

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

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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)::	<i>Grant:</i> \$25 million	<i>Loan:-</i>
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 fund. 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

(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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 design³							
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 multilateral 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 (km²). It has an exclusive economic zone of 2.4 million km², 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 area¹⁴, 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).

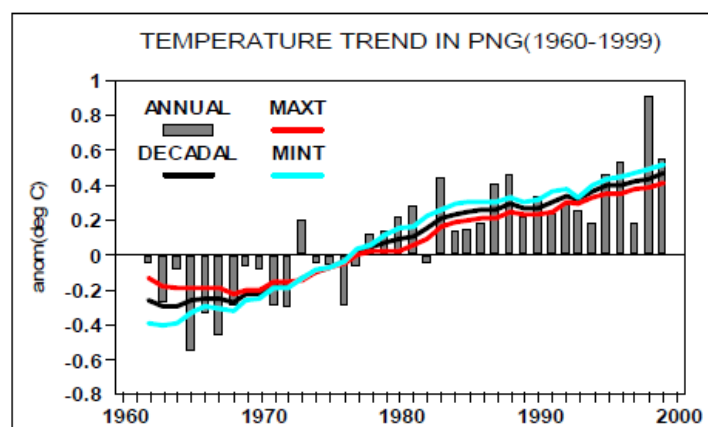


Figure 2: Temperature Trends in PNG, 1960–1999

- 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).

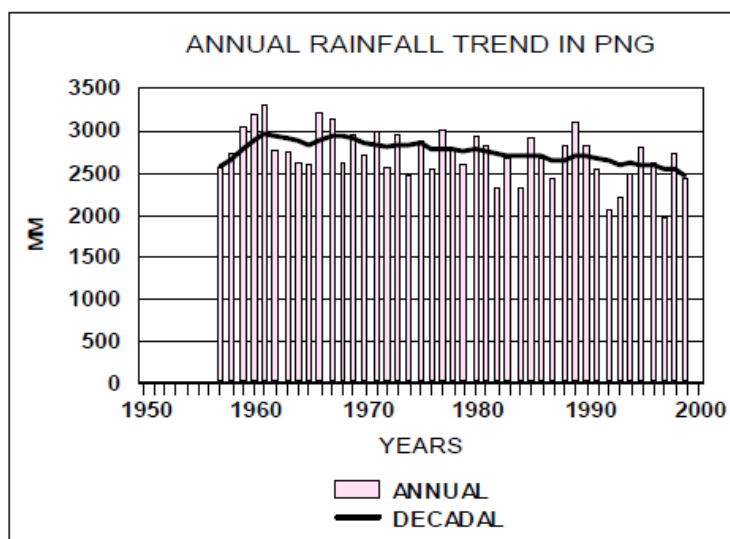


Figure 3: Annual Rainfall Trend in PNG

There is already relative sea-level rise around the country, but this is strongly influenced by El Niño and La Niña 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 (0–40°S, 130°E–170°E) (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.

The components of climate-compatible development

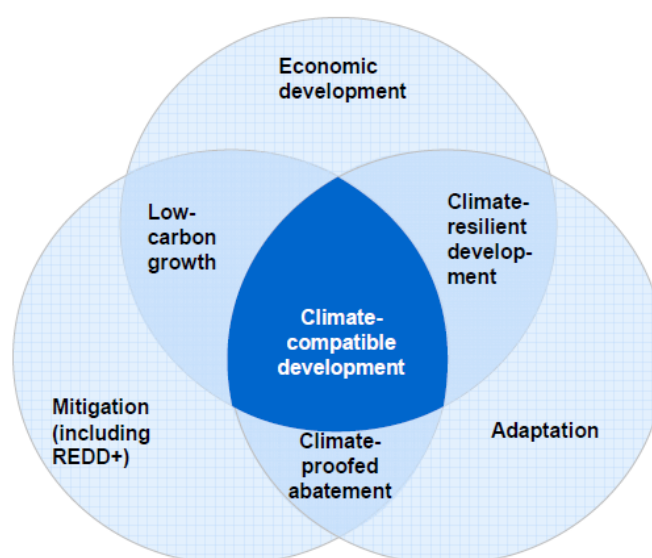


Figure 4: Components of Climate Compatible Development

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 sector²⁷ 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 analysis²⁸ 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.

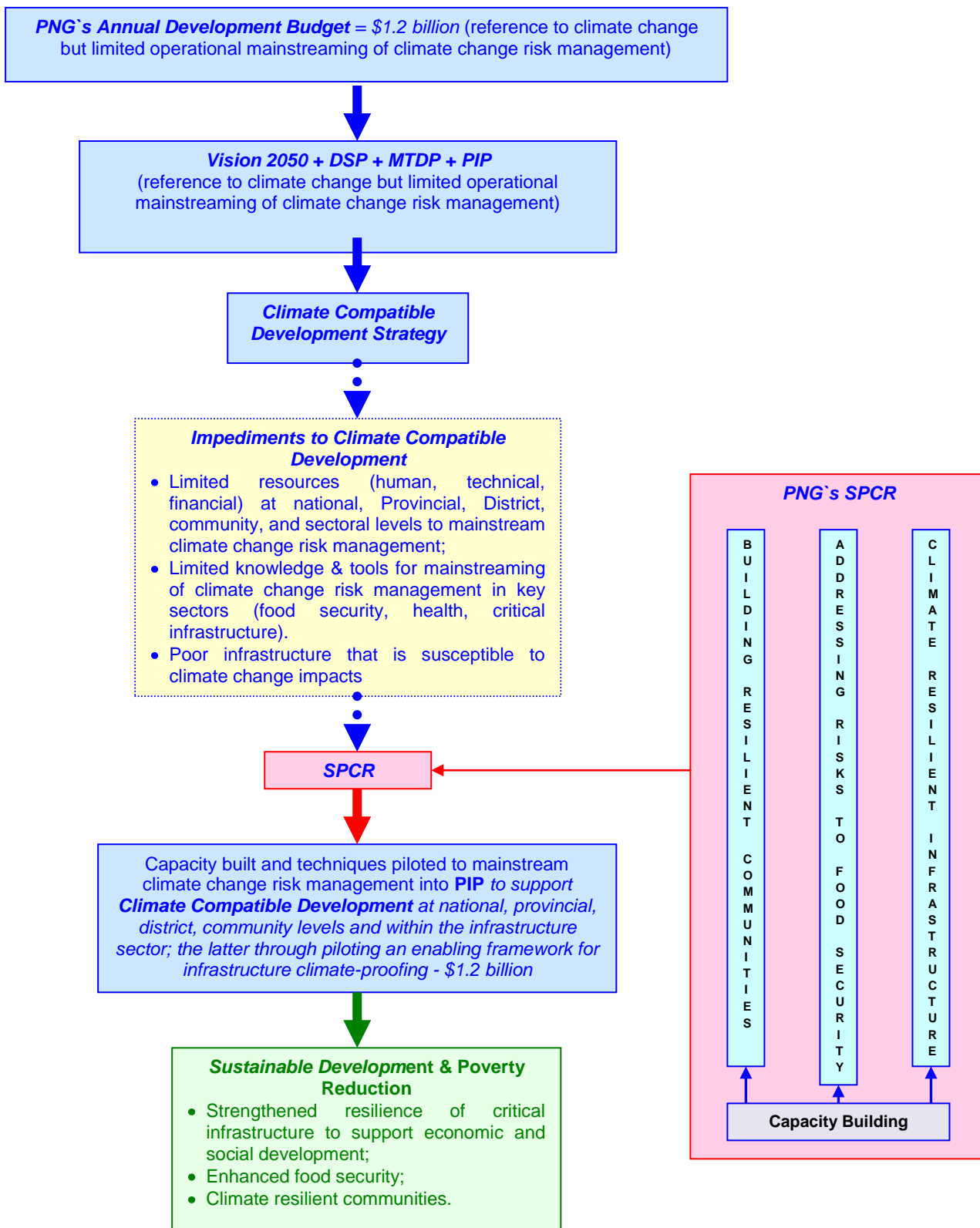


Figure 5: SPCR Overview

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 initiatives, 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 instruments²⁹ 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) projects³⁰ 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 Geoscience 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 consultants³¹ 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 safeguarded 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

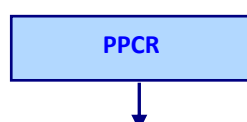
The program's Results Framework is attached as Annex 10. This is a strategic framework that summarizes the expected overall results, indicators, baseline, targets, and means of verification of the project. A detailed design and monitoring framework, including outcomes and outputs, for each component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

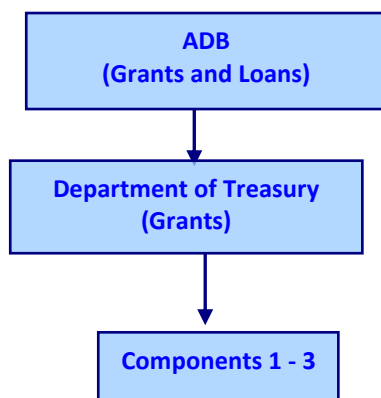
The preliminary Results Framework presents the overall impact of the SPCR with its component projects. The impact is increased resilience of PNG to climate change risks. To support the achievement of impact, the three components address the challenges PNG faces in implementing a programmatic approach 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.