gov.au
Joseph Kunda	DRMandCCA Specialist	WB/OCCD	73141907		jkunda@worldbank.org
Peta Mills	1st Secretary	AusAID	72007840		petamills@ausaid.gov.au
Stanley Wapot	CC Project Coordinator	UNDP	3212877		stanley.wapot@undp.org
Gwen Maru	Program Officer	UNDP	3212877		Gwen.maru@undp.org
Allan Oliver	Operations Officer	World Bank	321 7111	71856228	aoliver1@worldbank.org
Maria Cadahia Perez	Environmental and CC Program Analyst/ Officer	UNDP PNG	71811499		Maria.cadahia@undp.org
Nige Kaupa	Assistant Program Manager	AusAID	325 9333 ext-265	72094555	Nige.Kaupa@ausaid.gov.au
Yoshiki Takahana	Embassy of Japan	1st Secretary	3211800		yoshiki.takahana
Emily Fajardo	National Coordinator	GEF Small Grants Program	7384 3255		Emily.fajardo@undpaffiliates.org

Name	Title	Organization	Phone	Email
Charles Andrews	PNG Resident Mission	ADB	321 0400	candrews@adb.org
Scott Hook	Economic Infrastructure Adviser	Pacific Islands Forum Secretariat	+ 679 322 0212	scotth@forumsec.org.fj

Annex 4

Participatory Processes and Consultation with Stakeholders

This annex describes, the methods used for stakeholder consultations and the findings of the consultations; specific issues arising from the consultations regarding the private sector, civil society organizations, and development partners; and a consolidated list of persons consulted.

Stakeholder Consultations

Background

Several methods were used to ensure a country-led participatory process during SPCR preparation in PNG, including stocktaking and risk assessments by sector thematic working groups, focus meetings with key stakeholders, a series of national consultative workshops, semi-structured interviews with industry representatives (private sector, environment and other nongovernmental organizations (NGOs), media, insurance, Office of Climate Change and Development (OCCD) communication staff), and a household survey of vulnerable communities in Central Province. Additionally, an online survey for the media was distributed but only one response was received. This Annex provides an overview of key nongovernment stakeholders involved with climate change and development in PNG, and summarizes key findings from the capacity assessment that was undertaken during SPCR preparation.

Role of Civil Society

Civil society plays a key role in PNG's development strategy. Many NGOs and faith-based organizations are involved in all sectors of national development, notably in education, health, environment, and infrastructure development, frequently providing basic services outside of the reach of government. These organizations are often referred to collectively as nonstate actors (NSAs). The depth of involvement of NSAs in PNG society is best illustrated by their role in the health sector, where churches are responsible for direct delivery of 50% of the country's health services, such as running clinics and aid posts.

NGOs are dependent on external grant funding from donor initiatives or international benefactors for their development activities. As such, donors usually set the operating requirements in terms of priority activities, reporting, and budget for these development projects and some may also influence the policy directions of NGOs. Most NGOs are also short of funds and are forced to operate on tight budgets. Only a few NGOs conduct work or research outside their grant funding.

Some of the local advocacy NGOs include the Melanesian NGO Centre for Leadership, which provides skills in capacity development for NGOs in PNG; the PNG Eco-Forestry Forum, which promotes the development of the country's rural

communities through sustainable use of forestry industries; and the Individual and Community Rights and Advocacy Forum (ICRAF), an NGO based in Port Moresby that deals with human and land rights issues.

Internationally-affiliated NGOs, such as the Red Cross and Salvation Army, play a key role in assisting with disaster response, while others such as CARE, World Vision, Adventist Development Relief Agency (ADRA), and Oxfam assist during natural disasters, (e.g., the 1997/98 drought) but also are involved in village community development activities, such as education, agriculture, health, women's development, water supply, and sanitation. Government is reported to be very slow to respond during disaster relief as it is constrained by complex hierarchical procedures when releasing relief funds. Examples were given by several NGOs of the community getting on and helping itself or receiving relief support from disaster NGOs in preference to waiting for government assistance.

NGOs and Climate Change

NGO experience in climate change has to date largely centered around sustainable forestry and REDD+ (reduced carbon emissions from deforestation and degradation). There is a significant focus on mitigation (i.e., REDD among Government and NGOs in PNG) but much less focus on adaptation, except for those places that are already bearing the impact of rising sea levels, such as Manus and Bougainville. In these locations, e.g. Manus, there is a surplus of NGOs working on pilot projects funded by international donors, while there are many other areas in the country also needing support to address impacts other than rising sea levels. The status of NGO knowledge and participation on climate change is set within a context of donor funding, capacity of OCCD, coordination, and mechanisms to engage civil society.
Those NGOs working the area of REDD and closely involved with OCCD tend to be conservation-, environment-, forestry-type NGOs. The Eco-Forestry Forum and Mama Graun Conservation Trust have a coordinating and facilitating role to assist other NGOs implement activities, including climate change. OCCD does make an effort to engage civil society and NGOs, especially through technical working groups, however there is scope to widen consultation and participation of NGOs by broadening communications to a wider range of interested parties, and through adaptation activities. The scope for climate change adaptation can include a much broader representation of NGOs covering agriculture, gender, infrastructure, livelihoods, disaster relief, malaria control and prevention, and water supply and sanitation.

For those NGOs working directly with communities on climate change, the most successful communities are those that are organized and want to solve the problem themselves with some guidance from NGOs (or government). Communities where there has been previous donor assistance tend to wait for more to arrive rather than taking action themselves.

The key findings from NGO discussions are as follows:

Specific inquiry	Comment
Knowledge about climate change risks affecting the sector	
How many NGOs/CBOs know about climate change risk affecting the civil society sector?	Climate change is a familiar concept to NGOs, but most focus is on mitigation, with significant gaps in knowledge around adaptation. Most but not all the PNG climate change risks are familiar to NGOs, especially drought as this has been widely publicized as predicted for 2012. However, knowledge of strategies for NGOs to address climate risks is weak. There is interest from NGOs to learn more about the risks and how to build resilience and some NGOs are orienting their work programs to include climate risks and natural disasters. For example, World Vision's country strategy does have some specific goals around climate change although this is mainly around humanitarian and emergency affairs, which do include water, sanitation, and hygiene responses to emergencies that are likely to become more common.
What is the availability of data and appropriate documentation mechanisms that can be used for climate change risk management?	Technical data, especially costing information/cost norms for community adaptation, is difficult to obtain and is not standardized. Mama Graun has been working on costing adaptation at the community level over the last 12 months. A challenge is applying broad scientific data to specific development project contexts. There is a disconnect between scientific predictions and on-the-ground community activities.
What is the status of research (knowledge generation) and outreach mechanisms (including Research and Development) for climate change risk management?	Under the current program and project funding arrangements of NGOs, there is little scope for research. Some materials developed by NGOs, including a flier on "What is Climate Change Impact", posters for schools and teachers.

Specific inquiry	Comment
	There is a lack of standard approach and materials. Need to improve information sharing/communication between NGOs and with government.
Mechanisms to address climate change risks affecting the sector	
Does policy exist for climate change risk management?	Several NGOs appear to be at an early stage of considering climate change impacts in their work, particularly around water supply and sanitation and disaster preparedness. For international NGOs, policy on including cross-cutting issues, such as gender and climate change in country programs and projects, is often driven by international "mother" organizations.
Is there an institution/mechanism to integrate climate change risk management into day-to-day operations of the organizations?	Climate change risk management is not institutionalized into the day-to-day activities of NGOs. There are other challenges and priorities affecting the sector.
Do system/tools/guidance exist to undertake climate change risk management?	Risk assessment tools have been developed by individual NGOs, e.g. Mama Graun out of frustration that these did not exist, but these have not been universally adopted by other NGOs. The approach to tools is ad hoc at present as there are no national tools, nor routine assessment of vulnerability in different areas before doing adaptation. World Vision developed materials on climate change for community awareness. These were downloaded from the internet (site not known) and contextualized for PNG.
Resources/ability to implement climate change risk management measures	
How do you rate the availability of human resources in the area of climate change risk management within this organization?	Some staff from international NGOs, such as CARE and World Vision, have had training in climate change and impacts through their international organizations. For other NGOs, most focus has been on REDD+ with training through OCCD and

Specific inquiry	Comment
	donor workshops. Mama Graun has geographic information systems (GIS), economic analysis, and vulnerability assessment expertise.
How do you rate the availability of financial resources for climate change risk management within this organization?	NGOs are highly dependent on external/donor funding. Unless climate change risk management is included in donor specifications and adequately resourced, it will be given a low priority. NGOs operate on very tight budgets.
How do you rate the availability of technical resources for climate change risk management within this organization?	Communication materials are not standardized; tools have developed on ad hoc basis. It is difficult to get information from government. Technical capacity needs strengthening.
Impediments to implementation of climate change risk management measures	
What is the level of coordination among stakeholders at national and sectoral /district levels for managing climate change risks?	Some evidence of information sharing between key NGOs and OCCD with the NGOs providing briefings to OCCD staff (on mangrove replanting and management costs, and household survey techniques) and peer review of OCCD work. Some concerns over the use of NGO material without acknowledgement. NGOs would like to be included on an equal footing with government in climate change decisions, policy development, and advancement of adaptation, and would like their findings and experience to be able to influence. While provincial government coordination is critical for how climate change information filters down to community level, the capacity of provincial governments varies significantly. There is some coordination with provincial planning departments. Local government is aware of the climate issues and interested in learning more about climate change but level of coordination varies by location. Ward Development Committees are key organizations at

Specific inquiry	Comment
	community level and NGOs are willing and do work with these organizations, but leadership varies. Ward councilors are unlikely to have the skill or knowledge to lobby district and provincial government for support or seeking assistance from donors and international NGOs.
What is the level of inter-agency coordination among stakeholders at national/sectoral/district levels?	At the national level some networks exist for the sharing of information, e.g. Disaster Management Team, Eco-Forestry Forum, the Water, Sanitation and Hygiene Committee (WASHCOM). The Eco-Forestry Forum is the only network known to have dealt with climate change risk management and adaptation. For other networks, climate change risk management has not been a featured topic and coordination of the networks varies. There is no overarching NGO forum in PNG. Key NGOs participate in the Adaptation and Mangrove technical working groups convened by OCCD. Other NGOs and civil society organizations are not routinely consulted. NGOs like World Vision are engaging in forums with the national governments, AusAID, and USAID, which are all interested in furthering investments in disaster risk reduction and climate change adaptation.
Other…….	NGOs need to improve basic skills and capacity especially in governance, constitution, financial accountability and auditing to meet donor funding requirements for climate change and other projects. This would improve their sustainability and performance. Local NGOs need assistance to prepare proposals in accordance with donor requirements, (e.g., cost estimation).

Private Sector

PNG has a diverse private sector, which has developed from the economic sectors of agriculture and livestock, forestry, mining and petroleum, tourism and hospitality, fisheries and marine resources, manufacturing, retailing and wholesaling, building and construction, transport and telecommunications, and finance and business trade.

Many businesses are members of the Chamber of Commerce, which has 17 chapters in the country, representing all types of business. Other peak bodies for specific sector groups include Australia-PNG Business Council (50 members), mining industry, Forestry Council, and Employers Federation. The Chamber of Commerce is active, has a staffed national office but a very limited budget, and is well supported by members. The Chamber is able to disseminate information to members through its network and sponsored workshops, but also to nonmembers through the website and trade shows. The Chamber does not have a lot of money for activities but it can support macro-issues considered of national importance, e.g., poverty reduction, job creation, and issues aligned with the National Policy of PNG. Financial support would be required for promotion of climate change risk management through the Chamber of Commerce and other business organizations.

Representatives from the private sector are understandably very busy and have little time to attend meetings and workshops unless the topic is of direct relevance to them. Most leaders, particularly from international organizations, care about a sustainable PNG with a future. Socially responsible firms want to show that they have done everything in their power to address certain issues. However, businesses do not currently think much about climate risks. For example, the Tourism Operators Authority did not see how climate change related to them as they did not own any tourist infrastructure but operated tours only. Aon Risk Services' (insurance brokers) technical adviser had never considered the relevance of climate change to insurance services, although personally had thought about the impacts of climate change. The reasons for overlooking climate change were partly due to a lack of understanding by business about what the risks are to them and practically what they can do to reduce risks and reduce carbon emissions, and partly attributed to a perceived lack of direction and concern from Government on broader issues such as energy saving, natural power, and waste reduction. It was felt that there is a lack of national consciousness about energy reduction, compliance, and risk reduction. While the private sector is aware of the existence of a national disaster management plan, it is viewed as limited to plan preparation.

More information is needed to help the private sector understand, prepare and adapt to climate risks. A starting point could be a list of actions that the private sector can undertake to reduce climate risks. This could be emailed to members of the Chamber of Commerce. More specific workshops could follow, with individual business or sector group consultation and advice if requested. Obtaining interest and attendance by busy decision makers in the private sector is a considerable challenge. Consequently any information to the private sector needs to be short, to the point, highly relevant, and practical.

Media and Communications

Media outlets

Radio is an important medium in PNG, because of widely-scattered, isolated settlements and low levels of literacy. The government operates a national radio network and provincial stations. Several private FM stations have also been established, especially in Port Moresby. Foreign services, such as the BBC World Service (106.7) and Radio Australia, broadcast on FM in Port Moresby.
Television coverage includes government-owned stations and private satellite television stations broadcasting foreign content. Television access is difficult to determine; there is limited availability of electricity (about 10% of households connected to the main grid), which restricts the use of televisions, it is not uncommon for a village to run a generator for everyone to view a communal television.

The two national newspapers are The National (circulation of 48,490 and owned by Malaysian logging company Rimbunan Hijau) and the Post Courier (circulation of 27,988 and owned by Rupert Murdoch's News Corporation). Together with other publications, newspapers play a key role on reporting on corruption and other sensitive issues.

As of August 2011 there were 125,000 internet users[1] with a growing blogging scene, including for protest and information sharing. E-mail communication is common between government employees.

Mobile phone usage has increased with an estimated 300,000 users in 2007. One of the expressed benefits was the use of the mobile phone in times of critical emergencies and crises, including contacting relatives far away to ask for assistance. Difficulties are the cost of owning and operating a handset, as well as financial and logistical challenges when recharging handset batteries, particularly in areas with no mains electricity supply.

Effective awareness methods for the general public are those that involve verbal communications, e.g. radio, radio plays, videos, and drama.

Media and Climate Change

According to journalists, the role of the media in climate change is to report on climate change impacts; highlight successful climate change projects; educate the public on how people can prepare for climate change—what to do what not to do; and advocate for funding of climate change. The media is not perceived as having a watchdog function for climate change activities, expenditure, or national carbon emissions targets. However, according to NGO spokespersons, the media participates in climate change through government and NGO forums or by invitation to attend climate change workshops and conferences. But attendance at the latter is to report on the outcomes of the conference or workshop, not as learning participants. Journalists attend climate change workshops (mostly held in Port Moresby) without understanding the context, topic, or even statements given by NGOs. NGOs do not always properly brief the media.

[1] http://www.internetworldstats.com/stats6.htm viewed 30/12/2011

The media is used often by NGOs to spread information, especially if government is seen as not responding to particular environmental issues. NGOs that work independently do not involve the media in information exchange, but send prepared media statements issued by the media. A few NGOs directly involve the media and invite them to visit projects to see first-hand the range of issues or do capacity building for the media, e.g. SeaWeb. This results in greater understanding by journalists/reporters and more real, experiential reporting. The government, e.g. OCCD, also uses the media to distribute information but may not do this routinely. For example, during coverage of Cyclone Yasi, journalists made frequent visits to the Weather Bureau, as forecasters rarely answered the phone, but they were willing to explain to journalists what is happening if journalists are there in person.

Sources of information for climate change reporting are the Department of Environment and Conservation, Weather Bureau staff, Provincial Climate Change Officers, NGOs, and international websites. Technological difficulties in accessing the Internet such as unreliable servers, mean that this is not a dependable source of information for journalists.

The PNG Media Council is playing an important role in training journalists about climate change by linking with NGOs and government and promoting international attention on climate change impacts in PNG. For example, the PNG Media Council ran a Workshop on Advocacy for Climate Change Action in March 2011 (in Divinai village Milne Bay Province). This was a three-day workshop facilitated by the Media Council in partnership with the Eco-Forestry Forum, WWF, and the United Nations. The objective of the workshop was to facilitate education on climate change and carbon trade action for civil society. It was focused on addressing the climate change mitigation and adaptation challenges faced by rural communities with a focus on REDD and climate change reduction, and specific climate-affected communities rather than broader climate risk identification and resilience building.

Reporters and journalists would like more information on climate change to help them understand the issues and better report them. Difficulties expressed were in understanding the technical aspects of climate change (treaties, Cop17, REDD, mitigation, etc.), but there was also an absence of knowledge about climate resilience and climate proofing, which reflects the overall lack of attention to this aspect. Information was sought on such issues as sea level rise, how climate change affects weather patterns, climate change and food security, and government actions. Training was considered very important as many reporters have been thrown into environmental/climate change reporting from general reporting with no training.

Gender Issues in Climate Change

General Situation

In 2011, PNG ranked 140 out of 146 countries (one rank above Afghanistan) on the UNDP Gender Inequality Index. The index reflects women's disadvantage in three dimensions—reproductive health, empowerment, and the labor market.
Levels of development for PNG women vary widely depending on geographic isolation, history of contact with colonizers, matrilineal or patrilineal culture of the

group, quality of governance at the provincial level, and levels of service delivery and infrastructure. Most of PNG's communities are patriarchal where women have a low status. There are some communities that have matrilineal customs; however, it is reported that even in these communities, women's status, which was once relatively high, has deteriorated, including the erosion of their traditional land rights.

The combination of poverty, overwork, normalized violence, and the high-risk security situation in PNG is a severe constraint to women's development. Papua New Guinean women suffer from excessive physical workloads, malnutrition, poor access to safe water and healthcare services, excessively repeated pregnancies, and sexual violence including gang rape, rape in marriage, and child sexual abuse. In many rural communities, where traditional customs still dominate everyday life, women face serious challenges such as child marriage, and sorcery. The custom of paying a bride price reinforces the view of women being the property of men. There is widespread disregard for women's rights and dignity, particularly in the police and military systems. Within the casualties of PNG's HIV/AIDS epidemic, women make up over half the cases and have the additional responsibility as caregivers to AIDS suffers. All these factors severely limit women's safety, mobility, and opportunity to participate in economic and political systems, and undermine development of social capital.

Women are poorly represented in decision-making systems with only one out of 109 seats in parliament being held by a woman, (who previously also held a ministerial post), and there is only one female judge in the 27 national judicial positions.

Despite PNG being a signatory to a number of international conventions and treaties, such as the UN Committee on the Elimination of Discrimination Against Women (CEDAW) and the Millennium Development Goals (MDGs), and the presence of national laws to protect rights, due to the Government's inadequate capacity to uphold law and order, and weak institutional capacities of the government and NGOs to address gender discrimination and biases, little progress has been made toward gender equality. Recent National development strategies, such as the PNG Government's Medium Term Development Plan (2011–2015), do acknowledge the importance of addressing gender equality and improving the status of women as part of the country's development efforts. Broad targets are established for educational access, literacy, employment, income, representation in national parliament, and violence. The lack of sex- and age-disaggregated data across all fields inhibits targeted planning and budgeting to improve outcomes for women.

The Office for the Development of Women (ODW) was established in the Department of Families and Community Development in July 2009 and has 15 staff (8 males, 7 females). ODW's role is to address issues concerning policy and strategy formulation, gender-related research, coordination with other line agencies, and monitoring of achievements in relation to international commitments. Gender mainstreaming is the task of the Gender Division, also within the Department of Families and Community Development. It links with the National Council of Women and through to the provincial Councils of Women however the capacity of this organization varies significantly by province. However, the ODW is constrained by a limited budget and the Gender Division is constrained by lack of technical capacity

and inadequate resources for staff and programs. The 1991 National Women's Policy was recently reformulated with the help of UNDP into the 2010–2015 National Policy for Women and Gender Equality.

Rural Conditions

More than 80% of PNG's population lives in rural areas – the majority are subsistence farmers. Women are responsible for the food-crop production for family consumption and the rearing of small livestock such as pigs and chickens. Women also increase their production and sell surplus production to earn cash income required in an expanding cash based economy, e.g. for school fees and healthcare.

In coastal areas, women move along the coastline catching small fish and harvesting various shellfish for household consumption and local sale. It is estimated that women's harvest accounts for 20%–50% of the annual fishing yields, but this contribution is not officially recorded.

Women must gather fuelwood and water, walk to rivers to wash laundry and dishes, and care for family members who fall ill from preventable disease caused by poor sanitation conditions and a lack of potable water. Water and sanitation coverage is low; an official estimate of 42% of households have access to basic sanitation (others in the field estimate 15% is a more accurate number)[2], while 39% of households have access to safe water in rural areas.

Women carrying heavy loads of firewood - Rigo District,

Women washing dishes and bathing children – Oro

Women's economic activity and market access are constrained by the poor quality of roads and a shortage of feeder roads into dispersed rural communities. Women often have to walk long distances to access public motor vehicles, which run on unreliable schedules, partially due to the poor quality of the roads. It is estimated that 35% of the population live at least 10 km from a national road. This heavily reduces the ability of the government and donors to deliver health and education services and improvements.

[2] Staff on the EU PNG Rural Water Supply and Sanitation Project

In rural areas many people have limited or no access to education due to the limited number of schools and the distance to schools. This has contributed to the very low completion rate for Grade 6 girls in several remote regions. Only half of the girls who attend primary school move on to secondary school. Many girls leave school after puberty due to the lack of schools as well as sexual harassment and abuse, and preparations for marriage.

Maternal mortality rates increased from 370 deaths per 100,000 live births in 1996 to 773 per 100,000 births in 2006. In rural areas, the public health service has declined with many health facilities ceasing to function. This decline in health services and long distances to the nearest clinic have resulted in more unattended births and the increase in maternal mortality.

Women's access to microfinance is problematic due to limited time to contact financial institutions and lack of finance skills. Women tend to use microfinance for immediate household financial needs. Because women's earnings are controlled by male family members, it is very difficult from a financial standpoint (as well as knowledge, and ambition) to expand any microbusiness.

Situation of Women/Gender in Disaster Management and Environment

According to a recent analysis by JICA, the Government's capacity to manage natural disasters is limited and gender consideration in emergency management and reconstruction is virtually nonexistent. If a disaster is small scale, community support through clan and kinship ties provides a reliable coping mechanism, especially in tough rural locations where self-reliance is strong. When a large-scale disaster occurs, the whole community is affected and women, along with other vulnerable people such as children and the elderly, suffer without support.

The needs of women during recovery may be overlooked or relegated to a low priority over men's needs. Long-term female refugees relocated after volcanic eruptions in Manam Island in 2004 and 2005 are still experiencing inadequate latrines with lack of privacy, food scarcity and child malnourishment, lack of female health care, and gender-based violence including rape.

NDC's national plan, Disaster Risk Reduction and Disaster Management: National Framework of Action 2005–2015, acknowledges the importance of women's participation, but the gender perspective is not effectively incorporated into the disaster prevention/management/recovery process. The NDC has few staff and resources and gender is not an immediate priority. Even OCCD has not explicitly integrated gender into its work and in 2009 only two staff had gender training relating to climate change.

NGOs with female outreach staff are well placed to have separate consultation groups with women in the community. Women working at Mama Graun found that they do not have to request sex segregation of meetings as the women demand it, often requiring more meetings than with the men. However, when consultation is not gender segregated or led by men, women's views are rarely heard.

Women and Climate Change

In a study by ActionAID on gender and climate change in PNG in Siar and Derin villages, little or no difference was found between men and women in terms of the climate impacts they identified. However, across the study communities, women were more likely to identify in detail the impact of climate variation on food production activities. Similarly, when both men and women were asked who were most vulnerable to climate-related risks, they all identified women. The reason for women's vulnerability was their role as primary food providers/producers.

Women already carry a heavy burden for community development and family sustenance and climate change exacerbates this burden. Many of the activities that are the domain of women are climate sensitive, e.g., food production, cash incoming-generating activities (pots, tapa cloths), water, and health.

BOX 1: The impact of a climate event on Women's Daily Lives

(as told by Mama Graun Development Trust)

Collingwood Bay area experienced severe inland flooding in 2009. The changes caused by this event included the permanent inundation of women's garden areas, and a change in the course of the river to be a shallow wide permanent body of water where it previously did not exist. Now women have had to make their gardens 5 km from where they live. This means walking 5 km to the garden every day and returning 5 km home, each woman carrying 20–30 kg of vegetables on their backs. Because of the permanent change in the river women are now wading to their knees and thighs in 5 km of water every day. The local Health Officer reported that women are now having neck pains, back pains, leg pains, and problems with their hips, which is causing very difficult births. The Health Officer said he had never experienced more complications with delivery than after the disaster, because women are sick and tired and not coping with birth. The seriousness of this situation was highlighted because it was the *men* in the village who raised the issue of women's health at a community meeting. The women had protested to the councilor that they needed paths to the garden to make their life easier; however. whenever a path is made it is washed away by the new river.

Women from Rigo district in Central Province identified the dry season, landslides, and flooding as climate impacts that most affected them. According to them, these climate events affect women's health as their workload becomes harder, and they tend to lose weight. During climate events, women are affected financially as they are unable to sell their produce and cannot pay for children's schooling or basic household items. In the dry season, fetching water is difficult as women in more remote areas have to go a long distance to collect water, use dirty water that requires boiling, or buy water for K10. Only a few better-off households can afford to buy rainwater tanks, yet if everyone had tanks this would help the situation. A common outcome is an increase in diarrhea during droughts, especially affecting young children and the elderly. In Rigo district, people living close to the road are better-off in terms of access to services, but those in the mountains have to walk long distances to get water and to a hospital. Without roads, or if roads are inaccessible due to landslides or heavy rain, sick people are carried to the hospital, but often die. Childbirth and snake bites are the most serious emergencies faced in Rigo district.

Household Survey Results

Forty-two households were interviewed from Rigo district. The district covers three distinct geographical areas—coastal, central, and inland remote—which reflect the climate impacts experienced in other parts of PNG.

Most households (83%) have a male head. The average size of a household is 7 persons although households were up to 18 people. Eighteen percent of the population is under 5 years of age, with 6% over 65 years of age. Slightly more males than females are under 5 years old, while slightly more females are over 65 years of age.

Education Level of Head of Household

Education	***No.***	***Percent of Household Heads***
No education/illiterate	1	2.4
Primary or upper primary	13	31.0
High school	15	35.7
Secondary school	1	2.4
Tertiary	11	26.2
No response	1	2.4
Total	42	100.0

Just over a quarter of households (26%) had a member who was chronically ill or physically disabled. In two households there were two people in this category, and one household had three chronically ill or disabled members.

The main sources of income show a high reliance on agriculture, primary production, and subsistence activity. Remittances and family assistance are also a vital source of emergency income.

Most Important Sources of Income

Income	1st ranked	2nd ranked	3rd ranked
1. Salary or wages – government	17%	2%	2%
2. Salary or wages – private company	5%	2%	2%
3. Self employed/own business	5%	5%	10%
4. Agriculture and fish sales	31%	14%	7%
5. Home produce/market sales	17%	33%	-
6. Remittances and gifts	-	7%	24%
7. Casual jobs	-	2%	5%
8. Welfare and pensions	-	-	-
9. Royalties, e.g. land, mining, timber	2%	-	-
10. Subsistence activity	19%	17%	12%
11. Other income	-	2%	19%

Home ownership is high, with 95% of occupants owning their own home, and just 3% renting. Most houses have been built by their owners (71%) with 27% built by a professional builder. The average age of the house is 15 years with the average duration of the household living in the house at 13 years. Housing stock consists of mostly thatch (57%) and timber-walled (21%) houses with iron roofs and timber floors (81%). The median value of the houses surveys was K8,500 (but ranged from K500 to K80,000). Only 22% considered their walls to be in good condition while 41% claimed their roofs were in good condition, with just 39% having cyclone ties.

Approximately 22% of households had experienced flooding, yet all but one house were raised above the ground, typically on timber poles (71%), but also a few on concrete posts. Raising houses above the ground appears to be a common local practice regardless of location. The average height of raising was 2.25 meters, but up to 4 meters.

Only one house was insured.

For the majority of households, the house was the main building asset owned by the family. For the 45% with other associated buildings, these included

- shed for selling flammable liquid (4 m X 3 m);
- tool shed;
- 15-post house valued at K20,000 for dwelling
- generator shed: (4 m X 4 m) = K150; toilet: (3 m X 3 m) = K100; poultry shed: (12 m X 4 m) = K500;
- three houses: (K40,000); one chicken house: (K200);
- house similar to main dwelling house;
- shelter for family: (30 m X 10 m) = K5,000;
- external kitchen: (2 m X 2 m) = K500; chicken house: (4 m X 6 m) = K200; toilet: (1 m X 1 m); and
- store: (6 m X 8 m).

Nearly all households have their own food garden (3 households did not respond to the question). The results show that many households also sell produce, especially staple root crops and other market garden vegetables.

Home Garden Foods Grown for Own Consumption

Crop	No.	% of Households
Sweet potato	34	85.0
Taro	37	92.5
Cassava	31	77.5
Yam	39	97.5
Sago	7	17.5
Bananas	40	100.0
Breadfruit	28	70.0
Pineapple	34	85.0
Coconut	39	97.5
Vegetables	38	95.0
Abika	2	5.0
Betelnut	1	2.5
Sugarcane	1	2.5

Note: Percentages shown for only those households that had a home garden.

Home Garden Foods Grown for Sale

Crop	No.	% of Households
Sweet potato	27	84.4
Taro	25	78.1
Cassava	18	56.2
Yam	17	53.1
Sago	9	28.1
Bananas	25	78.1
Breadfruit	16	50.0%
Pineapple	24	75.0

Coconut	23	71.9
Vegetables	24	75.0
Abika	1	3.1
Sugarcane	1	3.1
Mango	1	3.1
Pitpit grass	1	2.5

Commercial crop product was only undertaken by a few households—one growing coffee, and nine growing rubber trees.

Surprisingly, only 11 households indicated they had pigs (typically 1–3 animals), with even fewer households having chickens, although larger numbers of these were kept per household. Goats and sheep were not kept by anyone. Only one household indicated they had crop insurance. The importance of garden food in the household diet is seen in its high ranking of most important and frequently consumed foods listed by households. Wild or bush food is also important, as is store-bought food.

Top Three Sources of Food

Food source	1st ranked	2nd ranked	3rd ranked
Fresh fish/seafood	24%	19%	5%
Pork, chicken, goat		2%	10%
Garden food	76%	19%	2%
Wild bush food		26%	19%
Store bought food (rice, tinned fish)	12%	12%	57%

Food shortages were experienced by two thirds of all households, and these occurred several times in a year or were annual events (usually in December–March). Events like the drought of 1997 had an impact on many people, but recent bad weather periods in 2010 and early 2011 were also remembered as causing food shortages. In Rigo district, the causes of food shortages are wide ranging —drought, extended dry seasons, long periods of heavy rain, cyclones, and flooding. Strong winds and bushfires were also mentioned as causes of food shortages.

Food shortages are felt for durations of 1–12 months from a natural or climate related event, most frequently 3–6 months of impact. The foods most likely to be in short supply are the staple high energy food crops, such as sweet potato, yams, taro, breadfruit, cassava, and bananas.

Coping strategies to deal with these events include turning to bush food and seafood to consume and/or sell; asking relatives, especially those in Port Moresby for help; and asking the government for assistance (but with disappointing results). The range of coping strategies is expressed below:

- Asked for govt. assistance; wanted to ask for govt. assistance but they were out of reach.
- Asked for relief supplies from the province disaster office, however, the response was negative most of the time.
- Matter reported to LLG Ward Office but no response.
- Reduced the number of meal times and quantity; number of meals per day was reduced to two.
- Asked relatives in Port Moresby for assistance; relied on relatives in Port Moresby for food assistance.
- Harvested the damaged food before decay; we went quickly to the riverside to harvest the taro; harvested sago.

- Made more gardens to plant crops; planted on high land; made extra garden on the upper slope; planted a garden of tapioca; planted sweet potato in these months.
- Received relief assistance from Japan; received Japanese aid assistance.
- Received support from NGOs, churches (relief assistance).
- Food was supplied by govt.
- Obtained food from forest, animal/fruits; relied on bush/wild food; survived on banana, wild yam, wild flower, and roots and tubers.
- Survived on fish, seafood.
- Relied/survived on store goods.
- Cut timber for sale and street marketing.
- Sold betelnut, wild yam, and bush food for cash.
- Sold fish to purchase garden food.
- Nothing was done, i.e., we coped with the situation.

Asked if households preserve or store food for future use, 71% of households said they did. Mostly this involved storing yam, but also some storage of store-bought foods, such as rice, flour, tinned meat and tinned fish. The most common method of storing/preserving food was to stockpile it in a shed or storage area. This is consistent with other feedback from communities showing that food preservation, such as drying, is not generally practiced.

The main sources of water are vulnerable to climate variations and present health risks. For example, 71% use rainwater during the wet season, 29% use a river source all year round; while 48% use a shallow well all year round. Only 55% of households have a rainwater tank, and of those households that have rainwater tanks the average size is 1,000 liters. Some 88% have a roof rainwater catchment system, but most have just a single spout or guttering piece to collect water. As only a fifth of households have a full rainwater collection system, it appears that there is scope to improve this infrastructure. Only 55% said their rainwater collection system was working properly.

Water shortages were experienced by 76% of households. Coping strategies during times of water shortage were:

- Ask those who have tanks.
- Rely/survive on borehole water.
- Obtain from main river; collect from surviving creeks and streams; collect from river/stream about 100 m from the house.
- Build hand pump wells; create water wells in waterlogged areas; dig wells for bore water; obtain from wells.
- Get water from shallow well; fetch water from the water wells in the bush; seek spring water 100 m away; search for accessible water.
- Minimize usage of water; use water wisely.
- Organize the community to fetch water only on scheduled days.
- Store water.

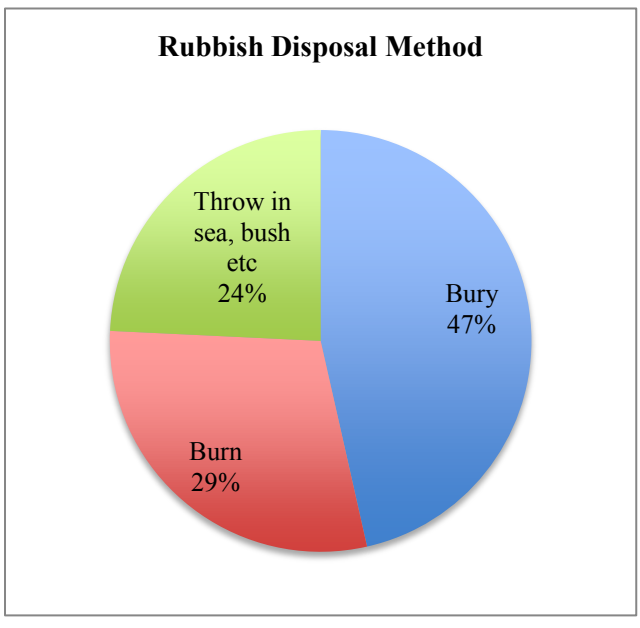
Only 7 households were connected to mains electricity. The remainder use generators and kerosene lamps. Wood is the primary source of fuel for cooking for 95% of households, with only one house using electricity for cooking. Gas and kerosene provide a secondary source of cooking fuel for 15% of households.

A dry pit latrine is the most common type of toilet used (see table below).

Type of Toilet Used by Household

Type of Toilet	No.	Percent of Households
Dry pit latrine	31	73.8
Bucket collection (night soil)	-	-
Water (pour) flush to pit	-	-
Water flush to septic tank	1	2.4
Water flush to sewerage system	-	-
Composting toilet	6	14.3
No toilet – sea, bush, river etc.	3	7.1
Other	-	-
No response	1	2.4
Total	42	100.0

Rubbish is disposed of using several methods, but mostly it is buried.



Flooding and storm surges were experienced by a third of households (37%), most of whom live in coastal areas. There were significant events noted in 2009, 2010, and 2011, but it was also mentioned that this was an almost annual event, especially in December. The causes were heavy rain periods, strong southwesterly winds, and for a few, strong wave action and cyclonic conditions. The most common damage experienced was the loss of food gardens as these were washed away. Other damage included loss of flower gardens, and one roof blew off a house.

Typically, the flooding lasted 1–4 hours, which suggests a very intense and destructive rain period. Flooding inside the house was less common than outside flooding. Internal flooding was between 0.1 and 0.5 m in depth but affected just 3 households. Flooding seemed to be on a regular basis for these households so it is likely they are living in a flood-prone area. Outside flooding was anywhere between 0.3 and 1.0 m in depth and impacted about one in eight households.

The value of property and assets damaged or lost in the floods was typically K300–K1,000 for internal flooding and on average K890 per household for crop damage from external flooding (ranging from K250 to K1,500 per event).

Actions were taken by only a few households to prevent flooding, such as building a raised house and planting trees, or placing logs to divert the water or prevent wave action.

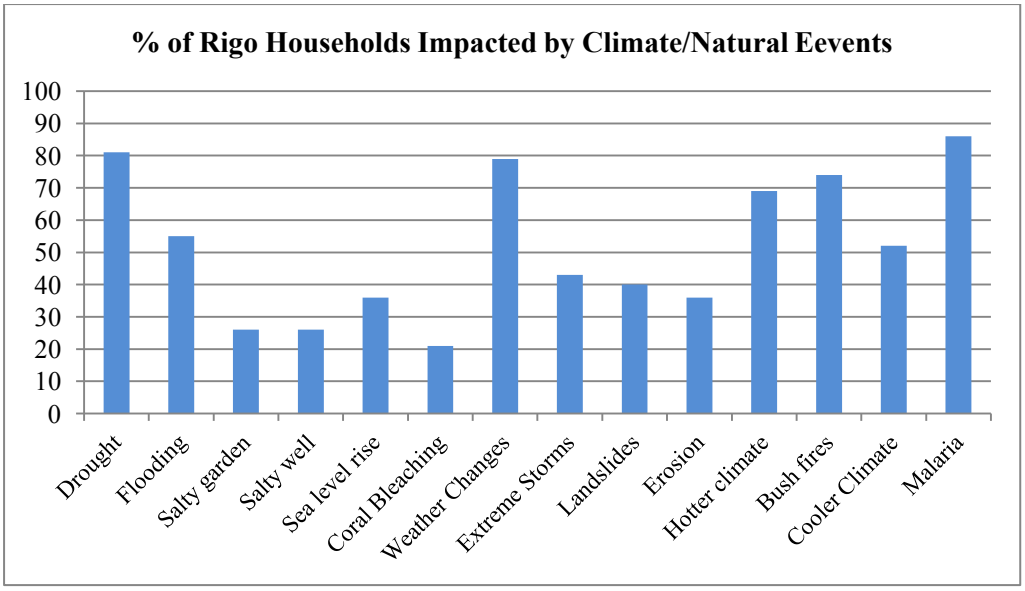
Just 19% of households indicated they might move to avoid flooding. The reasons why others would not move were lack of money, lack of a place to move to, or the fact that they had already moved and built on posts, or the flooding was unexpected.

The concept of climate change is not unfamiliar to people in Rigo district, with 69% of respondents having heard of it prior to the interview. When asked to describe climate change, the following responses were given which show respondents' experience in changing weather patterns and food insecurity:

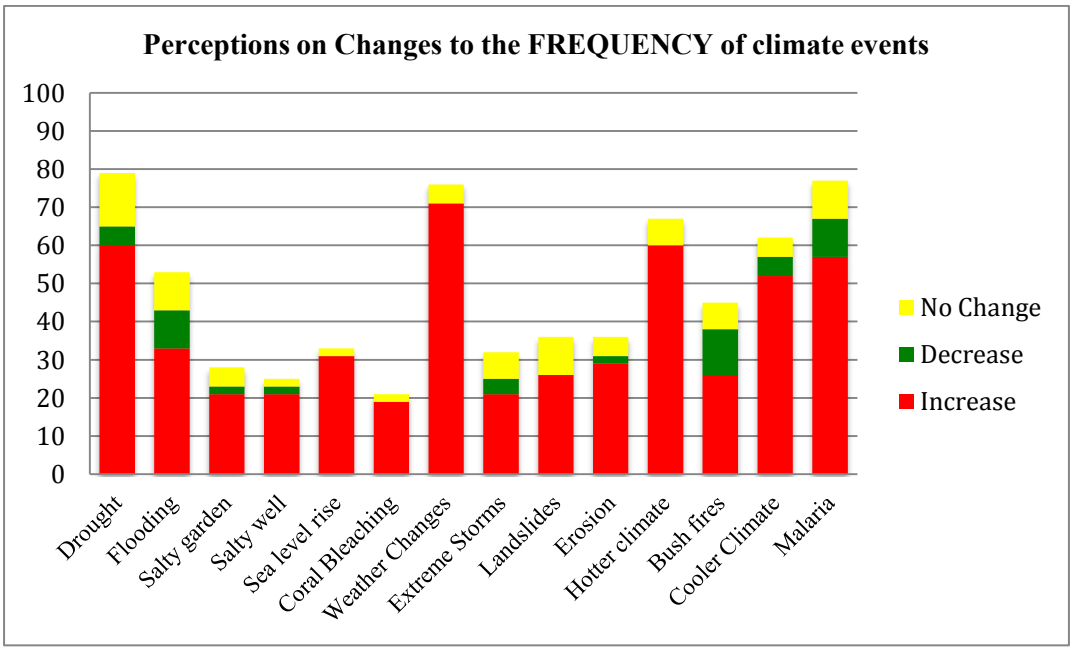
- An example was the drought in 1997.
- Caused by bush burning, deforestation, and intensive cultivation.
- Change in the weather, e.g., continuous rainfall, animals destroying food plants, newly introduced bad plants, weed and insects.
- Change of weather patterns, e.g., wet season lasting longer than expected.
- Changes in the regular weather patterns, e.g., prolonged rainy seasons, too much sun during the dry season. The season starts too soon/is too long and causes stronger movements in the atmosphere, which creates the change.
- Changes in the weather pattern, more rainfall, long dry periods, and rising sea levels.
- Changes in weather, such as long periods of drought.
- Changes of wet and dry patterns in the cycle.
- Destruction of garden food; strong wind develops; sun is getting hotter; population pressure on environment.
- Changes in dry, rain, cold, and hot seasons.

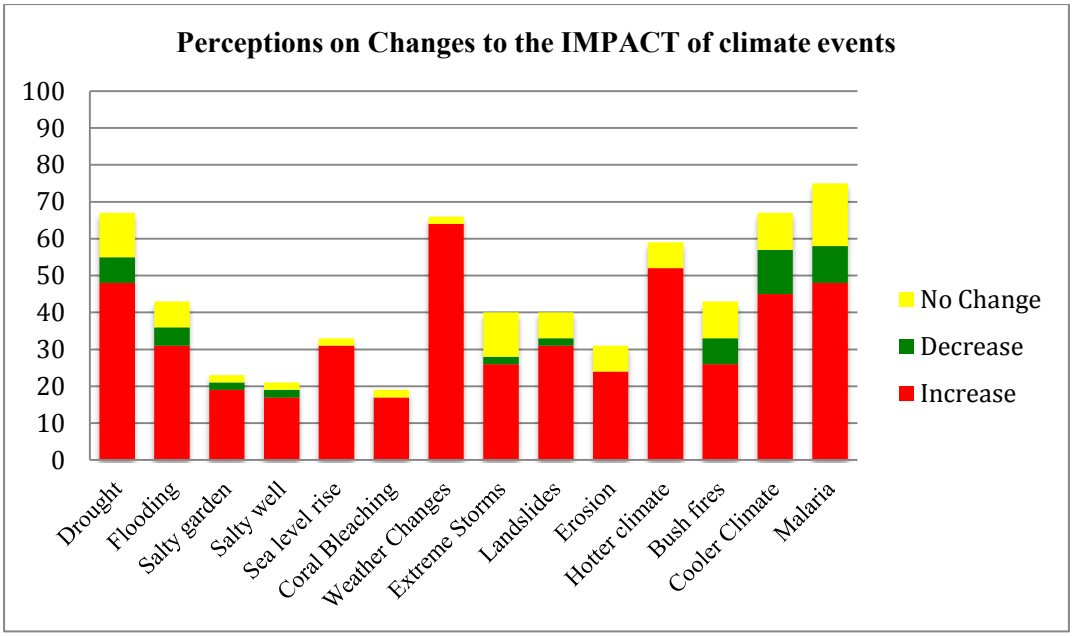
- Drought; sun getting hotter; change of rainfall patterns.
- Environment changes—increase in temperature, high humidity; yams rotting.
- Erosion; trees dying, e.g., coconut and betelnut trees.
- Global warming, sinking of little islands, food shortage, and change in traditional calendar.
- Rising temperature and change in the rainfall patterns.
- Sea level rising, sun getting hotter, food shortage.
- Sea level rising or when river is flooded and when trees are dying.
- Rising sea level, causing erosion and flooding; long dry period.
- Sun getting hotter, sea levels rising, winds getting strong more often.
- Late fruiting of trees, cold at nights, unexpected hot days.
- North/south pole Ice melting due to advance technologies, which cause the sea-level rise, causing environmental changes, especially seasons, which are now varying—not like before, e.g., rain falls almost all the year now, which causes damage to gardens as well as soil erosion.
- Not much is harvested from gardens, less fish caught, unlike before.
- Previously dry and wet seasons came at certain times but now any time during the year. Also the seasons for coconut and betelnut have changed.
- Rainfall at odd times and winds blowing stronger.
- Change of weather patterns, which affects the growth and production of food crops and health patterns of human beings.
- Weather disturbing the community.

Residents in Rigo have experienced a range of climate change impacts, notably droughts (81%) but many other impacts, such as weather changes and malaria, were recorded (refer to chart below).



The community's analysis of the changes to climate events and whether they are increasing, decreasing or staying the same in frequency and intensity are shown below.




Perceptions on Changes to the IMPACT of climate events
100
90
80
70
60
50
40
30
20
10
0
Drought
Flooding
Salty garden
Salty well
Sea level rise
Coral Bleaching
Weather Changes
Extreme Storms
Landslides
Erosion
Hotter climate
Bush fires
Cooler Climate
Malaria
No Change
Decrease
Increase

When asked about the causes of these weather and climate events the following responses were offered:

- According to media reports, destruction caused to forest and other natural resources by mining and oil exploitation in the name of development.
- Air pollution from burning.
- Carelessness with regard to the surroundings.
- Carelessness is the cause; also blame the people moving house from the sea, allowing the sea to take control.
- Changes in the climate; changes in weather patterns.
- Climate change/industrialization, green house effect.
- Cutting lots of trees; deforestation.
- Cutting of trees down near the river and shifting cultivation.
- Due to logging and mining activities.
- Drought and heavy rainfall bringing disease.
- Dry season and heavy rains, imbalance in climate, animal pests feeding on food crops.
- Hotter/increasing temperature; prolonged drought; increasing heat from the sun.
- Global warming; rapid population growth; bush fires; forest degradation.
- Increasing population pressure on the environment.
- As a Christian, I believe man has become too clever and he is now reshaping plus destroying the foundation of the earth God created; the earth with its weather normal interaction is now disturbed; logging in this area is contributing to climate change.
- We are going towards the end of times as stated in the Bible.
- Not sure.

If a catastrophe occurred, such as flooding or serious drought, households would turn in the first instance to the head of the household, local government, and local politicians for help. The provincial government appears to have an important role in assistance as a second option, possibly after the initial crisis.

Top Sources of Help during a Catastrophe

Help	1st ranked	2nd ranked	3rd ranked
No one	7%		
Head of household	24%		
Village chief	21%	5%	
Local member of parliament or politician	26%	10%	5%
Church	12%	2%	2%
Representative organization	2%	7%	7%
Provincial government	2%	31%	26%
National Government	2%	7%	24%
Family	10%	2%	2%
Other		7%	

Nearly all households have a social connection to a church organization, with women's groups and youth groups also having notable membership levels.

Membership of Social Organizations

Organization	No.	Percent of Households
Church	39	93
Local nongovernment organization (NGO)	9	21
International NGO	1	2
Women's group	24	57
Youth group	23	55
Fishing association	4	10
Agriculture/farmers'	4	10

association		
Landowners' association	5	12
Other	2	5

Respondents were asked what measures would help their family to prepare for and manage the risks of climate change, (e.g,. 50 cm sea level rise, droughts, floods, landslides, changes in weather patterns). The following needs and suggestions were given:

- As a mother; make more gardens and sell surplus for store goods.
- Ask for assistance from government about seasonal crops.
- Obtain drought resistant crops from the Department of Agriculture and Livestock and technical assistance from the Office of Climate Change and Development (OCCD).
- Seek assistance from the National Agriculture Research Institute (NARI) to select crops that will best adapt to climate change impact.
- Plant drought resistant crops, share information, and adjust to changing environment.
- Change of food crop, e.g., from banana to yam.
- Cut timber for sales, market store goods, and sell fish.
- Reduce bush fires and replant trees..
- For rising sea levels, build sea walls and awareness.
- Use mobile network to communicate with the appropriate authorities e.g. local government ward members.
- To avoid floods, houses are built on high posts, gardens are made on higher grounds; to avoid landslides, we move to higher grounds and to combat weather changes we plant introduced crops and raise livestock.
- Collect information to put forward to proper authorities.
- Awareness programs on environmental issues run by the climate change team.
- Create awareness to save forests and reduce bush fires.
- Seek advice from experts on adaptation measures and from the Office of Climate Change and Development.
- Seek advice from the responsible authorities/government. Keep ears open to the climate change program from media and awareness programs.
- Support peace officers, councilors, and local leaders to do more climate related awareness, plant more trees, and prevent unnecessary bush fires.
- Support the initiatives/policies of climate change through global interventions.

- Assist any organization by combating climate change and diverting water flows.
- Being old will mean help needed from family members.
- Seek family member's assistance.
- Vacate the locations.
- Move to another location.
- Pray for divine assistance and protection, plant a lot of trees, and reduce bush fires.
- No idea; never experienced any disasters.

Vulnerable Areas, Community Coping Strategies, and Help Needed

Climate impacts in PNG are many and varied. Civil society expressed the need to give more attention to the wide range of impacts affecting Papua New Guineans, not just focusing on sea level rising in a few notable islands.

The impacts of concern included

- inland river flooding, especially the Highlands, where gardens are washed away and resettlement is not possible;
- flooding of large rivers in Oro Province, which cut off access for months at a time, increasing malaria and putting pressure on health facilities;
- inland flooding and landslides, washing away roads and cutting access to health centers and markets;
- tidal surges in coastal areas of New Ireland, East Sepik, Bougainville, Madang, and Manus, which have destroyed gardens, drinking water, and many homes;
- water scarcity in coastal areas (dry areas plus wet areas with poor water quality);
- drought in Waghi Valley, making the ground hard and uncultivable, affecting food security and womens' livelihoods;
- lack of information on drought preparedness, especially for the 2012 predicted drought;
- deforestation and lack of firewood in Chimbu Province; and
- lack of testing equipment at health centers to determine what type of malaria a person has, to allow correct treatment rather than relying on current observational diagnosis.

1.1 Coping strategies

Feedback from civil society is that communities experiencing climate change impacts and natural disasters tend to help themselves to recover, albeit with some frustration at government and local leaders' lack of response. It would appear that the most remote and neglected villages are more resilient than those that have become dependent on assistance from outsiders. According to environmental NGOs, most villages have a high degree of self-reliance and want to help themselves; they want

to be shown how to do things for themselves rather than receive assistance or have things done for them.

Examples of current coping strategies include

- individual household actions to improve living conditions, e.g., experimenting with new farming methods, new crop varieties (not necessarily climate resilient ones), building their own sea wall in front of their house, and trying to find alternative sources of income (not just selling surplus garden foods); installing rainwater tanks if affordable;
- collective community action, which is more common as a response to a severe climate change event or natural disaster, such as flooding or cyclones. After a natural disaster, the government is very slow to respond so the members within the community help each other out. Collective action is often hampered by lack of leadership in the community. For example, in Siar (a village researched by ActionAid), women involved in the study expressed their frustration with the lack of leadership in the community and were taking action into their own hands by trying to establish micro-businesses (like street stalls) to increase family income to have more funds to invest in food production training, equipment, or for buying materials for the sea wall. People in Siar (particularly women) were frustrated by the inaction of the local leaders. The construction of a sea wall has been talked about for the past 10 years but nothing has eventuated. The women felt that this inaction was due to the local leaders not taking the matter seriously and not being capable of lobbying government, and/or seeking assistance from donors and international NGOs. Women in Rigo district in Central Province also expressed frustration with government support, including the National Disaster Office provincial office, which is meant to help, but even if they are given money and food to deliver, it does not reach the affected villages;
- turning to extended family for help by asking for money or assistance, especially from relatives in urban centers such as Port Moresby;
- selective harvesting of kaukau (sweet potato), practiced by women. Only a few tubers are removed at a time from the growing mound, with harvesting spread over several months to provide an ongoing food source;
- planting drought resistant crops as encouraged by NARI; however, not everyone has access to this information or the crop varieties;
- limited storage of food, although this is not common practice in PNG and only some food like yams can be stored—taros not for long, and sweet potatoes not beyond a week or two. While rice can be stored, it is not possible to grow this everywhere and requires intensive labor and cropping for not much yield. In coastal areas, there is some storage of coconuts but no drying of fruit for later use. Traditionally, wallaby meat was dried but this only lasts several weeks, not for long periods. NARI is showing how to preserve cassava by grating and squeezing the liquid to dry, but this information is not widely available;

- microfinance and insurance, taken up by a few households. Some women in agricultural cooperatives open bank accounts to save for school fees but individual women do not do this as they do not have the training in bookkeeping. Insurance is limited to very specific cases of health insurance, (e.g., Milne Bay Anglican church health center operating a family health insurance scheme, or Aon company's medical insurance for wage earners) and private cover for possessions (middle income earners). Micro-insurance at the village level does not exist.

BOX 2: Provincial Differences in Disaster Preparedness and Community Impact

(as told by Mama Graun Development Trust)

In 2007, Cyclone Guba affected communities in Oro and Milne Bay provinces.

In Oro villages, inland flooding came as a total surprise. The only warning of some flooding was a cyclone warning from neighboring Milne Bay Provincial Radio. The lack of information and surprise from the inland flooding was a sad and terrifying experience for the community. Although they were asking for help, no one answered them for a day, no one told them what was going on, and no one had said anything about an inland flood.

By comparison, Milne Bay Province has a Provincial Disaster Office with a computer system, weather monitoring system, staff to read the forecast, and announcements on radio. Milne Bay has an early warning system: every village with a health center has a VHS radio. When there is a disaster warning, it goes out to every radio network— government, health center, and church— with residents receiving early warnings of natural disasters and climate events.

In 2010, a tsunami warning was issued for the Milne Bay area after an earthquake in the Solomon Islands. In Milne Bay Province, local level government received the message and relayed this through the networks. By comparison, in Oro Province the warning about a possible tsunami came two days late. (Oro now has Digicel access so will now have access to early warnings sent out through the early warning system by OCCD.)

Needs and Solutions

Reducing the vulnerability of people to climate change requires action at the community level. This includes training and facilitating communities to understand their own situation and future vulnerabilities, as well as exploring new and old ways of reducing vulnerability. Villages in PNG have demonstrated that with some assistance and knowledge, they can build on help and contribute ideas and resources of their own to solve their own issues. Solutions must come from the community itself through engagement and empowerment, and having knowledge to make choices that suit their conditions.

Steps for this to happen include

- training ward development committees, including women, to understand and integrate adaptive behaviours into their daily lives. For example, this might include

training of women in postharvest and technical areas of food production, storage and preservation;

- Training local level government, district and provincial leaders;
- Developing current adaptive actions and then spreading this information so that others can use, learn, and adapt these models;
- Civil society's key role in sharing information and supporting communities to build resilience; the media also need to be strengthened by training to understand the climate risks and how to inform and facilitate community solutions. Civil society organizations need to know about disasters/climate events and how to prepare for them, i.e., what are the risks and impacts, and how to help communities build resilience.
- Improving OCCD communication and knowledge sharing on climate change risk management to operate as a partnership with civil society and to include a wider range of stakeholders, e.g., development NGOs, businesses, and media. NGOs report that information from OCCD is not clear or timely and the principle contact person for follow up is unclear. Work by NGOs is not always acknowledged and requires technical expertise not available through OCCD.

Persons Consulted Pilot Program on Climate Resilience National Workshop

16-18 November 2011. Hideaway Hotel

NAME	ORGANIZATION	DESIGNATION	PHONE	MOBILE	EMAIL
Alex Abore	Rigo Inland	Ward 12 councilor	72255530		P.O Box 43 , Kwikila
Allan Uru	Rigo Coast LLG, Gabagaba village	Aqua Marine Committee Leader	72500640		
Asi Manega		Gabagaba village, Rigo District	71932155		
Avena Willie		Ginigolo Village, Rigo Central	76136997		
Bala Nigona		Village Court Magistrate			
Bala Nigona	Karaikomana village, Rigo Inland	Village court magistrate	72255530		
Barry Nenai	Rigo Central LLG	Project Officer	73557925		
Bema Govi	Karaikomana village, Rigo Inland	Village Peace officer	72255530		
Bema Govi	Rigo Inland	House Father			
Bouna Misina	Libuna Komana Village, Rigo Inland	Boku Circuit Women Fellowship secretary			
Emmanuel Alex	GobuKomana Village, Rigo Inland	Youth			
Erik Sikam	Department of Works	FAS- Design Services	327 1402	71020076	esikam@works.gov.pg
Estha Malaga	Karaikomana village, Rigo Inland	Youth leader	72255530		
Esther Malaga	Rigo Inland LLG	House Girl	73375745		
Felix M. Daroa	Bootless Lavadae Reforesting Ass Inc	Chairman	3407696	72004434	
Geboka Guana	Rigo Central	Ward Liaising Officer	73578743		
Goru Aboga	Rigo Central LLG		72614890		
Grace Mou	Rigo Inland	Ward 12			P.O Box 43, Kwilkila
Huau Saina	Rigo Coast LLG-Kwikila, Rigo	Project Officer	72853698		

	District				
Kathy Kila	Rigo Coast LLG	House Wife	73903557		
Kedea Uru	Gabagaba United Church	President Fisherman Association	76884194/ 72083644		
Kevin Mabone	Rigo central LLG	Ward Councilor	71764178		
Kila Fred	Education Department	Teacher	73566080		P.O Box 740, Port Moresby
Kila Gimana	Boinanamo Village, Rigo District		72698110		
Kila Manu	Rigo Coast LLG	House Wife	73903557		
Kila Raka Daba	Prime Minister's Office	Retired Politician	72507677		
Kone Burana	Rigo Central LLG	Clerk of Assembly	71831448		
Luania Gadd	Rigo Central LLG Assembly	Women Representative	76629618		
Mick N. Raga	Gabagaba Ornamental Fish Project	Chairman	71485040/ 76798050		
Mio Kila	Rigo Central LLG	Ward Member Gidobada village	76639737		
Omae Ivaha	Rigo Inland LLG	Finance Officer	71342164		
Pida Kila	Bonanamo Village, Rigo Coast LLG	Ward 7 member	71939451		
Raka Vele	Kalo Village	Community leaders (formerly radio broadcaster)	73609756		
Renagi Irau	Rigo Coast, Hood Point, Hula	Fisherman	72761684		United Church Hula
Tau Pokana	Kalo Village, Rigo Coast LLG	Member for Kalo: Rigo Coasta LLG	71601644/ 76766240		
Tauai Gani	Rigo Central LLG		72138040		
Vigini Babona	Gobukomana, Rigo Inland	House wife	71257611		

PNG Conference sector groups

PNG sector groups

Health sector working group prioritizing climate risks

Women from Rigo district discussing climate change issues that affect them

Women from Rigo district identify water, food insecurity, health, and transport as critical issues

Feedback from women in Rigo district, Central Province

Persons Consulted through interviews or email

October–November 2011

Name	organization	Designation	Phone	E-mail address
Kate Morioka	ActionAID Australia	Project Manager Fighting for Women's Rights Pacific Research	+61 2 9565 9176 M: +61 419 144 466	Kate.Morioka@actionaid.org
David Randle	AON Risk Services	Technical Adviser	3224562	David.randle@aon.com.opg
Daniell Cowley	CARE	ACD Projects	532 2766 71117172	Daniell.cowley@careint.org
Senson Mark	Eco-Forestry Forum	Climate Change Officer	323 9050/7186 1101	smark@ecoforestry.org.pg
Stuart	EU Rural Water	Watsan	62472365	sjordan@rwssp.org.pg

Jordan	Supply and Sanitation project	Engineer		
Rose Godan	Mama Graun	GIS/Geographer	3256041	mamagraun@global.net.pg
Dr Jane Mogina	Mama Graun	Executive Director	3256041	moginaj@global.net.pg
Chiara Boin	Mama Graun	Economist	3256041	mamagraun@global.net.pg
Joy Kisselpar	Nau FM	Reporter		jkisselpar@naufm.com.pg
Gwen Sissiou	OCCD	Director, Measurement, Reporting, Verification and National Communication		gwensissiou@yahoo.com
Keto Vari	Office of the Development of Women	Policy Specialist-Mining, Energy and Water	3254566	kvari@dfcd.gov.pg
Nalini Nandan-Hallt	PNG Chamber of Commerce and Industry/PNG Business Council	Executive Officer	321 3057/ 71298202 9	pngcci@global.net.pg or apngbc@global.net.pg
Jason Wuri	The National	Journalist	3246888	Jwuri@thenational.com.pg
Bernard Kila	The Salvation Army	National Disaster and Emergency Coordinator	325 5522	Bernard.kila@png.salvationarmy.org
Amelia Siamomua	UNDP	Gender Officer		amelia.k.siamomua@undp.org
Joseph Kunda	WB/OCCD	DRMandCCA Specialist	73141907	jkunda@worldbank.org
Poela Utama	Women in Agriculture Development Foundation /Fresh Produce		3426306 or 72674296.	poelautama@yahoo.com.au
Joseph Kapis	World Vision	Operations Manager PNG	725 26829	joseph_kapis@wvi.org
Brian Mathew	World Vision	WASH Advisor, Timor Leste	+670 763 9535	Brian_Mathew@wvi.org
Bryce McGowan	World Vision	WASH Advisor, Solomon Islands		brycemcgowan@ymail.com

Vulnerable Household Survey Respondents

November 2011, Central Province

Respondent	Province	District	Local Level Government	Ward	Village
Henry Rodney	Central	Rigo	Rigo Coastal	7	Bonanamo
Gimana Vele	Central	Rigo	Rigo Coastal	7	Bonanamo
Alau Vele	Central	Rigo	Rigo Coastal	7	Bonanamo
	Central	Rigo	Rigo Coastal	7	Bonanamo
Ragana Puli	Central	Rigo	Rigo Coastal	7	Bonanamo
Renagi Kila Gimana	Central	Rigo	Rigo Coastal	7	Bonanamo
Gima Gini	Central	Rigo	Rigo Coastal	7	Bonanamo
Godei Vele	Central	Rigo	Rigo Coastal	7	Bonanamo
Mari Vekwa	Central	Rigo	Rigo Coastal	17	Kalo
Pokana Kila	Central	Rigo	Rigo Coastal	17	Kalo
Raka Vele	Central	Rigo	Rigo Coastal	17	Kalo
Cr. Tau Pokana	Central	Rigo	Rigo Coastal	17	Kalo
Lydia Kwaipo	Central	Rigo	Rigo Coastal	17	Kalo
Kapana Pokana	Central	Rigo	Rigo Coastal	17	Kalo
Veari Ani Vali	Central	Rigo	Rigo Coastal	16	Hula
Gima Kila Ope	Central	Rigo	Rigo Coastal	16	Hula
Kila Kilalema	Central	Rigo	Rigo Coastal	16	Hula
Luania Gado	Central	Rigo	Rigo	4	Gomore
Makena Noga Kila	Central	Rigo	Rigo	4	Saroa
Raga Ofora	Central	Rigo	Rigo	5	Babaga
Mio Kila	Central	Rigo	Rigo		Girobara
Iavane Vanuga	Central	Rigo	Rigo	15	Saroakeina
Kevin Mabone	Central	Rigo	Rigo	18	Daroa Komana
Gesina Beliga	Central	Rigo	Rigo Inland	12	Taukomana
Gabriel Gasi	Central	Rigo	Rigo Inland	12	
Gaulo Kevin	Central	Rigo	Rigo Inland	12	Matanatou
Diru Bina	Central	Rigo	Rigo Inland	13	Kokorogoro
Kemsie Bina	Central	Rigo	Rigo Inland	13	Kokorogoro
Micheal Kirimu	Central	Rigo	Rigo Inland	13	Kokorogoro
Dagia Misina	Central	Rigo	Rigo Inland	13	Kokorogoro
Neke Gobona	Central	Rigo	Rigo Inland	12	Libuna Komana
Gary Galagi	Central	Rigo	Rigo Inland	12	Libuna Komana
Maino Rigena	Central	Rigo	Rigo Inland	12	Libuna Komana
Bouna Misina	Central	Rigo	Rigo Inland	12	Libuna Komana
Angela Kwalimu	Central	Rigo	Rigo Inland	12	Binagoro
Oena Malona	Central	Rigo	Rigo Inland	12	Binagoro
Luana Gou	Central	Rigo	Rigo Inland	12	Binagoro
Vali Diniva	Central	Rigo	Rigo Inland	12	Binagoro
Ps Brus Magini	Central	Rigo	Rigo Inland	12	Karaikoma

Jack Gasi	Central	Rigo	Rigo Inland	12	Karaikoma
Bala Nigona	Central	Rigo	Rigo Inland	12	Karaikoma
Gabana Demeni	Central	Rigo	Rigo Inland	12	Karaikoma

Saroa Ward Councilor discussing the survey

Village meeting to talk about climate change

Women washing and bathing and collecting water at inland river area prone to flooding

Wharf damaged by tidal wave action, coastal Rigo

Discussing climate change and the questionnaire with villagers in coastal Rigo

Babaga ward councilor completes the questionnaire

Gamore Local Level Government women's representative completes the questionnaire

References:

UNDP (2011) *Human Development Report*

IMG Inc (2010) *Country Gender Profile: Papua New Guinea*. JICA

Alston, M (2011) *Understanding Gender and Climate Change in the Pacific*, UNESCO: Apia

Watson, A (nd) *The mobile phone: the new communication drum of Papua New Guinea.* PhD thesis. Queensland University of Technology. ahawatsaon@hotmail.com

B. Additional Consultations with Key Stakeholder Groups during Development of SPCR

In addition to the broad-based seven step national consultative workshops, group-specific consultations were sought with key stakeholders. Key concerns identified by these groups are outlined below.

Government Agencies. During the SPCR planning process, a series of consultations were undertaken with representatives from key government agencies, including the Department of Mineral Policy and Geohazards Management (DMPGM), PNG Forest Authority, Department of Transport (DoT), PNG Ports and the National Disaster Centre. Feedback informed the design and development of PNG's SPCR. Consultations were coordinated by OCCD.

Private Sector Engagement. Representative bodies of PNG's private sector were engaged during the SPCR planning process and follow-on technical consultations, including with the PNG Chamber of Commerce and Industry (PNGCCI), which represents a broad range of PNG businesses, including manufacturing, services, agriculture, and transport. The meetings confirmed the need for considerable climate change risks capacity building among PNG's private sector and the need to raise awareness of climate change adaptation issues among its members.

The Institute of Engineers PNG (IEPNG) represents professional engineers and those engaged in the engineering profession. It has an active membership of over 1,500 and regularly organizes professional development and capacity building events. IEPNG is responsible for the registration of Professional Engineers in PNG. IEPNG has significant scope for promoting climate change risk management in the technical community responsible for planning, design, and maintenance of infrastructure in PNG under proposed SPCR interventions.

Civil Society. Consultations were held with civil society organizations (CSOs) during the SPCR planning process. The consultations, facilitated by the Department of Community Development (DCD) and OCCD, were attended by local and international CSOs. The critical role played by CSOs in all aspects of community development in PNG was stressed during these consultations. In particular, the consultations outlined that the varied and complex nature of traditional society in PNG will require careful design of SPCR community capacity building interventions to ensure their meaningful and effective engagement, including training of communities for on-ground climate resilience-building projects during SPCR implementation. It was recognized during the CSO consultations that various CSOs have been engaged in climate change projects, with a focus on REDD, which has raised awareness of climate change issues. This is likely to provide a useful platform on which to build capacity for climate change risk management activities under the SPCR.

Development Partners. A series of both informal and formal consultations were held with a wide variety of development partners during the SPCR planning process, including meetings with the Development Partners Climate Change Taskforce (DPCCT), World Bank Group, ADB, IFC, UNDP, AusAID, Embassy of Japan, and EU. Development partner consultations stressed the importance of ensuring donor harmonization with respect to climate change adaptation activities, and for the SPCR to support improved donor coordination so as not to overwhelm the over-stretched capacities of OCCD and other agencies involved with climate change programming

in PNG, while recognizing the importance of whole-of-government implementation. Development partner consultations reinforced the potential for PNG's SPCR to contribute to, rather than duplicate, current and pipeline climate change projects and programs.

C Persons Consulted

Pilot Program on Climate Resilience Inception Workshop

7 September 2011, Ela Beach Hotel

Name	Organization	Designation	Phone	E-Mail Address
Havini Vira	National Fisheries A.	Manager	73604073	hvira@fisheries.gov.pg
Ian Liriko	NFA	Fisheries Scientist	3090440	iliviko@fisheries.gov.pg
Goodwill Amos	PNG Forest Authority	Manager, CC and REDD	3277907	gamos@pngfa.gov.pg
Gae Gonae	UPNG	Lecturer	3267224	gygowas@gmail.com
Jason Alonk	UPNG	Rep	3267576	jalonk@upng.
Ethel Namuri	OCCD	PRandComm. Officer	3442265	eanamuri@gmail.com
Lovis Kurika	NARI	Agronomist	71935886	Lovis.kurika@nari.org.pg
Eric Sikani	Dept. of Works	FAS – Design	3241402	esikani@works.gov.pg
Dr Jane Mogina	Mamagraun	Executive Director	3256041	moginaj@global.net.pg
Rose Godan	Mamagraun	GIS	3256041	mamagraun@global.net.pg
Ken Neyakawape	Health Dept.	Technical Advisor	3013795	ken.neyakawape@health.gov.pg
Tanya Zeriga	WCS	Planning Officer	76794895	tzeriga@wcs.org.au
Ruby Kenny	OXFAM	Program Officer	72959483	rubyk@oxfam.oxfam.org.au
Maihaea Huasue	Dept. of Transport	Policy Officer	7257500	mhuaupe@transport.gov.pg
Joe Kapa	Dept of National Plan.	a/Deputy Secretary	3288390	joe_kapa@planning.gov.pg
Karen Hiawalyer	National Planning	CC Program Officer	72919453	Karen-_hiawalyer@planning.gov.pg

Pilot Program on Climate Resilience Workshop

27 September 2011, OCCD

Name	Organization	Designation	Phone	E-Mail Address
Leo Makita	Nat. Dept of Health	Principal Advisor Malaria	3013819	makital@global.net.pg
Havini Vira	National Fisheries Auth.	Manager, Aquaculture	3200420	hvira@fisheries.gov.pg
Ken Neyakawaya	National Dept of Health	Technical Advisor	3013715	ken_neyakawaya@health.gov.pg
Dr Jane Mogina	Mama Graun	CBA	3256041	mamagraun@global.com
Rose Godana	Mama Graun	CBA	3256041	mamagraun@global.com
Chiara Boin	Mama Graun	CBA	3256041	mamagraun@global.com
Philemon Meapa	Dept of Transport	AS (Policy)	3257500	pmeapa@transport.gov.pg
Maino Virobo	Dept of Environment and Conservation	Executive Manager	3014516	mvirobo@dec.gov.pg
Daba Rakagaro	GHD	Climate Project Officer		drakagaro@yahoo.com.au
Vani Igo	GHD	Country Manager	3212184	Vani.igo@ghd.com
Jacob Ekinye	OCCD	Snr Policy Analyst	3442293/ 76581126	jekinye@gmail.com
Emmajil Bogari	OCCD	Policy Analyst	3442293/ 76581128	
Varigini Badira	OCCD	Director Adaptation	3442293/ 76581137	vbadira@gmail.com

Infrastructure Sector – Capacity Needs Assessment workshop 15th November 2011

Name	Organization	Designation	Phone	E-mail Address
William Luke	PNG Ports Corporation	PNG		William.luke@pngports.com.pg
Leon Blatcham	PNG Ports Corporation	Projects Manager, Infrastructure		Leon.blatcham
Christopher Maingu	PNG Ports Corporation	Manager. Corporate Standards		
William Walo	Water PNG	Senior Business Development Officer		
Roger Kara	Water PNG	General Manager Engineering		
Henry Opu	Water PNG	Corporate Planner		
Peter West	Water PNG	Manager Capital Works and Infrastructure		
Martin Teine	Treasury Department	Adviser, ex Shoalhaven Water, NSW, Australia		
Ismael Sunga	Treasury Department	Economist		
Philemon Meapa	Department of Transport	Economist		
Sent Raiya	Department of Transport	Assistant Secretary		
Ms Toksy Tanabi	Institution of Engineers	Policy Officer		

Name	Organization	Designation	Phone	E-mail Address
		Coordinator of Member Services		

Pilot Program on Climate Resilience National Workshop

16–18 November 2011, Hideaway Hotel

Name	Designation	Organization	Phone	E-Mail Address
PNG				
Alex Abore	Ward 12 councillor	Rigo Inland	72255530	P.O Box 43 , Kwikila
Allan Uru	Aqua Marine Committee Leader	Rigo Coast LLG, Gabagaba village	72500640	
Asi Manega	Gabagaba village, rigo District		71932155	
Avena Willie	Ginigolo Village, Rigo Central		76136997	
Bala Nigona	Village Court Magistrate			
Bala Nigona	Village court magistrate	Karaikomana village, Rigo Inland	72255530	
Barry Nenai	Project Officer	Rigo Central LLG	73557925	
Bema Govi	Village Peace officer	Karaikomana village, Rigo Inland	72255530	
Bema Govi	House Father	Rigo Inland		
Bouna Misina	Boku Circuit Women Fellowship secretary	Libuna Komana Village, Rigo Inland		
Dan Yansom	Assistant director-Technical Standards	PNG NISIT	3231852	dan.yanson@nisit.gov.pg

Name	Designation	Organization	Phone		E-Mail Address
David A. Veiyoke	Standards officer-construction	PNG NISIT	3231852	71190734	veiyoke.david@nisit.gov.pg
Dennis Uba	Country Director	Oxfam PNG		71003949	dennis@oxfam.org.au
Elizabeth Kaidong	Adaptation and Low Carbon Growth Officer	PNG Forest Authority REDD and Climate Change Branch	327 7823	76884460	ekaidong@pngfa.gov.pg
Emmajil Bogari-Ahai	Policy Analyst	OCCD	3442293	76581124	emmajil.rowanna@gmail.com
Emmanuel Alex	Youth	GobuKomana Village, Rigo Inland			
Erik Sikam	FAS- Design Services	Department of Works	327 1402	71020076	esikam@works.gov.pg
Estha Malaga	Youth leader	Karaikomana village, Rigo Inland	72255530		
Esther Malaga	House Girl	Rigo Inland LLG	73375745		
Ethel Namuri	PRand communications officer	OCCD	3442265	76581114	eanamiru@gmail.com
Felix M. Daroa	Chairman	Bootless Lavadae Reforesting Ass Inc	3407696	72004434	
Geboka Guana	Ward Liaising Officer	Rigo Central	73578743		
Gerard Natera	Manager GIS	Department of Environment and Conservation	3014517	73016520	gnatera@dec.gov.pg
Goodwill Amos	Manager Climate Change and REDD	PNG Forest Authority	3277907		gamos@pngfa.gov.pg
Goru Aboga		Rigo Central LLG	72614890		

Name	Designation	Organization	Phone		E-Mail Address
Grace Mou	Ward 12	Rigo Inland			P.O Box 43, Kwilkila
Graham Sem	International Consultant	SEM Ltd/ GHD Pty Ltd	7285211 6	+649360 571	gsem@xtra.co.nz
Huau Saina	Project Officer	Rigo Coast LLG- Kwikila, Rigo District	7285369 8		
Jacob Ekinye	Senior Policy Analyst	OCCD	3442293		jacobekinye@gmail.com
Jason Alonk		UPNG- Centre for Climate Change and Sustainable Development	3267576	7641770 2	jalonk@upng.ac.pg
Jason Gima Wuri	Journalist	The National	3246725	7114842 4	jwuri@thenational.com.pg
Job Opu	Environment and Compliance Officer	PNG Ports	3084297	7357637 7	Job.opu@pngports.com.pg / j_opu@hotmail.com
Joshua Salimibi	Technical Officer	Department of Health		7680097 7	
Joy Kisselpar	Editor Yumi FM	PNGFM Ltd (Nau/ Yumi/ Legend FM)	3234288	7109448 0	jkisselpar@naufm.com.pg
Kathy Kila	House Wife	Rigo Coast LLG	7390355 7		
Kedea Uru	President Fisherman Association	Gabagaba United Church	7688419 4/ 7208364 4		
Ken Nepakaya	Senior Officer	Department of Health			
Keto Vari	Policy Specialist- Mining, Energy and Water	Office of the Development of Women	3254566		kvari@dfcd.gov.pg
Kevin Mabone	Ward Councilor	Rigo central LLG	7176417 8		
Kila Fred	Teacher	Education Department	7356608 0		P.O Box 740, Port Moresby

Name	Designation	Organization	Phone		E-Mail Address
Kila Gimana		Boinanamo Village, Rigo District	7269811 0		
Kila Manu	House Wife	Rigo Coast LLG	7390355 7		
Kila Raka Daba	Retired Politician	Prime Minister's Office	7250767 7		
Kone Burana	Clerk of Assembly	Rigo Central LLG	7183144 8		
Leon Blatcham	Team Leader Corporate Standards	PNG Ports Corporation	3084200		leon.blatcham@pngports.com.pg
Luania Gadd	Women Representative	Rigo Central LLG Assembly	7662961 8		
Luanne Losi	Policy Analyst	OCCD	3442293	7658113 6	lulan2431@hotmail.com
Mick N. Raga	Chairman	Gabagaba Ornamental Fish Project	7148504 0/ 7679805 0		
Mio Kila	Ward Member Gidobada village	Rigo Central LLG	7663973 7		
Morea Lohia	Principal Policy and research Officer	Department of Transport	3257500	7625029 2	mlohia@transport.gov.pg
Omae Ivaha	Finance Officer	Rigo Inland LLG	7134216 4		
Omae Koake	Reporter	Sunday Chronicles Newspaper		7297886 1	omaekoake@gmail.com
Pida Kila	Ward 7 member	Bonanamo Village, Rigo Coast LLG	7193945 1		
Raka Vele	Community leaders (formerly radio broadcaster)	Kalo Village	7360975 6		
Rebecca Asigau	Forest/ Climate Change Campaigner	CELCOR	3234237/ 3234509	7263781 7	rasigau@celcor.org.pg

Name	Designation	Organization	Phone		E-Mail Address
Renagi Irau	Fisherman	Rigo Coast, Hood Point, Hula	72761684		United Church Hula
Roger Kara	Corporate Planner	Water PNG	3235700 ext- 274	73117448	rkara@waterpng.com.pg
Senson Mark	Climate Change Officer	PNG Eco-Forestry Forum	323 9050	71861101	smark@ecoforestry.org.pg
Sent Raiya	Policy officer and research	Department of Transport			sraiya@transport.gov.pg
Stephen Rambe	AD- Corporate Service	Department of Implementation and Rural Development	3230431	73698756	Stephen_rambe@ord.gov.pg
Tau Pokana	Member for Kalo: Rigo Coasta LLG	Kalo Village, Rigo Coast LLG	71601644/ 76766240		
Tauai Gani		Rigo Central LLG	72138040		
Vani Igo	Country Director	GHD			
Varigini Badira	Director-Adaptation	OCCD	3442293	72119444	vbadiara@gmail.com
Vigini Babona	House wife	Gobukomana, Rigo Inland	71257611		
Welenie Yaki	Policy Officer-Land Use	Department of Lands and Physical Planning	3013204	76695479	yakiw@lands.gov.pg
Wesley Supro	Events Manager	PNG Ports Corporation	3084360	76420140	wesley.supro@pngports.com.pg
William Lakain	Senior Policy Analyst	OCCD	3250180	76581113	wlakain@gmail.com
William Walo	GM- Engineering	Water PNG	3235700	76956519	wwalo@waterpng.com.pg

PNG PPCR 2nd Joint Mission

13–16 March 2012, Crowne Plaza Hotel

Name	**Title**	**Organization**	**Phone**	**Email**
PNG				
Dr Wari Iamo	Secretary	Ministry of Environment and Conservation		
Joe Kapa	Deputy Secretary	Dept. of National Planning and Monitoring	328 8575	Joe_kapa@planning.gov.pg
Damien Horiambe	A/Asst. Secretary	Treasury Department	3128742	Damien_horiambe@treasury.gov.pg
Lia Norah Kenehe	Financial Analyst	Treasury Department	3218893	Lia_kenehe@treasury.gov.pg
Leon Blatcham	Corporate Standards	PNG Ports Authority	308 4297	Leon.blatcham@pngports.com.pg
Albert Veratau	Coordinator – Strategy Initiatives	PNG Ports Authority	308 4297	Albert.veratau@pngports.com.pg
Keto Vari	Senior Policy Officer	Dept. of Community Development		kvari@dfcd.gov.pg
George Romilly	Climate Change Specialist	PPCR Consultant Team		romillyg@istar.ca
Paul Osilis	Research Associate	NARI SRC - Laloki	323 5511	Paul.osilis@nari.org.pg
Luanne Losi	Policy Analyst	OCCD	344 2293	Lulan2431@hotmail.com
Emmajil Bogari-Ahai	Policy Analyst	OCCD	344 2293	Emmajil.rowanna@gmail.com
Varigini Badira	Director - Adaptation	OCCD	344 2293	vbadira@gmail.com
Karen Hiawalyer	Program Officer	Dept. of National Planning and Monitoring	328 8522	Karen_hiawalyer@planning.gov.pg
Tanya Zeriga-Alone	Conservation Planner	Wildlife Conservation	7679 4895	tzeriga@wcs.org

Name	**Title**	**Organization**	**Phone**	**Email**
		Society		
Welenie Yaki	Policy Officer - Landuse	Dept. of Lands and Physical Planning	301 3204	yakiw@lands.gov.pg
Eleki Minalyo	Senior Cartographer	National Mapping	325 7408 / 7338 3192	
Gideon Pama	Aquaculture Officer	National Fisheries Authority	309 0406	gpama@fisheries.gov.pg
Amanda Mararuai	Scientist (Entomology and Biosecurity)	NARI SRC-Laloki	323 5511	Amanda.mararuai@nari.org.pg
Emily Fajardo	National Coordinator	GEF Small Grants Program	7384 3255	Emily.fajardo@undpaffiliates.org
Philemon Meapa	Assistant Secretary (policy)	Dept. of Transport	7126 3773	pmeapa@transport.gov.pg
Trevor Tararau	Director (PLLSMA)	Dept. of Provincial and Local Government Affairs	72217 0006	ttararau@dplga.gov.pg

Annex 5

SPCR Climate Change Risk Assessments

Background

This Annex provides the working papers of the SPCR sector technical working groups (TWGs), which undertook the climate change risk assessments (using a multicriteria analysis) and identification of viable interventions to address priority risks. The key steps in the process are based on the **Risk Management Guidelines for Climate Change Adaptation Decision Making**[3] and **Shaping Climate-resilient Development: A Framework for Decision-making**[4]. Each sector TWG presented the outputs from their analysis during the National Consultative Workshop where stakeholders reviewed the outcomes and reached consensus on priority climate change risks (see Table 2, main text) and interventions to address these risks that constitute the basis for SPCR investments.

Papua New Guinea PPCR Risk Assessment (Infrastructure)

Team Members:

Dan (NISIT)/ David (NISIT)/ Sent (Transport)/ Roger (Water PNG)/Leon (PNG Ports)/ Wesley (PNG Ports)/ Joseph (World Bank)/Phil (PPCR)

Step 1: Summarize the Risks.

[3] Developed under the "Mainstreaming Adaptation to Climate Change" project funded by GEF/World Bank/CIDA. 2003.

[4] ClimateWorks Foundation, Global Environment Facility, European Commission, McKinsey and Company, Rockefeller Foundation, Standard Chartered Bank, and Swiss Re. 2009. *Report of the Economics of Climate Adaptation Working Group*.

Table 1: Event Outcome Risks

Source: Current and Future Climate of Papua New Guinea (November 2011) and Second National Communication (November 2011)

Event Risk Note: Below event risks identified in **Current and Future Climate of Papua New Guinea** and PNG's **Second National Communication**	**Outcome Risk** Note: Below outcome risks identified in PNG's **Second National Communication**
1. Sea level rise and storm surge	1. Wharf structures flooded 2. Coastal infrastructure and utilities damaged or destroyed 3. Houses, public buildings, coastal towns and villages, commercial and residential assets damaged and destroyed 4. Warehouses flooded at port areas 5. Airport facilities being inundated 6. Drainage systems destroyed 7. Sewerage sea outfalls destroyed 8. Power pole/lines become unstable as sea level rises 9. Increase in corrosion levels e.g. metal structures in coastal areas
2. Changes in local and national temperatures regimes – warmer days and nights	1. Thermal expansion affecting structure design. 2. power station capacity may be exceeded due to increased energy demand (e.g. Increase use in air conditioning) 3. Damage to buildings, e.g. expansion due to extreme heat 4. Increased demand for climate resilient design standards 5. Roads weathering faster 6. Thermal discomfort
3. Changes in rainfall patterns – increased intensity of rainfall	10. Roads/airports weathering faster 11. increased wear and tear on infrastructural materials, e.g. water intake tanks, increased turbidity on water levels 12. Water table increases→ subsidence 13. drainage/ sewerage systems become congested 14. Hydropower generation will be affected 15. Flash flooding drainage/ roads/ buildings 16. Increased incidence of landslides affecting roads/ bridges

	17. Capacity of dams affected
4. Increased climate variability – changes in seasons	• Increased corrosion of materials • Transport capacity to facilitate trade affected • Water and sewerage treatment cost and efficiency • Frost/hail damage to infrastructure • Service infrastructure affected
5. More severe weather events – droughts, severe rainstorms, heat waves, and category 4/5 cyclones	• All private and public infrastructure impacted by severe weather events • Affect operation, maintenance, design standards and development cost • Increase demand in reliability of infrastructure • Increased relocation vulnerable infrastructure • Rerouting roads and public utilities

Identify the Priority Outcome Risks from Above List:

- *Sea level rise and storm surge*
    - Coastal service infrastructure and utilities damaged or destroyed
    - Houses, public buildings, coastal towns and villages, commercial and residential assets damaged and destroyed
    - Airport facilities being inundated
    - Power lines become unstable as sea level rises
- *Changes in local and national temperatures regimes*
    - power station capacity may be exceeded due to increased energy demand (e.g., increase use in air conditioning)
    - Increased demand for climate resilient design standards
- *Changes in rainfall*
    - Roads/airports weathering faster
    - Hydropower generation will be affected
    - flash flooding damaging drainage/ roads/ buildings
    - increased incidence of landslides affecting roads/ bridges
- *Increased climate variability*
    - Transport capacity to facilitate trade affected
    - Water and sewerage treatment cost and efficiency
- *More severe weather events –*
    - All private and public infrastructure impacted by severe weather events
    - Affect operation, maintenance, design standards and development cost
    - Increase demand in reliability of infrastructure
    - Increased relocation vulnerable infrastructure
    - Rerouting roads and public utilities.

Step 2: Estimate Risks

Estimate the Severity of the Impact (Event and Outcome Risks)

Table 2a: Direct Impact Rating Matrix – *Sea level rise and storm surge*. Coastal service infrastructure and utilities damaged or destroyed

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low											
Moderate			X	X	X			X		X	
High	X	X				X	X				X
Very high									X		

Table 2b: Direct Impact Rating Matrix – *Sea level rise and storm surge.* Houses, public buildings, coastal towns and villages, commercial and residential assets damaged and destroyed

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low			X					X			
Moderate		X			X	X			X		
High	X			X			X			X	X
Very high											

Table 2c: Direct Impact Rating Matrix – *Sea level rise and storm surge.* Airport facilities being inundated

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			X
Low			X	X					X	X	
Moderate											
High	X	X					X				
Very high					X	X					

Table 2d: Direct Impact Rating Matrix – *Sea level rise and storm surge.* Power lines become unstable as sea level rises

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low	X										X
Low								X	X		
Moderate		X	X		X					X	
High				X		X	X				
Very high											

Table 2e: Direct Impact Rating Matrix – *Changes in local and national temperatures regimes.* Power station capacity may be exceeded due to increased energy demand (e.g., increased use of air conditioning)

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low	X						X				
Low			X		X						
Moderate		X		X				X			X
High						X			X	X	
Very high											

Table 2f: Direct Impact Rating Matrix – *Changes in local and national temperatures regimes.* Increased demand for climate resilient design standards

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low	X	X	X	X	X		X	X	X	X	X
Low											
Moderate											
High						X					
Very high											

Table 2g: Direct Impact Rating Matrix – *Changes in rainfall.* Roads/airports weathering faster

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low	X	X	X		X			X	X		X
Low										X	
Moderate				X			X				
High						X					
Very high											

Table 2h: Direct Impact Rating Matrix – *Changes in rainfall.* Hydropower generation affected

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low									X	X	
Low	X	X	X	X	X			X			
Moderate											
High							X				X
Very high						X					

Table 2i: Direct Impact Rating Matrix – *Changes in rainfall.* Flash flooding damaging drainage/roads/buildings

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			
Low									X		X
Moderate	X				X		X			X	
High		X	X	X		X					
Very high											

Table 2j: Direct Impact Rating Matrix – *Changes in rainfall.* Increased incidence of landslides affecting roads and bridges

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low		X						X	X	X	X
Moderate					X						
High	X		X	X		X	X				
Very high											

Table 2k: Direct Impact Rating Matrix – *Increased climate variability.* Transport capacity to facilitate trade affected

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					X			X	X		
Low	X	X	X								X
Moderate				X						X	
High						X	X				
Very high											

Table 2l: Direct Impact Rating Matrix – *Increased climate variability.* Water and sewerage treatment cost and efficiency

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X		X	X	X			X			X
Moderate		X								X	
High						X	X		X		
Very high											

Table 2m: Direct Impact Rating Matrix – *More severe weather events.* All private and public infrastructure impacted by severe weather events

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low								X			
Moderate		X	X								
High	X			X					X	X	X
Very high					X	X	X				

Table 2n: Direct Impact Rating Matrix – *More severe weather events.* Affect operation, maintenance, design standards, and development cost

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low	X								X		
Low				X	X		X	X		X	X
Moderate		X	X								
High						X					
Very high											

Table 2o: Direct Impact Rating Matrix – *More severe weather events.* Increase demand in reliability of infrastructure

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low			X								
Low	X	X			X			X	X	X	X
Moderate				X			X				
High						X					
Very high											

Table 2p: Direct Impact Rating Matrix – *More severe weather events.* Increased relocation vulnerable infrastructure, rerouting roads and public utilities

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low					X			X	X		X
Moderate		X	X	X			X			X	
High	X					X					
Very high											

Step 3: Estimate Frequency or Probability of Event

Table 3: Frequency/Probability Rating (Rank 1-5 based on climate change risks that are likely to occur during SPCR period > 5 years)

Climate Change Risk	Very Unlikely to Happen	Occasional Occurrence	Moderate Frequent	Likely to Occur Often	Likely to Occur Regularly
Climate change risks from risk scenario – ***Step 2*** (deal with each separately)	Not likely to occur during SPCR period **1**	May occur sometime but not during SPCR period **2**	Likely to occur at least once during SPCR period **3**	Likely to occur several times during SPCR period **4**	Happened often and will happen again during SPCR period **5**

NOTE: Only risks scoring high to very high in the impact rating matrix above to be evaluated in terms of frequency/probability.

Table 3a: Frequency/Probability Rating based on high scoring outcomes (see Tables 2 a–2q)

Event + Outcome Risk	Frequency/Probability Rating
• *Sea level rise and storm surge*: Coastal service infrastructure and utilities damaged or destroyed 6	**5**
• *More severe weather events* All private and public infrastructure impacted by severe weather events 8	**5**

Step 4: Identify Priority Risks and Vulnerable Communities.

Priority Risk	Top Three Vulnerable Communities
1. *Sea level rise and storm surge*. Coastal service infrastructure and utilities damaged or destroyed	Island : Manus and outlying atolls Coastal: Lae, Wewak, Aitape, Oro, Milne Bay
2. *More severe weather events.* All private and public infrastructure impacted by severe weather events	Island : Kavieng, Milne Bay Islands Coastal: Oro Bay, Aitape Highland : Highlands Highway (Simbu to Goroka)

Step 6: Identify Viable Interventions and Investments to Address Above Priority Risks.[5]

Team Members-Day2:

David (NISIT)/ Sent (Transport)/ Morea (Transport)/ Roger (Water PNG)/ Leon (PNG Ports)/ Wesley (PNG Ports)/ Erik(Works)/ Phil (PPCR)/ Emmajil (OCCD)

Funding: Ensuring that funding remains focused on what is meant for. Seeking a mechanism or establishing an institution that will ensure sustainability and transparency in this, e.g., Transport Sector Support Program, Trust Fund.

Networking and linkages: Build on and improve on the network that OCCD has started, and use it as an avenue to share lessons, and access international financing and resources.

Research and Design: Needed for climate resilient technology, taking international lessons and then changing it to fit PNG context; then feed into upgrading design standards.

1. Sea level rise and storm surge: Coastal service infrastructure and utilities damaged or destroyed

Island Communities: Manus and Outlying Atolls

- Institutionalizing and sensitizing climate proofing awareness in the areas of infrastructure development (public and private) through capacity building in

5 Comment: Make Policy on a specific infrastructure not one policy on all infrastructure. Direction from Government is needed, to initiate legislation and policy development at National and sectoral level: take ownership.

- policy development (from the national level)
- research and development of design standards
- human resources development in all sectors
- financial resource
- climate resilient technology
- climate proofing projects (mangrove planting, etc.)

Coastal Communities: Lae, Wewak, Aitape, Oro, Milne Bay

- Institutionalizing and sensitizing climate proofing awareness in the areas of infrastructure development (public and private) through capacity building in
  - policy development (from the national level)
  - research and development of design standards
  - human resources development in all sectors
  - financial resource
  - climate resilient technology
  - climate proofing projects (mangrove planting, etc.)

2. More severe weather events: All private and public infrastructure impacted by severe weather events

Island Communities: Kavieng, Milne Bay Islands

- Institutionalizing and sensitizing climate proofing awareness in the areas of infrastructure development (public and private) through capacity building in
  - policy development (from the national level)
  - research and development of design standards
  - human resources development in all sectors
  - financial resource
  - climate resilient technology
  - climate proofing projects (mangrove planting, etc.)

Coastal Communities: Oro Bay, Aitape

- Institutionalizing and sensitizing climate proofing awareness in the areas of infrastructure development (public and private) through capacity building in
  - policy development (from the national level)
  - research and development of design standards
  - human resources development in all sectors
  - financial resource
  - climate resilient technology
  - climate proofing projects (mangrove planting, etc.)

Highland Communities: Highlands Highway (Simbu to Goroka)

- Institutionalizing and sensitizing climate proofing awareness in the areas of infrastructure development (public and private) through capacity building in

- policy development (from the national level)
- research and development of design standards
- human resources development in all sectors
- financial resource
- climate resilient technology

PPCR Risk Assessment (Natural Resources)

Step 1: Summarize the Risks.

Table 1: Event Outcome Risks

Source: Current and Future Climate of Papua New Guinea (November 2011) and Second National Communication (November 2011)

Event Risk Note: Below event risks identified in ***Current and Future Climate of Papua New Guinea*** and *PNG`s* ***Initial National Communication***	**Outcome Risk** Note: Below outcome risks identified in *PNG`s* ***Second National Communication***
1. Sea level rise and storm surge	1. Inundation of sago and other low-lying coastal agricultural lands 2. Inundation of mangroves 3. Loss of coral reefs and sea grass 4. Loss of and impact of fisheries resources, nursery grounds, breeding grounds 5. Inundation of coastal deltas and associated aquatic biodiversity 6. Impact upon livelihoods for communities who rely on coastal resources resulting in possible migration or relocation of communities 7. Salt water intrusion of underground water 8. Loss of low-lying coastal land which is under or close to sea level 9. Loss of Turtle nesting grounds 10. Loss of and impacts on migratory routes of water fowls, dugongs 11. Increased pressure on inland natural resources through migration and loss of coastal biodiversity 12. Increased salt content in coastal soil 13. Impact on natural drainage and water flows 14. Coastal erosion
2. Changes in local and national temperatures regimes – warmer days and nights	1. Impact on crop yield 2. Changing pattern of flowering and fruiting 3. Extinction of biodiversity that cannot adapt to changes in temperature 4. Increase in pests, disease and vermin 5. Loss of high altitude vegetation 6. Migration of fauna 7. Loss of soil moisture and fertility

	8. Changes in the range of economic trees (i.e., buai) 9. Changes in spatial and altitudinal range of terrestrial biodiversity 10. Increase in incidence of algae bloom 11. Increase in incidence of coral bleaching 12. Ocean acidification 13. Impacts on coral biodiversity 14. Impacts on fish migration, fish nursery and fish stock affecting the viability of fishing communities 15. Impact on agricultural biodiversity 16. Increase in invasive species (marine and terrestrial) 17. Increase frequency and magnitude of forest fires 18. Increase water demand for agriculture 19. Land degradation
3. Changes in rainfall patterns – increased intensity of rainfall	1. Increased inland and coastal flooding impacting on terrestrial and aquatic biodiversity 2. Increased soil erosion 3. Increased incidence of occurrence of landslides 4. Decrease in crop yield 5. Increase in parasitic diversity 6. Impacts on fruiting and flowering patterns
4. Increased climate variability – changes in seasons	1. Impacts on fruiting and flowering patterns 2. Loss of genetic resources 3. Decline in quantity and quality of agriculture products resulting in loss of income 4. Loss of biodiversity 5. Emergence of invasive species (locusts, toads) 6. Increase in pests and diseases 7. Impacts on fish migration, fish nursery and fish stock affecting the viability of fishing communities 8. Increase in sedimentation affecting coral reefs 9. Temporary loss of habitats 10. Increased flooding, soil erosion, land slides
5. More severe weather events, such as droughts, severe rainstorms, heat waves, and category 4/5 cyclones	1. All above

Identify the Priority Outcome Risks from Above List:

- *Sea level rise and storm surge*
    - Inundation of sago, mangroves and other low-lying coastal agricultural lands
    - Loss of and impact of fisheries resources, nursery grounds, breeding grounds, coral reefs, and sea grass
    - Impact on livelihoods for communities that rely on coastal resources, resulting in possible migration or relocation of communities
    - Loss of low-lying coastal land that is under or close to sea level.

- *Changes in local and national temperatures regimes*
    - Loss of soil moisture and fertility and Impact on crop yield and agricultural biodiversity
    - Increase in pests, disease, and vermin
    - Increase in incidence of algae blooms, coral bleaching, and ocean acidification, with impacts on coral biodiversity, fish migration, fish nursery and fish stocks, affecting the viability of fishing communities
    - Increased frequency and magnitude of forest fires

- *Changes in rainfall*
    - Loss of genetic resources and loss of biodiversity
    - Decline in quantity and quality of agriculture products resulting in loss of income
    - Increase in pests and diseases
    - Impacts on fish migration, fish nursery and fish stock affecting the viability of fishing communities
    - Increased flooding, soil erosion, land slides

- *Increased climate variability*
    - Loss of genetic resources and Loss of biodiversity (including agro-biodiversity)
    - Decline in quantity and quality of agriculture products resulting in loss of income
    - Increase in pests and diseases
    - Impacts on fish migration, fish nursery and fish stock affecting the viability of fishing communities
    - Increased flooding, soil erosion, land slides
    - More severe weather events

Step 2: Estimate Risks.

Estimate the Severity of the Impact (Event and Outcome Risks)

Table 2a: Direct Impact Rating Matrix – *Changes in rainfall patterns.* Increased intensity of rainfall- Decrease in crop yield

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			
Low											
Moderate	X					X			X		
High		X		X			X			X	X
Very high			X		X						

- **Table 2b: Direct Impact Rating Matrix –** *Changes in rainfall.* Loss of genetic resources and Loss of biodiversity (including agro- biodiversity)

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X							X			
Moderate				X			X		X	X	
High		X			X	X					
Very high			X								X

- **Table 2c: Direct Impact Rating Matrix –** *Changes in rainfall.* Decline in quantity and quality of agriculture products resulting in loss of income

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X				X			X	X		
Moderate		X								X	
High			X	X		X	X				X
Very high											

- **Table 2d: Direct Impact Rating Matrix –** *Changes in rainfall.* Impacts on fish migration, fish nursery and fish stocks, affecting the viability of fishing communities

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X	X		
Low	X									X	
Moderate											
High		X	X	X	X						

- **Table 2e: Direct Impact Rating Matrix –** *Changes in rainfall.* Increased flooding, soil erosion, land slides

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low								X			
Moderate			X						X		
High		X		X	X	X	X			X	X
Very high	X										

- **Table 2f: Direct Impact Rating Matrix –** *Sea level rise and storm surge.* Inundation of sago, mangroves and other low-lying coastal agricultural land

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low								X			
Moderate	X				X				X		
High		X	X	X		X	X			X	
Very high											X

- **Table 2g: Direct Impact Rating Matrix –** *Sea level rise and storm surge.* Impact and loss on fisheries resources, nursery grounds, breeding grounds and coral reefs

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X				X			X	X	X	
Moderate			X								
High		X		X		X	X				
Very high											X

- **Table 2h: Direct Impact Rating Matrix –** *Sea level rise and storm surge.* Loss of low-lying coastal land on islands and atolls which is under or close to sea level (Carterets, Duke of York, Nissan, Siassi, Ahus) - 9

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low								X			
Moderate							X				
High											

- **Table 2i: Direct Impact Rating Matrix –** *Increased climate variability.* Loss of genetic resources and Loss of biodiversity (including agro- biodiversity)

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X				X		X	X	X	X	
Moderate		X	X	X		X					
High											X
Very high											

- **Table 2j: Direct Impact Rating Matrix –** *Increased climate variability.* Decline in quantity and quality of agriculture products resulting in loss of income

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X							X	X		
Moderate		X	X		X					X	
High				X		X	X				X
Very high											

- **Table 2K: Direct Impact Rating Matrix –** *Increased climate variability.* Increase in pests and diseases on natural resources

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X		X					X		X	
Moderate					X						
High		X		X		X	X		X		X
Very high											

- **Table 2l: Direct Impact Rating Matrix –** *Increased climate variability.* Impacts on fish migration, fish nursery and fish stocks, affecting the viability of fishing communities

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low										X	
Low	X		X		X			X	X		
Moderate		X		X			X				
High						X					X
Very high											

- **Table 2m: Direct Impact Rating Matrix –** *Changes in local and national temperatures regimes.* Loss of soil moisture and fertility and Impact on crop yield and agricultural biodiversity

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			
Low	X		X		X						
Moderate		X					X		X		
High				X		X				X	
Very high											X

- **Table 2n: Direct Impact Rating Matrix –** *Changes in local and national temperatures regimes.* Increase in pests, disease, and vermin

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X				X			X		X	
Moderate			X	X			X				
High		X				X			X		X
Very high											

- **Table 2o: Direct Impact Rating Matrix –** *Changes in local and national temperatures regimes.* Increase in incidence of algae blooms, coral bleaching, and ocean acidification with impacts on coral biodiversity, fish migration, fish nursery and fish stocks, affecting the viability of fishing communities

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low	X							X		X	
Moderate			X		X				X		
High		X				X	X				
Very high				X							X

- **Table 2p: Direct Impact Rating Matrix –** *Changes in local and national temperatures regimes.* Increased frequency and magnitude of forest fires

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low			X								
Moderate	X	X		X							
High					X	X	X	X	X	X	
Very high											X

Step 3 - Estimate Frequency or Probability of Event.

.

Table 3: Frequency/Probability Rating (Rank 1-5 based on climate change risks that are likely to occur during SPCR period > 5 years)

Climate Change Risk	**Very Unlikely to Happen**	**Occasional Occurrence**	**Moderate Frequent**	**Likely to Occur Often**	**Likely to Occur Regularly**
Climate change risks from risk scenario – ***Step 2*** (deal with each separately)	Not likely to occur during SPCR period **1**	May occur sometime but not during SPCR period **2**	Likely to occur at least once during SPCR period **3**	Likely to occur several times during SPCR period **4**	Happened often and will happen again during SPCR period **5**

NOTE: Only risks scoring high to very high in the impact rating matrix above to be evaluated in terms of frequency/probability.

Table 3a: Frequency/Probability Rating based on High Scoring Outcomes (see Tables 2a – 2q)

Event + Outcome Risk	Frequency/Probability Rating
Sea level rise and storm surge - Loss of low-lying coastal land on islands and atolls which is under or close to sea level (Carterets, Duke of York, Nissan, Siassi, Ahus) - 9	**5**
Changes in rainfall – Increased flooding, soil erosion, landslides - 8	**4**
Changes in rainfall patterns – increased intensity of rainfall- Decrease in crop yield - 7	**4**
Changes in rainfall – Impacts on fish migration, fish nursery and fish stocks, affecting the viability of fishing communities- 7	**5**
Sea level rise and storm surge – Inundation of sago, mangroves and other low-lying coastal agricultural land - 7	**4**
Changes in local and national temperatures regimes- Increased frequency and magnitude of forest fires - 7	**3**
Increased climate variability – Increase in pests and diseases on natural resources - 6	**4**

Step 4 – Identify Priority Risks and Vulnerable Communities

Priority Risk	Top Three Vulnerable Communities
Sea level rise and storm surge - Loss of low-lying coastal land on islands and atolls which is under or close to sea level (Carterets, Duke of York, Nissan, Siassi, Ahus) - 9	Carterets, Nissan, Ahus (Manus)
Changes in rainfall – Increased flooding, soil erosion, landslides - 8	Oro, Chimbu, Morobe (Wau),
Changes in rainfall patterns – increased intensity of rainfall- Decrease in crop yield - 7	Ramu, Bougainville, Milne Bay (Trobriand Islands)
Changes in rainfall – Impacts on fish	Barramundi fishery - Western Province, gulf

migration, fish nursery and fish stock affecting the viability of fishing communities - 7	prawn fishery, tuna in the Bismarck Sea
Sea level rise and storm surge – Inundation of sago, mangroves and other low-lying coastal agricultural land - 7	East Sepik, Gulf, Manus
Increased climate variability – Increase in pests and diseases on natural resources - 6	Markham Valley, east New Britain, Bougainville

STEP 6 – Identify Viable Interventions and Investments to Address Above Priority Risks.

Priority Risk	Top Three Vulnerable Communities	Viable Interventions and investments
Sea level rise and storm surge - Loss of low-lying coastal land on islands and atolls that is under or close to sea level (Carterets, Duke of York, Nissan, Siassi, Ahus) - 9	Carterets, Nissan, Ahus (Manus)	• Relocation – develop or improve existing relocation plans • Address social /cultural/socioeconomic and health issues (land ownership) – assess/ identify social issues • Adaptation and mitigation – mangrove, seawall
Changes in rainfall – Increased flooding, soil erosion, landslides - 8	Oro, Chimbu, Morobe (Wau),	• Sustainable land-use management – relocation of affected communities; legislation on land use • Reforestation, re-vegetation programs etc. – strengthen protection around watershed areas • Awareness programs for all • Mapping of areas prone to landslides, flooding
Changes in rainfall patterns – increased intensity of rainfall- Decrease in crop yield – 7	Ramu, Bougainville, Milne Bay (Trobriand Islands)	• Encourage resistance crops (drought / wet crops). • Fund seedling program • Develop water storage/ drainage of access water • Good land/ crop practices (gardening practices)
Changes in rainfall – Impacts on fish migration,	Barramundi fishery -	• Barramundi – restocking program/ aquaculture

fish nursery, and fish stocks, affecting the viability of fishing communities- 7	Western Province, gulf prawn fishery, tuna in the Bismarck Sea	• Prawn culture? • Ecosystem-based fisheries management – reduce water pollution; awareness/ education; promote good fishing practices
Sea level rise and storm surge – Inundation of sago, mangroves, and other low-lying coastal agricultural land - 7	East Sepik, Gulf, Manus	• Relocation of sago palms further inland • Initiate program on mangrove planting • Awareness/education program • Develop program for environmentally friendly seawalls to protect coastal agriculture lands
Increased climate variability – Increase in pests and diseases on natural resources - 6	Markham Valley, east New Britain, Bougainville	• Introduce pest/disease resistant crops • Program on environmentally friendly pesticides • Establish/ introduce pest eradication programs • Awareness programs

PPCR Risk Assessment (Health)

Step 1: Summarize the Risks.

Table 1: Event Outcome Risks

Source: Current and Future Climate of Papua New Guinea (November 2011) and Second National Communication (November 2011).

Event Risk Note: Below event risks identified in ***Current and Future Climate of Papua New Guinea*** and *PNG`s* ***Second National Communication***	**Outcome Risk** Note: Below outcome risks identified in *PNG`s* ***Second National Communication***
1. Sea level rise and storm surge	• Impact on water quality and quantity • Saltwater intrusion of underground drinking water • Damage to water infra-structure • Dead carcasses pose health hazards • General unhygienic living conditions • Damage of health infrastructure, e.g., aid posts • Increase in incidences of vector/water-borne diseases • If food sources are destroyed, there can be instances of malnutrition, diarrhea and other food-borne diseases • Increased morbidity and death • Increased instances of drowning • Increased stress and depression • Loss of agriculture land • Loss of soil fertility
2. Changes in local and national temperatures regimes – warmer days and nights	• Increased incidences of malaria and other vector-borne diseases where not present before • Increased level of endemicity of malaria • Increased stress levels • More evaporation of water affecting water quality and availability • Increased algae blooms resulting in fish poisoning • Affects on agriculture yield and food security • Increased perspiration and dehydration leading to loss of energy • Increase in respiratory diseases, e.g., asthma and TB
3. Changes in rainfall patterns – increased intensity of rainfall	• Increased incidences of malaria and other vector-borne diseases • Contamination of drinking water • Overflowing pit latrines causing cholera,

	dysentery • Destroyed food gardens causing food shortage/yield/security • Death and injury from flash floods and landslides
4. Increased climate variability – changes in seasons	• Increased incidences of malaria and other vector borne diseases • Affects on food security and food yield resulting in malnutrition and food-borne diseases • Long dry spells affects water quality and supply
5. More severe weather events such as droughts, severe rainstorms, heat waves, and category 4/5 cyclones	• Increased incidences of malaria and other vector-borne diseases • Affects on food security and food yield resulting in malnutrition and food-borne diseases • Long dry spells affects water quality and supply • Affects accessibility of water supply • Increased workload on women and children to find food and water, which affects their health detrimentally • Stress and mental health affected • Increased social issues • Increased infant mortality and impact on live birth rates • Loss of shelter • Loss of infrastructure • Loss of access to health services • Increased injury and death rates

Identify the Priority Outcome Risks from Above List.

- *Sea level rise and storm surge*
  - Impact on water quality and quantity
  - Increase in incidences of vector/water-borne diseases
  - If food sources are destroyed, there can be instances of malnutrition, diarrhea, and other food-borne diseases

- *Changes in local and national temperatures regimes*
  - Increased incidences of malaria and other vector-borne diseases where not present before
  - Affects on agriculture yield and food security

- *Changes in rainfall*
  - Overflowing pit latrines causing cholera, dysentery
  - Destroyed food gardens causing food shortage/yield/security
  - Death and injury from flash floods and landslides

- *Increased climate variability*
  - Affecting food security and food yield resulting in malnutrition and food-borne diseases

- Long dry spells affects water quality and supply

- *More severe weather events*
  - Increased incidences of malaria and other vector borne diseases
  - Affecting food security and food yield resulting in malnutrition and food-borne diseases
  - Increased workload on women and children to find food and water, which affects their health detrimentally
  - Stress and mental health affected
  - Increased injury and death rates

Step 2: Estimate Risks.

Estimate the Severity of the Impact (Event and Outcome Risks)

Table 2a: Direct Impact Rating Matrix – *Sea level rise and storm surge and increased precipitation.* Increase in incidences of vector/water-borne diseases

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x			x			
Low											
Moderate			x				x			x	
High	x			x							x
Very high		x				x			x		

Table 2b: Direct Impact Rating Matrix – *Sea level rise and storm surge.* Food sources are destroyed; there can be instances of malnutrition, diarrhea, and other food-borne diseases

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								x			
Low					x		x		x		x
Moderate			x			x				x	
High	x	x		x							
Very high											

Table 2c: Direct Impact Rating Matrix – *Changes in local and national temperatures regimes.* Increase incidences of malaria and other vector-borne diseases where not present before

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low	x				x			x	x	x	
Low											x
Moderate											
High			x			x	x				
Very high		x		x							

Table 2d: Direct Impact Rating Matrix – *Changes in local and national temperatures regimes.* Affects on agriculture yield and food security

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x			x	x		
Low											x
Moderate										x	
High							x				
Very high	x	x	x	x		x					

Table 2e: Direct Impact Rating Matrix – *Changes in rainfall.* Overflowing pit latrines causing cholera, dysentery, and diarrhea

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low											
Moderate				x	x	x	x				
High	x										
Very high		x	x					x	x	x	x

Table 2 f: Direct Impact Rating Matrix – *Changes in rainfall.* Destroyed food gardens causing food shortage/yield/security

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								x			x
Low					x						
Moderate									x	x	
High	x					x	x				
Very high		x	x	x							

Table 2g: Direct Impact Rati*ng Matrix* – *Changes in rainfall.* Death and injury from flash floods and landslides

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								x			
Low					x						x
Moderate	x	x	x	x		x	x				
High									x	x	
Very high											

Table 2h: Direct Impact Rating Matrix – *Increased climate variability.* Affects on food security and food yield resulting in malnutrition and food-borne diseases

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x			x	x		
Low	x										
Moderate			x	x		x				x	
High		x					x				x
Very high											

Table 2i: Direct Impact Rating Matrix – *Increased climate variability.* Long dry spells affects water quality and supply

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x			x		x	
Low						x	x				
Moderate	x		x	x							
High		x									
Very high									x		x

Table 2j: Direct Impact Rating Matrix – *More severe weather events.* Increased incidences of malaria and other vector-borne diseases

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x			x		x	
Low	x										x
Moderate						x	x		x		
High			x	x							
Very high		x									

Table 2k: Direct Impact Rating Matrix – *More severe weather events.* Affects on food security and food yield resulting in malnutrition and food-borne diseases

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x			x	x		
Low											x
Moderate			x							x	
High	x	x		x		x	x				
Very high											

Table 2l: Direct Impact Rating Matrix – *More severe weather events.* Increased workload on women and children to find food and water, which affects their health detrimentally

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x			x			x
Low						x	x			x	
Moderate	x			x					x		
High			x								
Very high		x									

Table 2m: Direct Impact Rating Matrix – *More severe weather events.* Stress and mental health affected

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low					x	x	x	x	x	x	x
Low	x			x							
Moderate											
High		x	x								
Very high											

Table 2n: Direct Impact Rating Matrix – *More severe weather events.* Increased injury and death rates

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								x	x	x	x
Low					x	x	x				
Moderate	x	x	x	x							
High											
Very high											

Step 3: Estimate Frequency or Probability of Event

Table 3: Frequency/Probability Rating (Rank 1-5 based on climate change risks that are likely to occur during SPCR period > 5 years)

Climate Change Risk	Very Unlikely to Happen	Occasional Occurrence	Moderate Frequent	Likely to Occur Often	Likely to Occur Regularly
CC risks from risk scenario – ***Step 2*** (deal with each separately)	Not likely to occur during SPCR period **1**	May occur sometime but not during SPCR period **2**	Likely to occur at least once during SPCR period **3**	Likely to occur several times during SPCR period **4**	Happened often and will happen again during SPCR period **5**

NOTE: Only risks scoring high to very high in the impact rating matrix above to be evaluated in terms of frequency/probability.

Table 3a: Frequency/Probability Rating Based on High Scoring Outcomes
(see Tables 2a – 2n)

Event + Outcome Risk	Frequency/Probability Rating
Sea level rise and storm surge and increased precipitation - Increase in incidences of vector/water-borne diseases 6	**5**
Changes in local and national temperatures regimes – Affects on agriculture yield and food security 6	**5**
Changes in rainfall – Poor sanitation causing increase cholera, dysentery, and diarrhea and typhoid 7	**4**
Changes in rainfall - Destroyed food gardens causing food shortage/yield/security 6	**4**

Step 4: Identify Priority Risks and Vulnerable Communities

.

Priority Risk	Top Three Vulnerable Communities
Sea level rise and storm surge and increased precipitation - Increase in incidences of vector/water-borne diseases	Bougainville (Carterets), Manus Province and Morobe Province
Changes in local and national temperatures regimes – Affects on agriculture yield and food security	Chimbu, Enga, Central Province,
Changes in rainfall – Poor sanitation causing cholera, dysentery and diarrhea	Morobe Province, Western and Gulf Province and Central Province

STEP 6: Identify Viable Interventions and Investments to Address Above Priority Risks.

Priority Risk	Viable Interventions and Investments
Sea level rise and storm surge and increased precipitation – Water- and vector- borne disease. (Many projects on the ground working on this area undertaken by government and NGOs.)	Undertake a pilot in Manus Province to determine best mechanisms to address water- and vector-borne disease, including the following: • Undertake initial study/evaluation of international and local best practices/technologies to address water and vector borne disease, followed by design and installation of suitable location-specific (island areas) climate proof water supply and sanitation systems – which should also address water shortages, sea-level rise and coastal inundation issues. • Include education and awareness programs in support of the installation/maintenance/operation of appropriately designed and site-suitable systems. • Improve supply of and access to appropriate medicines to combat vector and water-borne diseases. • Expand preventative health care services and information.

	• Monitoring and evaluation of situation concerning water and vector borne disease incidents at the beginning of the pilot and establish monitoring/evaluation programs to document any improvements, with a view to replicating lessons learned to other high risks areas.
Changes in local and national temperatures regimes – Affects on agriculture yield and food security.	Undertake pilot in one priority district with a view to replicating lessons learned and best practices to other vulnerable areas. Improve crop diversification, land use, and farming techniques to introduce climate and pest resilient crops, facilitate access to markets, and improve food preservation, storage and processing. Contact NARI to discuss what is being undertaken and how this could be supported by PPCR.
Changes in rainfall – Poor sanitation causing cholera, dysentery, and diarrhea.	Undertake pilot in one district in Morobe Province to address issue with a view to replication in other high risk areas.

PPCR Risk Assessment for Agriculture Sector

Team Members:
Mika (PACC) / Stanley (NDAL Land Use Section)/

Step 1: Summarize the Risks.

Table 1: Event Outcome Risks

Source: Current and Future Climate of Papua New Guinea (November 2011) and Second National Communication (November 2011)

Event Risk Note: Below event risks identified in ***Current and Future Climate of Papua New Guinea*** and *PNG's* ***second National Communication***	**Outcome Risk** Note: Below outcome risks identified in *PNG's* ***second National Communication***
6. Sea level rise and storm surge	18. Loss of productive land through salinity 19. Reduction and /or loss of food /tree crops (food shortages) 20. Loss of livelihood 21. Hunger and starvation (esp. smaller atolls) 22. Degradation of water quality through intrusion of sea.
7. Changes in local and national temperature regimes – warmer days and nights	7. Increased/Reduced crop growth and productive functions of food crops. 8. Crop loss through extreme temperatures 9. Increased incidences of pests and diseases.
8. Changes in rainfall patterns – increased intensity of rainfall	1. Increased/reduced crop growth and productive functions of food/tree crops 2. Disruption of the timing of growing season and harvesting seasons. 3. Increased incidences of pests and diseases 4. Flooding and inundation of productive agriculture lands, e.g., (waterlogging, which leads to food rotting). 5. Direct loss of food/tree crops 6. Land degradation (Loss of productive agriculture land through soil erosion, etc. 7. Disruptions to agricultural income earning and other livelihood activities (e.g., flooding).

9. Increased climate variability – changes in seasons	1. Increased/reduced crop growth and productive functions of food/tree crops 2. Disruption of the timing of growing season and harvesting seasons. 3. Disruptions in meeting trade (export) obligations (e.g., delays and not meeting quotas) 4. Increased incidences of pests and diseases 5. Flooding and inundation of productive agriculture lands, e.g., (waterlogging, which leads to food rotting). 6. Direct loss of food/tree crops 7. Land degradation (Loss of productive agriculture land 8. Disruptions to agricultural income earning and other livelihood activities (e.g., via flooding). 9. Apathy resulting from unpredictable climate conditions (which gives rise to reduced productivity and dependency on remittances-handouts) 10. Reduced/Loss of sales and hence loss of income. 11. Increased production costs (e.g., irrigation to alleviate water shortages).
12. More severe weather events such as droughts, severe rainstorms, heat waves, and category 4/5 cyclones	1. Loss and damage to agricultural produce through cyclones/drought/flooding) 2. Loss of food security base 3. Reduced agricultural local and export earnings

Identify the Priority Outcome Risks from Above List

Sea level rise and storm surge

- Loss of productive land through salinity
- Reduction and /or loss of food /tree crops (food shortages)
- Hunger and starvation (esp. smaller atolls)

- *Changes in local and national temperatures regimes*
  - Crop loss through extreme temperatures
  - Increased incidences of pests and diseases.

- *Changes in rainfall patterns – increased intensity of rainfall*
  - Flooding and inundation of productive agriculture lands. e.g. (waterlogging, which leads to food rotting).
  - Land degradation (Loss of productive agriculture land through soil erosion, etc.
- *Increased climate variability – changes in seasons*
  - Disruptions in meeting trade (export) obligations (e.g., delays and quotas)
  - Reduced/Loss of sales and hence loss of income

- Increased production costs (e.g., irrigation to alleviate water shortages).

- *More severe weather events*
  - Loss of food security base
  - Reduced agricultural local and export earnings

Step 2: Estimate Risks.

Estimate the Severity of the Impact (Event and Outcome Risks)

.

Table 2a: Direct Impact Rating Matrix – *Sea level rise and storm surge*. Loss of productive land through salinity

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low							X	X			
Low											
Moderate	X	X	X			X					X
High				X	X						
Very high									X	X	

Table 2b: Direct Impact Rating Matrix – *Sea level rise and storm surge.* Reduction and/or loss of food/tree crops (food shortages)

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			
Low							X				
Moderate		X	X			X			X	X	
High	X			X	X						X
Very high											

Table 2c: Direct Impact Rating Matrix – *Sea level rise and storm surge.* Hunger and starvation

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			X
Low									X	X	
Moderate				X							
High		X	X				X				
Very high	X				X	X					

Table 2d: Direct Impact Rating Matrix – *Changes in local and national temperatures regimes.* Crop loss through extreme temperatures

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low							X				
Moderate		X	X					X	X		
High	X			X	X	X				X	X
Very high											

Table 2e: Direct Impact Rating Matrix – *Changes in local and national temperatures regimes.* Increased incidences of plant diseases

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low							X	X	X		
Low			X								
Moderate	X	X								X	
High				X	X	X					
Very high											X

- **Table 2f: Direct Impact Rating Matrix –** *Changes in rainfall patterns – increased intensity of rainfall*. Flooding and inundation of productive agriculture land , e.g., waterlogging, which leads to food rotting

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			
Low			X				X			\	
Moderate	X	X			X						X
High				X		X			X	X	
Very high											

Table 2g: Direct Impact Rating Matrix – *Changes in rainfall patterns – increased intensity of rainfall.* Disruptions in meeting trade (export) obligations (e.g., delays and not meeting quotas)

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low		X						X	X	X	X
Low											
Moderate	X		X		X						
High				X			X				
Very high						X					

Table 2h: Direct Impact Rating Matrix – *Increased climate variability.* Reduced/Loss of sales and hence loss of income.

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X	X	X	
Low		X			X						
Moderate			X	X							X
High	X					X	X				
Very high											

Table 2i: Direct Impact Rating Matrix – *Increased climate variability – changes in seasons.* Increased production costs (e.g., irrigation to alleviate water shortages)

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X			
Low											
Moderate	X			X	X		X		X	X	X
High		X	X			X					
Very high											

Table 2j: Direct Impact Rating Matrix – *More severe weather events.* Loss of food security base

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low											
Low								X			
Moderate					X						
High		X	X	X		X	X		X	X	X
Very high	X										

Table 2k: Direct Impact Rating Matrix – *More severe weather events.* Reduced agricultural local and export earnings

Impact	Social			Economic				Environmental			
	Displacement	Health	Cultural aspects	Loss of livelihood	Property loss	Financial loss	GDP loss	Air	Water	Land	Biodiversity
Very low								X	X		
Low		X	X		X						X
Moderate	X			X						X	
High											
Very high						X	X				

Step 3 - Estimate Frequency or Probability of Event.

Table 3: Frequency/Probability Rating

(Rank 1–5 based on climate change risks that are likely to occur during PPCR period > 5 years)

Climate Change Risk	Very Unlikely to Happen	Occasional Occurrence	Moderate Frequent	Likely to Occur Often	Likely to Occur Regularly
CC risks from risk scenario – ***Step 2*** (deal with each separately)	Not likely to occur during PPCR period **1**	May occur sometime but not during PPCR period **2**	Likely to occur at least once during PPCR period **3**	Likely to occur several times during PPCR period **4**	Happened often and will happen again during PPCR period **5**

NOTE: Only risks scoring high to very high in the impact rating matrix above to be evaluated in terms of frequency/probability.

Table 3a: Frequency/Probability Rating Based on High Scoring Outcomes

(see Table 2 a – 2q)

Event + Outcome Risk	Frequency/Probability Rating
Sea level rise and storm surge - Loss of productive land through salinity	5 (Environmental risk aspects)
Sea level rise and storm surge - Reduction and /or loss of food /tree crops (food shortages)	5
Sea level rise and storm surge - Hunger and starvation (esp. smaller atolls)	5
Changes in local and national temperatures regimes - Crop loss through extreme temperatures	4
Changes in local and national temperatures regimes - Increased incidences of pests and diseases	5
Changes in rainfall patterns - Flooding and inundation of productive agriculture lands. (e.g., waterlogging, which leads to food rotting)	4
Changes in rainfall patterns - Land degradation (Loss of productive agriculture land through soil erosion etc.	3
Increased climate variability – Disruptions in	

meeting trade (export) obligations (e.g. delays and quotas)	3
Increased climate variability – Reduced/Loss of sales and hence loss of income	4
Increased climate variability - Increased production costs (e.g. irrigation to alleviate water shortages).	4
More severe weather events - Loss of food security base	5
More severe weather events - Reduced agricultural local and export earnings	5

Step 4: Identify Priority Risks and Vulnerable Communities.

Priority Risk	Top Three Vulnerable Communities
1. *Sea level rise and storm surge* - Loss of productive land through salinity	Island : Manus, The Carterets, Madang and outlying atolls Coastal: Lae, Wewak, Aitape, Oro, Milne Bay, parts of Central, Gulf , Western
2. *Increased climate variability* - Increased production costs (e.g., irrigation to alleviate water shortages during droughts).	Impacts on the entire country
3. *More severe weather events* - Loss of food security base	Impacts on the entire country.

Step 6: Identify Viable Interventions and Investments to Address Above Priority Risks.

Priority Risk	Vulnerable Communities	Viable Interventions and investments
Sea level rise and storm surge: Loss of productive land through salinity	Island communities: Manus, The Carterets, Madang, and outlying atolls Coastal communities: Coastal: Lae, Wewak, Aitape, Oro, Milne Bay, parts of Central, Gulf , Western	○ Expensive yet possible reclamation of land and or the building of sea walls or climate proofing projects, such as planting mangroves. ○ Due to loss of productive land look at alternate non-agricultural uses (e.g., aquaculture). ○ Expensive yet possible reclamation of land and or the building of sea wall or climate proofing projects such as planting mangroves. ○ Due to loss of productive land look at alternate non-agricultural uses (e.g. aquaculture). ○ Relocation elsewhere
Increased climate variability : Increased production costs (e.g., irrigation to alleviate water shortages during droughts)	Impacts on the entire country	○ Subsidization of agricultural production items/machinery ○ Introduction of low-cost technology (either locally or imported) ○ Establishing climate station networks and strengthening capacity.
More severe weather events: Loss of food security base	Impacts on the entire country	○ Subsidization of agricultural production items/machinery ○ Introduction of low-cost technology (either locally or imported) ○ Establishing climate station networks and strengthening capacity. ○ Increased use of appropriate weather forecasting systems

Annex 6

Assessment of Capacity for Adaptation (Sector, Community, Gender, Civil Society, Household)

Part 1: Indicators to Measures Progress in the Adaptation Process at the National Level

This self-assessment undertaken by OCCD during SPCR preparation serves to evaluate progress achieved in implementing a stage-by-stage process toward adaptation planning and management at the national level as recommended during the First Meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) (COP-1, Berlin, 1995), where the decision was taken[6] to approach adaptation in three stages:

- Stage 1 – Planning for adaptation, which includes studies of possible impacts of climate change, to identify specific vulnerable regions or communities and policy options for adaptation and appropriate capacity building.
- Stage 2 – Measures to prepare for adaptation, including further capacity building.
- Stage 3 – Measures to facilitate adequate adaptation, including insurance.

This phased approach, which systematically builds national capacity through strategic interventions thereby ensuring country-ownership and long-term sustainability, is proposed as the basis for evaluating adaptive capacity at the national level. The information contained in the "status" section is a quantifiable set of indicators recording the status achieved in building national adaptive capacity.

Note: *There are other activities being undertaken by other people in Papua New Guinea that are not captured in this assessment. This table records activities being undertaken by the Office of Climate Change and Development with its partners.*

Stage I: Planning, which includes studies of possible impacts of climate change, to identify particularly vulnerable countries or regions and policy options for adaptation and appropriate capacity-building. Such Stage I adaptation activities will[7], among other matters, identify options to facilitate adequate adaptation to climate change. These activities could encompass the following:	
Capacity Building Activities	**Status**
i. *Sensitization and building awareness* of climate change impacts and risks at national and local levels and within vulnerable sectors and population groups, including awareness on economic costs of	• 10 provincial consultations already made (Manus, Milne Bay, East and West New Britain, NIP, Morobe, West Sepik, Simbu, WHP, Enga) • 10 Provincial climate change reports compiled, 7 additional provinces to be visited

[6] UNFCCC - Decision 11/CP.1 *Initial Guidance on Policies, Programme Priorities and Eligibility Criteria to the Operating Entity or Entities of the Financial Mechanism.*

[7] GEF Operational Strategy on Climate Change.

climate change impacts	• IBS school debate competition • Consultation and awareness kit Developed (manuals, CDs , handouts, questionnaires,) • Radio awareness, talk back show, radio drama • School distribution of awareness materials in over 50 schools across 10 provinces • Monthly e-newsletter to key stakeholder partners (Government, NGOs, academia, diplomatic partners, development partners, private sector) • Monthly technical working group updates • Sub-technical working groups have also been established to address specific issues
ii. Building climate monitoring and analytical capacity, including climate modeling and climate data/records;	• Pacific Climate Change Science Program has trained 15 people in PNG to use a web based tool that generated climate projections for PNG. • CLiDE: National Weather Service is transferring its old weather records to electronic form • Global Facility for Disaster Reduction and Recovery transport component is building capacity by procuring and installing 4 automatic weather stations, and are building a geological laboratory in PMGO • OCCD and partners are working to establish an early warning system using mobile phone messaging for PNG • Institutional capacity building to undertake climate modeling and data recording
iii. *Building adaptation planning capacity* at national and local levels and within vulnerable sectors and vulnerable population groups, initially by facilitating the creation of climate change coordinating mechanism (climate change focal point, climate change committee e.g. OCCD), which is afforded political power by being attached to a senior political office or powerful ministry of government (Prime Minister's Department), stakeholder analysis of existing policies and strategies that may be affected by climate change impacts, and evaluation of	• International Obligations o PNG signed the UNFCCC treaty in 1992 and ratified it in 1994. o 2007 COP 13: REDD became an action under the treaty o Kyoto ratified 2002 o PNG subscribed to the Cancun Decision voluntarily and conditionally, depending on international funding and capability support. • National Overarching Guiding Policies: o Vision 2050 Pillar 5, o Development Strategy Plan 2011–2030: Lead Agency is OCCD (Section 6.7), o Medium Term Development

	functions and risks management capacities of institutions and organizations (at national and local levels), and identifying and prioritizing opportunities for addressing identified climate change risks	Program Section 5.7: Lead Agency is OCCD
		• Sector Policies
		  ○ CCDS/ Interim Action Plan 2010
		  ○ Draft National Climate Change Policy Framework (to be approved by Cabinet through NCCC)
		  ○ OCCD Corporate Plan: 2011-2013
		  ○ REDD National Development Program 2011-2013
		  ○ Strategic Plan for Climate Resilience
		• Legislation
		  ○ Draft Climate Change Legislation to be circulated in March 2012
		• National Climate Change Committee is chaired by the Head of all government institutions, and is made up of relevant Sector heads.

iv.	*Undertake a vulnerability and adaptation assessment* to identify general strengths and weaknesses of baseline conditions and specific needs and concerns, such as potential barriers to adaptation in critical areas or sectors, and opportunities and priorities for adaptation	• Vulnerability assessment section of the Second National Communication • National consultation validation process which is still underway • Few case study sites, e.g., Collingwood Bay (Mama Graun) • No sector/community/country/province wide vulnerability assessment done yet
v.	*Assessment of national, regional, and/or subregional vulnerability* to climate change, where appropriate, rely on related data-gathering systems to measure climate change effects in particularly vulnerable countries or regions and strengthen such systems as necessary, and identify a near-term research and development agenda to understand sensitivity to climate change	• World Bank-Pacific Islands Applied Geoscience Commission Pacific Catastrophe Risk Assessment and Financing Initiative (earthquake and tropical cyclone) • No regional district wide assessment done yet
vi.	*Evaluation and assessment of policy frameworks for implementing adaptation measures* and response strategies in the context of disaster preparedness, agriculture, fisheries, health, economic development, and	In progress: Some departments are already looking at mainstreaming climate change into their existing policy frameworks (e.g., health, education, forestry are moving into sectoral policy climate change-mainstreaming (look at priority sectors)

forestry, with a view of integrating climate change impact information, as appropriate, into national strategic planning processes	
vii. *Develop, in a participatory manner, climate change adaptation strategy* (or National Adaptation Plan of Action - NAPA), which identifies priority approaches, methods, and tools for adaptation, and prioritizes institutional capacity building requirements at the national, local and municipal levels and within vulnerable sectors	• PNG has a Climate Compatible Development Strategy that is reflective of the Medium Term Development Plan, Development Strategy Plan, and *Vision 2050*. • CCDS +/- equivalent to NAPA
Stage II: Measures to Prepare for Adaptation, including further capacity-building, which may be taken to prepare for adaptation[8], and measures that promote cooperation in preparing for adaptation to the impacts of climate change. These activities could encompass the following:	
i. Establish capacity building measures to support adaptation planning at national level (as outlined in national adaptation strategy or policy), including	In progress: Climate Change and Development Policy is in draft form
a. integration of climate change risk into the environmental impact assessment process;	In progress: working with NGOs, professional institutions, chamber of commerce Needs to be legislated and reflected in policy so that environmental impact assessment methodology is done in PNG, updated to include climate change
b. Integration of risk assessment and management in the design of infrastructure projects;	In progress: working with NGOs, professional institutions, chamber of commerce Need to institutionalize this in key departments
c. Integration of risk assessment and management in the urban planning process whereby vulnerable areas are spatially identified, and adequate risk management measures established through by-laws, zoning, setbacks, covenants,	In progress: Dept. of Lands and Physical Planning is developing a National Sustainable Land Use Policy in collaboration with relevant government agencies, NGOs, professional institutions, chamber of commerce Climate change risk to be integrated into Sustainable Land Use Policy

[8] As envisaged by Article 4.1(e) of the Convention.

building restrictions;	
d. evaluation of engineering design criteria and building codes to ensure they adequately reflect climate change projections in regards to loadings, tolerances, and return periods;	In progress: working with NGOs, professional institutions, chamber of commerce Need to climate proof building codes (assumption on loadings); only Canada has done it (took 3 years)
e. integration of climate change risk assessment and adaptation management in financial and insurance sector;	Not yet Reassurance industry is the only exception globally
f. integration of climate change risk and adaptation into formal and informal education programs;	In progress: e.g., National Disaster Centre is working with the Department of Education to integrate climate related disaster risk reduction into the curriculum for school children; some integration can be done informally
g. develop and elaborate appropriate and integrated plans for water resources and agriculture, and for the protection and rehabilitation of areas affected by drought and desertification, as well as floods; and	Not yet Climate Risk Management Project may develop short seasonal forecasts, e.g., 3 month outlook for agriculture
h. integration of climate change risk assessment and adaptation management into sectoral policies and programs, and national development strategies (e.g. sustainable development, water resource management, disaster management, biodiversity conservation, health, education, and coastal protection).	Not yet
• *Establish capacity building measures to support adaptation planning measures at local and community level,* including development of climate information and decision-making tools (vulnerability atlases, community-level risk management strategy).	Coral Triangle Initiative (CTI): Local Early Adaptation Planning (LEAP) training of government representatives, community leaders, and NGOs to develop adaptation plans at community level Other activities being undertaken by NGOs

	Need capacity building
• *Establish capacity building measures to support adaptation risk assessment and management measures within vulnerable sectors*, including financial sector (banks and insurance industry), agricultural sector:	Not done yet Need capacity building
a. build and strengthen formal and informal research and adaptation management networks;	This function is being taken up by National Research Institute, Institute of Medical Research, etc.
b. tool development to identify impacts and adaptation options; and	e.g., Mangrove planting tool being developed by OCCD LEAP tool from CTI
c. disseminate and train in the use of guides/tools for vulnerability assessment and adaptation management.	LEAP tool training from CTI and further training planned Some tools on hand but need more
• *Establish capacity building measures to support risk management and adaptation planning measures within vulnerable population groups*, including vulnerable communities, farmers, women, youth, and elderly.	The Pacific Adaptation to Climate Change (PACC) program may be doing this; otherwise not done yet
Stage III: Measures to Facilitate Adequate Adaptation, including insurance, and other adaptation measures[9]. Formulate, implement, publish and regularly update national and, where appropriate, regional programs containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change. These activities could encompass the following:	
i. *Mainstreaming climate change adaptation that results in the shift of responsibility* for climate change adaptation from single ministries or agencies to all sectors of government, civil society, and the private sector – guided by national multi-stakeholder committee/council.	At the national level, this has been reflected in some sectors reviewing their policies to mainstream climate change
ii. Climate change risk	No, still using pre-existing design manuals,

[9] As envisaged by Article 4.1(b) and 4.4 of the Convention.

	assessments being undertaken for all new infrastructure projects, and risk management measures incorporated into design and operation of infrastructure projects.	methodologies etc
iii.	*Assimilation of adaptation activities within development budgets* (at national, local and municipal levels) to ensure that these interventions continue to be properly funded over the long term, integrated into relevant sector priorities and balanced against other competing priorities.	Not Yet
iv.	*Climate change risk assessment and management a formal part of urban planning* processes and vulnerability atlases developed and used to inform urban growth.	UN Habitat Cities in/and Climate Change Pilot Programme is looking at mainstreaming climate change into the planning process. this is being spearheaded by UPNG and Office of Urbanisation; Port Moresby is the Pilot City Not formally included
v.	*Climate change relevant engineering design criteria and building codes* used for infrastructure design and construction.	Not yet
vi.	*Lending and insurance programs have adequate risk management measures in place* (e.g., site vulnerability assessments as part of loan process, re-insurance schemes established to cover catastrophic loss from extreme events, etc.).	no
vii.	*Climate change risk and adaptation a formal part of the education curricula* in formal education and profession education programs.	Not yet, see above reference to development of school curriculum. Within universities, climate change risk and adaptation are covered in environment science

		SeaWeb- series for educating reporters
viii.	*Vulnerability atlases used as part of early warning systems for disaster management* at national, local, and community levels.	Not yet. NDC has disaster management maps for various hazards and evacuation maps
ix.	*Health service delivery made resilient* to stressors caused by climate change impacts and population made more resilient to climate change health impacts.	Health Dept: with WHO are piloting a project on VBD's and using mobile phones to give alerts on outbreaks, such as cholera
x.	*Monitoring and evaluation*, and amending ongoing adaptation measures, policies, and programs as necessary.	Not as yet

Annex 7

Component 1 – Building Climate Resilient Communities

Objectives
Build climate resilient communities by strengthening capacity to address priority climate change risks.

Outputs/Outcomes
Outputs from Component 1 include:

- training materials and programs on community vulnerability mapping and adaptation planning;
- vulnerability maps for vulnerable communities on all atolls and islands;
- Climate Change Trust Fund and community grants program to support priority adaptation measures within vulnerable communities and sectors;
- community-based early warning systems in vulnerable communities;
- community emergency preparedness training material and programs;

Key outcomes are:

(i) the establishment of a pool of specialists (at the national, sectoral and community levels) -with complimentary input from the regional pool of experts established under the Pacific Regional SPCR- supporting CCA mainstreaming activities;
(ii) Improved access to and use of information and climate change risk management tools for vulnerable communities resulting in improved levels of preparedness and reduced levels of risk to climate change impacts amongst vulnerable communities
(iii) community vulnerability maps and adaptation plans developed by vulnerable communities and integrated into physical planning processes;
(iv) establishment of community early warning systems in vulnerable communities;
(v) establishment of climate change financing mechanism to provide “fast start” support for urgent climate change resilience building measures in vulnerable communities; and
(vi) community-level mechanism/strategies developed to address climate change risks to human health.

Activities

Component 1 will support the following activities:

1. Train and assist vulnerable communities – piloted on low-lying islands and atolls (Carteret, Duke of York islands, Nissan, Siassi, Ahus, islands in Milne Bay including Rossell) and replicated across PNG – to undertake ***community climate change vulnerability mapping and adaptation planning*** (see ADB SGA pilot project in Cook Islands for methodology - RETA 6420) - and integrate community vulnerability maps and adaptation plans into Sustainable Land Use Planning processes and national land use policies and plans. Community adaptation plans to determine viable options will include

(i) relocation; develop or improve existing relocation plans (land ownership);
(ii) addressing social-cultural/ socio-economic/ health issues; and
(iii) viable coastal defenses (soft and hard engineering options), including land reclamation.

Working through the National Mapping Bureau, SPCR investments will collate electronic versions of local level maps at 1:10,000 scale (including LandSAT images) to be used for community mapping. The Department of Lands and Physical Planning will collect existing geophysical data sets from various agencies, including Australian Government-supported LIDAR mapping, to form a central database that will support development of community vulnerability mapping and the physical planning process under the GEF Sustainable Land Management (SLM) project. Outputs from the SPCR community vulnerability mapping will inform revision of updated maps by the National Mapping Bureau and guide/inform development of the National Sustainable Land Use Policy and National Land Use Plan under the SLM project. SPCR investments will facilitate the development of a central database for physical planning at the community, district, provincial, and national levels, ensuring consistency and uniformity in GIS platform use across government. In undertaking community vulnerability mapping and adaptation planning, this component will draw upon lessons learned and information gained from other ongoing community-based vulnerability assessment initiatives including: the EU/AusAID Water and Health Sanitation (WASH) project, 3D Modeling Program by The Nature Conservancy, CTI LEAP program; Wildlife Conservation Society (WCS): Strengthening the Ability of Vulnerable Island Communities in Papua New Guinea to Adapt to Climate Change project; Live and Learn: Protecting Food Security through Adaptation to Climate Change project; and Conservation International: Boosting Traditional Approaches to Food Security in PNG project. The community climate change vulnerability mapping and adaptation planning component will build on local knowledge and NGO community experience.

2. SPCR support will also legally establish, through broad-based consultative process, PNG`s **Climate Change Trust Fund**, with funds raised from market-based instruments that will not raise the local tax base (e.g., carbon levy on liquid natural gas royalties with donors providing matching funds), which shall be external to government revenue, administered by a Board of Trustees, and empowered to support the financing of priority climate change adaptation projects in vulnerable communities and sectors. This activity will support an evaluation of experience and lessons from other countries that have established or are in the process of establishing Trust Fund (e.g. Tuvalu Trust Fund, Maldives Climate Change Trust Fund, Samoa Climate Change Trust Fund, Saint Lucia Climate Change Trust Fund, Cook Islands Environmental Protection Fund, Palau Environment Trust Fund), in order to inform and guide the development of an appropriate legally established Trust Fund in PNG. Examples of legislation establishing Trust Funds shall be considered, to evaluate lessons learned and best practices.

3. SPCR will also provide US$5 million in seed money to establish a **Small Grants envelope of the Climate Change Trust Fund** (modeled on GEF Small Grants Program) to provide sustainable “fast start” financing that can be accessed by vulnerable communities to implement community adaptation plans and early warning systems developed under this component. This component will support a review of current community climate change adaptation projects that suffer from lack of funding /resources and institutional capacity, and support the establishment of the supporting environment to access “fast start” climate change

financing by vulnerable communities[10]. Removing these constraints will be a priority in order to meet CCDS and SPCR objectives. Support will also be directed to ensuring transparency in the selection and management of the Trust Fund, learning from existing models, such as the GEF /UNDP Small Grant Program. The establishment of a PNG Climate Change Trust Fund and the establishment of a Small Grants envelope with seed funding will benefit from the previous work undertaken at the regional level by SPREP and the Pacific Islands Forum Secretariat (PIFS) and from the current work on the practical application of access to and management of climate change funding that has been undertaken in response to decisions by Pacific Leaders in 2010 in Port Vila and 2011 in Auckland. The details of national options (and an additional section on regional options) would assess the feasibility of the options and the associated risks and benefits, taking into account as appropriate, the specific capacities and needs of the respective countries and the potential in possible combinations of various national and regional options and modalities. Setting up a fund is more than establishing a bank account. It also requires the assessment of the national policy, regulatory, legal, and institutional frameworks necessary for the development of the trust fund. Some key questions to be addressed in designing the structure of the Climate Change Trust Fund and Small Grants Program include the size of the funds required to establish the trust, the scope of the trust and its objectives and the distribution and disbursement mechanisms that will be used. The current PIFS work can act as an extension of PNG's (and other PPCR pilot country efforts) process of assessing fund modalities. It is important to use these analyses as there is a vast array of reports and fast evolving information in climate change financing, which places challenges on every country seeking to progress this issue.

4. The SPCR will also support the development of **community-based early warning systems** by the same vulnerable communities (Carteret, Duke of York islands, Nissan, Siassi, Ahus, islands in Milne Bay, including Rossell) and the design/implementation of community preparedness training and capacity building program in climate change risk management within island and community climate change committees. The community early warning systems will address slow and rapid onset risks from climate change and develop standard operating procedures for community alerts based on real-time hydro-met data from the National Weather Services, the Islands Climate Update managed by the New Zealand National Institute of Water and Atmospheric Research (NIWA), and warnings on natural disasters from the Port Moresby Geophysical Observatory. The National Disaster Centre will coordinate the design and delivery of community early warning systems and will facilitate community emergency preparedness and response training using the early warning systems. Support will also be provided to establish, train and build capacity of District Climate Change Officers to develop district land-use plans and early warning systems building on community vulnerability mapping and adaptation plans that can be integrated into district and national land-use plans. This support includes US$0.5 million to integrate into the central database for physical planning the outcomes of the community vulnerability mapping process, namely the GIS-based maps identifying vulnerable communities, assets, and infrastructure.

5. Within the same vulnerable communities (Bougainville islands, Duke of York islands, Siassi, Ahus, Milne Bay islands), SPCR will support **pilot activities to**

[10] The review shall be undertaken with PPCR PPG funds to facilitate the establishment of the Trust Fund as well as determine the highest priority uses for such funds in aid of vulnerable communities.

determine the best mechanisms to address climate change health risks related to increases in water and vector-borne disease, including through

i. initial study/evaluation of international and local best practices/technologies to address water and vector borne disease;
ii. design and installation of suitable location-specific (island areas) climate proof water supply and sanitation systems—which should also address water shortages, sea-level rise, and coastal inundation issues;
iii. education and awareness programs in support of the installation and maintenance/operation of appropriately designed and site-suitable water supply and sanitation systems and public health issues;
iv. improved supply of and access to appropriate medicines to combat the spread of vector- and water-borne diseases;
v. building capacity in district and community health services provision and utilization to undertake climate change risk management;
vi. expanding preventative health care services for climate change on health risks and relevant information collection and analysis; and
vii. developing a climate change proof reticulated water supply system.

Additionally, a database will be established for monitoring and evaluation of incidence of water- and vector-borne diseases or other health impacts by climate change (time to access to rural facilities, provision of services variation by weather change) at the beginning of the pilot, and establish monitoring/evaluation programs to document any changes, with a view to replicating lessons learned to other high risk areas. The Government has requested that this initiative will be undertaken in collaboration with Government-approved ADB Rural Primary Health Services Delivery Project that supports the government to strengthen rural primary health system. This SPCR component will further support the Government through the ADB project by (i) improving health information system by using ICT and GIS tools to collect relevant information on climate change impacts on health (through project output 1); (ii) ensuring climate proofing of health facility rehabilitation (through output 4); (iii) capacity development of communities on climate change issues (through output 5); and (iv) collection and analysis of climate change health impact-related indicators/data through a six-monthly formative evaluation (output 6).

The capacity building elements of this component are:

(i) Train and assist vulnerable communities and NGOs to undertake **community climate change vulnerability mapping and adaptation planning.** Design/implementation of **climate change risk assessment/management capacity building** and training programs for provincial/district government officials to support the integration of community vulnerability mapping into the physical planning process, and develop tools and training modules based on lessons learned, with a view to replication in other vulnerable communities.
(ii) Train and build capacity within NGOs, private sector, and community climate change committees to design and implement pilot adaptation projects funded under the Small Grants envelope of the **Climate Change Trust Fund**, and develop tools and training modules based on lessons learned, with a view to replication in other vulnerable communities.
(iii) Train vulnerable communities and NGOs on the **deployment of early warning systems/responses** and develop tools and training modules based on lessons learned, with a view to replication in other vulnerable communities.
(iv) **Scholarships** for technicians/managers in provincial/district government to attend university-level programs (at regional institutions) on the integration of

climate change risk management into physical planning and health management. PNG will use, to the extent possible, the scholarship opportunities offered through the University of the South Pacific (USP) (EU project as well as regional PPCR) before drawing down on this budget line. Scholarships will be dedicated to highly specialized training specific to PNG rather than the more general USP courses, for which there are already scholarships that PNG can access.

Key Indicators and Baseline

Although the Public Investment Plan (PIP) makes budgetary allocations to meet current priority development needs, PNG possesses little capacity at the community, provincial, and district levels to integrate climate change risk management into planning and decision making. Climate change risk management is still the domain of central Government, with little understanding that this is a responsibility that must be shared with civil society. There are virtually no tools or mechanisms to support civil society engagement in climate change risk management, or to facilitate civil society management of their own climate change risks. Due to cumbersome financial management requirements, central government is unable to provide ready access to "fast start" financing to address urgent climate change risks at the community level. PNG has very limited capacity in the area of physical planning outside urban areas, with the result that poor planning decisions serve to increase the vulnerability of rural communities to climate change impacts associated with extreme events (e.g., landslides and flooding). No database exists for monitoring and evaluation of the incidence of water- and vector-borne diseases or other health impacts associated with climate change, thereby undermining any scientific basis to address health risks from climate change.

Risks

The greatest risk to the sustained success of PNGs CCDS is from the limited in-house capacity within OCCD to assist provincial/local government and vulnerable communities to manage pressing climate change risks. Community vulnerability mapping being supported under the SPCR will only provide value if such maps can be integrated into the local area physical planning process to guide development planning and inform the design of coastal defenses and community resettlement plans. SPCR investments under this component could be undermined if capacity building under the GEF-funded Sustainable Land Management (SLM) project does not result in the establishment on an effective physical planning capacity at the provincial and district levels. It is proposed that SPCR investments address these risks by expanding and broadening the pool of climate change adaptation experts at the provincial, district, and community level and within civil society.

Investment Costing – Component 1 Budget

Component Activities	Budget allocation US$	Cofinancing and parallel financing
Training of and assistance to pilot vulnerable communities on low-lying islands and atolls to undertake community climate change vulnerability mapping and adaptation planning**.**	2,000,000	AusAID/WCS/CI A$2,500,000 UNDP/SPREP PACC
Establishment of a Climate Change Trust Fund and provision of US$5 million in seed money to	5,100,000	UNDP/GEF Small Grants

establish a small grants envelope of the Climate Change Trust Fund.		Program
Development of community-based early warning systems and the design/implementation of community emergency preparedness training and capacity building program in climate change risks management within island and community climate change committees.	1,000,000	AusAID (SPSLCMP) funded under A$150,000,000 ICCAI
Pilot activities to determine the best mechanisms to address climate change health risks related to increases in water- and vector-borne disease.	1,650,000	UNDP/SPREP PACC KOICA (CCABD)
Component 1 Total	9,750,000	

AusAID = Australian Agency for International Development, CI = Conservation International, GEF = Global Environment Facility, ICCAI = International Climate Change Adaptation Initiative, KOICA = Korea International Cooperation Agency, PACC = Pacific Adaptation to Climate Change, SPREP = South Pacific Regional Environment Programme, SPSLCMP = South Pacific Sea Level and Climate Monitoring Project, UNDP = United Nations Development Programme, WCS = Wildlife Conservation Society.

Annex 8

Component 2 – Addressing Climate Change Risks to Food Security

Objectives

Addressing threats to PNG's food security from climate change impacts by piloting adaptation measures with a view to replication in other vulnerable communities.

Outputs/Outcomes

Outputs from Component 2 include:

- Training materials and programs on food processing, preserving, and storage and the development of climate resilient fishery at the community level;
- food processing, preserving, and storage systems in seven vulnerable districts;
- climate resilient fishery in vulnerable communities.

Key outcomes are strengthened capacity and improved access to management techniques and technologies to address climate change risks to food security in vulnerable communities.

Activities

Component 2 will address threats to food security by piloting the following measures with a view to their replication in other vulnerable communities:

- Design/establish pilot **food processing, preserving techniques and storage systems** in 7 vulnerable districts (including vulnerable communities covered by the Pacific Adaptation to Climate Change (PACC) program) and expand existing systems that support existing activities in food processing (downstream processing, postharvest technology, food preservation), planting material preservation and distribution, and helping to lay foundations for the sustainability of those systems post-project. This activity will be undertaken in collaboration with other initiatives (UNDP/FAO, EU and in collaboration with the SPC Regional Centre for Pacific Crops and Trees, which is already collaborating with the PACC project on climate change and food security). This initiative is in keeping with the type of services provided by Government due to the difficulties associated with establishing such food support systems in vulnerable remote locations where such services are required.

- Establish ecosystem-based **climate resilient fisheries management** in pilot vulnerable communities, including

  i. measures to reduce pollution of water and coastal resources;
  ii. promotion of climate change risk management awareness and education within vulnerable fishing communities;
  iii. promotion of sustainable fishing practices;
  iv. monitoring to determine climate change impacts on fishery resources;
  v. aquaculture, coral nursery, and fishery restocking programs; and
  vi. storage, processing, and marketing fish produce.

The capacity building elements of this component are:

- Train and assist vulnerable communities and NGOs to design/establish pilot **food processing, preserving techniques, and storage systems** and develop tools and training modules based on lessons learned.
- Train and assist vulnerable communities and NGOs to undertake ecosystem-based **climate resilient fisheries management** and develop tools and training modules based on lessons learned, with a view to replication in other vulnerable communities.

Key Indicators and Baseline

Eighty-five percent of PNG's population are subsistence farmers/fishers, with very limited knowledge of climate change risks to agricultural and fisheries resources. At the community level, there exists little by way of practical information on viable management practices and technologies to address climate change risks to agricultural and fisheries resources.

Risks

High rural illiteracy amongst subsistence farmers/fishers presents a considerable risk to proposed SPCR investments under this component. The inability of subsistence farmers/fishers to access resources (human, technical, financial) needed to replicate successful management practices/techniques would present a considerable risk to the sustainability of SPCR investments if not for the access to such resources through the small grants program of the Climate Change Trust Fund being established under Component 1.

Investment Costing – Component 2 Budget

Component Activities	Budget allocation US$	Co-financing and parallel financing
Design/establishment of pilot food processing, preserving, and storage systems in seven vulnerable districts and expansion of existing systems in food processing (downstream processing, postharvest technology, food preservation), as well as planting material preservation and distribution.	3,000,000	UNDP/FAO, EU, SPC EU/NARI USAID / SPC
Undertake ecosystem-based climate resilient fisheries management in pilot vulnerable communities	4,000,000	AusAID Coral Triangle Initiative A$1,700,000
Capacity building, which includes training for vulnerable communities and NGOs to design/establish pilot food processing and preserving techniques and storage systems, undertake ecosystem-based climate resilient fisheries management, and develop tools and training modules based on lessons learned.	250,000	GCCA USP Euro 8,000,000
Component 2 Total	7,250,000	

AusAID = Australian Agency for International Development, EU = European Union, FAO = Food and Agriculture Organization of the United Nations, GCCA = Global Climate Change Alliance, NARI =

National Agricultural Research Institute, SPC – Secretariat of the Pacific Community, UNDP = United Nations Development Programme, USAID = United States Agency for International Development, USP = University of the South Pacific.

Annex 9

Component 3 – Climate Resilient Infrastructure

Objectives

Strengthen design, operation, and maintenance of select vulnerable ports/wharves/jetties (and associated infrastructure) in order to improve the resilience of vulnerable social and economic support systems to climate change impacts while climate proofing existing critical infrastructure.

Outputs/Outcomes

Outputs from Component 3 include:

- Climate Change Risk Management Policy and strategy for the PNG Ports Corporation and Provincial/District Governments;
- site specific climate change risk models and vulnerability assessments for the ports/wharves/jetties and associated infrastructure under the management of the PNG Ports Corporation and Provincial/District government;
- revised building codes and engineering design criteria relevant to the design, location, building, operation and maintenance of ports/wharves/jetties (and associated infrastructure) to address climate change risks based on site specific climate change projections;
- training materials and programs for engineers, architects, developers and planners on the climate proofed building codes relevant to ports/wharves/jetties (and associated infrastructure);
- training materials and programs on climate change risk management for PNG Ports Corporation staff;
- training materials and programs on climate change risk cost / benefit analysis for Department of Treasury, Department of Finance and Planning, Office of Rural Development and Implementation, and Department of Transport;
- climate change risk cost / benefit analysis for PNG Ports Corporation assets and operations;
- climate change risk management education and awareness materials and training programs for PNG Ports Corporation and Provincial/District Government;
- climate change risk financing for ports infrastructure.

The key outcome is critical coastal infrastructure that is less vulnerable to impacts of climate change and disasters.

Activities

Establishment of an “enabling framework” for climate proofing ports/wharves/jetties (and associated infrastructure) and integrating climate change risk management into the day-to-day operations of the PNG Ports Corporation[11] and within provincial/district government, thereby providing a case study that can be replicated in other key infrastructure agencies. SPCR interventions will support site-specific

[11] PNG Ports Corporation currently manages all ports, wharves and jetties in PNG, but since becoming a state-owned enterprise has embarked on a program to divest responsibility for wharves and jetties to the provincial and district governments.

assessment of climate change risks on ports, wharves and jetties, and build capacity in PNG Ports Corporation and at the Provincial/District levels to effectively manage risks associated with such critical infrastructure. The following elements of the enabling framework will be developed and implemented under this project:

- *Legislation / Policy / Strategy* – PNG Ports Corporation and provincial/district government, would benefit from a clear climate change risk management policy to guide climate proofing activities. However, site and operation-specific climate change risk assessment needs to precede policy development, and cost/benefit analysis is needed to support specific policy development. Thereafter, PNG Ports and provincial/district government will need to establish the in-house capacity to design, build, and maintain ports/wharves/jetties (and associated infrastructure) that address climate change risks. To achieve this goal, PNG Ports Corporation and the provincial/district governments, need technical assistance as the skills are not available at present. Policy and strategic plans based on that policy all need to be subject to continuous monitoring and evaluation to ensure that focus is maintained and new technology and approaches are being monitored, evaluated, and constantly improved. The project will support the development of a Climate Change Risk Management Policy and strategy for the PNG Ports Corporation and provincial/district governments, including legal drafting support for any legislative changes required to integrate climate change risk management into the operations of PNG Ports Corporation and provincial/district governments. Additionally, effective enforcement mechanisms will be defined, developed, established, and/or strengthened as appropriate to ensure timely implementation of the policy/legislation/ strategy.

- *Climate Change Projections* – PNG is probably the only country in the region large enough to warrant a specific, country-level approach to the development of climate change projections. The Australian Government is assisting in this area and a recent report by CSIRO is providing analysis at the national level—but the projections are not sector- or site-specific. Climate change projections need to be supported by robust science to be credible, and they need to be district specific to be directly useful in climate proofing individual port/wharves/jetties and associated assets, operations, and infrastructure. The Australian Government has worked with the PNG Government in providing updated climate projections for PNG. Building on the work undertaken by CSIRO, SPCR will support the development of district climate change projections and vulnerability assessments to guide the climate proofing of the port/wharves/jetties and associated assets under the management of the PNG Ports Corporation and provincial/district governments. The project will work with the Australian Government CSIRO and Bureau of Meteorology, together with the PNG National Weather Service (PNGNWS), to utilize the data currently available and assess the requirements for providing provincial-, district-, and site-specific climate modeling. The project will support the downscaling in one or more pilot areas (dependent upon data availability) in order to develop site-specific climate change risk modeling and vulnerability assessments for climate proofing the ports/wharves/jetties and associated infrastructure under the management of the PNG Ports Corporation and provincial/district governments.

- *Building Codes And Engineering Design Criteria* – Economic growth in 2008 and 2009 has revealed that poor infrastructure—including ports/wharves/jetties (and associated infrastructure)—often acts as a bottleneck to further growth. The PNG Government is committed to improving

the state of national infrastructure, and the LNG and other petroleum and mining projects will provide the fiscal capacity to service additional borrowing for long-term transport assets. However, there is a critical need to ensure that all ports/wharves/jetties (and associated infrastructure) in PNG is able to sustain risks from climate change impacts. For ports/wharves/jetties (and associated infrastructure) infrastructure, PNG currently uses a mixture of building codes and engineering design criteria which have been locally developed, and those from Australia and/or New Zealand. However, the climate proofing of the Australian and New Zealand codes is a work-in-progress. The project will support the evaluation of building codes and engineering design criteria relevant to the design, location, building, operation, and maintenance of ports/wharves/jetties (and associated infrastructure) and revision to address climate change risks based on site-specific climate change projections developed under this component. The project will also support the development and presentation of training programs to engineers, architects, developers, and planners on the climate-proofed building codes relevant to ports/wharves/jetties (and associated infrastructure) (see below).

- *Training* – The project will support climate change risk management training, targeted not only at engineers but also surveyors, architects, building inspectors, key support personnel, and tradespeople, including trade associations, project managers, and planners involved in the design, location, building, operation, and maintenance of ports/wharves/jetties (and associated infrastructure). The training will also be targeted to those responsible for developing and approving Ports Corporation and provincial/district government financial operational budgets and budgets for infrastructure capital projects, and the insurance industry that provides insurance for ports/wharves/jetties (and associated infrastructure) and operations.

- *Capacity Building* – is needed at individual, institutional, and systems levels in the PNG Ports Corporation and Provincial/District Government. At the institutional level, the PNG Ports Corporation and Provincial/District Government will need trained individuals to head the climate change risk management units. Capacity also needs to be built for PNG Ports Corporation and Provincial/District Government managers, employees, and contractors in order to support the whole climate change risks management process. The project will support the establishment of a comprehensive training and climate change risk management capacity within the PNG Ports Corporation and Provincial/District Governments, supported by corporate climate change risk management guidelines, protocols and operational procedures.

- *Cost/Benefit Analysis* – PNG Ports Corporation and provincial/district government budget allocations do not consider climate change risks—this needs to become a standard operational procedure in their planning and approval process. PNG Ports currently include cost/benefit analysis in their decision-making processes, but this does not include the cost/benefit of climate change risk management. The cost of not taking climate change risks into account is often the direct cost of repairing, or even replacing, damaged infrastructure. Training in climate change risk cost/benefit analysis techniques will be needed at all levels within the PNG Ports Corporation and provincial/district government.

- *Education and Awareness Raising* – Education and awareness on climate change risks and appropriate management options need to be provided at all

levels within the PNG Ports Corporation and provincial/district government. Climate change risk management costs time and money; therefore, broad corporate support is needed. The project will support the design and implementation of a comprehensive climate change risk management awareness and education program within PNG Ports Corporation and provincial/district government, and for contractors, stevedores and private sector port/wharf/jetty workers.

- *Sustainable Financing* – for climate change risk management as a process to be incorporated at all levels within PNG Ports Corporation and provincial/district governments clearly costs money – and for it to be sustained beyond SPCR interventions, the PNG Ports Corporation and provincial/district governments will need to establish a source of climate change risk financing. The project will support the evaluation of possible sustainable financing mechanisms to sustain climate change risks management activities after SPCR support finishes. Sources of innovative and sustainable financing for climate change risk management will be explored, and an appropriate financing mechanism will be established—not only to cover internal operational costs but also to support the climate proofing of ports infrastructure on a permanent basis. Climate change risk insurance options for ports infrastructure will also be developed.

The capacity building elements of this component are:

- Design/implementation of **climate change risk assessment /management capacity building** and training program for Departments of Treasury, Finance and Planning, the Office of Rural Development and Implementation, and the Ministry of Transport to support the integration of climate change risk management into national, sectoral, provincial, and district budgetary processes relating to the climate proofing of infrastructure. SPCR will initially undertake an inventory of climate change training programs ongoing or proposed within the region,[12] in order to design a training program that meets

[12] The USP-EU Global Climate Change Alliance project that started last year will allow Capacity building via Post Graduate Diploma. New courses will be developed within this project on aspects of climate change not yet covered. A range of optional courses will also give students the opportunity to study scientific, socio-economic and cultural aspects of climate change. Some courses will combine face-to-face or distance learning with on-site workshops and case studies.

Postgraduate Diploma in Climate Change program: An AusAID funded program that builds capacity of Pacific students to understand the concept of climate change and to be future climate change experts in the Pacific. PACE coordinates the core course of the program that is EV 414: Climate Change impacts and adaptation , EV 415: Climate Science, EV 424: Disaster Risk Management and EV 425: Environmental Impact Assessment/Strategic EV 425:

Environmental Impact Assessment/Strategic Environment Assessment (EIA/SEA) course: In collaboration with United Nations University (UNU), Royal Melbourne Institute of Technology University (RMIT University) and United Nation Environment Program (UNEP), PACE-SD has developed this course targeting environmental managers in the Pacific. This course is also offered for the Post Graduate Diploma in Climate Change program. The course is only offered in the 2nd Semester and is coordinated by PACE.

Non-Formal Training

Pacific Island Community-based Climate Change Adaptation Program (PICCCCAP). This program will be offered in three phases. There will be some direct teaching, interspersed in most sessions with activities. The objective of this training course would be to implement the trainer the trainer program on skill building and elements of climate change adaptation. The course will also include field visits to provide practical in field and in the community experience in applying the principles and skills learned during the module.

country needs.[13] For example, cost/benefit analysis for adaptation exists under PACC and can be adapted to specific sectors in PNG as required.

- **Scholarships** for technicians/managers in government and state-owned enterprises to attend university-level programs (at regional institutions) on climate change risk management for ports infrastructure. PNG will use, to the extent possible, the scholarship opportunities offered through USP (EU-GCCA as well as regional PPCR) before drawing down on this budget line.

On-going non-formal training

USP-EU Global Climate Change Alliance (GCCA) Project. The USP-EU GCCA project instigated in 2011 and has a component on capacity building that covers the non-formal training on climate variability and climate change impacts in the region. This includes capacity building workshops and training of trainers program to improve the knowledge and skills of the climate change practioners in the region. This knowledge and skills will focus on climate change related topics, but also on practical management skills, such as project management, written and oral presentation, reporting, monitoring and evaluation of project, and conflict management. There will be two sessions of the non-formal training programs that will be carried on within the duration of the projects. The topics and skills will be determined by the needs and demands from the practioners.

Human Rights and Climate Change: The added value for the South Pacific course was organised by the Centre and the International-Lawyers.org. This course was supported by EU-GCCA as a program to improve the skills and knowledge on climate change and its impact. The 10 day course was designed for young academics and professionals. This course aims to familiarise participants with international human rights law and mechanisms, and the links between international climate negotiations and issues and concerns on human rights in the context of threats due to climate change and sea level rise across the South Pacific. The course also seeks to identify practical approaches to influence decision-making on climate change at all levels, thereby using human rights as a tool to facilitate just and effective responses.

[Fiji Training and Capacity Building workshop on Climate Variability and Change in Pacific Island Countries: Impacts, Vulnerability and Adaptation held at the USP Laucala Campus, Fiji from the 22 November to the 03 December, 2010. This workshop aimed to enhance the local human resource capacity in finding ways and means of managing risks that climate change poses for freshwater availability, food (including fisheries) productivity, coastal erosion, salt water intrusion, tourism, human heath etc.

Kiribati Training and Capacity Building workshop on Climate Variability and Change in Pacific Island Countries: Impacts, Vulnerability and Adaptation held at USP's Tarawa campus from the 20-27 October 2010. The eight day intensive workshop was conducted by PACE-SD as part of the AusAID funded Future Climate Leaders Project activity that covers issues on climate change impacts, vulnerability and pathways for adaptation in Pacific Island Countries and examine community-based strategies to adapt to climate change. The workshop aimed to enhance the local human resource capacity in finding ways and means to managing risks that climate change poses for freshwater availability, food (including fisheries) productivity, coastal erosion, salt water intrusion, tourism, human health etc.

APN funded Global Change and Coral Reef Management Capacity in the Pacific; Engaging Scientist and Policy Makers in Fiji, Samoa, Tuvalu and Tonga is a joint capacity building program with the Institute of Marine Resources. It included a seminar in Fiji that was held in June and in Samoa, Tonga, and Tuvalu in the month of August, 2010. The main aim of having the seminars in each country is to bring Pacific Leaders in each country together with scientist and experts on the sustainable management of coral reefs, using most recent information.

[13] There will be an opportunity under component 1 of the regional SPCR to assist climate change capacity building and strengthening institutional and policy support to mainstreaming. Component 1 of the regional SPCR proposal has a focus on mainstreaming integrated climate change adaptation and disaster risk considerations into sector planning processes, decision making and resources allocations and linked into national development planning processes. In addition, the regional component is aiming to develop tailor made tools for mainstreaming CCA and DRR specific to each participating country and target sectors. This will also include building awareness and understanding climate drivers, climate variability and climate change consequences and impacts and the role of these in adaptation and disaster risk reduction to underpin mainstreaming. Under the regional SPCR proposal for component 3, there is a proposal for a Regional Technical Support Mechanism (RTSM) to provide technical assistance to PICs on climate change issues as required. The RTSM support would include project development, sourcing funds and a range of pooled regional technical expertise required that is not always available at the national level, including peer-to-peer support and south-south skills transfer.

Scholarships will be dedicated to highly specialized training specific to PNG rather than the more general USP courses, for which there are already scholarships that PNG can access.

Key Indicators and Baseline

No capacity exists in PNG to climate proof critical infrastructure and recurrent costs for damage to such infrastructure continue to place a serious burden on economic and social development programs.

Risks

The principal risks that need to be addressed under this component are the high turn-over of qualified and trained staff in the public sector and state-owned enterprises, such as PNG Ports Corporation, that consistently undermine capacity building and sound programming initiatives, such as those proposed under the SPCR.

Investment Costing – Component 3 Budget

Component Activities	Budget allocation US$	Co-financing and parallel financing
Establishment of an "enabling framework" for climate proofing ports/wharves/jetties (and associated infrastructure) and integrating climate change risk management into the day-to-day operations of the PNG Ports Corporation and within provincial/district government.	4,500,000	World Bank BMDCRTS US$2,700,000 SPREP/FINPAC
Capacity building – design/implementation of climate change risk assessment/management capacity building and training programs (supported by scholarships) for Departments of Treasury, Finance and Planning, the Office of Rural Development and Implementation, and the Department of Transport to support the integration of climate change risk management into national, sectoral, provincial, and district budgetary processes relating to the climate proofing of infrastructure.	1,500,000	GCCA USP Euro 8,000,000
Component 3 Total	6,000,000	

FINPAC = Finland–Pacific project on reducing vulnerability of PICs livelihoods to the effects of climate change, GCCA = Global Climate Change Alliance, SPREP = South Pacific Regional Environment Programme, UNDP = United Nations Development Programme, USP = University of the South Pacific.

Annex 10

Results Framework

PPCR Transformative Impact				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
1. Improved quality of life of people living in areas most affected by climate variability and climate change in PNG	a) Change in the Global Adaptation Index (GaIn). b) Relevant Millennium Development Goals (MDGs) Indicators. c) Percent (%) of people classified as poor (women and men) and food insecure (women and men) in most affected regions. d) Number of lives lost/injuries from extreme climatic events (women/men). e) Damage/economic losses ($) from extreme climatic events.	To be determined as implementation progresses–this task will be included in the detailed project preparation phase	To be determined as implementation progresses–this task will be included in the detailed project preparation phase	Global Adaptation Institute PNG's monitoring and evaluation/United Nations – The Millennium Development Goals Report PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards Activity-specific monitoring and evaluation designed during the project preparation phase EM-DAT International Disaster Database (http://emdat.be/about)

PPCR Transformative Impact				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
2. Increased resilience in economy, society, and ecosystems to climate variability and climate change through transformed social and economic development in PNG	a) Country outcome indicators: action plans for mainstreaming CCA implemented; increased resilience for communities in low-lying islands already impacted by rising sea levels, strengthened capacity in PNG for food security; effective planning for resilient infrastructure; enhanced access to technical resources to assist with the above. b) Changes in budget allocations of all levels of government to take into account effects of climate variability and climate change across sectors and the regional level.	To be determined as implementation progresses–this task will be included in the detailed project preparation phase	To be determined as implementation progresses—this task will be included in the detailed project preparation phase	PNG's monitoring and evaluation systems (results framework of the National Development Plans monitored by the Department of National Planning and Monitoring (DNPandM)) Public expenditure reviews undertaken by appropriate agencies/departments and monitored at a higher level by DNPandM

PPCR Catalytic Replication Outcomes				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
1. Improved institutional structures and processes at national/provincial/local government levels to facilitate response to climate variability and climate change in PNG	a) Number and quality of national/provincial/local government level policies introduced in PNG to address climate change risks. b) Quality of participatory planning process (as assessed by private sector, CSOs). c) Extent to which PNG's results monitoring and evaluation systems include processes to monitor adaptation efforts (at all levels of government) and related indicators are publically available. d) Extent to which PNG's development decision making is made based on country-specific information and knowledge products based on climate science, local climate knowledge (regional and eco-regional level), and (gender-sensitive) vulnerability studies. e) Staff in key line agencies at the national/provincial/local government level in PNG promote climate resilience integrated with disaster risk management as part of their development agendas.	To be determined as implementation progresses—this task will be included in the detailed project preparation phase	To be determined as implementation progresses—this task will be included in the detailed project preparation phase	National/provincial/local government monitoring and evaluation systems Satisfaction surveys Periodic qualitative assessment at the national/provincial/local government level Activity-specific monitoring and evaluation designed during the project preparation phase Periodic qualitative assessment at the national/provincial/local government level Component level monitoring and evaluation reports produced by the SPCR PMU

PPCR Catalytic Replication Outcomes				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
2. Scaled-up investments in climate resilience and their replication in most vulnerable regions of PNG	a) Number and value of climate-proofed investments (national and local government, non-government, private sector, etc) in infrastructure (including coastal roads, water management and ports), food security. b) Evidence of integrating lessons learned (regional, national, and local government level, nongovernment organizations, private sector) from PPCR pilot projects/programs and their replication across PNG. c) Evidence of increased capacity to mange climate resilient investments at the national/ provincial/local government levels.	To be determined as implementation progresses	To be determined as implementation progresses	PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards Budget allocations at all levels Activity-specific monitoring and evaluation designed during the project preparation phase MDB qualitative review Component level monitoring and evaluation reports produced by the SPCR PMU
3. Replication of PNG PPCR learning scaled-up from the pilot scale	a) Number of PNG government agencies and sectors applying climate proofing and resilience principles in development strategy planning and sharing it through PPCR knowledge management.	To be determined as implementation progresses	To be determined as implementation progresses	PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards Activity-specific monitoring and evaluation designed during the project preparation phase

PPCR outputs and outcomes				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
Improved integration of resilience through mainstreaming consideration of CCA into PNG's development strategies, plans and policies (at the national, provincial, and district levels) including in regard to resilient island communities, health, food security and resilient fisheries, and critical transport infrastructure focused on ports/wharves/jetties	Degree to which development plans integrate climate resilience by subjecting planning to climate proofing and assessments of vulnerability (including gender dimension and measures to better manage and reduce related risk), and is disseminated broadly. Budget allocations (at all levels) taking into account effects of climate variability and climate change (vulnerabilities) across sectors and regions, including financing accessed from sources external to PNG's own budget resources. Number of training programs delivered to assist vulnerable communities and civil society to undertake community-level climate change vulnerability mapping and adaptation planning. Coverage of community-based early warning systems and numbers of District Officers trained in climate change risk management.	Limited skills, know-how and resources available for communities and civil society to undertake climate change vulnerability mapping and adaptation planning For vulnerable communities in low-lying islands and atolls, no or inadequate access to early warning systems and limited access to District Officers trained in CCA.	CCA is mainstreamed in priority sectors such as infrastructure, fisheries/agriculture, health and education Budget allocations increased to high priority sectors 1,000 people in vulnerable communities trained in vulnerability mapping and adaptation planning At least 5,000 people in remote islands and atolls to benefit from establishment of early warning systems and 200 District Officers trained in climate change risk management.	Periodic qualitative review of strategies and other development plans and policies PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards Component level monitoring and evaluation reports produced by the SPCR PMU Periodic public expenditure reviews—budget allocations and funds sourced from development partners and CCA programs

PPCR outputs and outcomes				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
Increased capacity to integrate climate resilience through CCA into PNG's country or sector development strategies at all levels	Increasing numbers of policies, plans, and strategies and legislation that require CCA to be integrated into planning, development, and approval processes, alongside evidence of a functioning cross-sector mechanism that takes account of climate variability and climate change at the country level Evidence of line ministries or functional agencies updating or revising country or sector development strategies (moving from 'outside management' to country ownership) at the country level The enactment of a legal framework for CCA Key staff in Departments of Treasury, Finance, Planning, Rural Development and Transport trained in and applying climate change risk assessment/management principles in budgetary processes relating to infrastructure development	Few, if any, sector specific policies requiring CCA to be integrated into planning and approval processes The PNG Capacity Building Needs Assessment workshop for critical infrastructure agencies and professional associations showed that no sector currently has the knowledge, skills, and resources to climate proof infrastructure investments or retro-fitting	Key climate change vulnerable ministries/ sector agencies have established appropriate policies requiring, and staff capable of implementing, the mainstreaming of CCA An enabling framework for climate proofing ports/wharves/jetties has been developed by PNG Ports Corporation, Ministry of Transport and selected provincial/district government agencies Infrastructure sectors other than maritime transport are picking up the enabling framework and lessons learned and applying it to their infrastructure planning	Government gazette proclaiming enactment of legislation Periodic qualitative review of strategies and other development plans and policies PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards SPCR monitoring and evaluation by SPCR PMU MFandT allocations for incremental costs for climate proofing, and annual reports of PNG Ports Authority and Ministry of Transport

PPCR outputs and outcomes				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
Increased knowledge and awareness of climate variability and climate change impacts (e.g. climate change modeling, climate variability impact, adaptation options) among government/private sector/civil society/education sector	Coverage (comprehensiveness) of climate risk analysis and vulnerability assessments within the limits that current scientific evidence permits (project-specific: sector, geographical area, sex, population group, and location) Number of scholarships awarded/training courses completed for managers and technicians in Departments of Finance, Treasury, Planning, Rural Development, and Transport Pilot food processing, preservation, and storage systems established and lessons learned being replicated in other vulnerable provinces/districts Pilot ecosystem-based, climate resilient, fisheries management systems established and lessons learned being replicated in other vulnerable fisheries Pilot (s) established to determine best mechanisms/approaches to combat an increase in water- and vector-borne diseases emanating from climate change impacts	Climate risk analysis and vulnerability assessments are limited in scope and geographical coverage Limited scholarships/ further education opportunities available for PNG agency managers and technicians Inadequate food processing, preservation, and storage systems contributing to food insecurity in vulnerable districts Unsustainable fisheries practices contributing to food insecurity in vulnerable districts Water- and vector-borne diseases spreading/increasing in vulnerable areas	Analyses and assessments of climate change vulnerability undertaken and updated for vulnerable communities Scholarships taken up, degrees/diplomas awarded and trainees have returned to active service Pilot food processing, preservation, and storage systems established and operating and lessons learned being disseminated. Pilot ecosystem-based, climate resilient fisheries practices established and operating and lessons learned being disseminated Community based pilot (s) established and lessening impacts from water- and vector-borne diseases	SPCR monitoring and evaluation – qualitative assessment PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards Media monitoring Hydro and meteorological assessment reports by PNG Met Service Reported uptake of food processing, preservation and storage technologies Reported uptake of ecosystem-based, climate resilient fisheries practices Reported uptake of health system initiatives lessening the impacts of climate change related water- and vector-borne disease incidence

PPCR outputs and outcomes				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
			benefiting 500 to 700 individuals and lessons learned being used elsewhere in health sector programs	
Improved integration of learning through an enhanced body of local, national, and regional knowledge and information on CCA integration into climate resilient development in vulnerable communities and within the infrastructure sector	Relevance (demonstrated by complementing/integrating with other initiatives) and quality (stated by external experts) of knowledge assets (e.g., publications, studies, knowledge sharing platforms, learning briefs, communities of practice, etc.) created. Documentary evidence of use of knowledge and learning. Evidence of use of expertise available under the regional technical support mechanism.	Limited availability of CCA and knowledge products Enhanced learning mechanisms established under the Regional SPCR	CCA knowledge products and services made available to vulnerable communities and are being routinely used PNG uses the enhanced learning mechanisms established under the regional SPCR	SPCR documents, and monitoring and evaluation done by the SPCR PMU CIF – AU qualitative assessment PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards OCCD annual reports Regional SPCR monitoring and evaluation reports

PPCR outputs and outcomes				
Results	**Indicators**	**Baseline**	**Targets**	**Means of Verification**
Through a Small Grants envelope operating under the proposed Climate Change Trust Fund, leverage new and additional resources for CCA sensitive investments in priority sectors vulnerable to climate change and climate variability	Evidence of the establishment and effective operation of a PNG Climate Change Trust Fund and Small Grants Program	PNG does not have an adequate and effective enabling framework established for financing CCA at the community, district/provincial government and infrastructure agency level	An enabling framework is established and operating for CCA financing	SPCR Project monitoring and evaluation done by the SPCR PMU PNG's monitoring and evaluation system reports and databases, including MDG reports and risk reduction scorecards Increase in government budgets and donor funds targeted at climate sensitive investments Component level monitoring and evaluation reports produced by the SPCR PMU Funds dispersal from the 'Small Grants' program

CCA = climate change adaptation, CIF – AU = , CSO = civil society organization, MDB = multilateral development bank, MDG = Millennium Development Goal, MFandT = , OCCD = Office of Climate Change and Development, PNG = Papa New Guinea, PMU = project management unit, PPCR = Pilot Program on Climate Resilience, SPCR = Strategic Program for Climate Resilience,

Annex 11

Project Preparation Grant Request

1. **Country/Region**:	Papua New Guinea	2. **CIF Project ID**#:	(Trustee will assign ID)
3. **Project Name:**	PNG's Strategic Program on Climate Resilience (SPCR) - Components 1-3		
4. **Tentative Funding Request (in $ million total) for Project[14] at the time of SPCR submission (concept stage):**	*Grant: US$*25 million	*Loan*	
5. **Preparation Grant Request (in $ million):**	$0.75 million	*MDB:* Asian Development Bank	
6. **National Project Focal Point**:	Office of Climate Change and Development (OCCD)		
7. **National Implementing Agency (project/program):**	Office of Climate Change and Development (OCCD) Ministry of Finance		
8. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	*Anne Witheford, Pacific Department*		

Description of Activities covered by the Preparation Grant

PNG is sensitive to natural hazards, such as coastal flooding, inland flooding, landslides and drought. Significant risks are posed by climate change to the PNG environment, economy and population including from natural disasters enhanced by climate change and gradual shifts in climatic conditions. Climate change will disrupt daily life, cause damage to assets and infrastructure, destroy livelihoods, endanger cultural and ecological treasures, and kill or injure people.

In March 2010, in order to implement key goals outlined in the country national development strategy (*Vision 2050*), PNG's Office of Climate Change and Development (OCCD) led the development, through a broad-based consultative process, of **Climate Compatible Development Strategy for Papua New Guinea** (CCDS) that outlines key measures that will "shape development to be more climate-resilient". The CCDS commits government to implement climate-compatible development, while the vision outlined in the CCDS is climate-compatible development that has the potential to broaden the base of PNG's economy and reduce reliance on natural resource exports while enhancing the earning power of smallholder farmers and forest communities. Climate-compatible development will contribute to food security by enhancing agricultural productivity and to rural development through small-scale electrification, infrastructure development, and service provision.

[14] Including the preparation grant request.

With the preparation of the CCDS and related strategies and the establishment of the OCCD, substantial progress has been made at the policy and strategy level, and a commitment has been given to fast-track pilot programs in the future. Nonetheless, the real task of implementing climate change adaptation at the operational level is yet to begin. Climate risk management is still to be integrated into policy, planning, and budgetary processes. There is limited budget to meet even current priority development needs, let alone the cost of adaptation. There is also limited understanding of climate risks and a lack of technical capacity to integrate climate risk management into planning processes. Further, there is no evidence of significant training at national, sectoral, or provincial/local levels to provide this capacity, although the consultations revealed a strong desire for the PPCR to support such efforts. Legislation (*Climate Change Authority Act 2012*), is currently being finalized to provide OCCD with legal powers to undertake its role and also to set up a sustainable climate change financing framework— both priorities under *Vision 2050*. However, considerable capacity building will be needed within OCCD if the new legislation is to be implemented in a timely and effective manner. It is by addressing these priority areas that SPCR can best provide support to facilitate the mainstreaming of climate change adaptation into PNG's national climate resilient development program as defined in *Vision 2050* and the CCDS.

The proposed SPCR will focus on three components:

Component 1 – Building Climate Resilient Communities: through strengthening capacity to address priority climate change risks;

Component 2 – Addressing Climate Change Risks to Food Security: through addressing threats to PNG's food security from climate change impacts by piloting adaptation measures with a view to replication in other vulnerable communities.

Component 3 –Climate Resilient Infrastructure: through providing much needed resources and capacity building in order to mainstream climate change risk management into development planning at the national, sectoral, and community levels.

The project preparation grant is needed for conducting technical, economic, financial, and social due diligence, and prepare PNG`s Technical Assistance (TA) for ADB Board approval. The major activities of the preparation grant are:

- Evaluating technical, economic and financial viability of the interventions.
- Conceptualizing the project including the design and monitoring framework including baseline data.
- Liaison with stakeholders to finalize a project management and administration framework;
- Assessing financial management, procurement, anticorruption measures, policy and legal, capacity, and other institutional issues and mechanisms.
- Conducting poverty reduction, gender and social impact assessment; and safeguards assessments (environment, involuntary resettlement, and indigenous peoples).
- Preparing procurement and selection criteria for the activities, implementation arrangements and project administration manual;
- Undertaking an assessment of information gaps and development of a knowledge management program;
- Preparing the TA for ADB Board approval.

Outputs	
Deliverable	**Timeline**

Inception Report	Month 1
Mid-term Report Draft Final Report Final Report (TA) for ADB Board approval)	Month 3 Month 4 Month 5

Budget (indicative)	
Expenditures[15]	**Amount (US$) –** estimates
Consultants	460,000
Equipment	10,000
Workshops/seminars	45,000
Travel/transportation	150,000
Others (admin costs/operational costs)	10,000
Contingencies (max. 10%)	75,000
Total Cost	**750,000**
Other contributions:	
• Government	
• MDB	
• Private Sector	

Timeframe (tentative)

Submission of Project Preparation Grant request to PPCR Sub-Committee: July 2012
Expected TA approval by Asian Development Bank Board: February 2013

Other Partners involved in Project Design and Implementation

The Project Preparatory Technical Assistance (TA) will be implemented through a participatory and consultative approach with OCCD and the Ministry of Finance (MoF), and other stakeholders including development partners, such as AusAID, PRIF, UNDP, World Bank, and bilateral donors. Stakeholder consultation will be a key activity to reach consensus on detailed project design.

If Applicable, Explanation for Why the Grant is MDB Executed: Standard Asian Development Bank procedure (ADB executes all such grants to its developing member countries)

Implementation Arrangements (incl. procurement of goods and services)
The OCCD, combined with (MoF, will be responsible for overall coordination of detailed project preparation, and for overall oversight of TA development. OCCD will report to the NCCCC to provide regular reports on project preparation activities. The technical working group will provide technical input during project preparation.

All procurement to be financed under the TA will be carried out in accordance with ADB's Procurement Guidelines (2010, as amended from time to time) and consultants will be recruited in line with ADB's Guidelines on the Use of Consultants (2010, as amended from time to time). The TA proceeds will be disbursed in accordance with ADB's Technical Assistance Disbursement Handbook (2010, as amended

[15] These expenditure categories may be adjusted during project preparation according to emerging needs.

from time to time).

The TA will require 12 months international and 20 months national consulting services. Following is the summary of consulting requirements:

Name of Position	**Person Months**
International	
Team Leader	3
Climate Change Mainstreaming/Training Specialist	2
Climate Change Risk (Infrastructure) Specialist	2
Climate Change Fisheries Specialist	1
Climate Change Financing Specialist	2
Climate Change Health Specialist	1
Other TA	1
National	
Capacity Building and Training Specialist/Deputy Team Leader	3
Financial Management Specialist	2
Environmental and Gender Analysis Specialists (1 each)	2
Safeguard Specialist	2
Community/Organizational Capacity Building Specialists	4
Legal Specialist	2
Project Economist	3
Other TA	2

Annex 12

Request for Payment of Preparation and Supervision Costs of ADB

<table>
<tr><td colspan="4">PILOT PROGRAM FOR CLIMATE RESILIENCE

Request for Payment of MDB Preparation and Supervision Costs</td></tr>
<tr><td>1. Country/Region:</td><td>Papua New Guinea</td><td>2. CIF Project ID#:</td><td>(Trustee will assign ID)</td></tr>
<tr><td>3. Project Title:</td><td colspan="3">Strategic Program for Climate Resilience – Papua New Guinea</td></tr>
<tr><td>4. Tentative Project Funding Request:</td><td>At time of SPCR Submission: : $25,000,000 (including $750,000 for project preparation grants)</td><td colspan="2">At time of project approval:</td></tr>
<tr><td rowspan="2">5. Request for MDB Preparation and Supervision Costs:</td><td rowspan="2">$393,915</td><td colspan="2">MDB: Asian Development Bank</td></tr>
<tr><td colspan="2">Date: June 1, 2012</td></tr>
<tr><td>6. Project/Program Financing Category</td><td colspan="3">a - Investment financing - additional to ongoing MDB project ☐
b- Investment financing - blended with proposed MDB project ☐
c - Investment financing - stand-alone ☐
d - Capacity building - stand alone X</td></tr>
<tr><td>7. Expected project duration (no. of years)</td><td colspan="3">Five years</td></tr>
<tr><td>8. Payment requested</td><td>for services during preparation phase

for services during supervision phase

TOTAL:</td><td colspan="2">$178,915

$215,000 ($43,000 per year for 5 years)

$393,915</td></tr>
</table>

Annex 13: Reviewer's Comments and Response

Independent Review and Response to Reviewer's Comments

of

Papua New Guinea's Strategic Program for Climate Resilience

prepared for the Pilot Program for Climate Resilience (PPCR)

A. Independent Review by Maarten van Aalst (mkvaalst@xs4all.nl)
5 April 2012

Introduction

This external review of the draft Papua New Guinea Strategic Program for Climate Resilience (PNG SPCR) was undertaken in late March - early April 2012, based on desk review of documents and telephone conversations.

The review follows the structure specified in Annex A of the —Procedures for the Preparation of Independent Technical Reviews of PPCR and SREP Investment Plans and Programs,‖ based on general criteria (part I), program-specific criteria (part II), and additional recommendations (part III).

I: General Criteria

a) The program complies with the principles, objectives, and criteria of the relevant program as specified in the design documents and programming modalities.

The PNG SPCR is consistent with the principles, objectives, and criteria of the PPCR.

b) The program takes into account the country capacity to implement the plan.

As in many highly vulnerable countries, current capacity for adaptation in PNG is still relatively low, but capacity building, both in terms of technical capacity and in terms of institutional and implementation arrangements, is an essential component of the program.

The program is ambitious in what it aims to achieve in this area, but this ambition appears to be matched by strong country ownership of the program's objectives, and an institutional framework with high-level government support and clear legal status. Strong support from the government and the Asian Development Bank (ADB) will be required to ensure the central coordinating unit, the Office of Climate Change and Development (OCCD), will be able to coordinate the ambitious SPCR effectively and eventually achieve even broader adaptation objectives.

Special attention will also be required to build capacity beyond national government structures, particularly regarding subnational government, civil society, and the private sector. This will require special care in specific project design, close monitoring, and sufficient flexibility to adjust the capacity building needs as the program progresses.

c) The program has been developed on the basis of sound technical assessments.

The program is based on a range of technical assessments and consultations: a stocktaking of adaptation frameworks, projects, and programs in PNG and in the Pacific region; a climate change risk assessment; adaptive capacity assessment (including the most vulnerable groups through a household survey); a prioritization exercise; an assessment to review whether the proposed investments enhance resilience within vulnerable communities/sectors and at the national level; an initial (scoping) cost/benefit analysis; and design of implementation modalities.

These assessments are of sufficient quality, striking an appropriate balance between, on the one hand the need to keep the process simple and participatory enough so that a wide range of actors can be engaged and the technical assessments can be used to achieve consensus on prioritization of risks and potential interventions to address those risks; and on the other hand, the aim to use all relevant science and representation of complexity and uncertainty (where some steps have understandably been kept relatively straightforward).

The bulk of the analysis has focused on the analysis of potential impacts and identification of generic options to address those risks, with less analysis on the detailed characterization of those options and more refined prioritization (including in terms of risk management costs and benefits). Further technical assessment will be needed during detailed project preparation and implementation, including the context of specific investments (e.g., coastal morphology for some of the investments in coastal areas), as well as environmental and social analysis (the latter specifically including incentives and barriers for action, particularly also in the case of community-based activities and early warning systems).

In undertaking that more detailed project preparation work, one of the aspects that could be given more technical attention is the characterization of risks—including climate change, but also explicitly current variability (including seasonal forecasting) and extremes (where information may be better and sometimes more relevant for the investment decisions being taken than for long-term change). Generally, the program appropriately takes a comprehensive approach, not aiming to separate climate change artificially from other climate-related risks. However, in some cases, there appears to be a lack of clarity in use of terminology (e.g., climate change risk management versus climate risk management—I would suggest always using the latter), and/or analysis (for instance regarding ENSO related variability to characterize risk).[16]

d) The program demonstrates how it will initiate transformative impact.

Overall, the PNG SPCR comes across as a well-balanced package of interventions to achieve better climate resilience. It focuses on a number of priority sectors and areas, targeting the most vulnerable groups, while particularly using its investments to foster programmatic approaches in overall development planning, capacity building, and institutional strengthening.

The combination of local and national investments, and of different types of interventions (from local action and food security improvements to infrastructure proofing) ensures that experience is built in a wide range of adaptation interventions involving a variety of different key actors, which will also

[16] It would be highly useful to make the full technical assessments done for the preparation of the SPCR available online— possibly with a little further polishing—so that in-country stakeholders and other countries going through similar exercises can benefit from them.

facilitate broader implementation and mainstreaming beyond the SPCR based on lessons learned and capacities built in this program.

The program has additional opportunities to generate and share lessons learned through the regional Pacific PPCR program. This documentation and evaluation of good practice merits continued attention during further project preparation and implementation.

e-i) The program provides for prioritization of investments.

Prioritization of investments was based on the priorities identified in the March 2010 Climate Compatible Development Strategy (CCDS) and the SPCR national consultative planning process. The intervention areas appear to be well chosen for the range of risks the SPCR identifies and aims to address.

e-ii) The program provides for adequate capturing and dissemination of lessons learned.

The program clearly refers to a range of other efforts internationally that will be reviewed and drawn on to guide the implementation of the SPCR.

In addition, the SPCR contains pilot activities that will be evaluated and scaled-up to other areas and sectors, including through tools and training modules.

Finally, the fact that the PNG SPCR is part of a broader regional program allows PNG to benefit from regional expertise and enhances the opportunities to contribute to scaling-up beyond the country the lessons learned during implementation of the PNG SPCR.

e-iii) The program provides for monitoring and evaluation and links to the results framework.

The Results Framework included in the current program documents (Annex 11) is a good basis for monitoring and evaluation.

Some aspects merit further attention during project preparation (as partly already indicated). The indicators are a mixture of process and outcome indicators (which is appropriate, but could be structured more clearly). In addition, some indicators are appropriate in principle, but will require some hard thinking in implementation, for instance in terms of

- baseline data (e.g., lives lost/injuries/economic losses from extreme climatic events—what is the baseline or control group given that each event is different?);
- attribution of progress to the program (especially in the case of high-level outcomes, such as Millennium Development Goal indicators or poverty incidence, unless applied at relatively local level).

Elements of the national adaptation planning and management assessment (Annex 7) could possibly be included in the program‘s Results Framework.

f) The program has been proposed with sufficient stakeholder consultation and provides for appropriate stakeholder engagement.

As outlined in section 1.3, a participatory approach that included a wide range of stakeholders was used to prepare the SPCR. These consultations appear to have been successful to identify a general sense of issues and priorities for the general program. However, there is clearly a need for continued and more intense consultation for detailed design and implementation. Such stakeholder engagement is a clear priority, particularly in components 1 and 2. It will merit continued attention and further capacity building, including among civil society and local government.

g) The program adequately addresses social and environmental issues, including gender.

Community, civil society, and gender perspectives were taken into account in the consultations and capacity assessments (see Annex 2); this rich information should continue to inform detailed project preparation.

Environmental assessments will have to be carried out for specific investments during detailed project preparation.

h) The program supports new investments or funding additional to on-going/planned multilateral development bank investments

The program primarily supports new (pilot) investments as well as the enabling capacity building, jointly laying the groundwork for further scaling-up.

The SPCR also provides a good overview of other ongoing programs in related areas. A good example is the World Bank‘s —Building a More Disaster and Climate Resilient Transport Sector|| (to be implemented 2012–2015) and ADB loans for the infrastructure sector. There seems to have been good engagement with other development partners during the preparation process, which should be continued systematically as standard practice during the implementation of the SCPR to ensure synergies and mainstreaming of climate risk management into other programs, utilizing capacities built in the context of the SCPR.

i) The program takes into account institutional arrangements and coordination.

The program is strongly grounded in the Government‘s institutional arrangements for addressing climate resilience (particularly through the OCCD), and builds on existing high-level policies and development plans.

At the same time, it is clear that the program is ambitious, and it will require significant efforts to ensure that it achieves all its objectives. A particular challenge will be to ensure proper arrangements at subnational levels (including local government, but also civil society, private sector, and communities). This merits further attention during detailed project preparation.

As noted above, the SPCR preparation process has included strong consultations with development partners. It is recommended that this be continued through the implementation of the SCPR.

Coordination with knowledge partners and regional expertise is ensured through the parallel Pacific regional SPCR.

j) The program promotes poverty reduction.

At policy level, the SPCR is connected to the Climate Compatible Development Strategy (CCDS) which outlines a vision to broaden the base of PNG‘s economy and reduce reliance on natural resource exports while enhancing the earning power of smallholder farmers and forest communities; and contribute to food security by enhancing agricultural productivity and to rural development through small-scale electrification, infrastructure development, and service provision—all contributing to sustainable growth and poverty reduction.

The choice of SPRC interventions has been made with specific focus on the most vulnerable groups, which are generally also the poorest segments of the population, and dependent on limited and strongly climate-affected livelihoods.

The interventions will enhance their resilience in the face of shocks and changes, now and in the future, which clearly contributes to poverty reduction.

k) The program considers cost effectiveness of proposed investments.

An initial cost/benefit analysis framework has been developed, to be further developed and applied to investments specified during detailed project preparation. In that sense, there is no comprehensive quantitative assessment of the cost effectiveness of the specific investments in the current program. As noted in this analysis, a challenge is that many of the SPCR components can be qualified as climate adaptation —enablers|| or —enhancers,|| for which it is difficult to quantify development benefits in the absence of bigger investment flows building on that capacity.

However, the choice of the pilot investments (sectors, geographic areas, target population) appears to have been made on sound criteria and matches international experience on sound adaptation programming, including cost effectiveness.

In addition, rather than investing directly in specific investments (such as infrastructure) the SPCR will also facilitate better access to information and funds for private and public initiatives, which should facilitate market efficiency and result in more effective climate risk management by local authorities.

II: Compliance with the Investment Criteria or Business Model of the Relevant Program

a) Climate Risk Assessment

The SPCR is based and good assessment of key climate impacts, vulnerabilities, and implications.

The risk assessment and intervention prioritization methodology is strongly based on expert judgment, including a range of people with strong local knowledge from diverse technical backgrounds. It provides a good list of priority interventions, but could be framed more sharply in terms of its approach in dealing with climate change in the context of current variability and extremes (and the country‘s current adaptation deficit). This merits further attention in future capacity building, but has no strong impact on the overall program design, given that the assessment does identify a set of high-priority risks and interventions that are both climate-related and particularly relevant in the context of the current vulnerabilities and the adaptation deficit facing the country.

b) Institutions/Coordination

The program is closely tied to the government's institutional arrangements for addressing climate resilience, particularly through the newly established OCCD, and builds on existing high-level policies and development plans. See also item I-i.

c) Prioritization

The SPCR has adequately prioritized activities, building on the risk assessment and options screening (as discussed above).

d) Stakeholder Engagement/Participation

The SPCR preparation process included stakeholder participation as well as a household survey to gather perspectives of particularly vulnerable groups. The poor are generally the largest groups of vulnerable people, with particular concerns for those in the areas most exposed to climate related hazards, which include the pilot areas addressed in the project.

Further stakeholder participation will be required through the design and implementation phases, especially for components 1 and 2; and will be stimulated, for instance, through the small grants fund that is being established as part of component 1. See also I-f.

III: Recommendations

This section provides additional recommendations that could be considered to further strengthen the program.

One area that is already covered in some program activities but can be explored more explicitly is the overlap between climate change adaptation and disaster risk reduction (as highlighted in the recent Intergovernmental Panel on Climate Change [IPCC] Special Report on Managing the Risks of Extreme Events and Disasters to Advance Adaptation [SREX]). The issue of climate-related extreme events is clearly addressed in the SPCR, for instance in early warning systems component, and in the collaboration with the Global Facility for Disaster Reduction and Recovery (GFDRR)-funded infrastructure project, but further and more explicit attention could be given to coordination with a wider range of disaster-oriented agencies (also in the region) as well as use of climate information on risks of extremes across timescales (see next point).

A second issue that merits attention (as mentioned above, e.g., in item 1-c) is the use of climate information across timescales. The current early warning systems focus on immediate risks and the long-term climate analysis is focusing on trends (in averages or in frequency of extremes). Some decisions would also benefit from predictability on intermediate timescales (El Niño/La Niña-Southern Oscillation [ENSO] in particular), and characterization of the most relevant envelopes of risk on the timescale most relevant to a particular decision (a season in the case of choice of crop; several years in the case of agriculture skills development; years to decades in the case of land-use planning, etc.). A helpful approach is often to look at the decisions at stake, explicitly map the timescales on which their implications play out, and then organize the climate information (characterization of variability, predictions, trends, etc.) in the way that is most relevant to that context.

This could be facilitated by exploring links to the development of —climate services|| as expressed it the Global Framework for Climate Services (GFCS), which explicitly focuses on the user interface to make climate information across timescales more relevant to end users. Regional partners, such as the Australian Bureau of Meteorology, likely already have linkages to the PNG meteorological office that could be built on to also strengthen both general provision of information, but particularly tailoring of information to user needs and application in decision making (in a variety of program components, from community-based elements to sector planning).

Specific Detailed Comments (beyond the formal review)

- Section 1.1 under climate could be strengthened (clarified, more focused on key aspects). For instance, ENSO (El Niño/La Niña) merits more specific attention, describing key aspects of (partly predictable) climate variability (including variability in sea levels) that directly affects development.

  As an example of less relevant detail and lack of clarity: in the same section, below Figure 2: there is a reference to weakening La Niña signals and longer decadal phases of dry conditions. Firstly, the notion of changing ENSO patterns may have been correctly identified at the time of the first communication, but current scientific knowledge indicates very high uncertainty regarding trends in ENSO. Secondly, it is not clear what is meant by the decadal statement—La Niña impacts primarily affect seasonal/interannual climate patterns. There will be further information on decadal predictability as part of the new climate model outputs for the IPCC Fifth Assessment Report (AR5), but for now, the main message is that one should take account of the potential of decadal variability as a component of overall climate risk management (e.g., in infrastructure design, water management, and agriculture strategies— not over-interpreting short-term trends but being aware of this potential variability), but not expect too much predictability for specific planning on decadal timescales.

  For this entire section, I would consider basing the description more strongly on the Australian assessment mentioned at the end, plus a more user-oriented description of current variability (including regular seasons and, for instance, ENSO), and leave out the older information.

- In Table 2, in the category of —event risks,|| the categorization appears to contain overlaps; for instance —increased incidence of extreme events|| overlaps with —increased flooding||, —increased intensity of rainfall|| and —storm surge||.

- Annex 8, item 2e: Reassurance -> reinsurance.

B. Response to Reviewer's Comments on Papua New Guinea's

Strategic Program for Climate Resilience

Name of Reviewer: Dr. Maarten van Aalst
Date of submission of review: 5th April 2012

The Government of Papua New Guinea (GOPNG) and the Asian Development Bank (ADB) have considered the independent review of the Strategic Program for Climate Resilience for Papua New Guinea (SPCR), and thank the Reviewer for his insights, practical guidance, and advice for further development and refinement of the document. We welcome the Reviewer's assessment of the approach and objective of the PNG SPCR proposal, and his recommendations for further consideration during the project preparation stage, which will follow the consideration of the Proposal by the PPCR Sub-Committee.

More specifically, we note that the Reviewer:

- found that PNG's SPCR complies with the principles, objectives, and criteria of the PPCR;
- determined that the program is based on a range of technical assessments and consultations that strike an appropriate balance between the need to keep the process simple and participatory so as to achieve consensus on prioritization of risks and potential interventions to address those risks while at the same time using all relevant science;
- confirmed that community, civil society, and gender perspectives were taken into account in the consultations and capacity assessments;
- supported the proposed investments as a well-balanced package of interventions to achieve better climate resilience that focus on a number of priority sectors and areas, targeting the most vulnerable groups, while particularly using PPCR investments to foster programmatic approaches in overall development planning, capacity building and institutional strengthening;
- considered that the program is ambitious, but this ambition is matched by strong country ownership of the program's objectives, with the program being strongly grounded in the government's institutional arrangements for addressing climate resilience, and builds on existing high-level policies and development plans;
- found that the combination of local and national investments and of different types of interventions ensures that experience is built in a wide range of adaptation interventions involving a variety of different key actors, which will also facilitate broader implementation and mainstreaming beyond the SPCR based on lessons learned and capacities built in this program;
- determined that the PNG SPCR is part of a broader regional program that allows PNG to benefit from regional expertise and enhances the opportunities to contribute to upscaling of climate resilient investments based on lessons learned during implementation of the PNG SPCR beyond the country; and

- determined that the Results Framework that is included in the current program documents is a good basis for monitoring and evaluation.

The Reviewer also raised a number of important issues, to which our responses are provided below.
Issue: Strong support from the government and ADB will be required to ensure that the central coordinating unit (i.e., OCCD) will be able to effectively coordinate the ambitious SPCR and eventually achieve even broader adaptation objectives. Special attention will also be required to build capacity beyond national government structures, particularly regarding the subnational government, civil society, and the private sector. This will require special care in specific project design, close monitoring, and sufficient flexibility to adjust the capacity building needs as the program progresses.

Our Response: *Agreed. ADB, together with other development partners (DPs) will continue the close collaboration that has been fostered during SPCR preparation in order to strengthen the capacity of OCCD and expand its reach to other key stakeholders so as to ensure that climate change adaptation planning and management is integrated into day-to-day operational activities of provincial and district governments, sectoral agencies, and civil society. Capacity building needs will accordingly be adjusted during implementation of proposed interventions to respond to changing institutional requirements and priorities.*

Issue: Further technical assessment work will need to be undertaken during detailed project preparation and implementation, including regarding the context of specific investments (e.g., coastal morphology for some of the investments in coastal areas) as well as environmental and social analysis (the latter specifically including incentives and barriers for action, particularly also in the case of community-based activities and early warning systems). In undertaking that more detailed project preparation work, one of the aspects that could be given more technical attention is the characterization of risks, including climate change, but also explicitly current variability (including seasonal forecasting) and extremes (where information may be better and sometimes more relevant for the investment decisions being taken than for long-term change). Generally, the program appropriately takes a comprehensive approach, not aiming to artificially separate climate change from other climate-related risks.

Our Response: *This helpful suggestion is noted, and as discussed with AusAid during SPCR preparation, additional technical assessments will be undertaken to characterize climate change risks facing PNG, in part, through the Climate Change in the Pacific Program, which is supported by the Australian Government and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Moreover, during the course of detailed project preparation, special attention will be paid to the characterization of risks, including climate change and variability and climatic extremes that would be of relevance to investment decisions, especially those with longer term impacts.*

Issue: Some aspects of the Results Framework merit further attention during project preparation. Some indicators are appropriate, in principle, but will require some hard thinking in implementation, for instance, in terms of

- baseline data (e.g., lives lost/injuries/economic losses from extreme climatic events – what is the baseline or control group given that each event is different?);
- attribution of progress to the Program (especially in the case of high-level outcomes, such as MDG indicators or poverty incidence, unless applied at relatively local level).

Elements of the national adaptation planning and management assessment (Annex 7) could possibly be included in the program's Results Framework.

Our Response: *Agreed. GOPNG has commenced work on the development of baseline data for high-risk vulnerable communities, which will be expanded during detailed project preparation as part of SPCR implementation. Additionally, ADB will develop a set of indicators (based on the national adaptation planning and management assessments undertaken during SPCR preparation) that can be used to monitor and measure results under the PNG, Tonga, and Regional SPCRs.*

Issue: There is clearly a need for continued and more intense consultation for detailed design and implementation. Such stakeholder engagement is a clear priority, particularly in Components 1 and 2. It will merit continued attention and further capacity building, including among civil society and local government.

Our Response: *Agreed. The stakeholder consultation process used during SPCR preparation involving sector technical working groups, focus group meetings, and community/household consultations, have demonstrated their value as a mechanisms to achieve consensus while raising awareness, building capacity and enhancing knowledge on climate change risk management, and these activities will be continued and expanded during project preparation as part of SPCR implementation.*

Issue: There seems to have been good engagement with other development partners during the preparation process, which should be continued systematically as standard practice during the implementation of the SCPR to ensure synergies and mainstreaming of climate risk management into other programs, utilizing capacities built in the context of the SCPR.

Our Response: *Agreed. SPCR preparation has provided an opportunity and structure for improved level of coordination and identified options for collaboration with development partners on climate change programming in PNG. These structures and processes will be further refined, formalized and continued during project preparation (as part of SPCR implementation) and beyond, as the means to mainstream climate change in development planning.*

Issue: One area that is already covered in some program activities but can be explored more explicitly is the overlap between climate change adaptation and disaster risk reduction, as highlighted in the recent IPCC SREX (Special Report on Managing the Risks of Extreme Events and Disasters to Advance Adaptation). The issue of climate-related extreme events is clearly addressed in the SPCR, for instance, in the early warning systems component and in the collaboration with the GFDRR-funded infrastructure project. However, further and more explicit attention could be given to coordination with a wider range of disaster-oriented agencies (also in the region) as well as use of

climate information on risks of extremes across time scales.

Our Response: *Agreed. The Pacific Regional track SPCR has a strong focus on building capacity in climate change adaptation (CCA) and disaster risk reduction (DRR) and fostering close linkages between PNG's SPCR and the regional SPCR which will ensure that PNG will benefit from lessons learned and best practices in the integration of CCA and DRR in national, sectoral, and community development planning. This linkage will be strengthened during implementation of interventions proposed in the SPCR.*

Issue: An issue that merits attention is the use of climate information across time scales. The current early warning systems focus on immediate risks, and the long-term climate analysis focuses on trends (in averages or in frequency of extremes). Some decisions would also benefit from predictability of intermediate time scales (ENSO, in particular), and characterization of the most relevant envelopes of risk on the time scale most relevant to a particular decision (a season in the case of choice of crop, several years in the case of agriculture skills development, years to decades in the case of land use planning, etc.). A helpful approach is often to look at the decisions at stake, explicitly map the time scales on which their implications play out, and then organize the climate information (characterization of variability, predictions, trends, etc.) in the way that is most relevant to that context. This could be facilitated by exploring links to the development of "climate services" as expressed it the Global Framework for Climate Services (GFCS), which explicitly focuses on the user interface to make climate information across time scales more relevant to end users. Regional partners, such as the Australian Bureau of Meteorology, likely already have linkages to the PNG meteorological office that could be built upon to also strengthen both general provision of information, but particularly tailoring the information to user needs and application in decision making (in a variety of program components from community-based elements to sector planning).

Our Response: *This helpful suggestion is noted and will be explored in further detail during project preparation, particularly in light of discussions with AusAid during SPCR preparation pertaining to additional technical assessments, which will be undertaken to characterize climate change risks facing PNG and work being undertaken to build local capacity for timely information dissemination by the PNG meteorological office. Efforts will be made to develop a more relevant timeline of climate relevant information (including short-, medum-, and long-term projections) and actions on a timescale that is amenable to appropriate and timely interventions to prevent disasters and enhance resilience to climate change and variability.*

COMMENTS MATRIX ON PPCR SC COMMENTS ON PNG SPCR

Country/PPCR Sub-committee Member Comments	Response
UK Comments on PNG SPCR	
The United Kingdom congratulates PNG on putting together a credible well-constructed SPCR, which lists the critical risks and mitigations effectively and which as the independent review states, 'overall comes across as a well-balanced package of interventions to achieve better climate resilience'. The UK welcomes the move to table the SPCR at a sub-committee meeting for approval in line with standard PPCR procedures, and to give the chance for presentation by Government and proper discussion with donors.	Noted with thanks.
The independent review recognises the importance to the success of the SPCR of strong support from Government, a clear institutional home and legal status for the institutional framework to support it. Whilst the SPCR is strong on outlining how it is aligned with national planning processes and the role of the lead agencies, it doesn't specifically acknowledge any of the risks associated with political change, important for any programme reliant on one particular part of Government but even more so given the timing in an election year. As the document pre-dates the recent elections, it wasn't possible for it to address this specifically but some further analysis of the governance context would be welcome in the next draft.	Significant progress has been made by the Government of PNG over the last five years in establishing a strong policy and institutional framework for the country's climate change response over the medium to long term. While there is always a risk that a change in national leadership could result in a shift in national priorities, existing climate change policies, plans, and programs, as well as institutional arrangements, are not likely to be discarded given the potential impacts of climate change on the country's economy and people. Having said that, however, a detailed analysis of the institutional and governance aspects of PNG's climate response, including the identification of needs and gaps for capacity strengthening of concerned institutions, will be carried out in the initial stages of the PNG SPCR implementation.
There is a welcome emphasis on the subnational elements in parts of the document but it is not entirely clear how strong engagement has been with subnational government on a strategic level and how much ownership there is (beyond for example the PNG Ports Authorities).	During stakeholder consultations undertaken as a key element of the SPCR planning process, it was apparent that considerable capacity development was required in order to mainstream climate change adaptation into the operations of agencies and organizations working at the subnational and sectoral levels. Many organizations working at this level expressed interest in working to establish the enabling environment for mainstreaming climate change adaptation into their operations. Further consultations during project preparation will be conducted on how to strengthen engagements

	with relevant stakeholders including subnational governments and communities.
Capacity building is a strong recurring theme throughout which is appropriate. It would be good to be clearer on how the SPCR will ensure its approach to capacity building is sustainable and follows best practice, ensuring capacity is transferred to permanent civil servants and is in line with Government structures, for example, how will the PMU be transitioned into permanent government structures at the end of the programme or otherwise exit strategies made to close it? To avoid a proliferation of projectised structures.	It is suggested that the PMU comprise 'organic' government personnel to be detailed from various offices involved in climate change related work, and supported by consultants who will serve as their mentors, providing technical advice and guidance and transferring technology to them on a day-to-day basis. At the end of the program, the government staff will return to their 'parent agencies and departments' and transfer the knowledge and experience gained during SPCR implementation to other staff through formal or informal training and 'learning by doing' activities.
As the independent review recognises, the results framework as it stands is a mixture of process and outcomes, most appear to be activities rather than true outcomes. It would be useful to include better measures of the impacts achieved and to align these with the emerging overall PPCR result framework. For example, ensuring that the number of people supported or made more resilient by the programme is captured as a priority. We would also support the areas identified for improvement by the reviewer – on baselines and on attribution.	Noted. This will be addressed in the revised Results Framework. As suggested by the Independent Technical Reviewer for PNG's SPCR, and in response to the need that has already been identified, the revised Results Framework in the SPCR will include a set of indicators (based on the national adaptation planning and management assessments undertaken during SPCR preparation) that can be used to monitor and measure capacity building results under the PNG SPCR, as is the case for the Tonga and Pacific regional SPCRs. The development of such indicators during project preparation will establish a baseline for measuring and reporting on progress in capacity building and the number of people supported or made more resilient by the program, among other things.
More clarity is requested on the 'Project Management' component budget line which has $2 million associated with it, this is additional to capacity building elements of the other components and to the ADB supervision services so what does this consist of?	The PMU will comprise core professional technical staff and support staff services to support the implementation of the project. It will be responsible for (i) preparing the work plan with the lead implementing agency; (ii) setting up a program performance management system for supervising and monitoring the work program for the outputs and activities and preparing regular progress and monitoring reports; (iii) coordinating the activities of the different program implementers; and (iv) liaising with the concerned focal points. The cost estimates will be reviewed and revised during the next stage of project preparation as deemed appropriate.

We agree with the independent reviewer that it would be good if the technical assessments could be made publically available.	Noted. Technical assessments undertaken during SPCR planning process and SPCR implementation will be provided on the PNG SPCR website that is being established.
We welcome the apparent attention to stakeholder consultation in developing the SPCR but note the reviewer's comment that this will need to continue and to deepen in implementation, especially at the subnational level and with civil society and the private sector.	Noted. Continued and focused stakeholder engagement is a key element of the capacity building activities to be undertaken during SPCR implementation.
Environmental and social assessments and analysis will be important in the projects as they are developed given the sectors which are identified, e.g., fisheries management, early warning systems, and community resilience plans (also noted by the reviewer).	Noted. Environmental and social assessments will be undertaken as part of ADB safeguards compliance requirements during detailed project preparation.
USA Comments on PNG SPCR	
How will the mitigation projects be prioritized in the Climate Change Trust Fund (CCTF)? Will those be grants or loans and how will they compete with adaptation projects? Will the adaptation portion of the CCTF be kept at $5 million – or some other funding level after the $5 million in PPCR seed funding is depleted?	It is intended that the CCTF is established as a long-term sustainable source of financing for PNG's climate change program (adaptation and mitigation). The operational mechanisms of the Trust Fund are to be designed and developed during SPCR implementation, and will most likely be guided by the UNDP work in this area, as outlined in their publication, *Blending Climate Finance through National Climate Funds - A Guidebook for the Design and Establishment of National Funds to Achieve Climate Change Priorities,* which outlines key steps in a well-structured consultative process to develop the architecture for such funds. However, it is the Government of PNG's intent that capitalization of the CCTF will continue from a variety of sources (internal and external) to sustain the operation of the fund after it has been established with SPCR support. Modalities will be established for the Small Grants adaptation envelope of the CCTF, which is to be financed with PPCR support, while separate modalities will be designed for the mitigation envelope which is expected to be funded by government sources (possibly a percentage of LNG royalties). All financing under the Small Grants adaptation envelope of the CCTF will be on a

	grant basis.
Do you expect to use the full $4.5 million for training and policy development outlined in the first subset of Component 3 (enabling framework)? Will there not be any initial infrastructure investment?	As outlined in Annex 9, the US$4.5 million is to pioneer the establishment of the "enabling environment" for integrating climate change considerations into ports operations which has eight activities, as follows: *Legislation / Policy / Strategy.* The project will support the development of a Climate Change Risk Management Policy and strategy for the PNG Ports Corporation and provincial/district governments, including legal drafting support for any legislative changes required to integrate climate change risk management into the operations of PNG Ports Corporation and provincial/district governments. Additionally, effective enforcement mechanisms will be defined, developed, established, and/or strengthened as appropriate to ensure timely implementation of the policy/legislation/ strategy. *Climate Change Projections.* The project will support the downscaling in one or more pilot areas (dependent upon data availability) in order to develop site-specific climate change risk modeling and vulnerability assessments for climate proofing the ports/wharves/jetties and associated infrastructure under the management of the PNG Ports Corporation and provincial/ district governments. *Building Codes and Engineering Design Criteria.* The project will support the evaluation of building codes and engineering design criteria relevant to the design, location, building, operation, and maintenance of ports/wharves/jetties (and associated infrastructure) and revision to address climate change risks based on site-specific climate change projections developed under this component. The project will also support the development and presentation of training programs to engineers, architects, developers, and planners on the climate-proofed building codes relevant to ports/wharves/jetties (and associated infrastructure) (see below). *Training.* The project will support climate change risk management training, targeted not only at engineers but also surveyors, architects,

	building inspectors, key support personnel, and trades people, including trade associations, project managers, and planners involved in the design, location, building, operation, and maintenance of ports/wharves/jetties (and associated infrastructure). The training will also be targeted to those responsible for developing and approving Ports Corporation and provincial/district government financial operational budgets and budgets for infrastructure capital projects, and the insurance industry that provides insurance for ports/ wharves/jetties (and associated infrastructure) and operations. *Capacity Building.* The project will support the establishment of a comprehensive training and climate change risk management capacity within the PNG Ports Corporation and Provincial/ District Governments, supported by corporate climate change risk management guidelines, protocols and operational procedures. *Cost/Benefit Analysis.* Training in climate change risk cost/benefit analysis techniques will be provided at all levels within the PNG Ports Corporation and provincial/district government. *Education and Awareness Raising.* The project will support the design and implementation of a comprehensive climate change risk management awareness and education program within PNG Ports Corporation and provincial/district government, and for contractors, stevedores and private sector port/wharf/jetty workers. *Sustainable Financing* – The project will support the evaluation of possible sustainable financing mechanisms to sustain climate change risks management activities after SPCR support finishes. Sources of innovative and sustainable financing for climate change risk management will be explored, and an appropriate financing mechanism will be established—not only to cover internal operational costs but also to support the climate proofing of ports infrastructure on a permanent basis. Climate change risk insurance options for ports infrastructure will also be developed.

Is the $2 million for an SPCR project management unit something that the government will integrate into its budget in the future?	The PNG Government will devote core staff resources to implement the program envisioned under the SPCR. It is essential for a dedicated PMU to be established to manage SPCR implementation, in order to ensure the sustainability of capacity building efforts undertaken by the program. Government personnel will be detailed from various offices and their salaries covered by the government of PNG, and only the cost of consultants will be charged to the SPCR. The cost estimates will be revisited during the next stage of project preparation and the $2 million originally allocated to the PMU may be reduced and the amount reallocated to the other components.
Please comment on why such a significant portion of the SPCR is focused on training, capacity building and staffing as opposed to more tangible outputs?	During the preparation of the SPCR, national stakeholders determined that the lack of capacity, and the need for training and awareness on climate change risk management, together with the lack of sustainable financing, constitute the greatest impediments to PNG's transformation to a climate resilient development path. Hence, training and capacity building are at the core of the PNG SPCR. However, training and capacity building are not the only outputs expected from the SPCR. Under Component 2, pilot food processing, preservation, and storage systems, as well as pilot ecosystem-based climate resilient fisheries, are to be established in vulnerable districts, for which an estimated $7 million has been budgeted. Component 3 will include climate proofing of ports/wharves/jetties and associated infrastructure and climate risk management will be integrated into the operations of the PNG Ports Authority and into national, sectoral, provincial, and district governments, for which a budget of $6 million have been allocated. The budgets for non-training activities under these two components amount to $13 million out of the total project cost of $25 million.
Please include USAID projects Coastal Communities Adaptation Project (CCAP) and Mangrove Rehabilitation for Sustainably-Managed, Healthy Forests (MARSH) in the annex as projects underway in this area. We recommend that the USAID office in Port Moresby and the ADB and Papua New Guinea PPCR team be in contact to ensure	Noted. We will coordinate with USAID during project preparation and implementation phase and explore collaborative partnership. GOPNG and the ADB will continue to engage all relevant development partners during project preparation and SPCR implementation to ensure effective coordination with ongoing climate change programming while ensuring that the SPCR

appropriate investment coordination.	program is built on lessons learned and best practices arising from parallel climate change programs.
Germany's Comments on PNG's SPCR	
We congratulate the Government of Papua New Guinea for designing and presenting a sophisticated SPCR document. We appreciate the thorough assessment of sectoral vulnerabilities and the involvement of the different stakeholders. We also recognize food security as an area of high priority in the context of climate change. The infrastructural support for the construction of wharves will surely contribute towards improved food access and markets. Overall, there are no major objections from our point of view.	Noted with thanks.
We suggest elaborating the capacity building efforts for sectoral and provincial implementing agencies. This effort would be of essence in ensuring successful implementation on the ground and for institutional development. In addition, we recommend strengthening the multi-stakeholder approach and participatory processes for the implementation of Component 1 (Building Climate Resilient Communities) and Component 2 (Addressing Climate Change Risks to Food Security).	Capacity building is a key focus under PNG's SPCR and is the key priority need and constraint identified during SPCR planning and stakeholder consultations. The approach to capacity building under the SPCR program is to establish, through on-the-ground hands on training and mentoring, a cadre of qualified experts (at national level, in sector agencies, in civil society and in vulnerable communities) in climate change risk management and adaptation planning/ management. This will be the modality for implementing all three components under the PNG SPCR.
We suggest taking the recommendations made below (see bold highlights) into account during the following steps of program preparation.	Noted. The Government of PNG and ADB will take all PPCR-SC recommendations into account during detailed project preparation and SPCR implementation to ensure effective coordination with ongoing climate change programming while ensuring that the SPCR program is built on lessons learned and best practices arising from parallel climate change programs.
Concerning Section 1.4, "Rationale for PPCR Support", we note that there is some contradiction with regard to the availability of finance. The first paragraph states that the government has considerable resources for a development programme, whereas the second paragraph mentions that there is	Comments are noted. We would like to clarify that While PNG has considerable resources for development programs, the real task of implementing CCA at the operational level is in its infancy, and climate change risk management is still to be integrated into policy, planning, and budgetary processes. PNG's

limited budget to meet current priority development needs. We recommend clarifying these statements.	significant vulnerabilities and limited knowledge capacities and tools for utilizing these resources require a systematic approach to piloting climate change and disaster risk resilience building.
Component 1: Building Climate Resilient Communities Regarding Indicator 1 "community climate change vulnerability maps, adaptation plans, and risk management strategies developed in vulnerable islands", we recommend considering adding: "… vulnerable islands and communities" to be consistent with the phrasing of the other indicators.	Suggested revisions are noted and will be incorporated during project preparation and implementation phase. The process for community vulnerability mapping and development of adaptation plans - pioneered in the region under an ADB project (ADB SGA pilot project in Cook Islands - RETA 6420) – as outlined in Annex 7 is summarized in the report on the project which can be found at: http://www.adb.org/publications/community-based-climate-vulnerability-assessment-and-adaptation-planning-cook-islands
The maps and plans will be developed together with the local communities. Local knowledge and practices are as important as the expertise of the trainers. We recommend including clarification on the participatory planning process and on how the expert trainer pool will be established. We also recommend considering that besides the OCCD (Office of Climate Change and Development), other government agencies already conduct Provincial, District, and Community level trainings. These government agencies, such as the Department of Agriculture and the National Agricultural Research Institute (NARI) already have rich experience with capacity building activities of this kind. Additionally, we recommend that the mentioned activities should include a vulnerability assessment focussing on food security.	Based on the successful pilot program undertaken by the ADB in the Cook Islands, it is intended that the community vulnerability mapping be undertaken as a collaborative exercise involving the government agencies responsible for physical planning, community development, climate change adaptation management, disaster risk management working in association with sector agencies such as Department of Agriculture and NARI, non-governmental organizations, community groups, traditional leaders, and individual households. Such a collaborative approach ensures the broadest possible capacity building and strong ownership of the community adaptation and disaster risk management plans that result. The process for undertaking community vulnerability mapping and development of community adaptation plans will include a household survey as part of the community vulnerability assessment. The household survey, which is summarized in the above report of the pilot project, includes issues relating to food security.
Component 2: Addressing Climate Change Risks to Food Security The described activities "design/ establishment of pilot food processing, preserving and storage systems in seven vulnerable districts..." for the Kivori Pacific Adaptation to Climate Change (PACC) program are currently being undertaken by	Suggested revisions are noted. We will coordinate with GIZ and explore collaborative partnerships.

SPC/GIZ CCCPIR (Regional Programme - Coping Climate with Climate Change in the Pacific Island Region). This was agreed in the GIZ Papua New Guinea national planning workshop in June 2011. Therefore, we recommend adding GIZ as collaborating partner.	
Proposed SPCR Investment Program and Summary of Components: Concerning section 2.6 "Implementation Arrangements, Coordination, and Results Management", we note that the bullet point "integrating CCA and disaster risk management (DRM) into land-use planning processes" appears without any link to the program components. Therefore, we recommend elucidating which program component includes the CCA and DRM activities.	Noted with thanks. CCA and DRM activities are under Component 1(see Annex 7).
Comments on Cross-Cutting Issues	
Participation Other programs and the involvement of NGOs and community-based organisations are mentioned in the SPCR document, but the multi-sectoral implementation needed for Components 1 and 2 is not well defined. It is unclear how the program will coordinate efforts with other programs. We suggest being more precise on how the program will facilitate and promote the involvement of all concerned sectors during the implementation of the program.	Based on successful outreach and engagement programs undertaken by OCCD, it is intended that SPCR activities, which involve NGOs and CBOs, be undertaken as a collaborative exercise involving government agencies responsible for physical planning, community development, climate change adaptation management, disaster risk management working in association with key sector agencies such, non-governmental organizations, community groups, traditional leaders, and individual households. Such a collaborative approach ensures the broadest possible capacity building and strong ownership of the community adaptation and disaster risk management plans that result.
Gender The information on gender aspects in the Annexes is quite thorough and we appreciate the provision of a gender expert. The project document itself is however quite vague on these aspects. Therefore, we recommend defining how gender aspects will be considered in the context of climate change mainstreaming and planning at all levels. We also suggest formulating stronger indicators	Noted. In response to the need that has already been identified, ADB will develop a set of indicators (based on the national adaptation planning and management assessments undertaken during SPCR preparation) that can be used to monitor and measure capacity building results, including for women, youth, and other vulnerable groups - under the PNG, Tonga, and Pacific regional SPCRs. The

to measure how gender aspects are considered in the planning and implementation process.	development of such indicators during project preparation will establish a baseline for measuring and reporting on progress in capacity building and reporting on gender aspects.
Learning NGOs have been very active in the field of community training and have developed best practices. We suggest including the existing best practices and experiences in the planning process for the components.	Noted. The Government of PNG and ADB will continue to engage NGOs and all other relevant development partners during project preparation and SPCR implementation to ensure effective coordination with ongoing climate change programming while ensuring that the SPCR program is built on lessons learned and best practices arising from parallel climate change programs.
Synergies with German Climate Change Related Engagement in the Country/ Region The German supported SPC/GIZ CCCPIR (Regional Programme - Coping Climate with Climate Change in the Pacific Island Region) carries out similar interventions like this program under its Components 1 and 2. There is scope for collaboration to promote synergies and avoid duplicity amongst programs. GIZ is implementing climate change adaptation-focused projects and will establish a REDD+ pilot site through the SPC/GIZ CCCPIR and the SPC/GIZ Climate Protection through Forest Conservation Project respectively. We recommend cooperating with these two GIZ programs in Papua New Guinea.	Noted. The Government of PNG and ADB will continue to engage all relevant development partners during project preparation and SPCR implementation to ensure effective coordination with ongoing climate change programming while ensuring that the SPCR program is built on strategies, lessons learned, and best practices arising from parallel climate change programs, while avoiding duplication and overlap.