



PROJECT/PROGRAMME PROPOSAL



PART I: PROGRAMME INFORMATION

PROGRAMME CATEGORY: Regular
COUNTRY/IES: Papua New Guinea
TITLE OF PROGRAMME: Enhancing adaptive capacity of communities to climate change-related floods in the North Coast and Islands Region of Papua New Guinea

CLIMATE CHANGE ADAPTATION
TYPE OF IMPLEMENTING ENTITY: Multilateral Implementing Agency
IMPLEMENTING ENTITY: United Nations Development Programme
EXECUTING ENTITY/IES: Office of Climate Change and Development
AMOUNT OF FINANCING REQUESTED: 6,530,373 (in U.S Dollars Equivalent)
UNDP PIMS NUMBER 4452
ATLAS PROJECT ID NUMBER 00070900

PROGRAMME BACKGROUND AND CONTEXT¹:

Context:

Papua New Guinea (PNG) is a Pacific, tropical and mountainous island nation lying on the Eastern half of New Guinea Island. PNG is a country of exceptional ethnic and biological diversity. The population of approximately 6.3 million people speaks more than 840 distinct languages. The country harbors hundreds of endemic species over its 462,840 sq km mass. The indigenous population of PNG is one of the most heterogeneous in the world; several thousand separate communities and tribal groups live spread out over the country. 80% of this population lives a traditional rural subsistence lifestyle that is supported by the biological richness and diversity of the forests, inland waters and coastal seas. 85% of the country's labour force is absorbed by the agricultural sector. Major agricultural produce include coffee, cocoa, copra, palm kernels, tea, sugar, rubber, sweet potatoes, fruit, vegetables, vanilla, shell fish, poultry, and pork. In terms of the importance of different sectors to GDP, the agricultural sector accounts for 32.6% of GDP, with industries and the service sector accounting for 36.8% and 30.6%, respectively. Mineral deposits, including copper, gold, and oil account for nearly two-thirds of export earnings.

The impact of climate change-related hazards in the country has been increasing in intensity and frequency, which is particularly evident in increasingly frequent and impactful occurrences of tropical storms and cyclones able to produce significant natural disasters. Further impacts from climate change include the loss of food gardens (widely used for subsistence farming) due to extensive flooding (both in coastal and riverine areas) combined with extended periods of drought. The rising sea level is causing some of PNG's islands to be gradually submerged. In addition, salt water intrusion is causing dropping limits of clean groundwater levels and loss of freshwater, particularly on islands and in coastal areas, which poses a challenge for innovative agricultural

¹ A list of abbreviations used throughout this proposal is attached in Annex 2.

expansion. In the highlands increasing episodes of hailstorms and frost have resulted in the destruction of gardens used for subsistence farming. Irregular rainfall patterns with periods of prolonged dry seasons affect soil fertility and yield while increasing the spread of infectious diseases and pests, which are further decreasing agricultural productivity and producing shortage of food in some areas of the country. With this drastic onset and multitude of climate change impact in the recent past, the country, its economy, environment and the people are more vulnerable and are at risk of not meeting basic human development needs. Climate change puts the achievement of the goals set out in PNG's major development plans at risk.

The North Coast area comprises 6 provinces (Morobe, Madang, East Sepik, West Sepik², Milne Bay and Oro Province³) with a population of around 1.8 million people. The Islands Region comprises 5 provinces (East New Britain, Manus, New Ireland, Bougainville and West New Britain) with a total population of around 750,000 inhabitants.

Coastal flooding is the most important climate change related hazard in the North Coast and the Islands Region, where it is not only threatening the people in the coastal communities but also important economic centers, as most provincial capitals and economic centers are situated along the coast, particularly the provincial capitals of East Sepik (Wewak), Madang (Madang), Morobe (Lae), and West New Britain (Kimbe). The figure below shows the major costal flooding events during the last fifteen years.

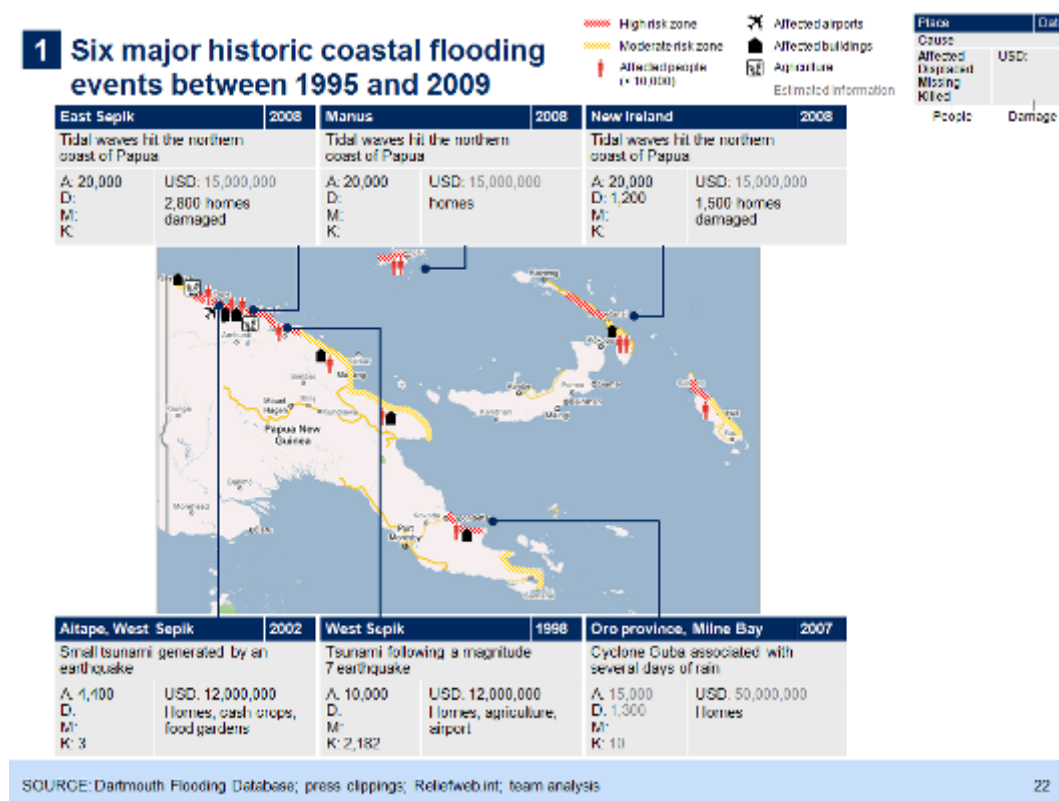


Figure1: Overview of major coastal flooding events

² Also commonly referred to as Sandaun Province

³ Also commonly referred to as Northern Province

Similarly, in the hinterland areas, climate change-related inland flooding is the most pressing hazard with the largest potential for wide-spread damage. The lack of water impoundments and/or water reticulation schemes serves to increase the vulnerability of the largely agrarian communities.

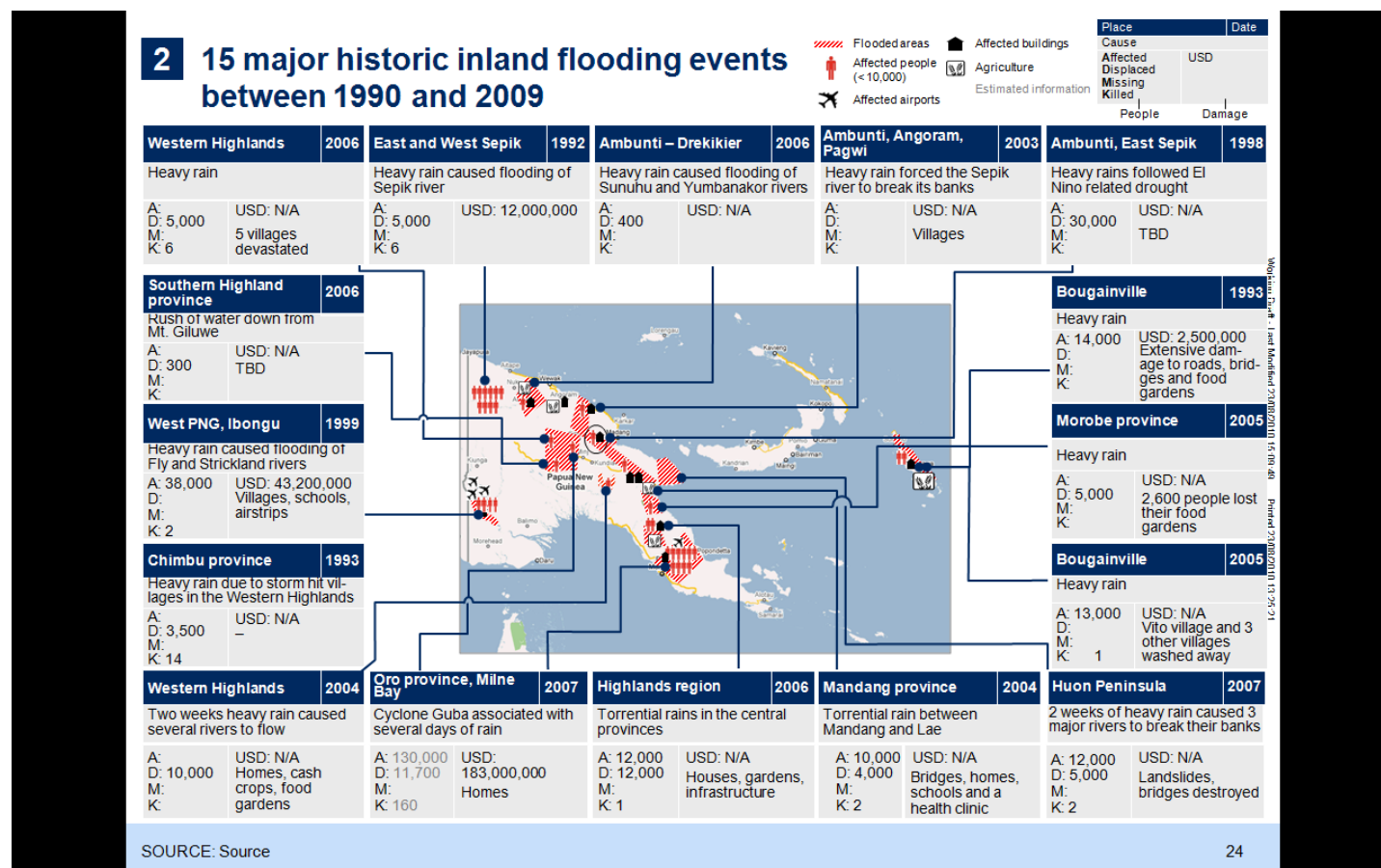


Figure2: Overview of major inland flooding events






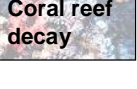
Climate change vulnerabilities, impacts and risks:

In recognising these emerging climate change related impacts and growing concern on the threats to the country, its people and the economy, the Government of Papua New Guinea has developed and adopted a Climate-Compatible Development Strategy (CCDS) and an Interim Action Plan, in response to the Copenhagen Accord. This strategic document sets out the challenges and strategies that promote an inclusive economy-wide approach to building climate resilience with a common goal of protecting communities, property and economic infrastructure.

The strategy and action plan focuses on six of the most serious climate-induced hazards in Papua New Guinea as illustrated in Figure 3. below: Coastal flooding and sea level rise, inland flooding driven by irregular rainfalls, landslides triggered by increased rainfall intensity, the spread of Malaria amidst raising temperature, as well as the variability in agriculture yields and the change in sea water temperature with adverse effect on coral reef systems.

Hazards which require adaptive measures

USD million

Hazard	Risk exposure
 Coastal flooding	<ul style="list-style-type: none"> Affects ~6,000; displaces ~400; and kills several people annually Damages buildings
 Inland flooding	<ul style="list-style-type: none"> Affects ~26,000; displaces ~8,000; and kills several people annually Damages buildings and property
 Land-slides	<ul style="list-style-type: none"> Affects 500-600 and kills ~10 annually, mainly in remote, mountainous areas Damages infrastructure
 Malaria	<ul style="list-style-type: none"> Epidemics will affect ~200k more people in the highlands Highland cases are more severe
 Agricultural yield loss	<ul style="list-style-type: none"> 3 million people depend on climate-sensitive crops Climate change may reduce yields
 Coral reef decay	<ul style="list-style-type: none"> ~70,000 people earn a living from reefs Decay/ bleaching may reduce this

Top priority hazards to be addressed



Already affects almost half the population, with Climate Change impacting ~200k more



PNG is vulnerable to coastal flooding, only to be exacerbated by rising sea levels

- 20,000km of coastline and
- Severe floods affecting 6,000+ annually,



PNG suffers inland floods multiple times per year

- Extensive river system
- Population living close to rivers

Working Draft - Last Modified 07/05/2010 17:16:34 Printed 07/05/2010 17:10:32

SOURCE: Dartmouth Flooding Database; EM-DAT; Reliefweb.int; press clippings; academic journals; Reefbase; WHO; PNAS; Worldbank; FAO; IMF; WRI; TEEB; ANU; Internet research; interviews; Adaptation technical working group

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Figure 3: Hazards requiring adaptive measure

Based on these climate risks, the CCDS outlines that impacts will be most profoundly felt in regions along the northern coastline where coastal villages and rural coastal population will be especially vulnerable to coastal flooding and sea level rise. Within coastal areas, flooding exacerbates problems caused by the loss of wetlands, seawater intrusion into freshwater sources, and loss of land through erosion and inundation, all of which have and are likely to further displace communities and induce knock-on social, economic and environmental problems. Inland flooding, driven by heavy irregular rainfalls, regularly affects valleys and wetlands in both lowlands and highlands. Based on 19 years of data, 22,000–26,000 people are affected annually by inland floods, displacing 6,000–8,000 and typically resulting in a few deaths each year. Coastal as well as inland flooding has also had negative impacts on the health of the affected population through contaminated drinking water, inadequate disaster response and insanitary situations over prolonged time.

Coastal and islands areas including many coral atolls in PNG are low-lying, and nearly 500,000 people in 2,000 coastal villages are vulnerable to climate-induced flooding risks.⁴ Communities in the islands and coastal areas have been increasingly affected by coastal erosion, king tides, cyclones and storm surges, which in turn leads to degradation of coral reefs and marine ecosystems and further diminishes fish resources. Salinization of freshwater resources is affecting

⁴ Reducing the Risk of Disasters and Climate Variability in the Pacific Islands, Papua New Guinea Country Assessment. (2010). Op cit. p. 7.

crop production, and communities are being pushed further inland due to receding coastlines. As such, inland flooding in the coastal provinces is the most pressing hazard with the largest potential for wide-spread damage. The lack of water impoundments and/or water reticulation schemes serves to increase the vulnerability of the largely agrarian communities.

In addition to flooding, PNG is also expected to experience increased frequency of drought as announced by the National Agricultural Research Institute. The 1997/98 drought demonstrated the high vulnerability of agricultural crops (both for food and cash), water resources and environmental health problems.⁵ In 1997 a national state of disaster was declared as a result of drought that also caused increased incidents of bushfire and frost hazards.⁶ Between 1997 and 2002 almost 3.2 million people have suffered from drought and frost events, at an estimated cost of K85 million.⁷ It is estimated that around 3 million people in the country depend on climate-sensitive crops, and that a yield loss of 10% on sensitive crops could cause a loss of USD 100 – 150m of value.⁸

In PNG, food security for more than one million people in vulnerable parts of the highlands and lowlands is considered to be seriously at risk, due to recurrent and increasingly intense El Niño and La Niña events. Currently, nineteen of the 89 districts have existing and emerging food insecurity based on energy intake per capita. During the 1997 El Niño drought, some 200,000 people were considered to be in a life-threatening situation with little or no food other than that hunted and collected from the bush. Another 980,000 people were estimated to have had inadequate amounts of food available from gardens, sago palm, coconuts or freshwater fisheries.

Many of the places where people affected by the abovementioned hazards live have poor access to services and markets. They are commonly located away from roads, along provincial borders, inland between the highlands and the lowlands, or inland on the larger islands and on most of the small islands. Even in normal times living conditions in these places are poor and government services minimal. Cash incomes are very low and child malnutrition rates are well above the PNG average.⁹

In short, the vulnerability of coastal communities in particular, to anticipated climate-induced hazards including floods and drought is expected to increase. As climate change unfolds, impacts on the population are likely to intensify and development will be hindered, if not reversed. The adverse impacts will compromise the country's ability to meet and sustain the Millennium Development Goals (MDG) and national development plans, the pursuit of which will be hampered by the loss of community livelihoods, property and economic infrastructure from a range of climate-related factors.

PNG has recently started addressing climate change risks in national development frameworks, highlighting vulnerabilities of coastal regions in particular, but there is a need to systematically address such vulnerabilities in provincial and local level development programmes, and build institutional capacity accordingly. This is particularly valid in regards to adapting to climate change-related coastal and inland flooding, which is prioritised and addressed through this proposal while a number of other initiatives currently under design or implementation seek to address the impact of climate change on agriculture, health and coral reef system.

⁵ Initial National Communication, Papua New-Guinea (2000).

⁶ Office of Climate Change and Environmental Sustainability and World Bank. (2009). Climate Change in Papua New Guinea: A National Stocktake.

⁷ PNG Development Strategic Plan (2010-2030).

⁸ Climate-compatible Development for PNG (2010).

⁹ ACNARS, 2006

Pressures due to unsustainable use of natural resources, further increasing vulnerability:

- Inappropriate land use practices, due to intensified farming systems accelerate land degradation (e.g. soil erosion, siltation, and loss of soil fertility). In PNG 97% of land is under customary landowners' control and 3% is government-owned land. The former ownership arrangements are often extended to coastal and marine resources. However for any resources development, the GoPNG's Physical Planning Act legislation (1989) provides for land-use management of all land through national and provincial land boards. Despite this there is little influence exercised on customary land use, with only 2% (most of which is government-leased land sub-leased for development or mining purposes) subject to the planning rules contained within the Physical Planning Act legislation.¹⁰ Risk management and sustainable land management has not been incorporated into sectoral land-use planning and other technical measures.
- Unsustainable logging practices result in adverse environmental impacts (e.g. soil erosion, hydrology and water quality impacts, and loss of habitat and biodiversity). In the forestry sector poorly managed commercial logging is a major cause of deforestation, as is subsistence agriculture, with lesser causes being fires, plantations and mining. There is awareness of degradation issues, but analysis has been limited, and programmes to address these issues are significantly under-funded.¹¹
- Destructive fishing practices and harvesting of corals for cultural purposes destroy natural barriers (reef) and result in exposing coastal areas including assets and people to coastal erosion. Increased destruction of natural coastal barriers such as mangroves and coastal pollution due to run-off from land-based activities as well as oil spills cause impacts on coastal and marine resources.
- Environmental impacts of large-scale mining operations (e.g. discharge of heavy metals, cyanide, and acids into rivers) cause adverse impacts on forests and water quality. Through increased sedimentation this also has an impact on river flow and potentially exacerbates floods.
- Increase in population and the need for income to meet basic necessities have led to unsustainable fishing practices that further contribute pressures on coastal and inshore marine resources. There are already growing concerns on overfishing of certain species. Associated with this pressure is the demand for access and use of mangrove forests for building materials, smoking of fisheries resources as well as requirements for processes related to the cultivation and harvesting of marine resources such as beche de mer and prawn farming. The clearance of mangrove forests has also affected the breeding grounds of some fish species and thus threatens food and income security. Furthermore, unsustainable fisheries practices such as use of dynamite and harvesting of corals destroy reef systems, which serve as natural wave barriers. The combined loss of reefs and mangrove forests expose the coastal communities to coastal erosion from sea level rise and increased impact from flooding events, which consequently affect peoples' livelihoods and can displace communities who search for better places to settle.

¹⁰Reducing the Risk of Disasters and Climate Variability in the Pacific Islands, Papua New Guinea Country Assessment. (2010). Op cit. p. 7.

¹¹ Office of Climate Change and Environmental Sustainability and World Bank. (2009). Climate Change in Papua New Guinea: A National Stocktake, June 2009.

The Preferred Solution:

The preferred solution is to support the Government of Papua New Guinea (GoPNG) to lead the planning, coordination and on-the-ground implementation of measures to facilitate adaptation at all administrative levels to manage climate change risks with a particular focus on increasing vulnerable communities' resilience to climate change. Papua New Guinea at all societal levels requires support to effect a paradigm shift in development processes in order to transform reactive and ad hoc responses, which became particularly evident during the consultation processes in preparation of this proposal (as detailed in Annex 6), into anticipatory and planned interventions to manage the uncertainties of climate change. Resources are required to support the country to put in place pro-active systems and concrete measures that can provide real and lasting benefits to vulnerable communities and development-critical sectors with respect to adapting to climate change.

These resources are critical for the GoPNG to achieve its aspirations laid out in the overarching development frameworks: PNG Vision 2050, Development Strategic Plan (2030), Medium Term Development Plan (2011-2015) and the Climate Compatible Development Strategy (CCDS) as well as the Interim Action Plan resulting from the CCDS.

Organizational & Governance Structure

In March 2010 the Cabinet created the necessary organizational and governance structure to implement PNG's CCDS. This included the establishment of the Office of Climate Change and Development (OCCD) as well as the National Climate Change Committee (NCCC), who take full and exclusive responsibility of climate change and environmental sustainability. Discussions are currently underway to elevate the status of OCCD to that of an Authority to give it greater scope for responding to climate change issues and build resilience in PNG's development agenda. This is a very positive development in putting climate change at the forefront of national priorities and in the implementation of this project.

Since September 2010 OCCD has been fully staffed. In addition PNG's NCCC meets on a monthly basis to guide the country's climate change work. The NCCC includes departmental heads of all government departments and authorities most concerned with climate change issues including but not limited to the Departments of Forestry, Agriculture, Environment and Conservation, Finance, National Planning and Monitoring.

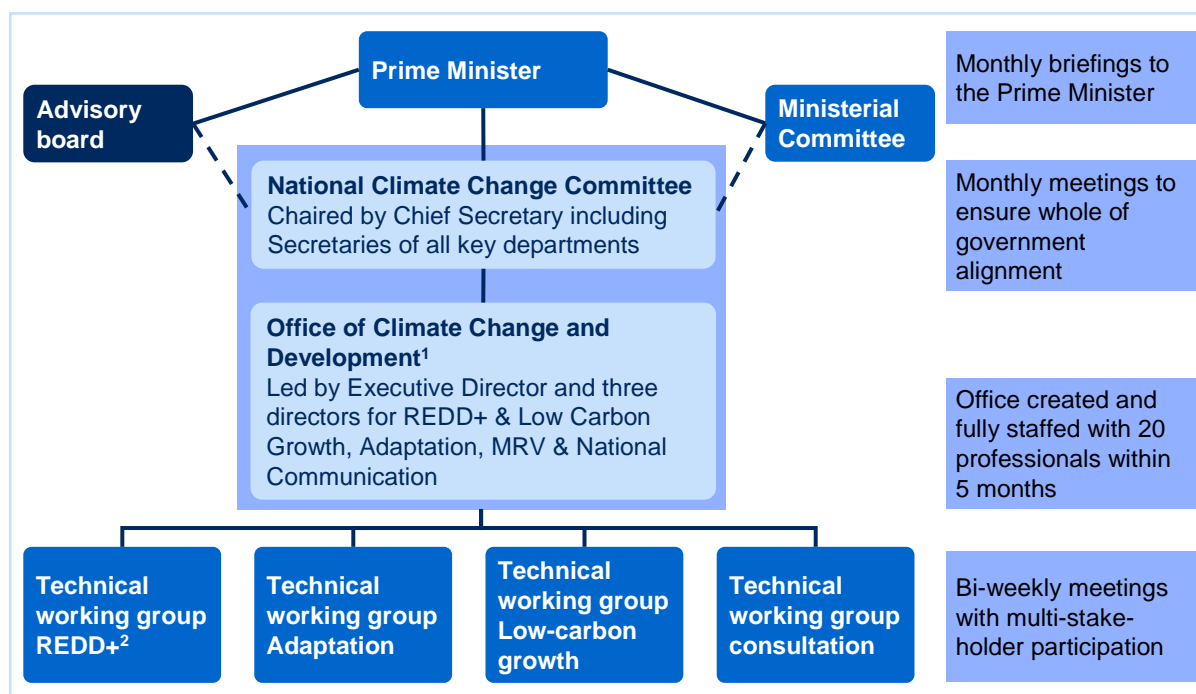
At a working level, the OCCD has created multi-stakeholder Technical Working Groups (TWG) and sub-working groups. These TWGs include stakeholders from different backgrounds (government departments, non-governmental organization, developing partners and academics) and focus on specific areas such as adaptation (ATWG), consultations, low-carbon growth and REDD+. Sub-working groups are convened on a needs-basis and focus on more detailed solutions such as the implementation of a coastal early warning system and community based mangrove planting projects.

These Technical Working Groups have already undertaken significant efforts to identify, analyse, prioritize and develop appropriate adaptation solutions such as a Coastal Early Warning System (CEWS) and community based mangrove planting projects, which constitute a sound basis for the achievement of some of the outcomes and outputs put forth in this proposal. For these efforts to be successful and sustainable in the long term, it is instrumental to support and build capacity for the OCCD. At the same time, it is essential that this support is extended to line agencies and departments including the National Disaster Center (NDC), Department of Environment and

Conservation (DEC), Department of Agriculture and Livestock (DAL) and other research and academic institutions in order to effectively coordinate and implement climate and disaster risk reduction measures. A strengthened institutional framework will enable the development and implementation of measures for disaster preparedness and the responses necessary for managing the increased occurrence and intensity of climate change-related hazards at the national, sub-national and community level. Further, the strengthened capacity of key government agencies and communities will be key to facilitate the mainstreaming of climate change considerations in sustainable water management, agriculture and land-use practices.

In March 2010, PNG created the Office of Climate Change and Development to coordinate the Government's climate change activities

■ Not set up yet



¹ OCCD Executive Director reporting directly to Prime Minister

² The Technical working group REDD+ consists also of sub-working groups of MRV, Forestry and Agriculture. The adaptation TWG includes sub-working groups on Coastal Early Warning system and community based mangrove projects

SOURCE: NEC decision 54/2010

Figure 3: OCCD Organigramme

Barriers to integrate climate-resilience into sustainable development of coastal areas:

There are a number of legal and policy, institutional, capacity, coordination, and financial barriers hindering the Government's ability to put in place an effective and systematic mechanism to support the vulnerable population to adapt to the uncertainties of climate change.

Technical resource and human capacity constraints

There is a constraint from insufficient technical resources and human capacity to apply pertinent information on climate change (including projections of likely impacts) and make informed decisions about livelihood development and protection options for affected communities. The Papua New

Guinea Weather Service (PNGNWS) is mandated to collect and archive data on weather. It is also mandated to prepare information on projected climate change and variability as well as sea level rise based on research.¹² It operates with very real constraints including reliance on 14 meteorological observation stations across a highly diverse country, with little or no significant presence in most of the provinces. In the whole country there are only 2 tidal monitoring stations.

Currently there are no water-level or rain gauges at communities living by rivers, which severely limits the local capacity to monitor floods and put early warning systems in place. With limited information, the PNGNWS produces monthly climate outlook information at the national and provincial scale. Furthermore, the dissemination and uptake of this information amongst provincial and local authorities, farmers and villagers is very limited - in part because of confidence issues including relevance to decision-making processes and constraints in outreach among others. There is therefore a desire on the part of the PNG government to establish an effective system of generating relevant information for decision-making to manage the uncertainties of climate change on key sectors as well as a communication and information distribution system, tailored to different user groups and their specific needs. This system will also be the informational basis for an integrated disaster preparedness and response plan.

In addition, the absence of early warning systems for droughts, floods and sea level rise constraints efficient management of anticipated risks which in turn hinders the effective function of National and Provincial Disaster Centers and their coordination with key technical agencies. These agencies are staffed with individuals who have limited training, but high potential to generate relevant climate change and weather information for decision-making at all levels — at the household, sectoral or sub-national/national levels.

Ineffective policy and legal instruments to implement climate change adaptation and disaster risk reduction policy frameworks

A programmatic and systematic approach to implement the recently developed climate change-related policy and planning frameworks such as the CCDS and the Interim Action Plan in an integrated way is hindered by existing challenges in institutional coordination between various relevant Ministries, Departments and Committees.

A number of existing policy instruments and strategies will need to be strengthened to better support the integration of climate change risks into disaster risk reduction and other development policies. These frameworks include:

- Vision 2050, which captures the importance of the sustainable development and environment under the 5th pillar “Environment Sustainability and Climate Change”,
- PNG Development Strategic Plan (PNGDSP) 2010-2030, which further emphasizes environmental sustainability as an essential priority for the country’s sustainable development and articulates the Nation’s 20 year plan to reach the MDGs
- Medium Term Development Plan (MTDP) 2011-2015, which promotes sustainable management of the environment and natural resources as well as adaptation to the domestic impacts of climate change while contributing to global efforts to abate greenhouse gas emission.

¹² Initial National Communications, Papua New Guinea (2000)

- Climate Compatible Development Strategy (CCDS), and an Interim Action Plan for Climate Change in PNG, which set out the strategic direction for PNG's actions in adapting to and mitigating climate change, with a strong focus on REDD+.
- Reducing the Risk of Disasters and Climate Variability in the Pacific Islands – PNG Country Assessment (SOPAC and WB)
- PNG DRR-DRM National Framework for Action (2005-2015)
- Framework for the National Climate Change Strategy and Action Plan (2009)

Similarly, there is an absence of systematic integration of climate change and disaster risks in most sectoral management and development policies, strategies and plans. The objectives of the National Agricultural Development Plan that contains the National Food Security Policy which emphasis improvement of the quality of agricultural produce and increase income-earning opportunities for agriculture-dependent communities is likely to be jeopardized by climate-induced disasters and gradual changes in the mean climate patterns. The current legal frameworks on natural resources use such as the Fisheries Management Act and other relevant acts including the Forest Management Act, Environment Act and various conservation and protected area management policies, do not integrate climate change risks, and are anticipated to be ineffective in increasing the resilience of ecosystems and related services to climate change. This includes benefits derived from mangroves that are vital for protecting communities from climate-induced hazards and provide livelihood options. There is currently no integrated climate change-sensitized coastal zone management plan and policy in the country and coastal zone management strategies remain insufficiently integrated at the provincial and local levels in particular.

Assessments undertaken by UNDP¹³ and UNCTAD¹⁴ underlined that despite the relatively well established Disaster Risk Management National Framework, and existing institutional structures from national to provincial, district and local levels, the government continues to be reactive rather than proactive in responding to natural hazard risks, and capacity for effective Disaster Risk Management (DRM) planning and action at sub-national levels remains low and fragmented. The current DRM Act is outdated (1987) and does not clearly set out roles, responsibilities and lines of decision making, especially in regards to the National Disaster Centre, National and Provincial Disaster Committees, the Controller, and the parliamentary Emergency Committee. Many stakeholders have different interpretations of the current disaster management legislative and institutional arrangements and thus an inconsistent appreciation of their respective roles and responsibilities. The stakeholder consultations undertaken in preparation of the proposal (see Annex 6) further revealed that there is a significantly limited capacity at the provincial and local levels to respond to disasters adequately, timely and with sufficient resources. The required infrastructure such as evacuation centres and water storage facilities are also inadequate and insufficiently maintained. This is a significant obstacle to effective disaster preparedness and response in PNG. Based on the above assessments, a national DRM Mainstreaming Programme has been developed recently, with the support of UNDP and the Secretariat of the Pacific Community (SOPAC), endorsed by the PNG National Disaster Committee on May 2010¹⁵.

Absence of awareness, education and advocacy of climate change impacts and practical adaptation measures.

Systematic efforts to inform and prepare the public in the North Coast and Islands Region to adapt and manage expected and uncertain changes have not yet been undertaken. The comprehensive

13 GAPS AND OPPORTUNITIES FOR DRM PROGRAMMING IN PAPUA NEW GUINEA, UNDP PNG CPR Programme, 2008

¹⁴ Disaster Response Preparedness Mission to Papua New Guinea, UNDAC Report, 2009

¹⁵ Disaster Risk Management (DRM) Mainstreaming Programme for Papua New Guinea

and sustainable awareness, education and advocacy programmes that are linked to livelihood support initiatives of the government (e.g. extension services, media outreach) have not been designed and thus not implemented. Even provincial, district and local level disaster management offices have inadequate capacity and presence for all areas in the country for the extension services on awareness on preparedness and response to climate-induced disasters that have short to long-term impacts on peoples' livelihoods. In particular, strategic capacity and resources for implementing comprehensive programmes of support have been inadequate and in most cases not been available through other existing sources (e.g. public funds) due to competing needs for scarce resources to cover the entire country. OCCD and some NGOs undertook climate change awareness programmes, but only on ad-hoc basis.

In the remoter provinces, the provincial DRM offices are isolated from the rest of the administration with DRM not viewed as a priority. Consequently, there is a mindset "challenge" among the local farmers that there is a compensation claim potential following localised hazard events (mostly hail damage, drought, landslides and flooding along river banks). This strongly suggest that there is little understanding of disaster risk reduction. Some of these provinces have undertaken some public awareness campaigns through radio broadcasts in the past (including sharing long-term weather forecasts received from the PNGNWS), but have had no regular awareness programmes. DRM resource materials such as posters and brochures are distributed to schools and districts whenever they are received (the provinces do not produce their own).

In the North Coast Provinces there is little or no acknowledgement or awareness, education and advocacy of the need for disaster risk reduction and a coastal early warning system. Preparedness for a large scale flooding is lacking in all levels of management from the provincial, district and community levels. This was apparent in the recent flooding disasters in Oro Province. There was no early warning and initial reaction to the disaster was slow, chaotic and disorganised. Relief efforts subsequently became bogged down in compensation squabbles and with no clear strategy for the management of care centres. Further there are no large scale evacuation plans in all North Coast Provinces.

During the stakeholder consultations undertaken for the preparation of this proposal (as detailed in Annex 6) it was further highlighted that although there was a general level of awareness on climate change affecting PNG (especially among coastal communities having experienced recent floods) there is little knowledge on effective village level adaptation measures. The adaptation at the community level is further hindered by lack of resources and insufficient coordination with agencies under the provincial administrations (such as the Department of Works) and the provincial planners. As a result, the required support services from the provincial departments are unavailable to the affected communities and adaptation measures remain adhoc, improvised and largely ineffective (an example is the use of the attempt to stop coastal erosion by dumping scrap metal such as disused cars and machinery on the shoreline).

PROGRAMME OBJECTIVES:

Programme Objective

The overall objective of this programme is to enhance the adaptive capacity of communities to make informed decisions about and adapt to climate change-driven hazards affecting both coastal and riverine communities in the North Coast and Islands Region of Papua New Guinea. In particular, the programme will focus on resilience towards occurrences of coastal and inland flooding events.

The proposed programme will contribute to several outcomes and outputs listed within the Adaptation Fund Strategic Results Framework (AFB/EFC.2/3 from 31 August 2010)¹⁶. Please refer to the table in Annex 7 of this proposal, which indicates the alignment of programme objectives with the AF results framework.

Programme Strategy

The programme will catalyze action on integrated risk management by building upon PNG's CCDS. The strategy has been developed in cooperation with various governmental and non-governmental stakeholders and was approved by the GoPNG (Cabinet decision 55/2010). The broad institutional support and the well established coordination among these stakeholders through Technical Working Groups will support the successful implementation of the proposed initiatives. Further details on the structure and composition of the OCCD and its TWGs as well as the role of the National Climate Change Committee (NCCC) are outlined in the section covering the implementation arrangements (please refer to page 56).

The development of the programme strategy was guided by the CCDS and the challenges and strategies laid out in the document as well as through consultations with stakeholders at the community, district, provincial and national level. The programme supports the goals of the CCDS to promote an inclusive economy-wide approach to building climate resilience with a common goal of protecting communities, property and economic infrastructure.

The programme strategy focuses on implementing measures as well as building institutional and policy capacity that promote efficient and cost-effective adaptation to coastal and inland flood-related risks at the sub-national levels. The community level-interventions under this programme address specific vulnerability characteristics of two distinct geographic areas:

- 1) Communities of the Northern coastal regions of PNG as well as the island provinces, which face **coastal flooding** risks, and
- 2) River communities in the North Coast Region that are exposed to **inland flooding**.

The targeted North Coast and Islands Region comprise 11 provinces and the majority of the country's estimated 2.3m people that are exposed to flood risks. The reach and impact of the implemented measures and strengthened institutions will be further supported by the facilitation of policy making and awareness raising activities in direct contribution to the objectives laid out in PNG's CCDS as well as a replication strategy that supports community-led replication of the adaption measures put in place in the pilot communities targeted under this programme. The

¹⁶ Reducing vulnerability and increasing adaptive capacity to respond to the impacts of climate change, including variability at local and national levels.

provinces targeted through the activities are indicated in the output and activity tables. The specific locations for the implementation of the adaptation measures within the provinces and cities are chosen based on the criteria explained on page 16. In order to ensure that the specific locations take into consideration the latest developments and further local-level consultations that are planned by the OCCD, this will be undertaken at the inception stage of the programme.

The largely flood-focused set of adaptation measures under this programme take into consideration that adaptation to climate-related impacts from issues such as malaria, (committed funding of USD 150m over 5 years through the Global Fund to Fight AIDS, Tuberculosis and Malaria) and agriculture (committed funding through several initiatives currently under DEC, NARI and other national agencies and supported by multilateral agencies) is addressed through a number of initiatives currently being implemented or developed.

With the objective of the programme and focus on adaptation to climate change-related flood risks, the expected outcomes, outputs and activities have been grouped into four components and are designed to be implemented in an integrated way over a span of four years.

Components 1 & 2: Adaptation Measures in the Coastal Areas and Riverine Communities

These first two components comprise the activities and outputs related to the adaptation measures in the coastal areas and river communities respectively. Both components include outputs on the establishment of climate early warning and information systems, disaster preparedness and response plans as well as integrated protection measures that are adapted to the respective river and coastal environments and prevalent vulnerabilities.

Components 1 & 2 have been designed with a particular focus on supporting communities-led initiatives. The stakeholder consultations at the local level that were undertaken during the preparation of this proposal revealed that there are a significant number of communities that are aware of the climate-change hazards they are threatened by and that the community-led nature of interventions is essential in ensuring the sustainability and long-term effectiveness of the adaptation measures put in place under this programme. Many communities have proactively initiated village-level committees and small scale adaptation measures in response to the hazards they face. Almost without exception these initiatives face constraints and are hence largely not effective. The constraints faced include the lack of support from provincial and district agencies, lack of technical knowledge for implementing best practice adaptation measures as well as the lack of resources such as building materials, financing and technical support.

In response to this situation and the need for strong buy-in from the targeted communities the programme was designed with a two-pronged strategy:

- The programme will identify eight project sites (four affected by coastal floods and four affected by inland flooding) where strong community initiative is evident and allows for the identification, design and implementation of best practice adaptation measures.
- Further, the programme puts in place a replication support mechanism that allows a minimum of eight other communities (four coastal and four riverine) to take the initiative to replicate the best practice adaptation measures demonstrated in the pilot communities above.

The focus on community-led initiatives also ensures that the risk of insufficient community support endangering the effective use of the programmes' resources and sustainability of the impact is effectively mitigated. Please refer to Annex 6 detailing the outcomes from the consultations and

reference cases of community-led initiatives.

Component 3: Institutional Strengthening

The institutional strengthening component serves to create an overall enabling environment for the effective implementation and long-term sustainability of adaptation measures and strengthen resilience to climate change. This will be achieved by mainstreaming climate change and adaptation into relevant policies, coastal zone management, development planning and regulations such as Environmental Impact Assessments.

Component 4: Awareness Raising and Knowledge Management

Through the programme's awareness raising and knowledge management component it will be ensured that the lessons learnt and best practices that are systematically extracted from the above components are disseminated locally, regionally and globally. Locally, the particular aim lies in the strengthened awareness and ownership of adaptation and climate change-related risk reduction processes that will support the replication of outputs through locally built capacity.

The combined outcomes of the above components will be a set of established and tested local adaptation measures that are supported by the institutional capacity, awareness and national policies to increase and maintain the level of resilience to climate change-related hazards in the targeted areas and at a national level. The components of the programme are not sequential, but highly interrelated and mutually beneficial in the overall implementation process.

The intervention strategy in light of various climate change scenarios

The proposed programme builds on the assessments and analysis contained in the Climate Compatible Development Strategy (CCDS). The CCDS uses three scenarios of the Intergovernmental Panel on Climate Change (IPCC) to account for the full breadth of uncertainty of climate change effects.¹⁷

While effective mitigation measures are crucial to curb climate change in the long run, IPCC models show that the level of GHG emissions will have little effect on temperature in the next 20 years, due to lags in the climate system. Hence, 2030 was selected as a time horizon for the underlying adaptation analyses. Depending on the scenario, temperature will increase by 0.2–0.7 degrees Celsius, rainfall will change minimally (by -0.9–3.4 mm) and the sea level will rise 0.08–0.20m by 2030.

The expected losses linked to climate change have been analysed in detail for inland and coastal flooding as well as for malaria. Economic development increases expected losses, as the economic value of assets at risk grows. In line with the rate used in the overall strategy, a GDP growth rate of 6% per year has been assumed. As demonstrated in the exhibit below, the projected damage resulting from inland flooding, coastal flooding and malaria is forecast to double from about USD 150m in 2010 to USD 275–365m in 2030¹⁸.

¹⁷ The IPCC scenarios are based upon assumptions on global integration (globalization vs. regionalization) and economic orientation of the world (ecological vs. economic). The three scenarios include: A2, which portrays an economically focused world with high economic growth that is divided into regional blocs; A1B, which reflects usage of mixed energy sources that balances economic and ecological interests; and scenario B1, which envisions a integrated, ecologically friendly world with relatively lower economic growth.

¹⁸ Analysis of the OCCD on the basis of data from IPCC AR4, CSIRO, SEAFRAME, Expert interviews, Academic literature, Meteorological data, NASA SRTM, CGIAR, ESRI, PNG RIS, PNAS, WHO, CDC, World Bank, PNG MRI, WRI;

In the worst-case scenario, expected estimated loss for PNG will increase from USD 150 to 365 million p.a.

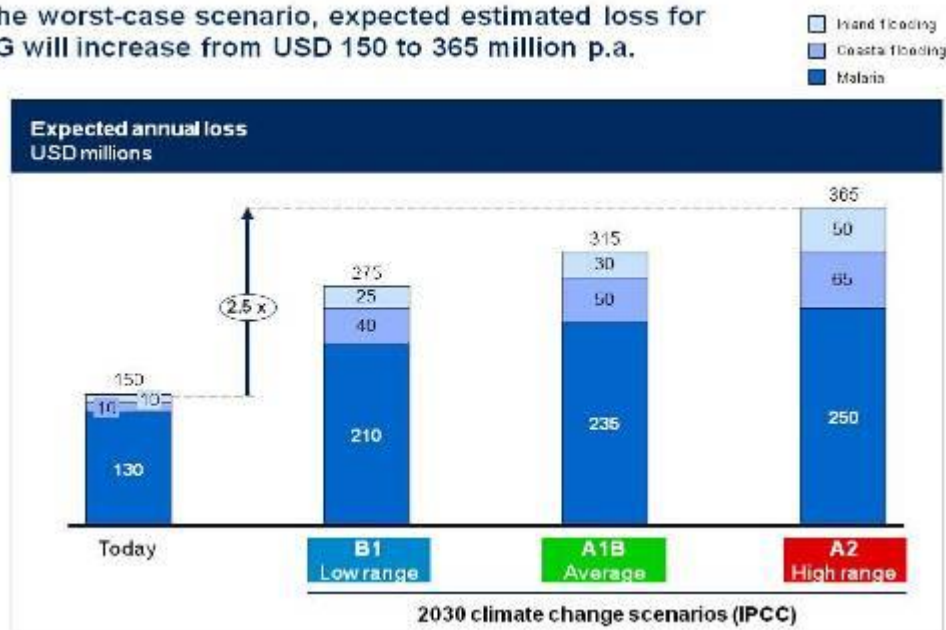


Figure 4: IPCC scenarios and estimated losses

Based on the described climate change scenarios, potential initiatives to address the hazards were prioritized through a series of filters that seek to maximize the benefits in terms of protecting livelihoods and assets while ensuring that resources are efficiently allocated. A five step process was used to filter adaptation measures:

- (1) Cost effectiveness: measures with a cost-benefit ratio greater than 1 were eliminated;
- (2) Feasibility in PNG: interventions such as beach nourishment were eliminated due to lack of skills and feasibility in PNG;
- (3) Need for funding (adaptation measures for agricultural and health impacts are not addressed in this proposal as there are several initiatives currently being planned or implemented in this areas)
- (4) Ability to protect human life: outputs that protect human life were valued above those primarily protecting physical and financial assets;
- (5) Cost per life affected: All measures meeting the above criteria were sequenced for implementation based upon the lowest cost per life protected.

The following figure illustrates the prioritisation of the adaptation measures according to the abovementioned Filter.

Prioritization process for adaptation measures to address coastal flooding

Priority measure

	Cost-benefit ratio for assets ¹ Percent	Feasible in PNG	No existing programs/funding in place	Ability to protect people	Cost per life protected USD
Early warning system	N/a	✓	✓	✓	<1
Elevate new structures in flood zone	8	✓	✓	✗	—
Revive reefs	14	✗	—	—	—
Plant mangroves	17	✓	✓	✓	1
Nourish beaches	41	✗	✓	—	—
Retrofit important buildings	83	✓	✓	✗	—
Coastal engineering in high-value locations	88	✓	✓	✓	18
Flood-adapt house contents	114	—	—	—	—
Build dikes	115	—	—	—	—
Create offshore breakers	365	—	—	—	—

¹ Best-case cost-benefit ratio, may not be applicable in PNG: does not quantify value of protecting human lives

SOURCE: Press clippings, UNESCO, WHO, NARPA, Academic Journals, press clippings, CDC, PNG High Commission, Deha Committee reports, GFVW System, US Army Corps, team analysis

Figure 5: Prioritisation of adaption measures

PROGRAMME COMPONENTS AND FINANCING:

The following table presents an overview of the Programme's components, outcomes, main outputs and their costs. Please refer to the Strategic Results Framework (page 67) for the full details on the outputs, activities and the implementation arrangements.

PROGRAMME COMPONENTS	EXPECTED OUTCOMES	EXPECTED CONCRETE OUTPUTS	Budget Amount (US\$)
1. Adaptation to coastal flooding-related risks and hazards for North Coast and Islands Region communities	1. Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and 3 cities of the 11 provinces of the North Coast and Islands Region	1.1 Coastal early warning system established for observation, data collection and information management and dissemination in the provinces of the North Coast and Islands Region	491,750
		1.2 Coastal flood preparedness and response plan and systems established in the provinces of the North Coast and Islands Region	432,500
		1.3. Support system for community-led mangrove reforestation and conservation projects	455,000
		1.4 Integrated coastal adaptation measures ¹⁹ implemented to protect 8 communities in East Sepik Province, Oro Province and New Ireland Province	1,108,000
		Total Cost Component and Outcome 1	
2. Adaptation to inland flooding-related risks and hazards for river communities in East Sepik, Oro, Morobe and Madang Provinces	2. Reduced exposure and increased adaptive capacity of 8 riverine communities of the 4 provinces (East Sepik, Oro, Morobe and Madang Provinces)	2.1 Inland flooding early warning systems established for observation, data collection and information management and dissemination in the North Coast provinces	500,500
		2.2 Inland flood preparedness and response plan and systems established in the North Coast provinces	358,000
		2.3 Integrated riverbank protection measures implemented to protect communities in East Sepik Province, Oro Province and Morobe and Madang Provinces	1,218,000
		Total Cost Component and Outcome 2	
3. Institutional strengthening to support climate- and disaster-resilient policy frameworks	3. Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices	3.1 Climate change-related risks and resilience to coastal and inland flooding integrated into coastal zone management related polices, legal and planning frameworks at the national and sub-national levels	381,500
		3.2 Policy makers and planners at the national, provincial and district offices, institutions and extension services systemically trained to implement climate-sensitive policies and plans	203,000
Total Cost Component and Outcome 3			584,500
4. Awareness raising and knowledge management	4. Strengthened awareness, education and advocacy to promote ownership of adaptation and climate change-related	4.1 Lessons learned and best practices generated, captured and distributed to other communities, civil society, policy makers in government and globally through targeted mechanisms	176,000

¹⁹ Measures include all other interventions not related to mangroves.

PROGRAMME COMPONENTS	EXPECTED OUTCOMES	EXPECTED CONCRETE OUTPUTS	Budget Amount (US\$)
	risk reduction processes at national and sub-national levels	4.2 Climate change awareness and education programmes carried out to build next generations' resilience to climate change	177,500
Total Cost Component and Outcome 4			353,500
Total for all Components			5,501,750
Programme Execution Cost (see Annex 3)			517,027
Total Programme Cost			6,018,777
Programme Cycle Management Fee charged by the Implementing Entity			511,596
Total Amount of Financing Requested			6,530,373

PROJECTED CALENDAR:

Indicate the dates of the following milestones for the proposed programme

Submission of Concept to AF	April 18, 2011	✓
Approval of the Concept by the AF Board (Estimate)	June 23, 2011	✓
Submission to AF of a Full Programme Proposal	July 13, 2011	✓
Approval of the Full Programme Proposal by the AFB (Estimate)	April 2012	
Start of Programme Implementation	Oct 2012	
Mid-term Review	Oct 2014	
Programme Closing	Oct 2016	
Terminal Evaluation	Last quarter 2016	

PART II: PROGRAMME JUSTIFICATION

A. Describe the programme components, particularly focusing on the concrete adaptation activities of the programme, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

The design of the programme described in detail below and in the Strategic Results Framework benefitted from the outcomes of the extensive consultations in the targeted provinces and communities. The results of these consultations are summarized in Section H and Annex 6 of this proposal.

Component 1: Adaptation to coastal flooding-related risks and hazards for North Coast and Islands Region communities

Outcome 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 coastal communities and 3 cities (Wewak, Lae, Madang) of the 11 provinces of the North Coast and Islands Region.

The combination of the outputs under this component will enhance the targeted coastal communities' capacity to adapt to the risks and hazards posed by climate-related coastal flooding. This will be achieved by increasing local capacity for adaptation by implementing a comprehensive coastal warning system, which, in combination with the establishment of a disaster preparedness and response plan will reduce the targeted communities' exposure to coastal flooding events.

As part of the flood adaptation plan, specific small-scale adaptation measures that focus on the use of locally available resources and the ability of the communities to manage and maintain the adaptation measures will be implemented to protect four pilot coastal communities from coastal flooding. Integrated mangrove planting, reforestation and conservation measures will aim at further reducing the impact of anticipated coastal floods.

It is further envisioned to enable the replication of the best-practice adaptation measures put in place in the pilot communities through support to community-led initiatives. The support will be made available through direct community support in terms of technical assistance and implementation as well as by strengthening the coordination of activities under the provincial agencies and the ties between communities and the Provincial Climate Change Offices or focal points (some provinces do not have designated Climate Change offices), in particular.

Output 1.1: Coastal early warning systems established for observation, data collection and information management and dissemination in the North Coast and Islands Region

The implementation of the coastal early warning system (CEWS) will build upon and be integrated within the infrastructure of the National Disaster Centre's early warning system, which currently does not include provisions for monitoring data. To facilitate a largely automated process of disseminating warnings, the OCCD has already established a public-private partnership with national mobile telecommunications provider Digicel. This partnership is of particular importance since it utilizes the public-private partnership (PPP) model to provide a low-cost and efficient solution to reach communities at risk. The system had its recent and successful maiden test when it was used to disseminate warnings to 300,000 people in the North Coast and Islands Regions in response to the recent (2011) Japan Tsunami. The effectiveness of the warning system became

evident through the positive feedback received from community members as well as representatives from the provincial administrations and the private sector during the stakeholder consultations. The OCCD is also in discussions with a large multi-national company, which has expressed a general interest in supporting disaster preparedness activities in PNG through their Corporate Social Responsibility (CSR) activities.

In terms of activities under this output, the integration of the CEWS will require the assessment and mapping of coastal flooding hazards in the targeted areas, with areas of major population being of higher priority. Further, a review of the limited early warning measures for coastal flooding that are currently in place will ensure the seamless integration of the system and avoid breaches and open-ended processes along the warning and information chain. At the same time, the capacity to collect and monitor the relevant data will be strengthened by equipping the PNG Weather Service with automated weather stations and water-level gauges in coastal areas as well as deriving appropriate risk indicators from the observed data as basis for triggering respective warnings. The observation data will be collected in a central database and an operations centre as envisioned in the MoU of the abovementioned PPP to be established under this programme and relevant data and warnings distributed via the abovementioned partnership with Digicel and media organizations. Workshops and continuous training for the establishment, maintenance and use of the CEWS will be undertaken alongside the implementation of the above activities and in cooperation with the relevant stakeholders such as the National Disaster Centre, PNG National Weather Service, Telecommunication companies (Digicel) and partners from the targeted communities and media.

This programme allocates resources for the maintenance and operation of the early warning system and respective capacity building over the course of the programme's implementation. Beyond the scope of this programme, it is envisioned that the operation and maintenance of the early warning systems are fully integrated into the relevant government institutions' recurrent budgets. OCCD has already started discussions on the incorporation of the required allocations with the Treasury, which is responsible for the allocations of recurrent budgets. Since the required allocations for the NDC are necessary to fulfil its very mandate, there is very limited risk that the allocations for operation and maintenance of the early warning system are not included into the budget allocations. As part of the project implementation process, the sustainability of the EWS will be continuously tracked and reported in annual project implementation reviews. This programme seeks to support OCCD in facilitating the process of integrating the PPP early warning systems in national and local budget allocations.

As outlined in the output and activities table as well as the programme implementation schedule, the programme (activity 4.2.4) also seeks to attract additional funding from CSR and sponsorship sources. Although the core operations and maintenance costs will be covered by recurrent budgets, these contributions will be able to support continued awareness raising and expansion activities (both, in terms of geographical focus as well as integrating other hazards into the warning system such as the monitoring of landslides, agriculture-related threats and other climate and non-climate related geo-hazards).

The functionality of the CEWS and its effectiveness has been proven by a number of well established multi-hazard early warning systems in place around the world. Following the Indian Ocean Tsunami of 2004 a large part of the Asian countries with coastal environments implemented tsunami warning systems. However, in most places, the systems have been expanded upon and now function as multi-hazard warning systems that are an integral part of disaster preparedness and response plans. In Malaysia, a country with somewhat comparable biophysical characteristics, a multi-hazard warning system (EWARNs) is in place and includes risk monitoring and analysis for several hazard scenarios including severe rainfall, flash floods, soil erosion, landslides, tidal waves

and forest fires. In Mozambique, somewhat comparable to PNG in terms of socio-economic characteristics, an inland flooding system has been established in Maputo.

Further integrated early warning systems have been put in place in Sri Lanka, India and Australia among others. The Australian Early Warning Network is a particularly comprehensive and sophisticated early warning system that allows customised alert distribution as well as access to collected data in various forms some of which even include aspects of revenue generation.

Flood early warning systems are being piloted through projects currently in their initial stages in Fiji (in the Nadi Catchment and at Navua river), and regular exchanges will be built in the proposed AF project through involving regional technical agencies in charge (SOPAC) to ensure synergies.

A number of disaster events over the recent years have proven the effectiveness of the early warning systems even in low-development environments, such as Aceh and other parts of Indonesia. It is evident that communication via text messages to mobile phones provides a quick and effective distribution channel for hazards warnings.

As mentioned above PNG itself has already made some experience with the coastal early warning system. The warning that was issued after the Japanese earthquake of March 2011 through the public private partnership model protected lives, livelihoods, infrastructure and assets in the coastal areas and islands. This became particularly evident during a fact-finding visit in Wewak, on the coast of East Sepik Province, which was undertaken in early May 2011. The hospital of the town, for example was able to fully evacuate its patients prior to the waves reaching the hospital. In the nearby village of Wom Beach, the Ward Councillor confirmed that the warning he received on his mobile phone allowed him to inform the village. As a result, there was no impact on the population of the village and beach front properties and assets such as boats could be secured. The issued warning also lead Air Niugini to fly out an aircraft, which was scheduled for an overnight stay at Wewak airport, which lies at an elevation of 12 feet and is situated in the immediate vicinity of the coast. The warning had been issued after an alert was received and verified by the National Disaster Centre, which then confirmed that Digicel was to issue the warning via text message service to people in the affected areas.

However, through the above case and the largely ad-hoc responses on the ground it also became evident that the warning system has to be integrated in a broader disaster preparedness and response framework that included awareness raising activities for local stakeholders. It is particularly the limited coordination, oversight and follow-up analysis by the provincial disaster bodies that is addressed through the activities under this proposal.

Please refer to the table in section F of this proposal for a detailed explanation of the complimentary and difference of the interventions under this proposal in comparison with activities and focus of other initiatives and the UNDP DRM programme in particular.

The operation and maintenance of the early warning systems fall under the mandate of the National Disaster Centre. The alert-warning chain and respective decision making is established and, as demonstrated, functioning. As such and as mentioned above, the activities under this programme focus on building the required capacity of the NDC's provincial disaster centres in utilising the information from the early warning systems and responding to warnings as an integral part of the national disaster preparedness and response plans. These activities are complimentary to the UNDP-DRM project as outlined in section F of this proposal.

The operation and maintenance of the early warning systems is one of NDC's core functions and should be guaranteed by respective allocations under the recurrent government budget. However, with no functioning early warning system having been in place until recently, there are no allocations for maintenance and operation. It is proposed that the installation work of the early warning system as well as the initial funding for operation and maintenance of the system (that is accompanied by respective training) is drawn from AF resources. The allocations for operation and maintenance shall then be gradually integrated into the budget allocations for the NDC. The respective milestones are 50% of the resources for maintenance and operation coming from recurring government allocations by the end of the second year and 100% by the end of the fourth year.

As mentioned above, the early warning system that has been put in place through cooperation among OCCD, NDC and Digicel has attracted a private sector partner. As demonstrated by this partnership with the mobile telecommunications provider Digicel, the system also offers opportunities as platform for public private partnership as well as corporate social responsibility activities that can further complement budget allocations. The partner has also proven to have the capacity to efficiently act upon decisions from the NDC. As such, the alert-warning chain is short, with only one control and decision making function between the automated alert system and the dissemination of the warning. The public private partnership is scoped to continue beyond the time of this project and as such will ensure that the alert-warning chain is maintained.

In regards to monitoring and analysis of data gathered by the early warning systems' instruments (sea level gauges, rain and river monitoring equipment etc.), the PNG National Weather Service plays the lead role, especially in regards to identifying and monitoring climate-related hazard triggers, trends and forecasting. The proposed activities include capacity building components to ensure that the PNGNWS is able to provide the abovementioned support and analysis functions beyond the timeframe of this programme and as an integrated part of the national disaster preparedness and response framework.

Output 1.2: Coastal flood preparedness and response plan and systems established in the North Coast and Islands Region

The enhanced capacity to collect and monitor information and the ability to make informed decisions through the measures under the above output together with the mapped hazards are also the informational basis for the disaster preparedness and response system that is to be implemented under the proposed programme.

The activities under this output will encompass the development of a disaster preparedness and response plan for coastal flooding in one province of the North Coast (East Sepik) and one province of the Islands Region (New Ireland Province). Both provinces are regularly affected by coastal flooding and currently have inadequate disaster management arrangements. An additional activity focuses on providing training to provincial bodies that builds capacity to adopt and implement the disaster preparedness and response plans based on the North Coast and Island cases. In terms of measures for flood preparedness, the establishment of emergency water storage facilities and the setting up and strengthening of evacuation facilities will be targeted through the activities. The institutional coordination on the preparedness and response to flood-related disaster, will be strengthened by the facilitation of communication among the provincial, district and ward leaders of the province and the establishment of coordination mechanisms such as flood management committees. At the same time, the establishment of this network among provincial and district leaders will be the basis for the further replication of the disaster preparedness and response plan

in other coastal provinces with priority given to provinces with the highest vulnerability to coastal flooding.

Although targeting different geographic regions and addressing a distinct set of hazards, there will be a systematic exchange among this output and output 2.2, which aims at establishing a disaster preparedness and response systems for inland flooding. This will ensure the incorporation of knowledge and lessons learnt especially in regards to the effectiveness and communication and coordination among institutional stakeholders.

Output 1.3: Support system for community-led mangrove reforestation and conservation projects

The status of mangroves in PNG

Mangroves can be found along much of the PNG coastline but this ecosystem is currently decreasing due to inadequate development planning and, to a lesser extent, unsustainable subsistence use for construction, fuel, food and other uses. There is no industrial logging of mangroves though some micro-scale commercial harvesting has been observed near cities.

Mangrove reforestation, planting and conservation initiatives are included in this proposal as such programmes do not yet address many vulnerable areas in PNG; it has been identified as adaptation measures as shown in Fig 5. Mangrove reforestation and conservation can offer protection at low costs (around \$1 per protected life and less than \$0.20 per protected USD of assets per year²⁰) and can be coordinated at a community level. Though mangrove projects do exist in PNG (e.g. in the area around Port Moresby and in Manus), they are often small scale and lack an overall coordination and technical guidance especially in regards to the identification of suitable species and sites and in the context of mitigating coastal flooding.

Although the rehabilitation of mangroves and their adaptation function is integrated in the 20-year Development Strategic Plan and the 5-year Medium-Term Development Plan, it remains insufficiently integrated into development plans at all geopolitical levels. To date, there is also no established system for monitoring and enforcing mangrove protection beyond some ad-hoc community patrolling. There is some experience available from designating protected areas and establishing Wildlife Management Areas (WMA) and Locally Managed Marine Areas (LMMA).

The Drivers of Mangrove Forest Degradation and Deforestation

The drivers of mangrove forest degradation and deforestation in PNG are summarized in the table below. The ultimate impact of these drivers is to reduce the effectiveness of mangrove forests to protect communities from climate change impacts, particularly coastal flooding, hence, the project will support the relevant mitigating measures.

The common measure to address these drivers is raising the level of awareness of communities as well as planners and policy makers about the benefits from mangrove conservation. Some regulatory measures include land-use planning and the enforcement of existing environmental regulations. The root cause seems to be the lack of awareness of the benefits from healthy mangrove ecosystems. Climate change impacts such as from intense typhoons, sea level rise and

²⁰ The figures are from CCDS, Adaptation Technical Working Group analysis. The computations are based on the costs of protecting 750,000 risk-exposed people through mangrove reforestation/conservation in the coasts of PNG through investments of around 22 million USD between 2010-2030 – the time horizon for adaptation cost calculations in IPCC models.

droughts have also been identified as one of the emerging threats. The measures to address these drivers will be addressed by the project as described in various sections.

Drivers	Mitigating Measures
Indiscriminate and unsustainable removal or harvesting for domestic and to a certain extent, commercial uses (timber and fuelwood)	Awareness raising Planting of fast growing tree species for timber and fuelwood in community (terrestrial) forests to be coordinated with the Department of Forestry
Conversion into other uses, particularly for human settlements, agriculture and other land-uses; clearing for construction of roads, jetties, piers and seawalls	Land-use planning designating areas suitable for settlements, mangrove forests and other land-uses to maintain a healthy ecosystem balance
Lack of awareness of the benefits of mangrove ecosystem functions (fisheries) and for coastal protection	Awareness raising at the community level, including in schools about the benefits from mangrove conservation
Clearing to reduce malaria	Awareness raising as this is a misperception
Pollution from point and nonpoint sources (defoliants, oil and heavy metals from ships, silt from roads, construction, mine tailings, human sewage, urban and industrial waste, agricultural pesticides and herbicides, etc)	Awareness raising, proper solid waste disposal, land-use planning, environmental regulation and enforcement
Dumping of all kinds of rubbish and burning in mangrove areas	Proper waste disposal; environmental regulation and enforcement
Climate change including sea level rise and droughts, storms	Mangrove reforestation and enhancement of existing stands

Drivers are adapted from Maniware (2007). An Introductory manual on the biology and restoration of mangrove ecosystems. David and Lucile Packard Foundation.

Community incentives towards mangrove conservation are primarily the increase in resilience from coastal flooding related to climate change. There are, however, **co-benefits** which include the ecosystem values, visual amenity and ecotourism. (There are early initiatives on ecotourism such as in the Gereka Dogura area near Port Moresby, which could provide cash income to communities.) The design of the project recognizes these co-benefits with the communities providing in-kind support for mangrove conservation. The project, on the other hand, will provide planting materials and technical support. It is expected that this arrangement will increase community buy-in for the project.

These climate adaptation benefits and co-benefits will be highlighted during awareness programmes with the communities prior to the start of any concrete interventions on the ground. Lack of knowledge about the benefits from mangrove conservation primarily drives the degradation and conversion of mangrove forest. The damages to life, livelihood and infrastructure associated with loss or degradation of mangrove ecosystems will also be emphasized. While these may be obvious to communities, there appears to be a lack of association between such damages and the status of mangrove ecosystems.

The OCCD's mangrove work

The OCCD plays an important role in scaling up the mangrove planting initiatives by bringing more funds in and by playing a coordinating role to the wide range of NGOs and development partners. A dedicated sub-working group of the ATWG has been established. The OCCD is currently

coordinating the development of a toolkit²¹ for community-based mangrove planting, reforestation and conservation that will be used during the implementation of this programme. The toolkit is based on the specific knowledge and awareness needs that were assessed during a mangrove-focused consultation workshops (please refer to Part II, Section H and Annex 6 for details). In line with this, the mangrove toolkit will include, among others, modules on community-based project planning, community management models, conservation, budgeting, funding options and specifics on best practices for mangrove reforestation and conservation such as species identification, root cause analysis of mangroves' low survival as well as general awareness materials.

The preparation of the toolkit included an analysis of various mangrove project implementation modalities with a special focus on initiatives that have shown to overcome problems regarding the low survival rate of seedlings and have managed to ensure long-term sustainability by achieving the critical buy-in from the communities. Thus, the toolkit will allow communities to identify the implementation modality and type of restoration/conservation activity that is suitable for the scenario prevalent in their area. Further, it will equip local CBOs and communities with the required knowledge and awareness to undertake sustainable mangrove planting and conservation initiatives.

The development of the toolkit is being based on:

- Discussions that took place at the mangrove sub-working group meetings,
- The mangrove-focused consultation,
- Regular exchanges with mangrove stakeholders,
- Documentation of international projects and
- International research, analysis and guidelines related to mangrove conservation and rehabilitation.

Overview of the mangrove-related activities of the proposal and budget allocations

The activities under this proposed programme build upon the initiatives by the OCCD. The following table has been consolidated from the Strategic Results Framework and relevant annexes of this proposal for the purpose of this overview.

Activities	Budget
1.3.1. Training of trainers for community leaders, CBOs, NGOs on best practices for mangrove reforestation and conservation (includes dissemination and application of mangrove toolkit in replication areas and nationally)	120,000
1.3.2. Establish regional mangrove nurseries and conduct training and support centres to also serve replication sites	335,000
1.3.3. Integrate mangrove reforestation and conservation in local development plans and formulation/signing of community mangrove forestry agreements/compacts	--- ²²
Total	455,000

The objective of this output is to first build the local capacity for the establishment of community-led mangrove projects and subsequent management to sustain mangrove projects. Secondly, regional nurseries, training and support centres will provide the necessary support for community-led

²¹ The toolkit is still being developed as of October 2011; it is a work in progress.

²² There is no separate budget allocation as this will be coordinated by the Programme Management Unit.

mangrove projects. Thirdly, mangrove rehabilitation and conservation will be integrated in the development planning processes and land-use plans.

The training-of-trainers (activity 1.3.1.) will include the application of the mangrove toolkit and its dissemination. Based on the experience of NGOs in PNG, the key to success and sustainability of mangrove conservation is community ownership, thus the proposal takes a bottom-up approach by focussing the support to mangrove projects that are initiated by the communities themselves. The indications from consultations (undertaken in the preparation of this proposal) and an increased awareness of mangroves' protective function support the assumption that the above training concept will translate into community-driven mangrove rehabilitation and conservation.

Where mangrove reforestation activities are undertaken it is essential and an integral part of the training activities under this proposal to undertake a comprehensive site-specific analysis of the root causes of mangrove degradation, building on the drivers outlined above. At the mangrove-focused workshop that was held in early May 2011 it was highlighted that there have been a number of mangrove planting initiatives which had very low survival rates of the replanted mangroves due to the fact that the root causes were ignored (for example, change in water flow and salinity through infrastructure such as roads, culverts etc.) or other site-specific conditions had not been taken into consideration. The proposed training activities also include building awareness about alternatives to the subsistence uses of mangroves to prevent overharvesting and achieve a sustainable level of resource use.

In this regard, the project will also support the planting of trees as compensatory sources of timber and fuelwood. OCCD has now discussed this project with the PNG National Forest Authority (PNGNFA) and agreement-in-principle has been reached to formulate a Memorandum of Understanding (MOU) at the start of the project for the latter to extend its Forest Extension Programme (FEP) to the coastal communities covered by this project. PNGNFA will supply seedlings and technical expertise in planting of compensatory timber and fuel sources in designated areas following the land-use plans. Examples of species include *Callophyllum inophyllum* (for timber), *Barringtonia procera* (for timber), *Terminalia catappa* (fruit-bearing tree with cuttings suitable as fuelwood) and *Casuarina equisetifolia* L (for fuelwood). The land-use plans will designate areas for planting of trees to serve as compensatory timber and fuelwood sources.

The potential coastal communities are identified based from the consultations and considering vulnerabilities. These are listed below. For each community, the area of mangroves was estimated using the Forest Information Management System (FIMS) database as of 2002, while the target area for reforestation/enhancement is based on the degraded mangrove forest as identified by NGOs working in these areas. The data are listed below. It is emphasized that during the inception phase of the project, these numbers will be verified but the target area for reforestation will be maintained, as applicable.

Nursery	Target Community/Province for Each Nursery	Total area of mangroves for target community (ha)	Area for reforestation in target communities (ha)	Replication targets by nursery (ha)*
1	1. East Sepik- Moem	82	10	10
2	2. East Sepik- Turubu (Taul, Sinal Blai 2)	132	10	15
3	3. East Sepik- Wom	295	20	25
4	4. New Ireland- Djaul (Sumuna)	240	10	40
5	5. New Ireland- Djaul (Leon)	173	5	10
6	6. New Ireland- New Hanover (Taskul, Konomatalin, Sunganpakang, kulpetauatla, Patiagaga)	990	20	30

7	7.Northern Province- Sinapa, Gegerawa, Marua	2,139	15	45
8	8. Northern Province- Kewansasap	870	10	25
	Total	4,921	100	200

* In addition to the 8 target communities, additional communities that will be served by the nurseries will include but not be limited to the following: Wewak town area (capital of East Sepik); Meni Beach; Moem Barracks and vicinities; islands that include Mushu, Wallis, Tarawai, Yuwo, among others. Other areas will be identified during project implementation.

It is estimated that in order to restore the coastal protection and ecosystem functions of mangrove forests in the target communities, which functions are critical to build community resilience from coastal flooding, from 5 ha to 20 ha of mangrove areas will be reforested in each community. The total is 100 hectares over the life of the project. This target area for the 8 communities will require about 1,000,000 mangrove seedlings based on an average density of up to 10,000 seedlings per ha. Areas directly facing the sea will be planted with higher density and lower density for other areas. This density will be adjusted according to the actual requirements of the specific sites. The best practices in mangrove reforestation (Annex 8) will be followed.

Eight (8) nurseries will be supported by the project and while they will serve primarily the requirements of the 8 communities; these will also provide for other communities in the future. The total turnover is expected at greater than 1,000,000 seedlings considering survival rate of about 90%. Average annual turnover per nursery is estimated at over 40,000 seedlings per year with the target planting period of over 3 years. The budget for the nurseries (Activity 1.3.2) is placed at \$335,000 to handle the volume. This amount will kick start the nurseries; supplementary funding will be sought from relevant government projects such as from Public Investment Programme which identified mangrove conservation as a priority. It is noted that the cost of an alternative centralized or shared nurseries will be higher considering the costs of transporting the seedlings over the wide geographical spread of the project sites. The consideration to encourage replication, as noted in the succeeding paragraph, has also weighed positively on the decision to develop the 8 proposed nurseries.

The total area of mangroves to be reforested by the project will go beyond the 100 hectares for the 8 coastal communities. Provisions have been made to maintain the nurseries beyond the life of the project as has been indicated in proposal, with the government committed²³ to provide the requisite financial and technical resources. While the initial priority will be the 100 hectares that are critical to moderate the impacts of coastal flooding, the nurseries will also provide the needs of other communities to generate CC adaptation co-benefits such as biodiversity conservation and fisheries livelihoods. It is estimated that at least additional 200 hectares of mangroves will be reforested through the same nurseries but with funding coming primarily from the government. Factoring the additional 200 ha would effectively bring the cost down to an average of \$1,517 per ha. It is noted, however, that the additional 200 hectares are not included in Strategic Results Framework as completion of reforestation activities will be completed after project completion. The committed allocation of resources by the government will go through the government budgetary processes at the national and local levels and the mainstreaming of mangrove reforestation and conservation into development and budgetary processes will ensure such commitment.

Another activity under this output aims at integrating the reforestation as well as the long-term conservation of mangroves, into local development plans (including the annual and medium term provincial plans and budgets). As mentioned above, community-based mangrove rehabilitation is aligned with the national development planning framework. However, the local approval processes in regards to mangrove projects depend on the source of funding: Where communities utilise funds

²³ Refer to the letter from OCCD which includes reference to government commitment about this project.

from provincial and district governments, the Joint District Planning Budget Priorities Committee (JDPBPC) will evaluate whether the project aligns with the local development and land-use plans. If a community utilises non-government funds, customary landowner rights in the country allow the community to proceed with any initiative they deem appropriate. Although listed as a separate activity here (1.3.3), no specific funds need be allocated for the integration of mangrove reforestation and conservation into development and land-use plans as these will be coordinated by the Programme Management Unit. The integration of mangroves in the development planning processes at provincial, district and local levels will include mangrove management and monitoring plans, which will be based on the analysis of suitable models and an evaluation of the WMA and LMMA models mentioned above.

At the start of the project, activities will be coordinated with officers from the local level government, including ward councilors, chiefs, and the officers from the provincial government and community representatives. This enables activities to be aligned with government programmes to ensure financial support during and beyond the life of the project. Community work programmes will be developed so as to include management of the nursery as a community activity. Planning at the local level is very important as this enables management of nurseries to be included in the local development plans. The process of including ward plans into the development plans is through the Joint District Planning Budget Priority Committee (JDPBPC). The capacity building component of the project will enable the community leaders to be empowered to prepare ward plans which fit requirements of the committee to ensure approval. The timing and mechanisms for turnover of the operation and maintenance of the nurseries will be done building on the related experiences of WWF in PNG.

An important consideration of the project is to effectively address the drivers of mangrove deforestation. The implementation of mangrove reforestation and other programme activities will build on traditional practices of communities. Such are based on adherence to rules and responsibilities verbally passed on across generations, which include beliefs related to protection functions from the natural environment that help in natural resource management. In a traditional hierarchical system, support is easy to obtain as members of the communities observe traditional practices as there are beliefs that disobedience is considered disrespectful which could lead to social pressure and penalties.

The government's current conservation and natural resource management laws allow communities to set their own rules to be observed and penalties for those who breach them. For example, the Flora and Fauna Act (FFA) provides for communities to set rules and guidelines to conserve and manage their resources. Even section 42 and 44 of the Organic Law on Provincial and Local Level Government (OLPLLG) allows local level governments (including wards) to make laws on the management of their natural resources. The project will assist these communities design the natural resource management plans in accordance with customary practices through trainings, awareness raising and technical assistance.

In accordance with the provisions of the abovementioned legislation, the project will initiate community mangrove forestry agreements/compacts that will be signed by all community members. This is a concrete and more direct approach to ensuring sustainability of mangrove forests. The agreements/compacts will cover the delineated mangrove reforestation area and the relevant adjacent areas that are critical for protecting the communities against coastal flooding. The agreements/compacts will define the allowable passive activities within the mangrove forest that will not involve cutting of the mangroves, such as fisheries. Provisions for penalties as well as incentives will also be included. The project will facilitate the drafting and signing of the agreements/compacts, which will be designed to be self-enforcing. Nevertheless, the project will put

in place a multi-sectoral monitoring and evaluation mechanism to monitor compliance and evaluate impacts. Community agreements/compacts are in accordance with the provisions of the Organic Law (OLPLLG) described above and consultative and participatory processes will be employed. The project will draw from the successful application of this law in Madang Province whereby a community with the assistance of an NGO formulated Conservation regulations for specific areas under threat from logging. The option of declaring the critical mangrove areas as protected areas under the FFA will be assessed during project implementation.

The formulation and signing of community agreements/compacts will require consultations and 'negotiations' with communities and local government units. With only 8 coastal communities covered by mangrove reforestation, the PMU will take the lead in this activity but will draw on the expertise and knowledge of the provincial implementation coordination units for site-specific considerations. The strong potential for securing long-term adaptation and co-benefits from these agreements/compacts points to the need for documenting best approaches and elements of such contracts for potential replication. Greater impacts could be realized through capacity building of practitioners, community leaders and local government and non-government partners in the best practices related to community compacts/agreements. Synergies with the activities in Components 3 (Institutional Strengthening) and 4 (Awareness Raising) are specified in the succeeding sections.

Throughout the activities under this output, the programme will draw on expert support, which is available from previous and ongoing mangrove planting pilots (e.g. the work by Motupore Island Research Centre - MIRC in East Hiri and a Wildlife Conservation Society - WCS project in Manus and WWF in a number of sites).

At the policy level, the project will contribute to the planned efforts of the DEC to review all the protected areas/conservation policies and legislative frameworks to have one Biodiversity Conservation Policy and Law in late 2012. This project will contribute ideas from perspectives of mangrove protection for biodiversity conservation, sustenance of livelihoods and serve as protection measure against coastal erosion/sea level rise.

Output 1.4: Integrated coastal adaptation measures implemented to protect 8 communities in East Sepik Province, Oro Province and New Ireland Province.

The initial activities under this output will comprise a comprehensive assessment of the flooding risk exposure in the targeted areas and the subsequent identification of cost-effective and suitable designs and specific location for the adaptation measures with the aim of providing adaptation functions to the most vulnerable communities.

Based on the above, the main activity under this output is the implementation of best practice coastal flooding adaptation measures in eight villages and/or small towns, whereas special emphasis will be put on the use of locally available materials and a strong buy-in from the communities. The adaptation measures will include hard measures (including small-scale seawalls and breakwaters among others). The eight coastal communities will be divided into two with activities commencing for the first set of four communities on the first year to be followed for the second set of four communities in the second year. Activities for the first set of communities will be guided by best practices culled from relevant completed and ongoing initiatives nationally and internationally. The lessons learned from the first set of communities will serve to 'fertilize' the best practices that will be useful for the second set of communities.

Coastal adaptation measures, including mangrove reforestation described below will be done in the context of land-use plans. The project will develop land-use plans in all of the 8 coastal

communities. Communities as defined in this proposal refer to a group of villages that consists of a 'ward'. The ward is the smallest geopolitical unit in PNG which has a defined political structure composed of village chiefs and recognized by the government. Land-use plans will be supported by the project, including its adoption by the ward and recognition by the district and provincial governments. The outputs of the land-use plans will include, among others, zoning plans for mangrove forests taking into consideration their buffering and protective functions against coastal flooding and including ecosystem services.

In order to ensure long-term sustainability and an enhanced local capacity the training activities on adaptation techniques under this output will go hand-in-hand with the implementation of the adaptation measures. The facilitation of communication and coordination among provincial, district and village leaders will be an integral part of the implementation of the adaptation measures against coastal flooding.

In line with the method employed for the implementation of the best-practice adaptation measures above the support for replication emphasises on community-led initiatives and the use of locally available materials. This ensures the strong local ownership of the adaptation measures, the local capacity to maintain the measure and will support the long-term sustainability of the adopted measures. To ensure that the replication support for other communities is achieving the desired impact, the oversight will be based with the Provincial Climate Change Committees²⁴.

Component 2: Adaptation to inland flooding-related risks and hazards for river communities in East Sepik, Oro, Morobe and Madang Provinces

Outcome 2: Reduced exposure and increased adaptive capacity of 8 riverine communities of the 4 provinces (East Sepik, Oro, Morobe and Madang Provinces).

Analog to the combination of outputs under the first component, the increased climate resilience of the targeted inland communities will be achieved by implementing a comprehensive early warning system that supports an established disaster preparedness and response framework while the impact of occurring floods will be further reduced by riverbank protection measures as outlined and justified below.

To address the risk of inland flooding in PNG, the OCCD has analyzed flood frequencies and scale; population numbers and asset value at risk as well as the vulnerability of people and assets in selected river systems (as presented in figure 2 on page 4). Building on this analysis of early warning systems, improved drainage and the construction of retaining walls and levees around villages and cities were identified as the most effective measures.

Catchment management in principle deals with regulating, controlling and managing activities conducted within the entire catchment, typically targeting head catchment use in order to reduce the environmental and flooding impacts in the middle to lower catchments. However, catchment management is only viable when there are conflicting and competing demands on limited natural resources in the catchment such as one river system serving as the main water source for hydropower generation, domestic water supply, agricultural irrigation and riparian users. In PNG, most large catchments including Sepik, Fly and Ramu are very rural with largely natural vegetation and where there is very little development taking place. This limits the viability of a catchment approach, given that there is little room to enhance the existing rainfall absorption and retention capacity through landuse measures at the catchment level.

²⁴ See Implementation Arrangements, p. 54

To this end a combination of riverbank protection measures and an integrated early warning system is seen as the most effective measure to limit damage and loss from flooding.

The protection of river banks is a localized, site-specific measure to protect the assets, infrastructure and population living in the low lying flood plains and is based on the assessment of the risks and severity of the flood events impacting on the assets, infrastructure and the population. Flood protection dykes can be built on the sides of river banks susceptible to inundation, and are commonly located along the middle to the end of the river channel. Wherever possible, community-managed measures using locally available materials, such as protective walls made of logs and complemented with vegetation planting, will be implemented. Successful examples of these measures have taken place in Fiji²⁵.

Lae City in the targeted Morobe Province is prone to flooding annually from the Bumbu River flash floods. The SMEC report of early 1990 recommended to the GoPNG and Morobe Provincial Government to construct embankment at lowly elevated areas to keep the flood waters away from the residential areas, industrial areas and government institutions. Financial constraints halted the project progress, which subsequently prevented it from fulfilling its primary objective of protecting the people from flood water; although only partially completed, some major assets (Lae Technical College, Bumbu Police Baracks and Cassowary Road Residential Area) and a portion of the population have been saved from the Bumbu River flood.

Output 2.1: Inland flooding early warning systems established for observation, data collection and information management and dissemination in the North Coast provinces.

Similar to the implementation of the coastal flooding early warning system, the initial activity necessary to achieve the output is an assessment that includes the analysis and mapping of inland flooding hazards faced by the riverine communities in the four targeted provinces with a particular focus on areas of major population. The assessment will also encompass the review of the very limited existing flood warning and forecasting systems with the aim of closing gaps and avoiding open-ended processes in the warning and information chain.

In order to increase flood disaster preparedness, the following actions will enhance the collection and observation of relevant data: The capacity of the PNGNWS in this regard will be enhanced by installing water level, river flow and rain gauges. This will be complemented by evaluating, selecting and implementing further technological options with the view of establishing an integrated system for the early detection of flooding hazards and disseminating respective warnings.

The database for the collection and monitoring of the collected data will be developed in a collaborative arrangement with the respective activity under output 1.1 in order to avoid the duplicity of infrastructure and processes where possible. Analog to the activity in output 1.1 an alert system for river communities will be put in place. The warnings for inland flooding hazards will be distributed via the abovementioned partnership with Digicel and media organizations. Workshops and continuous training for the establishment, maintenance and use of the inland flooding early warning system will be undertaken alongside the implementation of the above activities and in cooperation with the relevant stakeholders such as the National Disaster Centre, PNGNWS, Digicel and partners from the targeted communities and media.

The collected data shall also be monitored in regards to risk indicators for landslides that could

²⁵ Community-based adaptation project implemented by University of South Pacific in Buretu village, Fiji

affect populated areas or areas of strategic importance in regards to disaster preparedness and response (access roads, infrastructure etc.).

The inland flooding early warning system will be integrated into the management arrangements of the CEWS (output 1.1). This will ensure that there is no duplication of efforts and will be the basis for the long-term development of a multi-hazards warning system. Beyond the scope of this programme, the warning system, its operation and maintenance will be funded through recurrent budget allocations as mentioned in the narrative on output 1.1. Further expansion and integration of the system is envisioned to be achieved by generating additional resources through CSR and sponsorship contributions (activity 4.2.4).

Output 2.2: Inland flood preparedness and response plan and systems established in Oro Province

The enhanced capacity to collect and monitor information on inland flooding hazards and the ability to make informed decisions through the measures under the above output 2.1 are also the informational basis for the disaster preparedness and response system for inland flooding.

The activities under this output encompass the development of a disaster preparedness and response plan for inland flooding in Oro Province²⁶ in order to take different flood scenarios such as flash floods and slow rising floods into consideration. For flood preparedness, the establishment of emergency water storage facilities that are able to provide adequately clean water for consumption and the setting up and strengthening of evacuation facilities will be targeted through the activities. The disaster response and preparedness plan shall also include aspects of preparedness for landslides that could affect populated areas or areas of strategic importance in regards to disaster preparedness and response (access roads, infrastructure etc.).

The institutional coordination on the preparedness and response to inland flooding will be enhanced by facilitating systematic collaboration and exchange among the provincial, district and ward leaders of the province and the establishment of coordination mechanisms such as flood management committees. At the same time, the establishment of this network among provincial and district leaders will be the basis for the further replication of the disaster preparedness and response plan in other river provinces with priority given to provinces with the highest vulnerability to inland flooding. As mentioned in output 1.2, there will be a systematic collaboration among these outputs, which will ensure the incorporation of knowledge and lessons learnt especially in regards to the effectiveness of communication and coordination among institutional stakeholders. The collaboration among the two outputs will also ensure that redundant processes and infrastructure are avoided.

Output 2.3: Integrated riverbank protection measures implemented to protect 8 communities in East Sepik Province, Oro Province and Morobe and Madang Provinces.

As a basis for the other activities under this output, a comprehensive assessment of the flooding risk exposure in the targeted provinces will be conducted in order to identify cost-effective and suitable locations and designs of riverbank protection measures that provide adaptation functions to the most vulnerable communities. As with the coastal communities, the target eight communities will be divided into two with activities commencing for the first set of four communities on the first year to be followed for the second set of four communities in the second year. Activities for the first set of communities will be guided by best practices culled from relevant completed and ongoing initiatives nationally and internationally. The lessons learned from the first set of communities will

²⁶ Chosen as target area in response to the analysis of recent events as detailed in figure 2

serve to ‘fertilize’ the best practices that will be useful for the second set of communities.

Based on the above, the main activity under this output is the installation of suitable measures in the eight villages and/or small towns, whereas special emphasis will be put on the use of locally available materials. The protection of the riverbanks will be further complemented by the planting of suitable vegetation and land use planning that anchors the improved riverbank protection in further development and land use planning. Riverbank protection measures as with coastal adaptation measures will be done in the context of land-use plans in all of the 8 riverine communities, which is defined as a ‘ward’ described earlier. In order to ensure long-term sustainability and an enhanced local capacity the training activities on riverbank protection techniques under this output will go hand-in-hand with the implementation of the riverbank protection measures.

The following are the potential target communities based on vulnerability to inland flooding to be verified during the inception phase.

Province, River Basin	Communities
Morobe	
Bumbu River	Bumbu; West Taraka
Oro	
Mambare River	Kokoda; Loma
Madang	
Ramu River	Annanberg; Communities near Ramu Sugar to Bogia
East Sepik	
Sepik River	Ambunti; Angora

The facilitation of communication and coordination among provincial, district and village leaders will be an integral part of the implementation of the adaptation measures against inland flooding. A cross-community learning exchange on best practice adaptation measures for inland flooding and their management will provide the basis for capacity building on which the measures put in place in the demonstration villages can be replicated in other communities. This proposal puts in place a dedicated support mechanism (activity 2.3.3.) for the replication of the best practice adaptation measures described above. The replication of the adaptation measures and selection of sites will be based on OCCD’s criteria on adaptation interventions (as described in Figure 5).

In line with the method employed for the implementation of the best-practice adaptation measures above the support for replication emphasises on community-led initiatives and the use of locally available materials. This ensures the strong local ownership of the adaptation measures, the local capacity to maintain the measure and will support the long-term sustainability of the adopted measures. To ensure that the replication support is achieving the desired impact, the oversight on the replication projects will be based in the Provincial Climate Change Committees²⁷.

Component 3: Institutional strengthening to support climate- and disaster-resilient policy frameworks

Outcome 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices

The activities under this outcome focus on the development of the relevant institutions’ capacity to integrate aspects of climate change-related risks and respective adaptation strategies into policy

²⁷ See Implementation Arrangements, p. 54

making. A two-pronged approach is pursued under the proposed programme:

- (i) Integration of climate change risk and resilience to flooding into development policies that encompass legal and planning frameworks.
- (ii) Further capacity building through the systematic training of policy makers at the national, provincial and district level, which goes hand-in-hand with the above development and implementation of climate-resilient policies.

Through the above processes, the proposed programme also aims at strengthening ongoing dialogue and coordination among several stakeholders, feeding into the ongoing development of the Climate Change Act.

Output 3.1: Climate change-related risks and resilience to flooding integrated into coastal zone management related policies, legal and planning frameworks at the national and sub-national levels

A comprehensive analysis of climate change gaps in existing coastal zone management policies and the related legal and planning frameworks at different levels will constitute the first activity. Based on this, the OCCD, in its coordination function, will establish plans and timelines for the process of mainstreaming climate change issues into economic and land-use planning frameworks. The plans and timelines are based on the prior facilitation of agreements with the relevant bodies regarding the mainstreaming objectives and policy instruments to be modified or developed.

Following the above preparatory work, the OCCD will take on the facilitation of consultations to integrate climate change issues into the relevant policies. The implementation of the policy frameworks will then be monitored and analyzed in order to extract practical implementation challenges (such as issues in regards to communication, resistance to change or enforcement) adapt the policies accordingly and feed the lessons learned back into the national policy-making frameworks and processes.

Another activity related to the achievement of the implementation of climate-sensitive policies will be the programme's support for the establishment of the proposed Conservation and Environment Protection Authority (CEPA), which is currently ongoing. With the establishment of CEPA the Government of PNG seeks to address a gap in regards to enforcing, managing and auditing environmental regulations. As an Authority it is envisioned to be equipped with the powers to oversee environmental approvals, collect levies, enforce regulations and prosecute offences. In regards to climate change and adaptation CEPA will be an instrumental partner to the OCCD in enforcing the policies that will be climate-proofed under this proposal. The authority will also oversee approval processes and permits that are applicable to adaption measures that fall into the categories of prescribed activities which require environmental permits (as described in Part II, Section E). The draft bill for the establishment of CEPA is currently going through the NEC approval process. In the current draft it is planned for CEPA to substitute the DEC as an authority with a mandate over and beyond the one governing DEC.

The AF programme's support to CEPA will firstly focus on integrating climate change considerations in the Environment Impact Assessment process and various conservation acts falling under the intended purview of CEPA. As prerequisite part of mainstreaming Climate Change considerations into regulations, the AF programme will build the capacity of CEPA staff in regards to climate change and adaptation in general and the identification of non-adherence to climate-change related regulations and their enforcement in particular. This will positively contribute to the programme's objective by ensuring that the policies that are climate-sensitized through activities under this

programme and other adaptation interventions are effective and enforced thus supporting a strengthened climate resilient institution and policy framework.

Development planning will be initiated at the provincial level leading to protection of communities and city centres against climate change hazards. Resources will be used to provide expert input into the preparation of the development plans by the provincial administrations of the North Coast and Island Provinces and their alignment with district and local level development plans (Activity 3.1.4). This will ensure that the development plans are climate resilient, in line with the county's Climate-Compatible Development Strategy (CCDS) and supportive of this programme's objective of enhancing the adaptive capacity of communities. It will also ensure that soft and hard adaptation measures will be integrated in the development planning processes at all levels.

A comprehensive review (Activity 3.1.5) of the existing development plans for Wewak's protection against climate change impacts will be undertaken in cooperation with the Provincial Administration of East Sepik Province. During local consultations it became clear that the plans had been developed in a somewhat ad-hoc manner and with insufficient analysis and expertise. The planned measures are poised to be ineffective and could bring about negative impacts on the sea-front communities at the outskirts of Wewak. The objective of this activity in particular is to provide the Provincial Administration of East Sepik with a revised development plan for Wewak that responds to pressing needs and based on sound technical analysis of the impacts of climate change on vulnerable communities.

The review of the current development plans will pay particular attention to the 3 high-risk provincial capitals of Lae, Madang and Wewak²⁸. The study will build on the coastal hazard mapping and flood management plan developed under Output 1.1. The underlying cost-benefit analysis of the adaptation measures will also be reviewed. An initial estimate by the OCCD puts the investment cost of seawall construction at 1,7m USD per kilometre and an additional 25,000 USD per kilometre in annual maintenance costs²⁹. However, seawalls offer the potential to avert a significant part of the expected losses from climate-change related flood impacts. An estimate by the OCCD places this potential at around 30% of the expected losses³⁰. The study will serve to identify cost-effective and suitable locations and designs as well as resources for funding the identified measures. The feasibility study under this output will also seek the collaboration and coordination with activities undertaken by the PNG Pilot Project under the UN HABITAT Cities and Climate Change Programme.

To ensure that the abovementioned activities lead to actual adaptation it is an integral activity to provide technical trainings for the relevant agencies and the provincial planners in particular. With the underlying analysis and capacity of the provincial agencies the implementation of the adaptation measures for the provincial capitals relies on the identification of sources for funding, which will also be addressed by providing expert input into the development planning processes. This could include exploring the option of implementing the adaptation measures through further support and resources from the AF, which would be then sought through a separate proposal.

Output 3.2: Policy makers and planners at the national, provincial and district offices, institutions and extension services systemically trained to implement climate-sensitive policies and plans.

²⁸ In Wewak, for example, the king tide 3 years ago washed away large parts of the main street at the beach.

²⁹ The estimate is based on an averaged analysis. Costs vary depending on site specific conditions as well as on the respective design of the seawall.

³⁰ The estimated loss relates to economic centers with high value at risk.

In order to equip policy makers with the ability to develop and implement climate-sensitive policies and plans in line with PNG's CCDS, a series of targeted workshops and seminars on climate change-related topics encompassing risk assessments, policy and planning processes will be undertaken. The key agencies, which will be involved include the OCCD, Department of Environment and Conservation, Department of Agriculture and Livestock, Department of Health, Department of National Planning and Monitoring, Department of Provincial and Local Level Affairs, National Weather Service, and National Disaster Center. The scope of this activity will also cover the integration of climate change and disaster risks in the development of standards for building codes and land-use planning codes in collaboration with provincial authorities. It is noted that the community compacts/agreements related to mangrove conservation would constitute one of the major achievements of the project to ensure long-term adaptation benefits in the coastal zone. The knowledge products developed on this activity will be included in the targeted workshops and seminars in this activity.

The preparation and dissemination of regular policy briefs to inform higher-level policy makers on mainstreaming climate change-related risk reduction and related adaptation processes will ensure the national and cross-sectoral reach of integrating climate resilience in policies. The programme will further facilitate the utilisation of funding mechanisms such as the infrastructure tax credit schemes available to communities through trainings and provincial workshops. The workshops also aim and strengthening the link between communities and their provincial administration.

A further activity will be the facilitation of the cross-sectoral and inter-ministerial dialogue via a strengthened National Climate Change Committee and Technical Working Groups as well as their constituencies at the sub-national level.

Component 4: Awareness raising and knowledge management

Outcome 4: Strengthened awareness, education and advocacy to promote ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels

In order to ensure the long-term sustainability and broad outreach of the programme outcomes, as well as the development of local capacity to replicate the measures and policies put in place under the programme, a systematic and multi-faceted awareness raising strategy is proposed.

The intended audiences include the communities in the coastal and inland areas targeted by the intervention measures under components 1 and 2 with the aim to enable them to make informed decisions in regards to the occurrence of climate related risks and hazards. This includes awareness raising that informs vulnerable communities on the early warning system and the implications of warnings in regards to actions that need to be taken for disaster preparedness and response.

Further, the dissemination of lessons learnt and knowledge transfer among civil society, policy makers and educational institutions throughout the programme's implementation phase will support building of local capacity to replicate and sustain the achieved outcomes and thus ensure increased climate change resilience on a national level.

Output 4.1: Lessons learned and best practices generated, captured and distributed to other communities, civil society, policy makers in government and globally through appropriate mechanisms

Based on the experience from the implementation of adaptation measures under components 1 and 2 of this programme, targeted learning materials that include case studies on best practices, photo stories, short videos, posters and brochures (including in local languages), will be developed and disseminated via the local government institutions, extension services, NGOs and CBO's.

Further, regular information on the progress and undertakings under the proposed programme will be made available by implementing a programme communication plan and using range of national and local media. Another activity will be the setting up of a national web-based adaptation knowledge platform, which will be maintained through the OCCD and ensures that the knowledge and tools are available to stakeholders and other initiatives aiming at strengthening climate change resilience in PNG.

The activities in relation to Output 1.3 constitute the biggest government intervention on mangroves reforestation to date. As PNG has a long coastline affected by coastal flooding, the best practices generated in these activities will benefit the efforts of the government in replicating this project nationally. The community agreements/compacts as described in Output 1.3 constitute one of the path-breaking approaches of the project for which lessons learned in community consultations, negotiations and agreements and subsequent monitoring will be very valuable. Such will form part of the knowledge products from this project which will be packaged (in the form of e.g., reports, videos) for consumption by communities as well as by NGOs and government practitioners.

The developed knowledge products will be disseminated through regional and global platforms, such as the Climate Change Portal of the Secretariat of the Pacific Regional Environment Programme (SPREP), the Adaptation Learning Mechanism (ALM) and the UNDP Energy and Environment Network. The extracted knowledge on adaptation practices shall also be presented and discussed at national and regional forums and meetings.

At community-level, exchange and site visits will facilitate the sharing of lessons learnt and first-hand experience among the vulnerable communities as well as the replication of the adaptation measures to climate-related hazards.

Output 4.2: Climate change awareness and education programmes carried out

Under this output, the aim is to integrate the experience drawn from the implemented flood adaptation measures as well as general aspects of climate change and adaptation into training materials, school programmes and community awareness programmes. This includes a dedicated activity on the development of educational materials and actions for schools. In order to integrate the materials into school curricula, this also requires an activity focused on the training of teachers and educators on issues of climate change, adaptation and disaster preparedness and response. It will also be instrumental to facilitate school visits to programme sites and their inclusion in local consultation events.

It is further envisioned to attract private sector contributions from Corporate Social Responsibility programmes and sponsorships that allow make further adaptation support available to communities and continue the range and reach of the awareness raising activities beyond the timeframe and scope of this programme.

B. Describe how the programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities.

Through its outputs, the programme will deliver socioeconomic benefits (especially in the context of protection of lives, economic activities, livelihoods and assets) and create the enabling environment for resilience to medium, longer and creeping impacts of climate change. The coastal early warning, coastal and river bank protection activities will protect essential community and household assets, with expected spin-off benefits to livelihoods through the soft-adaptation measures (mangrove conservation, vegetation planting along riverbanks), such as sustainable supply of raw-materials and enhanced fish/crab production. By reducing exposure to flooding events and an increased ability to prepare for and respond to disasters, the implemented measures will also enhance the effectiveness and benefits of other initiatives that target the improvement of livelihoods of the vulnerable communities. Further, the reduced exposure to flooding events will also reduce negative impacts on the health of the population in flood-prone areas and thus support efforts aimed at improving health and fighting outbreaks of waterborne disease such as Cholera.

The adaptation measures to be introduced by the programme are also designed to provide key environmental benefits that will further support livelihoods. The riverside and coastal vegetation and mangrove conservation actions will strengthen the resilience of vital coastal ecosystems that provides a range of ecosystem services, including coastal protection and buffer for flooding, cyclones and other extreme climatic events. Given the role of mangroves in marine and near-shore ecosystems as breeding and raising grounds for many marine fish and other species, it is expected that food supply from coastal areas will be also enhanced.

Responding to the severe climate-related flood hazards and risks, as detailed in the context section, it is expected that the programme will produce impacts at scale, considering the direct involvement of several villages and broader outreach across 11 Provinces, representing the most populous areas of the country, comprising around 3.8 million inhabitants.

The OCCD is undertaking an intensive period of consultation with a broad range of stakeholders, including government representatives, members of the civil society, private sector and local communities. One objective of OCCD's provincial consultation is the identification of priority areas that offer the largest potential for providing benefits to the most vulnerable communities. Provincial consultation events involve local NGOs, CBOs as well as provincial, ward and community representatives. Please Annex 6 and section H on page 50 for further details on the consultation process and the identification of the most vulnerable communities.

C. Describe or provide an analysis of the cost-effectiveness of the proposed programme.

The proposed interventions outlined in this programme proposal are based on PNG's Climate Change Interim Action Plan in which cost-effectiveness was one of the main factors in the identification of priority actions. The Interim Action Plan resulted from a thorough in-country consultation process (refer to section H and Annex 6 for details) and contains analytical information, as well as recent assessments of legislative, policy and capacity constraints that are based on references from other related analysis, such as the draft National Capacity Self Assessment Report, National Climate Change Stocktake by World Bank and OCCD, the Climate Change Vulnerability and Adaptation Assessment under the Second National Communication Project³¹, and the review of the DRM assessments conducted for PNG by UNDP in 2008 and UNDAC in 2009.

³¹ Still being drafted

Cost effectiveness of the identified and proposed adaptation measures:

Over the course of developing this proposal, potential initiatives to address the identified hazards were prioritized through a series of filters that seek to maximize the benefits in terms of saving lives, protecting livelihoods and assets while ensuring that resources are efficiently allocated. As elaborated on in the programme strategy, a five step process was used to filter adaptation measures and included a filter on the cost-effectiveness of the adaptation measures (Adaptation measures with a cost-benefit ratio greater than 1 were eliminated – refer to figure 5 for example on prioritisation of adaptation measures to address coastal flooding)

Community-based small-scale adaptation measures:

The community-led implementation modality and related capacity building will ensure that the adaptation measures to address flood hazards are owned by the communities they protect. The programme's outputs also ensure that there is local capacity to maintain and sustain the protective function of the adaptation measures. The relation of the cost in consideration of the number of people protected is the most favourable among the alternatives as outlined in the table below.

Early warning systems and strengthened disaster preparedness and response frameworks:

As it has been demonstrated through recent (Oro Province) and past flood-related disasters in PNG, the current disaster management and response system has proven to be largely ineffective. Investing in climate-early warning systems enhances disaster preparedness and builds long-term climate-change resilience of communities by saving economic loss and damage to properties and lives in a more efficient way. The coastal disaster warning system of the NDC, which was enhanced by the partnership with a telecommunication company that was facilitated by the OCCD had its recent and successful maiden test when it was used to disseminate warnings to 300,000 people in the North Coast and Islands Regions in response to the recent (2011) Japan Tsunami. At this scale, the cost-effectiveness is self-evident. However, the shortcomings of the current system are the insufficient capacity and equipment that would allow the monitoring, storage and analysis of data, which can be used to determine the risk level for coastal floods and trigger the respective warning and/or information dissemination when required. The intervention under this programme will ensure that the early warning systems reach their potential in covering the majority of the population exposed to flooding hazards.

Ecosystem-based flood protection measures (mangrove and vegetation planting)

The alternative to ecosystem-based coastal protection (mangroves planting), and riverside protection using local material and complementary soft techniques (vegetation planting) is the employment of hard structures, which are highly investment and engineering intensive, and cannot be implemented and maintained through community-based actions. While hard infrastructure is preferable to critical assets with very high exposure (such as cities and economic centres), local and soft options are preferable in that the communities themselves can manage them, if empowered by training and technical assistance activities. The additional livelihood benefits as outlined in the above section further improve the cost-effectiveness of the measures implemented under this programme. There are some emerging experiences on soft coastal and riverside protection in the region (like the Tikina Wai mangroves adaptation project by WWF through UNDP-Small Grants Programme, and the University of South Pacific coordinated CBA projects on riverbank protection in Fiji), with well-documented evaluation of results, that can be used as reference for effectiveness. As outlined in the intervention strategy, a mix of harder and soft

solutions (with the latter preferred), will be employed in the programme, based on more detailed site-specific assessments to be done during the project implementation. The flood protection measures will be designed in a complementary way to the WB-Pilot Programme on Climate Resilience, Pacific Project and its PNG pilot initiative (currently the Phase 1, design stage is being initiated and coordinated through ADB and OCCD), which aims at climate-proofing national infrastructure.

As mentioned above, mangrove reforestation and conservation can offer protection at low costs (around \$1 per protected life and less than \$0.20 per protected USD of assets per year) based on a PNG analysis. Further at this stage, OCCD is conducting a detailed cost-benefit analysis of various mangrove project implementation modalities with a special focus on initiatives that have shown to overcome problems regarding the low survival rate of seedlings and have managed to ensure long-term sustainability by achieving a buy-in from the communities thus achieving an even higher cost-effectiveness. The data derived from this analysis will also be the basis for determining the most cost-efficient implementation modality that ensures long-term sustainability. The implementation modalities will be covered in the mangrove toolkit currently being developed under the coordination of OCCD.

At the operational level, cost effectiveness of the programme is reflected through the following characteristics:

- Throughout the programme, AF resources will be aligned with the financing and delivery of programme outputs that have competitive procurement components to ensure best value for money. In this regard, the programme will apply best practices identified by other, ongoing climate change adaptation projects in the region (e.g. PACC, SGP-CBA, USP-CBA). UNDP procurement procedures will be followed.
- This programme will utilize existing government structures and processes for implementation such as the District Support Development Programme, District and Ward Development Plans and sectoral extension services. By building on existing government and institutional structures, the programme will also harness in-kind support and contributions from offices at the national, provincial, district and local levels (office space, staff time, communications, etc.)
- Through the existing network of stakeholders, the results framework of the programme, will be able to utilize existing baseline surveys of line agencies and harness existing delivery mechanisms such as the Papua New Guinea Small Grants Programme, if applicable. This will further expand the reach and replicability of outputs.
- The bulk of the programme's funds will be directed to community-level activities and hence brings opportunities for local procurement of goods and services with it.
- Partnerships will be pursued with: a) communities providing in-kind support for community-level adaptation measures; and b) private sector in relevant activities such as in the early warning system where technology hardware and software are essential components. Cost sharing arrangements will be pursued during project implementation.

Specifically for the mangrove reforestation activities, cost effectiveness will be pursued through the following mechanisms:

- Cost-sharing with communities (whereby only the seedlings are provided) and through counterpart funding from government;
- Pursuing related conservation activities at the provincial, district, local and ward level governments in consultation with the communities which this project can build on and where cost-sharing options can be further pursued. It is anticipated that provinces will scale-up climate change-related activities to which this project could link up with;

- Collaboration with academic institutions for students to volunteer to conduct awareness and advocacy activities in the provinces, which usually happens a week or two leading up to World Environment Day celebrations in the country; and

In all aspects of the program, emerging opportunities for spreading costs will be tapped during project implementation.

Overview of climate change adaptation measures proposed and evaluation of alternatives:

Adaptation Objective	Proposed Measure(s)	Comparison with alternative(s)
Protection from Coastal Flooding	Community-based small-scale adaptation measures and replications (e.g., small-scale seawalls, erosion control measures and other small infrastructure measures) Mangrove reforestation and conservation	There are two alternatives to small-scale adaptation measures in the communities: Large scale infrastructure solutions: The protection of several communities that are exposed to the risk of coastal flooding through large scale infrastructure measures such as seawalls and offshore breakwaters would have an unjustifiably high cost per protected life. Provincial administrations are also not seen to be in a position to provide the required works and maintenance function for such infrastructure measures as is evident by the state (or absence) of the large-scale adaptation measures in the provincial capitals (such as Wewak). This would seriously affect the sustainability and long-term protection function of any large-scale infrastructure measures at risk. Resettlements: Resettlements in PNG have proven to be problematic, due to the landownership context of 97% of the land being owned under customary land rights. Thus the state does not own the land and would need to compensate landowners. Existing re-settlements have created significant problems and, in some cases brought social unrest.
Protection from Inland Flooding	Community-based small scale adaptation measures (riverside protection measures such as strengthened embankments with locally-available materials and vegetation planting, conservation levees and improved drainage systems)	There are two alternative to small-scale adaptation measures in the communities: Large-scale infrastructure measures: Analogue to the analysis of the viability of large scale infrastructure solutions for coastal flooding, the ratio of costs and protected people would far exceed the justifiable limits. Providing and maintaining large-scale infrastructure measures in riverine communities that are affected by inland flooding would also be beyond the capacity of provincial administrations in the current scenario. Resettlement: As mentioned above, resettlements are not a cost-effective solution due to the compensation costs as well as costs related to social problems and unrest brought on by resettlements. Catchment area management: Catchment management in principle deals with regulating, controlling and managing activities conducted within the entire catchment in order to reduce the environmental and flooding impacts in the middle to lower catchments. However, in the programme areas (including Sepik, Fly and Bumbu river systems), the catchment areas are well-vegetated and do not require rehabilitation. Catchment management is not a real alternative in this case.

		To this end a combination of riverbank protection measures and an integrated early warning system is seen as the most effective measure to limit damage and loss from flooding.
Protection from coastal flooding and inland flooding	Early warning system Strengthened disaster preparedness and response framework	Early warning systems and disaster preparedness are complementary measures to those mentioned above. In terms of cost-effective protection from climate hazards, there are no viable alternatives to early warning systems and strengthened disaster response frameworks that expand the protective function to a significant part of the hazard-exposed population at a very limited cost.

■ Programme Sustainability

The strong commitment of the Government of Papua New Guinea to sustainably address climate change and its social, economical, environmental and financial impacts has been evident through several initiatives from the country's leadership. This clear intention is reflected in the country's Climate Compatible Development Strategy and the establishment of the National Climate Change Committee as well as the Office of Climate Change and Development.

AF funds are sought to support the Government of Papua New Guinea in fulfilling these high ambitions and to facilitate the integration of climate-change adaptation into the relevant policies and decision making processes. AF resources will be used to ensure that the relevant institutions are equipped with the capacity to turn the policies into sustainable and positive impacts on the ground. At the same time, the programme's coastal and inland flooding components and adaptation measures put in place will clearly demonstrate the social, economic, financial and environmental benefits of adapting to the hazards of climate change under a climate-compatible policy and decision-making framework that will support the resiliency of longer-term development efforts beyond the programme cycle.

The outputs of this proposed programme serve to increase the targeted beneficiaries' resilience to climate change and the most pressing climate hazards, that remain insufficiently addressed to date. The activities for the implementation of adaptation measures are conducted on a community level and aim at building an understanding and awareness of the issues at hand while including the communities in the development and maintenance of the adaptation measures. The participation of the targeted communities is, for example, an instrumental part of the mangrove planting and adaptation measures related to coastal flooding. To a large part, the protective riverbank measures implemented under this programme will be designed in a way that they can be maintained and replicated in the using locally built capacity and locally available material. The focus on community-led initiatives and support to community-led replication of the best practice adaptation measures also ensures that the risk of insufficient community support endangering the effective use of the programmes' resources and sustainability of the impact is effectively mitigated

Trainings and participatory processes as well as the establishment of local processes and institutions (e.g. flood management committee at village level) aim at creating the local capacity to make informed decisions in regards adapting to climate change-related floodings. The implemented measures will protect the well-being, health and assets of individuals, households and villages, which in turn is a basis for further sustainable development of the targeted areas.

The programme integrates a specific component on awareness raising and knowledge

management as key part of the sustainability and replicability strategy of the initiative. Through systematically documenting and disseminating good practices, and through a broad network of partnerships, it is ensured that lessons learnt from other initiatives are integrated in this programme's implementation while providing a wide dissemination of programme results and lessons learnt.

Mainstreaming of climate change into sectoral and broader policies and plans will ensure that climate change adaptation will form part of government processes at all levels. Government has now provided an unqualified commitment (refer to footnote on page 27) to provide the necessary resources to implement the project and maintain and continue operating the facilities, including the mangrove nurseries, to ensure that replication activities will be carried out. The Strategic Results Framework reflects these targets accordingly. As the results framework will be the basis for the monitoring and evaluation, the related targets and indicators will be covered. The replication sites will be governed by the lessons learned from the project. Conservation compacts/agreements with communities will be formulated to ensure that the mangrove forests do not disappear.

D. Describe how the programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programmes of action, or other relevant instruments, where they exist.

This programme is in line with the objectives of the Government of Papua New Guinea's (GoPNG) Vision 2050 pillar on Climate Change and Environmental Sustainability, Development Strategic Plan 2030 (comprising 4 five-year Medium Term Development Plans), as well as sectoral policies including the National Agricultural Development Plan, PNG National Marine Programme, Environment Act and Fisheries Management Plan.

The proposed programme is further supportive of some of the key vulnerability areas identified by the CCDS and Interim Action Plan, which include coastal flooding and inland flooding. The interim actions from the CCDS at the national level form the basis for mainstreaming climate change and adaptation into provincial, district and local level government development plans through this programme's activities.

Most importantly, this programme seeks to support gender participation, and that women and youth are given a greater role in building community resilience to the climate hazards. Furthermore, this programme also seeks to institutionalise gender sensitivity in disaster management. This is inline with the MDGs, the 2005 Hyogo Framework for Action, PNG Vision 2050, Development Strategic Plan 2010-2030 and the Medium Term Development Plan 2011-2015.

The Development Strategic Plan 2010-2030 under part 6, sections 6.2-6.8, clearly articulates the strengthening of cross sectoral policies on youth, gender, HIV/AIDS, Vulnerable and Disadvantaged, Environment, Climate Change and Natural Disaster Management as priority. The proposed AF programme is supportive of these sections, having the objective of building climate change resilience in communities and at the same time foster development leading to more secure livelihoods.

The programme, therefore will serve to review and strengthen existing national policy frameworks through better integrating climate risks and resilience considerations. Building on existing government institutions at the different levels, the programme will foster inter-ministerial and

sectoral coordination on climate change adaptation issues, including consultations with representatives from NGOs and the private sector. Through its interventions on the institutional and policy levels as well as its cross-sectoral partnerships and implementation strategy, the programme will be instrumental to the mainstreaming of the objectives outlined in the CCDS.

E. Describe how the programme meets relevant national technical standards, where applicable.

All UNDP supported donor funded projects are required to follow the mandatory requirements outlined in the UNDP Programme and Operational Policies and Procedures (UNDP POPP). This includes the requirement that all UNDP development solutions must always reflect local circumstances and aspirations and draw upon national actors and capabilities under United Nations in PNG Delivering as One (UN DaO).

In addition, all UNDP supported donor funded projects are appraised before approval. During appraisal, appropriate UNDP representatives and stakeholders ensure that the programme has been designed with a clear focus on agreed results that are in line with national regulations and standards. The appraisal is conducted through the formal meeting of the Programme Appraisal Committee (PAC) established by the UNDP Resident Representative. The PAC representatives are independent in that they should not have participated in the formulation of the programme and should have no vested interest in the approval of the programme. Appraisal is based on a detailed quality programming checklist which ensures, amongst other issues, that necessary safeguards have been addressed and incorporated into the programme design.

The programme will be consistent with all relevant national legal frameworks and standards, such as:

- Lands and Physical Planning Act
- Environment Act (including Environmental Impact Assessment procedures and standards for water and wastes)
- Organic Law of Provincial and Local Level Government (provisions for District and local-level approvals)
- Disaster Management Act

The applicable technical standards (including provisions governing permits necessary for civil engineering works under the various outputs), are laid out in the requirements for the environmental permits (as detailed below). However, the programme's activities including the engineering works under outputs 1.4 and 2.3 are of insufficient scale and technical specifications to be classified as level 2 or 3 activities and hence district and local-level approvals only.

The approval process at the local and district level supports the timely of the implementation project activities in line with the schedule provide in the proposal document because it allows the direct communication between the communities and the decision-making bodies and thus allows for timely revisions to the planned adaptation measures should they become necessary in the view of the local decision making bodies (Ward councillors and Joint District Planning and Budget Priority Committee).

Environmental permits:

Environmental management and related impact assessments in PNG are provided for under the Environment Act of 2000 and its accompanying regulatory instruments including the Environment (Prescribed Activities) Regulation, 2002, and the Guideline for Conduct of Environmental Impact Assessment and Preparation of an Environmental Impact Statement, 2004. The Act and regulations are administered by the Department of Environment and Conservation (DEC). The Environment Act caters for the sustainable management of the biological and physical components of the land, air and water resources of the country.

The Environment (Prescribed Activities) Regulation 2002 categorizes activities in two schedules according to the anticipated potential environmental impact. Schedule 1 consists of Level 2 activities that are subdivided into two categories (Category A and B). Category B has 13 sub-categories. Projects that have more adverse environmental impact are designated in Schedule 2 as Level 3 activities and only apply to major developments that have an environmental impact on the national level. All activities that do not fall into either Level 2 or Level 3 are considered Level 1 activities.

An assessment of the programme's proposed activities shows that all activities fall within Level 1 activities as stipulated in the abovementioned provisions and do not require any permits. The close collaboration with the provincial and district administrations as well as with DEC will ensure that any new requirements that are put in place during the programme's implementation period will be adhered to. The reviews and studies might include the identification of adaptation measures that would require Level 2 or Level 3 permits. The respective permit requirements and related impact assessments will be included in the reviews and studies.

District & Provincial level approvals:

In cases where project activities are partially funded by funds from GoPNG, approval will be sought from the Joint District Planning and Budget Priority Committee in line with the requirements stipulated in the Organic Law of Provincial and Local Level Government³²

Local-level approvals:

For activities that are implemented with sole resources from this programme, the approval from the Joint District Planning and Budget Priority Committee (JDPBPC) is not necessary and the approval authority lies with the Ward Councillor.

A prerequisite for all adaptation activities is the approval by the customary landowners, which will be sought upon identification of the specific implementation sites.

There are no implications of the above requirements in regards to the programme's implementation schedule and budget allocations.

³² Approvals at the JPPBPC and Joint District Planning and Budget Priority Committee (JDPBPC) are somewhat gender-sensitized in that female representation is mandated.

F. Describe if there is duplication of project / programme with other funding sources, if any.

The coordination of adaptation interventions in PNG is the main function of the OCCD's Adaptation Division. The programme will clearly benefit from the executing entity's (OCCD) mandate to lead the coordination and facilitation of all climate change-related policies, initiatives and actions as stipulated under Pillar Five (Climate Change and Environmental Sustainability) of PNG's Vision 2050. In its function as clearing house, the OCCD will consider the implementation of a project (including this proposed AF programme), if it satisfies four criteria:

- 1) no existing programmes or no existing funding in place for this considered project;
- 2) the ability to protect people;
- 3) cost-effectiveness of the measures; as well as
- 4) high people-protection factors.

There are various bodies and institutionalised exchanges through which the OCCD coordinates adaption interventions in PNG. Representatives of all relevant government agencies, private sectors, civil society organisations and development partners involved in climate change adaptation issues are represented in the Adaptation Technical Working Group (ATWG) of the OCCD. The composition of the ATWG is described in the section covering the consultative process (Part II, Section H). Further, a regular Joint Government of PNG and Development Partners Climate Change Forum Meeting is undertaken with the aim of coordinating the contributions and programmes from international development partners. Furthermore, the coordination of climate change related issues and adaptation interventions is overseen by the National Climate Change Committee, which acts as safeguard to ensure to sufficient coordination among climate change-related initiatives.

With the above in mind, the programme will be implemented to create synergies with and implement complementary actions to the projects and initiatives outlined in the following table. Further, these initiatives will serve as resources for valuable lessons learnt and, at the same time, be part of the audience for the knowledge management and dissemination activities under the awareness raising component of the proposed programme.

The relevant projects (as outlined in the following table) have been reviewed and their activities in the areas of awareness raising and institutional strengthening of this proposal are well coordinated and complementary in that they focus on the integration of climate change related issues into established awareness raising and institutional training platforms rather than being stand-alone activities. This allows the relatively low cost allocations for awareness raising and institutional strengthening under this programme.

Initiative/ Organisation	Status, results, limitations	Complementarities to proposed AF programme
The Pacific Adaptation to Climate Change (PACC) 2009-2011 (UNDP-GEF)	PACC is a regional UNDP-GEF funded programme executed through SPREP, involving 13 countries of the PIC. In Papua New Guinea the activities under this programme are focusing at aspects of food security and droughts in, and limited to the pilot communities at Kivori, southern coast of Papua New	The GEF-funded PACC has identified its priority sector of intervention in the areas of drought and ENSO. The activities focus on soil water balance and ground water irrigation. As such, the focus of institutional strengthening under the PACC has a different scope. In some instances and locations, collaboration on specific activities might be possible. This is for example the case where salination from seawater is affecting the soil water balance or where land use and water management issues are impacted by floods. In these scenarios, the activities on

	Guinea.	awareness raising and institutional capacity building will be coordinated among the two initiatives. In order to identify the limited options for collaboration, the programme will ensure close coordination with the PACC national project coordinator and technical group in PNG.
Mangrove planting initiatives by Motupore Island Research Centre in East Hiri and a Wildlife Conservation Society project in Manus, PNG	The mangrove planting initiatives have been facing some limitations in regards of the survival rate of mangrove seedlings, both factors being essential for long-term sustainability.	The OCCD is currently conducting a stock take of planned and existing mangrove projects in PNG. Further, an analysis of the most cost-efficient and successful mangrove planting modalities that ensure community buy-in and long-term sustainability as well as enforcement of conservation areas will be undertaken. This will be the basis for the coordination of mangrove planting initiatives and respective capacity building activities in the country.
NDC-OCCD-Digicel Partnership	The coastal warning system set up through this public-private partnership has already demonstrated to be a cost-efficient warning dissemination system for disaster preparedness. The system, however is not fully integrated and there is insufficient capacity and equipment to allow the system's use as coastal flood warning.	The outputs under this programme will ensure the integration of the coastal early warning system and build respective capacities. The system will be expanded through further equipment and data management that allows the analysis in regards to climate-related coastal floods.
Coastal and Marine Resources Management in the Coral Triangle of the Pacific	This GEF-funded project falls under the purview of the Pacific Alliance for Sustainability Programme and is being implemented by ADB. It seeks to address vulnerability to various forms of risk including the impacts of climate change. As part of the project outcomes lessons learned on targeting the development of broad-scale resilience strategies (social, economic and biological) will be shared.	The GEF programme represents a valuable resource in regards to two outputs of the proposed AF intervention: <ul style="list-style-type: none"> - The development of a coastal zone management plan, and - Conservation and reforestation of mangrove forests
PNG Pilot Project under the UN HABITAT Cities and Climate Change Programme.	The global programme aims to identify and reduce the impact of city-based sources of climate change while implementing measures to increase resilience to the effects of climate change in city areas. The pilot project in Papua New Guinea will focus on Port Moresby.	An exchange between this programme and the UN HABITAT Cities and Climate Change Programme will be mutually beneficial: The proposed AF-funded programme will be able to draw from the experiences made in the major towns of the North Coast (Lae, Madang, Wewak). At the same time, lessons learnt from the pilot project in Port Moresby will be incorporated in the activities under this proposed programme.
WB-Climate Investment Fund, Pilot Programme on Climate	PNG is one of the 3 pilot countries in the Pacific PPCR Project and the PNG national pilot is directed at climate	As stated in the PPCR Phase I proposal document, one of the deliverables of the PPCR focuses on the integration of climate resilience into policies under ministries responsible for provision of infrastructure.

Resilience (PPCR).	proofing infrastructure.	national	<p>The PPCR Phase I proposal document further specifies key transport subsectors targeted through the PPCR:</p> <p>I. Air transport: airport runways, terminals, and associated navigation aids;</p> <p>II. Road transport: road pavements, drainage systems, and bridges; and</p> <p>III. Sea transport: wharves, ports, jetties, and cargo handling.</p> <p>As such, the focus of the PPCR – even in regards to integration of climate resilience in policy making – is different from the focus under the proposal for consideration by the AF.</p> <p>Further, the detailed proposal for PPCR Phase 2 (the investment phase) has not been developed yet. Since OCCD is tasked with the development of the Phase 2 proposal, it will also be responsible for the fine-tuning of interventions under the PPCR to align with the proposed interventions under the AF programme and compliment the steps undertaken under the AF programme.</p> <p>The proposed AF project will complement PPCR activities through introducing community-led coastal and riverside protection measures and early warning systems, while the PPCR will have a more specific focus on adaptation measures in the abovementioned subsectors.</p>
UNDP-SOPAC PNG DRM Mainstreaming Programme	This programme provides the overarching framework for UNDP-SOPAC support to PNG in 6 focal areas encompassing high-level advocacy, mainstreaming of DRM issues in national and sectoral plans, strengthened capacity and governance frameworks as well as risk information.		<p>The proposed programme will establish a close coordination mechanism with this DRM programme, especially in regards to the integration of climate change adaptation in the DRM frameworks as well as when taking capacity building support to provincial, district and local levels.</p> <p>The proposed AF programme is complementary to the UNDP DRM project, which addresses disaster coordination mechanisms at the national level and it is in the interest of the coherent development of the national disaster preparedness and response framework that the disaster-related activities are implemented in close collaboration among the two initiatives. For a functioning disaster preparedness and response framework, it is essential that the operation of the early warning system, which is a collaborative undertaking of the NDC, OCCD and telecommunications provider Digicel, is seamlessly integrated into the national level disaster preparedness and response framework. At provincial level, the programme focuses only on certain provinces. The interventions at the provincial level under this programme will hence be coordinated in regards to content and focus in order to ensure an expanded coverage of strengthening institutions at</p>

		the provincial level. Further, in addition to the scope of the UNDP-DRM the proposed activities of this programme encompass institutional capacity building and awareness raising in regards to the gathering, analysis and monitoring of data on climate-related hazards, which will in turn help forecasting and the identification of hazards triggers and trends.
GFDRR - Japan Policy and Human Resources Development (PHRD) Technical Assistance (TA) Programme to Support Disaster Reduction and Recovery	The programme has been approved as of October 2011 and will be implemented within the timeframe of the planned AF programme.	The activities under the GFDRR are complementary in that they address disaster risk reduction in the transport and agricultural sectors. Of greater relevance to this AF proposal is the second project on the transport sector. The proposed project amount is \$2,938,700. The project is attached to the ongoing WB-funded Roads Maintenance and Rehabilitation Project (RMRP II), thus the focus is on the transport sector in the provinces of the Central and Gulf. The relevance is with the road infrastructure that are located in the coasts and which may have impacts on mangrove forests. This AF project will coordinate with the GFDRR project in this area. With OCCD (together with the Department of Works) as the implementing agency, the points of synergy and coordination will be seamlessly achieved with the AF project. A Project Coordination Committee under OCCD will be formed to oversee the GFDRR project
UNDP-SGP PNG Community-Based CC Adaptation (CB CCA)	UNDP-SGP allocated \$50,000 for CB CCA. Trainings have been implemented on mangrove conservation in Madang and similar trainings are planned in other provinces, including the National Steering Committee members in 2012.	Discussions have been initiated between OCCD and UNDP-SGP about the potential follow-up activities to support activities related to this AF proposal, particularly mangrove reforestation to build resilience against coastal flooding and concrete adaptation measures to support riverine communities. Discussions are ongoing on additional allocation of \$110,000 for CB CCA.

The programme will further explore and create partnerships with country support programmes of regional organizations, such as SPC, SPREP, SOPAC and the University of the South Pacific (USP), as well as regional and national initiatives financed by bilateral donors, such as AusAID, the European Commission, JICA, GIZ, and others.

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The proposed programme includes an explicit outcome (4) on knowledge management to promote ownership and raise awareness of climate change and disaster risks at national and local levels. This is not a standalone outcome but one that will be fully operationalized in the context of the other outcomes and also in the relevant work of OCCD and other government and non-government partners. The purpose of the outcome's arrangement under a separate component in the proposed programme structure is to emphasise that the element of learning and knowledge dissemination is instrumental to strengthen the adaptive capacity at the local and national level. The systematic capturing of lessons learnt and good practices from early stages will allow the generation of a

variety of knowledge management products, such as case studies, technical reports, photo stories, short videos, posters and brochures which will be tailored to different user groups with a particular focus on local communities. Materials will be developed in local languages, which is of importance in a country with such ethnic and language diversity. Direct learning from programme implementation will be supported through peer-to-peer site visits between communities engaged, and national and regional forums. A range of web-based platforms will be harnessed (including the development of a national portal under OCCD, as well as regional and global platforms, such as the SPREP CC Portal, or the Adaptation Learning Mechanism and UNDP's Energy and Environment Network) to disseminate knowledge products generated by the programme and engage national stakeholders in web-based interactive exchanges. In the early implementation stage, the programme will establish a communication plan, to disseminate regular information using range of national and local media. The systematic integration of lessons learnt in educational and awareness activities, involving schools and educational institutions will support the long-term sustainability and replicability of the programme results.

Programme stakeholders will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks and events, which may be of benefit to support the diffusion of lessons learned. The programme will identify, analyze, and share lessons learned that can be beneficial in the design and implementation of similar future projects both in Papua New Guinea as well as elsewhere in the Pacific and beyond.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during programme preparation.

Shortly after the OCCD was established, a nation-wide consultation framework was developed and implemented. A series of consultations have been held. The aim of OCCD's consultation framework was to comprehensively obtain and assess input from local, provincial and national stakeholders in regards to climate change, its impacts, adaptation and mitigation. The framework was two-tiered. Some consultations were solutions-focussed and concentrated on specific topics (the latest consultation, for example was focussed on mangroves) while others were locality-focussed and concentrated on assessing and understanding issues around local climate change impacts, perceptions and behaviour patterns. OCCD's nation-wide consultation process will continue as one of OCCD's areas of engagement with further targeted consultations and is scheduled to be independently reviewed. These consultations provided a significant level of insight during the development of this proposal, especially at the concept stage. In particular, the provincial consultations contributed vital information in regards to the needs and gaps that need to be addressed through interventions on the local and provincial levels.

Further, the formulation of this programme has benefitted from the strong institutional ties of the OCCD as coordinating body for climate-change related issues and its reach that encompasses local, provincial and national level institutions including policy-making bodies and key decision makers.

This proposal has also been reviewed by and received valuable contributions from the OCCD's Technical Working Group on Adaptation (ATWG), which meets every 2-3 weeks. The TWGs comprise the OCCD Director for Adaptation and representatives of other government agencies, civil society and the private sector:

- Development partners (World Bank, AusAID, UNDP);
- Government (PNG National Weather Service, Department of Mineral Policy and Geo-hazard Management, Office of Urbanization, Department of National Planning and Monitoring,

Treasury Department, Office of Climate Change and Development, PNG Forest Authority, National Maritime Safety Authority, National Disaster Center);

- NGOs (WWF, Conservation International, University of PNG, The Nature Conservancy, Wildlife Conservation Society)
- Private sector (Digicel);

A final consultation with the Adaptation Technical Working Group took place in mid June 2011 and was aimed at receiving input into the finalisation of the project document.

In addition to the above, UNDP PNG and OCCD undertook two local-level stakeholder consultations in middle-end June 2011; one coastal consultation in East Sepik Province and one island province consultation in New Ireland Province. As intended, the outcomes of consultations reflected the different exposures to climate-related hazards as well as a different scenario in regards to institutional arrangements and capacities. The consultations were held with a particular focus on receiving stakeholder input that is specific to the adaptation measures targeted areas under this proposal. The contributions from the participants and people interviewed significantly contributed to the refining of the Strategic Results Framework.

As outlined above, the local-level consultations followed broader national and provincial-level consultations undertaken by the OCCD. Through the national and provincial level consultations a clear picture of the impact of climate-induced hazards and the exposure of communities in the different provinces was generated and validated the vulnerability assessments undertaken by the OCCD. In combination with the climate analysis and vulnerability assessments undertaken by the OCCD (as laid out in the section covering the background and context of this proposal) the data from the provincial consultations showed the areas where climate-hazards were most severe and communities were particularly exposed. This was the basis for the identification of the abovementioned areas in which communities were consulted through the dedicated stakeholder consultations undertaken in preparation of this full proposal.

In order to ensure the representativeness of the consultations, they were held in a mainland setting (Larger Wewak area in East Sepik Province)³³ as well as in an island scenario (Northern area of New Ireland Province as well as neighbouring small islands belonging to the same province). In both cases, the consultations were also not limited to one particular community. Both consultations had representatives from different Districts and Wards (sub unit of the districts). The communities involved in the consultation were identified with the help of local provincial and civil society representatives as well as through formal assistance from the provincial administrations. As highlighted in Annex 6 of the proposal the representation at the local-level stakeholder consultations included men and women at various leadership levels in the communities.

Through its monitoring and evaluation activities, the programme will track the involvement and representativeness of community members in community-based activities and the extent of participation of women in particular. Respective milestones have been integrated into the programme implementation schedule.

With the process of national, provincial and local-level consultations coupled with rigid analysis of climate change impacts and respective exposure of the population, the OCCD has, as far as

³³ As basis for the above consultations, a fact-finding mission took the OCCD team to Wewak (East Sepik Province) in early May and provided an insightful exchange between the team and local stakeholders, community members and officials of the East Sepik province. Wewak is visibly exposed to climate-change hazards that are affecting the population, livelihoods, infrastructure and economic assets of this important centre on PNG's North Coast.

possible, eliminated the risk of not consulting communities in further areas during the preparatory phase of this proposal. Further community-level consultations will be necessary and are planned for where adaptation measures are replicated based on the initial 8 communities (activities 1.4.1 and 2.3.1). The replication of the adaptation measures in other communities are undertaken through activities 1.4.2. and 2.3.3.

The stakeholder consultations at the local level that were undertaken during the preparation of this proposal revealed that there are a significant number of communities that had a generally good level of awareness in regards to the climate-change hazards they are threatened by. A number of communities, CBOs and NGOs have proactively initiated village-level committees and small scale adaptation measures in response to the hazards they face. Almost without exception these initiatives face constraints and are hence largely not effective. The constraints faced include the lack of support from provincial and district agencies, lack of technical knowledge for implementing best practice adaptation measures as well as the lack of resources such as building materials, financing and technical support.

As outlined in the programme strategy, the scenario of different characteristics and levels of capacity is addressed by the programme. The programmes will focus on eight initial adaptation sites (four coastal villages, four riverine villages) where strong community initiative allows for the implementation of best practice adaptation measures and their long-term sustainability. Further, through its activities, the programme puts in place a support mechanism that allows a minimum of eight other communities to take the initiative to replicate the best practice adaptation measures demonstrated in the pilot communities.

The intervention strategy of the proposed programme was developed with further contributions from a range of stakeholders which include the following national agencies and organizations:

- Department of Environment and Conservation
- Department of Agriculture and Livestock
- Department of Health
- Department of National Planning and Monitoring
- Department of Provincial and Local Level Development Affairs
- National Forest Authority
- Papua New Guinea National Weather Office
- National and sub-national level Disaster Risk Centres
- National Agricultural Research Institute
- Provincial level authorities

Please refer to Annex 6 detailing the outcomes from the consultations and reference cases of community-led initiatives.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Component 1: Adaptation to coastal flooding-related risks and hazards for North Coast and Islands Region communities

Baseline (without AF resources)

As mentioned in the barriers section, the government continues to be reactive rather than proactive

in responding to natural hazard risk, lacking an integrated early warning system that would allow preventive measures, resilience building and preparedness to climate-induced hazards. Due to the lack of adequate coordination and capacity of sub-national government institutions, flood hazards will continue to cause damage to community assets and livelihoods. Without proper awareness, education and advocacy on climate risks, and the systematic use of early warning systems, the vulnerable communities will remain inadequately prepared for disasters and insufficiently informed about responsive measures, which will further result in continued costs through compensations as solutions to hazards.

The current low capacity and insufficient equipment of the PNG National Weather Service to collect, monitor, manage and communicate relevant data will continue to hinder the effective production and uptake of climate information services. Due to the lack of tailored climate information services, coastal communities will continue to be exposed to flood risks, which will further impede coastal protection efforts. The current efforts undertaken by other initiatives (such as the identification and introduction of climate resilient crops by NARI) will have limited impacts, if communities do not receive timely information on potential flood hazards.

Current unsustainable coastal practices (clearing of mangroves, over-fishing), will continue to increase vulnerability of coastal communities to flood and cyclone-related hazards, with diminished and further decreasing function of protective coastal ecosystems, and related ecosystem services.

Additionality (with AF resources)

AF resources will be used to undertake comprehensive analysis and mapping of hazard impacts along the coastal area in order to facilitate the development and establishment of an early warning system. By supporting the capacity of the National Weather Service, and Disaster Centres at different societal levels, information will be communicated in a more effective and timely manner, allowing appropriate preparedness and needed response measures, in case of climate-related hazards. This will directly improve the vulnerable communities' resilience to climate-related hazards. The timely communication of early warning information and alerts will be supported through partnerships with telecommunication companies as well as the press, TV and radio media.

The programme will support the conservation of mangroves and their protective function, through replanting, establishment of nurseries and community-based conservation measures. It is expected that intact and healthy mangrove ecosystems will buffer coastal settlements and limit the impact from flood and storm hazards. This will continue to provide spin-off benefits through sustainable use of mangrove forests as outlined in section B on the benefits derived from the intervention measures.

Further, the proposed measures will also provide a clear picture on the effectiveness, potential, ideal locations and feasibility of other coastal infrastructure measures including but not limited to the construction of seawalls.

Component 2: Adaptation to inland flooding-related risks and hazards for river communities in East Sepik, Oro, Morobe and Madang Provinces

Baseline (without AF resources)

The baseline scenario in regards to early warning systems as well as disaster preparedness and response in the targeted river communities is analogue to the abovementioned situation with respect to the coastal communities: Capacities and equipment to collect and manage early warning data as well as the communication of information related to disaster preparedness and response

remains inadequate.

Without the establishment of locally designed riverbank protection measures, riverine communities will continue to suffer from flood-hazards. Current coping techniques (filling of riverbanks, ad hoc planting of vegetation) including traditional knowledge will not be sufficient to withstand the expected increase in intensity of rainfall events and associated floods.

Additionality (with AF resources)

A comprehensive analysis and mapping of hazard impacts will be the basis for the implementation of an integrated early warning system and provide the required capacity to identify the location of river and rain water gauges and develop tailored information services and respective communication channels. This will enable vulnerable communities to appropriately prepare for and respond to climate-related hazards and increase local resilience to climate-related hazards. Analogue to the coastal early warning system, the distributed of information and alerts will be supported through partnerships with telecommunication companies as well as the press, TV and radio media.

Through capacity building and technical assistance, communities will be able to implement appropriate riverside protection measures, constituting of a mix of hard structures based on the use of locally available material and complementary soft techniques such as planting and conservation of appropriate vegetation. This will significantly reduce flood-related impacts on livelihoods and assets in the vulnerable communities. The locally adjusted design of the protection measure will allow active community participation, and the long-term maintenance of such measures through local capacity.

Component 3: Institutional strengthening to support climate- and disaster-resilient policy frameworks

Baseline (without AF resources)

Although the country recently completed a series of climate risk assessments and plans under the framework of the Climate-Compatible Development Strategy, sectoral policies, plans and related legal frameworks continue to omit climate change and disaster-related risks. The objectives of sectoral frameworks, such as the National Agricultural Development Plan, Environment Act, Fisheries Management Plan, PNG National Marine Programme among others are likely to be jeopardized by climate-induced disasters and gradual changes in climate patterns. In the absence of an integrated and climate change-sensitized coastal zone management policy in the country, coastal protection efforts will remain fragmented and unsustainable in the long-term. Climate-change and disaster responses will remain fragmented and ineffectively coordinated within and between the national and local levels and will remained insufficiently addressed and mainstreamed into the policy-making processes.

Additionality (with AF resources)

AF resources will support a systematic overview and analysis of the policies and institutional capacities related to disaster preparedness and response, coastal zone management and development planning in flood-prone areas as well as legal frameworks at the different levels. This will serve to support the mainstreaming of climate and disaster risks, alongside similar supportive initiatives (like the UNDP DRM Mainstreaming programme), for the development of climate-resilient policies at the regional and local levels. This will be conducted by facilitating dialogue and providing

capacity building to relevant line institutions (In particular: OCCD, DEC, DAL, NARI, DCD, NDC, National Weather Service) while continuously informing higher level policy makers through regular policy briefs. The programme will support the strengthening of institutional structures, such as establishment of the proposed Conservation and Environmental Protection Authority, and the integration of climate and disaster-related risk responses in the development of standards for building and land-use planning codes in collaboration with provincial authorities.

Component 4: Awareness raising and knowledge management

Baseline *(without AF resources)*

Current dissemination of climate change and disaster risk-related information is completely ad-hoc, piecemeal and largely limited to some activities of OCCD and some NGOs. Without this programme ongoing adaptation experiences from other initiatives will not be communicated broadly, and opportunities will be missed to link ongoing projects and programmes (such as PACC, or the UNDP DRM Mainstreaming Programme) with the overarching policy-making process in a coordinated manner. Broader applications of the climate early warning system will be limited by the absence of systematic awareness raising programmes that provide the population and vulnerable communities in particular with the information to prepare and respond to climate and disaster risks.

Additionality *(with AF resources)*

The programme will support the active outreach to and engagement of local communities through climate change awareness raising and information exchange activities while harnessing a range of media, tailored to local cultural context. As result, vulnerable communities will be able to make informed decisions in regards to flood preparedness and undertake coordinated responsive measures when necessary. In addition, the OCCD as executing agency will provide the channels for the lessons learnt and best practices generated to be fed back into the policy-making processes on the provincial and national levels.

The introduction of the produced knowledge materials (case studies, photo stories, brochures) in school activities will ensure a mechanism for longer term impact and replication of experiences and climate resilience. The facilitation of peer-to-peer exchange visits will allow communities to learn from each other's experience on-site in a practical way. AF resources will also support the sharing of experiences more broadly at the national, regional and global levels through the establishment of knowledge sharing platforms and presentations at regional events.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for programme implementation.

The Adaptation Fund (AF) programme will be implemented over a period of four years. The implementing entity (IE) for the programme will be the United Nations Development Programme (UNDP) in Papua New Guinea, in its capacity as a Multi-lateral Implementing Entity (MIE) for the Adaptation Fund. The executing entity (EE) for the programme will be the Office of Climate Change and Development (OCCD) representing the Government of Papua New Guinea. The programme organisation chart below indicates the management structures for the AF programme and how these will interact with each other and at the different levels.

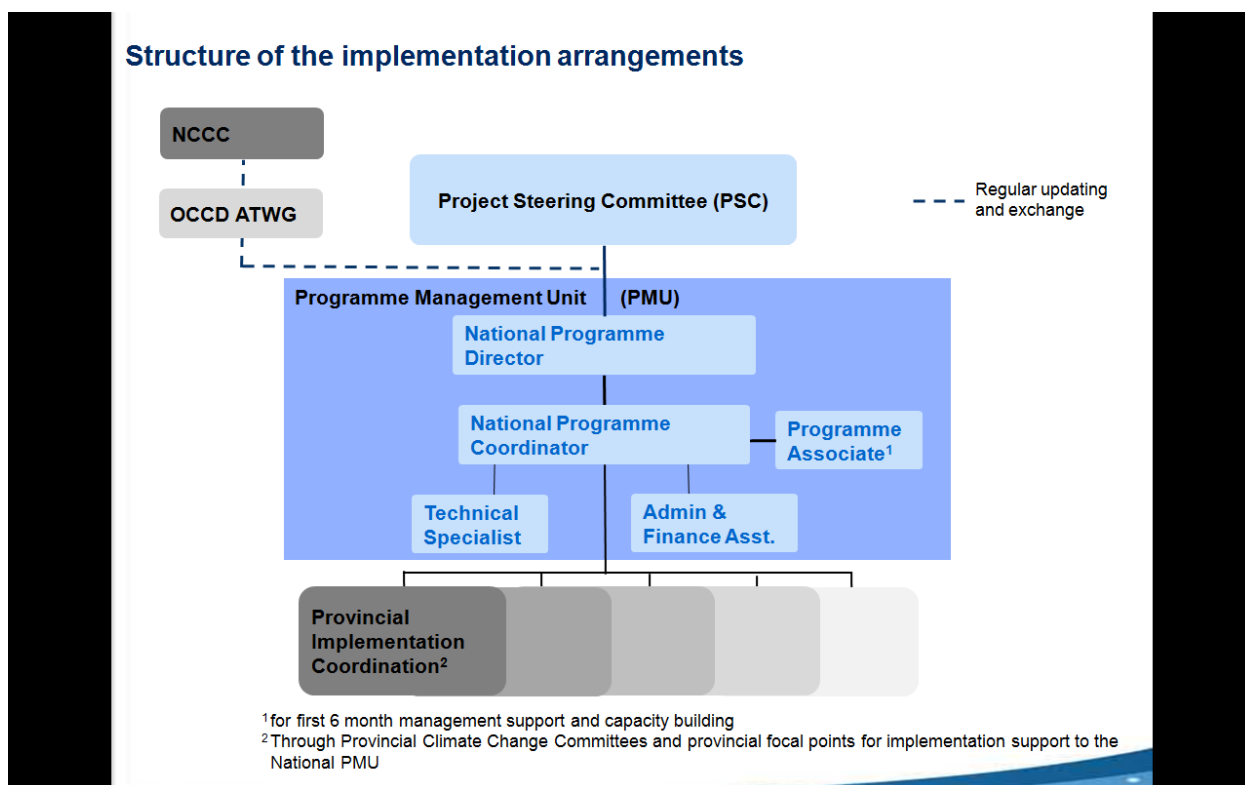


Figure 6: Organisation chart on the implementation arrangements

Programme Steering Committee (PSC)

The Programme Steering Committee (PSC) consists of high level representatives from the implementing entity (UNDP), the executing entity (OCCD) and key stakeholders from government agencies, civil society organisations and other development partners. The PSC will be co-chaired by Executive Director of OCCD and by the UNDP Resident Representative. In addition, the membership of the Steering Committee includes key stakeholders including the National Disaster Centre, Department of Environment and Conservation, Department of Land and Physical Planning, Department of National Planning and Monitoring, and the Department of Provincial and Local level

Government, as well as representatives from NGOs & CSOs and UNDP. The composition of the PSC will be determined at the inception stage of the programme.

The PSC will provide strategic directions and guidance to the programme; provide high-level quality assurance for programme results; oversee the programme implementation by monitoring the progressive achievement of programme objectives; approve work plans, progress reports and other project deliverables submitted by the Programme Manager; help resolve issues and policy decisions; approve scope changes, and help ensure that the project is responsive to the interests of PNG. The Programme Management Unit (PMU) will be the secretariat for the PSC and will provide assistance in convening meetings of the PSC at least twice a year, or as decided by the PSC.

National Programme Management Unit

The National Programme Management Unit (PMU) consists of: a National Programme Director (NPD), a National Programme Manager (NPM), a Programme Administrative and Finance Assistant (PAFA), a Programme Associate (PA), and a Technical Specialists (TS).

The **National Programme Director (NPD)** will be a senior government official appointed from within the executing agency (OCCD) as part of the Government's commitment to institutionalize externally funded initiatives within the OCCD structure and within the government. The NPD will report to the PSC and coordinates closely with UNDP. He updates the OCCD's executive director and the ATWG regularly and prepares briefings for the National Climate Change Council (NCCC). The NPD's specific tasks and key responsibilities include but are not limited to the following:

- Provide overall leadership and strategic direction for the programme (including staff and consultants);
- Serve as focal point for programme interaction with Government institutions and other stakeholders (donors, NGOs, academic institutions and the private sector);
- Ensure appropriate and adequate resources are provided to the programme team as part of the Government's contribution;
- Ensure the government inputs to the programme are forthcoming in a timely and effective manner;
- Ensure achievement of the overall objectives and specific outputs of the programme, by utilizing programme resources in an efficient, effective and transparent manner;
- Authorize programme fund disbursements according to the UNDP NEX guidelines, Programme Work Plan and in accordance with UNDP financial rules and regulations and
- Liaise closely with UNDP on all matters relating to the programme;

The **National Programme Manager (NPM)** will work under the direct supervision of the National Project Director. The NPM will manage the programme on a day-to-day basis and will be accountable to OCCD through the NPD for the planning, management, quality control, timeliness and effectiveness of the activities carried out, as well as for the use of funds.

The NPM will be fully supported by a Programme Assistant, a Programme Associate and by a Technical Specialist. It is envisioned that a high-calibre and experienced Programme Associate is engaged for the first six months of the programme's implementation and specifically tasked with building capacity of the NPM and the PMU in coordinating the implementation of the programme.

The NPM's specific tasks and key responsibilities include but might not be limited to the following:

- Prepare a detailed work plan and budget and submit regular quarterly progress and financial reports to UNDP and OCCD and lead its implementation;

- Coordinate (at national and provincial level) with Provincial Administrators and execution partners from other government agencies and oversee the undertaking of activities of the AF programme;
- Ensure effective communication and adequate information flow with the relevant authorities, institutions and government departments;
- Ensure appropriate stakeholder participation in the programme implementation and coordinate the work of all stakeholders under the guidance of the OCCD, and in consultation with the UNDP office;
- Prepare the Terms of Reference for consultants and experts and guide the work of consultants and experts and oversee compliance with agreed work plan and timely completion of tasks;
- Ensure that programme reports are consistent, in line with the Programme Document and UNDP requirements; and
- Oversee preparation of programme progress reports on time and as outlined in the Programme Document and submitted to UNDP and Programme Advisory Committee (PAC)

The **Programme Administrative & Finance Assistant (PAFA)** will work under direct supervision of the NPM and will provide administrative, logistical and accounting support to the Programme.

The **Programme Associate (PA)** will work in direct support of the NPM and will provide technical and analytical support in the preparation of day-to-day activities towards effective implementation of the programme and build capacity of the NPM and the PMU in coordinating the implementation of the programme. The terms of reference for these two staff members will be developed during the inception stage.

The **Technical Specialists (TS)** will be Climate Change Adaptation experts responsible for providing overall technical backstopping to the programme. The TS will render technical support to the National Project Manager (NPM) and staff as well as to government counterparts. The TS will coordinate the provision of the required technical inputs to the programme, reviewing and preparing Terms of Reference and technical reports, and performing quality control on the outputs of project consultants and other sub-contractors. Some of the key functions will be:

- Provide technical and strategic assistance for programme activities, including planning, monitoring and site operations, and assuming quality control of interventions;
- Provide hands-on support to the NPM, project staff and other government counterparts in the areas of project management and planning, management of site activities, monitoring, and impact assessment;
- Contribute to design of Terms of Reference for consultants and sub-contractors and assist in the selection and recruitment process;
- Assist NPM coordinate the work of all consultants and sub-contractors, ensuring the timely delivery of expected outputs, and effective synergy among the various sub-contracted activities;
- Assist the NPM in the preparation and revision of the Management Plan, including strategic budget revisions, as well as Annual Work Plans;
- Coordinate preparation of the periodic reports when called for by the NPM;
- Assist in mobilizing staff and consultants for project implementation, in the conduct of a mid-term and a final project evaluation, and in undertaking revisions in the implementation of the programme based on evaluation results;
- Assist the NPM in liaison work with programme partners, donor organizations, NGOs, private sector, academia and other groups to ensure effective coordination of programme

activities, as well as in the mobilisation of additional co-financing to the programme through strategic partnerships

- Document lessons from programme implementation and make recommendations to the Steering Committees for more effective implementation and coordination of programme activities; and
- Perform other tasks as may be requested by the NPM, PSC and other programme partners.

Provincial Implementation Coordination

At the provincial level, Provincial Climate Change Committees (PCCC) will be established and chaired by the Provincial Administrator. The role of the PCCC is to oversee the processes of integrating and coordinating climate change-related activities, to monitor progress of the AF programme and to ensure the necessary cooperation within and among agencies and communities. The full details on the composition and role of the PCCCs will be finalized during the inception workshop in consultation with the Provincial Administrators. In addition, the Provincial Administrator shall appoint a focal point who would act as Provincial Coordinator in support of the National PMU. In cases where provinces have established Climate Change Offices, this role should be taken by the Provincial Climate Change Officer, which will also allow for respective capacity needs to be addressed in an integrated manner as envisioned under the capacity building activities of this programme.

Roles of OCCD and UNDP

UNDP as the MIE for this project will provide all the technical services for this project as enumerated and described in Annex I, covering the following: identification, sourcing and screening of ideas; feasibility assessment/due diligence review; development and preparation; implementation and reporting.

Under UNDP's national execution modality (NEX), OCCD acts as Executing Entity³⁴ for this programme. The Executing Entity is the institutional entity entrusted with and fully accountable to UNDP in managing and delivering project outputs. It is responsible the preparation and implementation of project work plans and annual audit plans; preparation and operation of project budgets and budget revisions; disbursement and administration of funds; recruitment of national and international consultants and project personnel; financial and progress reporting; and monitoring and evaluation. As stated above, however, UNDP retains ultimate accountability for the effective implementation of the project.

The OCCD is the lead coordinating institution in the area of climate change and as such has strong cross-sectoral mechanisms. The OCCD reports directly to the Prime Minister through the National Climate Change Committee (NCCC). Through these strong links, the OCCD can draw on support of the line agencies and departments represented in the NCCC. The NCCC is comprised of 11 secretaries from different government departments, including the executive director of the OCCD and is chaired by the Chief Secretary, PNG's highest ranking civil servant. The NCCC meets every month and is mandated to oversee all policies and actions under Pillar Five of the Vision 2050, concerning Climate Change and Environmental Sustainability.

³⁴ Note that UNDP uses slightly different terminology to that used by the operational policies and guidelines of the Adaptation Fund. In UNDP terminology, the "executing entity" is referred to as the "Implementing Partner" in countries which have adopted harmonized operational modalities and the "Executing Entity" in countries which have not yet done so.

OCCD will follow the norms and procedures detailed in the UNDP NEX manual for programme execution. For its part, UNDP will provide support to the NPD and the NPM of the programme, in order to maximize its reach and impact as well as the quality of its products. Moreover, it will be responsible for administering resources in accordance with the specific objectives defined in the Programme Document, and in keeping with its key principles of transparency, competitiveness, efficiency and economy.

The ATWG will be regularly updated on the progress of the programme's implementation through the PSC and the NPM.

The project implementation schedule (Gantt chart) is shown in Annex 4.

B. Describe the measures for financial and programme risk management.

Risks and mitigation measures

The programme draws on GoPNG's strong commitment to climate compatible development. This limits the likelihood of institutional-level risks to have a negative impact on the proposed programme and the desired outcomes. Furthermore, linkages made to ongoing and planned baseline development activities implemented by other government agencies as well as the local buy-in emphasized as requirement for the implementation of the adaptation activities will also minimize these risks. One of the generally valid risks related to institutional coordination is staff turnover, a common issue in a number of Pacific countries and often a cause for broken communication chains, continuity and institutional memory. The mitigation strategy to address this risk involves early and consistent engagement of senior government decision makers (at the national and provincial levels) on programme progress and monitoring, the application of an awareness programme for policy makers, and the involvement of a group of core technical officers in relevant line ministries and departments, as well as national NGOs and community—based support organizations.

The following table presents the risks that may affect implementation of the project and achievement of outputs and outcomes. Each of the identified risk scenarios is accompanied by the respective mitigation measures and stakeholders involved in the mitigation measure.

Project Risks & Mitigation Measures			
Risk	Level	Mitigation Measures	Responsibility
Insufficient collaboration between project implementation partners and stakeholders	M	<ul style="list-style-type: none"> - Develop detailed inception work plan to guide inception phase and clarify roles and responsibilities through agreements - Continuous stakeholder engagement throughout the implementation 	PMU, OCCD, UNDP
Weak cooperation by communities at proposed sites	M	<ul style="list-style-type: none"> - Initial site selection and implementation of activities is based on proactive and community-led initiative. - One of the central principles of the replication support is to support activities that are initiated by communities and have appropriate management/support structures in place 	PMU, SC, ATWG, Inception workshop
Land use disputes within the communities affect implementation of project	L	<ul style="list-style-type: none"> - Community consultations will be held and the risk assessed as part of the site selection process. 	PMU, Inception workshop, Community

activities and plans		- Agreements from traditional village management bodies are a prerequisite for the project activities to be undertaken in the communities	bodies
Limited human resources in PNG's national and provincial agencies to adequately support to the activities and ensure the sustainability of the adaptation measures	M	- Capacity building at provincial and national levels is an integral part of the project's implementation. - As coordinating body, the OCCD will identify, monitor and address any gaps in the capacity of implementing agencies involved.	PMU, OCCD, Provincial Administrations
A series of unusually adverse climatic conditions impacts the adaptation measures being implemented, or weakens the interest of key stakeholders to address adaptation issues.	L	- Schedule project activities to avoid adverse weather conditions as far as possible - Address the potentially cyclical nature of climate change events in awareness raising efforts	PMU, OCCD
The best practices and adaptation measures adopted are not gender sensitive – i.e. they increase inequity between men and women or change the social roles of men and women in a way that reduces self reliance.	M	- Conduct training on gender analysis for project team and use guidelines during selection of adaptation measures and identification of best practices	PMU, ATWG, OCCD, UNDP, Consultant,
The selection of pilot sites does not follow the established criteria and is derailed due to political processes and influences.	M	- Selection criteria and decisions of the PMU are clearly communicated and endorsed through national (NCCC, ATWG) and provincial level agencies and bodies (Provincial Climate Change Committees)	PMU, NCCC, ATWG, Provincial Climate Change Committees
The government is not supportive, politically and financially, to a cross-sectoral and integrated approach to the management of climate risks and opportunities.	L	- Foster links between OCCD and GoPNG through regular involvement of the NCCC	PMU, OCCD

During regular programme review meetings, in which UNDP is an active participant, all risks and mitigation measures will be reviewed and updated as per established practices.

C. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

Programme monitoring and evaluation will be conducted in accordance with established UNDP procedures by the PMU with the support of UNDP Staff. The results framework for the programme provides outcome and output level indicators along with their corresponding means of verification. These will form the basis on which the programme's Monitoring and Evaluation (M&E) system will be built.

The following sections outline the principal components of the M&E plan and indicative cost estimates related to M&E activities. The programme's M&E plan presented here for approval by the AF Board will be reviewed and finalized in the programme's Inception Report following a collective

fine-tuning of indicators, means of verification, and the full definition of programme staff M&E responsibilities.

Audits: The Audit will be conducted in accordance with UNDP Financial Regulations and Rules and applicable audit policies on UNDP projects by a legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

In accordance with the programming policies and procedures outlined in the UNDP User Guide, the Programme will be monitored at the national levels through the following:

Within the annual cycle

- On a quarterly basis, a quality assessment shall record progress towards the completion of key results, based on quality criteria and methods captured in the Strategic Results Framework).
- An Issue Log shall be activated in Atlas and updated by the Programme Manager/National Programme Managers to facilitate tracking and response of potential problems or requests for change.
- Based on the initial risk analysis submitted, a risk log shall be activated in Atlas and regularly updated by reviewing the external environment that may affect the programme implementation.
- Based on the above information recorded in Atlas, a Programme Progress Report (PPR) shall be submitted by the Programme Manager to the Programme Board and the National Programme Managers to the National Programme Boards through Programme Assurance, using the standard report format available in the Executive Snapshot.
- A Programme Lesson-learned log shall be activated and regularly updated to ensure on-going learning and adaptation within the organization, and to facilitate the preparation of the Lessons-learned Report at the end of the programme.
- A Monitoring Schedule Plan incorporating the activities outlined in the table below shall be activated in Atlas and updated to track key management actions/events.

Annually

- *Annual Review Report.* An Annual Review Report shall be prepared by the National level Programme Manager and shared with the Programme Board. As minimum requirement, the Annual Review Report shall consist of the Atlas standard format for the Quarterly Progress Report (QPR) covering the whole year with updated information for each above element of the QPR as well as a summary of results achieved against pre-defined annual targets at the output level.
- *Annual Programme Review.* Based on the above report, an annual programme review shall be conducted during the fourth quarter of the year or soon after, to assess the performance of the programme and appraise the Annual Work Plan (AWP) for the following year. In the last year, this review will be a final assessment. The national review is driven by the Programme Board and may involve other stakeholders as required. It shall focus on the extent to which progress is being made towards outputs, and that these remain aligned to appropriate outcome(s). The regional review is driven by the Programme Board.

Mid-term and terminal evaluation report

According to established UNDP practices, the programme will undergo an independent mid-term and terminal evaluation.

The overview, scheduling and budget for M&E activities are shown in the table below

Type of M&E activity	Schedule	Responsibility	Total Budget
Inception workshop	Within 1st month in 1st Year of Project	Project Coordinator, UNDP PNG	5,000
Inception report	2nd month in the 1st Yr of Project	Project Coordinator, Local consultant, UNDP PNG	2,000
Quarterly reports	Every quarter	PMU	0
Annual technical monitoring report	Annually at the end of 12 months	PMU	12,000
Meetings of National Project Steering Committee	Immediately following inception workshop and thereon every six months	Local consultant PMU	1,000
Meetings of Provincial Climate Change Steering Committee	Immediately following inception workshop and thereon every six months	PMU	1,000
Meeting of National Climate Change Country Team	Annually at the end of 12 months	PMU UNDP-CO	0
Mid-Term Evaluation	Half way through project implementation	PMU, UNDP-CO External consultant	20,000
Final Project Evaluation	At end of Project	PMU, UNDP-CO External consultant	30,000
Project Terminal Report	During last quarter of final year of project	PMU	0
Audits		PMU, UNDP-CO	12,000
Total Estimated M&E Costs (USD)			83,000

Notes on the M&E overview:

- A technical Advisor with expertise on climate change adaptation will be engaged to provide technical monitoring of the project. This will involve assessing as well as providing technical advice on the design and implementation of adaptation options.
- Provincial-level Climate Change Committees will be established to begin the process of integrating and coordinating climate change work and also to monitor progress of the AF project. The Provincial Climate Change Committee shall report to the Provincial Administrator and its TOR and membership will be finalized during the inception workshop.

PROJECT BUDGET³⁵

Project Budget Summary by Output and main Activity

Project Components, Outputs, Activities and Tentative Budget

Component 1: Adaptation to coastal flooding-related risks and hazards for North Coast and Islands Region communities

Outcome 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and 3 cities of the 11 provinces of the North Coast and Islands Region.			
Outputs	Activities	Implementing Partners	Cost Estimate
1.1 Coastal early warning systems established for observation, data collection and information management and dissemination in the North Coast and Islands Region	1.1.1. Assess and map coastal flooding hazards with areas of major population as higher priority	NDC, Provincial Disaster Coordinators, PNGNWS, UNDP DRM Programme, Provincial Planners Digicel	62,500
	1.1.2. Train and equip the PNGNWS / NDC / Digicel with the necessary systems (weather stations, gauges, operations centre) and capacity.		371,250
	1.1.3. Establish a central database on coastal flooding hazards as basis for the monitoring of respective weather scenarios		19,000
	1.1.4. Train PNGNWS / NDC / Digicel in monitoring and analysis of weather data and especially the identification of indicators and scenarios relevant to triggering early warning messages and processes.		39,000
	1.1.5. Facilitate the integration of the operation and maintenance of the early warning systems under this programme (incl. the system under output 2.1.) in recurrent government allocations by 2014		-
Total Output 1.1			491,750
1.2 Coastal flood preparedness and response plan and systems established in the North Coast and Islands Region	1.2.1. Develop a model disaster preparedness and response plans for coastal flooding in East Sepik Province and New Ireland Province	NDC, Provincial Disaster Coordinators, PNGNWS, UNDP DRM Programme	62,000
	1.2.2. Establish local flood management committees with clear communication channels to the provincial-level disaster coordination bodies (East Sepik & New Ireland Province)		72,500
	1.2.3. Expand the water storage and evacuation centre facilities in East Sepik Province and New Ireland Province		187,000
	1.2.4. Facilitate the integration of the coastal flooding early warning system into the national and provincial DRM plans		40,000
	1.2.5. Provide cross-provincial training and support for the implementation of the provincial disaster preparedness and response plan and measures in the remaining provinces of the North Coast and Islands Region		71,000
Total Output 1.2			432,500
1.3. Support system for community-led mangrove reforestation and conservation projects	1.3.1. Training of trainers for community leaders, CBOs, NGOs on best practices for mangrove reforestation and conservation (includes dissemination and application of mangrove toolkit in target sites and replication areas and nationally)	OCCD, CBOs and local NGOs (such as Turubu Eco Forestry in Wewak, Saltwater School in Kavieng, WCS in New Ireland Province and Manus)	120,000
	1.3.2. Establish regional mangrove nurseries and conduct training and support centres to serve target sites and replication areas and commit resources for their operation beyond the life of the project		335,000
	1.3.3. Integrate mangrove reforestation and conservation		-

³⁵ The detailed budget is provided in Annex 5

	in local development plans and formulation/signing of community mangrove forestry agreements/compacts (no separate budget allocation as this will be coordinated by the PMU)		
		Total Output 1.3	455,000
1.4 Integrated coastal adaptation measures implemented to protect 8 communities in East Sepik Province, Oro Province and New Ireland Province.	1.4.1. Adapt four coastal communities to coastal flooding in the context of land-use plans that will be prepared and through support to community-led best practice adaptation measures in the most affected areas of East Sepik Province, Oro Province and New Ireland Province	Provincial & District Planners, Department of National Planning and Monitoring, Provincial Administrators, Institute of Engineers, PPCR Programme	525,000
	1.4.2. Support for best practice adaptation measures in additional four communities of East Sepik Province, Oro Province and New Ireland Province		432,500
	1.4.3. Document/capture and develop trainings and implementation materials on best practice adaptation measures to coastal flooding in support of community-led initiatives		150,500
		Total Output 1.4	1,108,000
		Total Component / Outcome 1	2 487 250

Component 2: Adaptation to inland flooding-related risks and hazards for river communities in Morobe, East Sepik and West Sepik

Outcome 2: Reduced exposure and increased adaptive capacity of targeted 8 river communities of the 4 provinces			
Output	Activities	Implementing Partners	Cost Estimate
2.1 Inland flooding early warning systems established for observation, data collection and information management and dissemination in the provinces of the North Coast and Islands Region	2.1.1. Assess and map coastal flooding hazards with areas of major population as higher priority	NDC, Provincial Disaster Coordinators, Provincial & District Planners, PNGNWS, UNDP DRM Programme, Digicel	62,500
	2.1.2. Train and equip the PNGNWS / NDC / Digicel with the necessary systems (weather stations, gauges, operations equipment) and capacity.		380,000
	2.1.3. Establish a central database on inland flooding hazards as basis for the monitoring of respective weather scenarios		19,000
	2.1.4. Train PNGNWS / NDC / Digicel in monitoring and analysis of weather data and especially the identification of indicators and scenarios relevant to triggering early warning messages and processes.		39,000
Total Output 2.1			500,500
2.2 Inland flood preparedness and response plan and systems established in the North Coast provinces	2.2.1. Develop a model disaster preparedness and response plan for inland flooding in Oro Province	NDC, Provincial Disaster Coordinators, Provincial & District Planners, PNGNWS, UNDP DRM Programme,	62,000
	2.2.2. Establish local flood management committees with clear communication channels to the provincial level disaster coordinators.		72,500
	2.2.3. Expand the water storage and evacuation centre facilities in Oro Province.		112,500
	2.2.4. Facilitate the integration of the flood early warning system into the national and provincial DRM plans.		40,000
	2.2.5. Provide cross-provincial training and support for the implementation of the provincial disaster preparedness and response plan and measures in the remaining provinces of the North Coast		71,000
Total Output 2.2			358,000
2.3 Integrated riverbank protection measures implemented to protect 8	2.3.1. Flood adapt four communities in the context of land-use plans that will be prepared and through support to community-led adaptation measures in the most affected areas of East Sepik Province, Oro Province and Morobe and Madang Provinces.	District Planners, Provincial Planners, Ward Councillors, ATWG (2.3.3.).	485,000

communities in East Sepik Province, Oro Province and Morobe and Madang Provinces	2.3.2. Facilitate a cross-community learning exchange on the adaptation measures to inland flooding and their management with support of provincial authorities in the four provinces	CBOs and local NGOs	94,000
	2.3.3. Support best practice adaptation measures in additional four communities of East Sepik Province, Oro Province and New Ireland Province		422,500
	2.3.4. Document/capture and develop trainings and implementation materials on best practice adaptation measures to inland flooding in support of community-led initiatives		216,500
Total Output 2.3			1,218,000
Total Component / Outcome 2			2,076,500

Component 3: Institutional strengthening to support climate- and disaster-resilient policy frameworks

Outcome 3: Strengthened institutional capacity at national and sub-national level to integrate climate change-related risks into sectoral policies and management practices with focus on flooding			
Output	Activities	Implementing Partners	Cost Estimate
3.1 Climate change-related risks and resilience from coastal and inland flooding integrated into coastal zone management related polices, legal and planning frameworks at the national and sub-national levels	3.1.1. Comprehensive review of coastal zone management policies and related legal and planning frameworks and identification of climate change related gaps	Department of National Planning and Monitoring, DEC, Provincial Planners, CEPA, Institute of Engineers	40,000
	3.1.2. Coordinate the mainstreaming of climate change issues according to the needs identified in 3.1.1. and in accordance with the Climate Change Act (currently being developed).		44,000
	3.1.3. Train the Conservation and Environment Protection Authority (being established) with the focus on building capacity for identifying non-adherence to climate change related policies, laws and regulations as well as respective enforcment.		104,000
	3.1.4 Facilitate integrated development planning that aligns provincial, district and local level development plans through a regular exchange mechanism.		97,500
	3.1.5 Comprehensive technical review of the proposal on coastal infrastructure measures in Wewak with expert input		96,000
Total Output 3.1			381,500
3.2 Policy makers and planners at the national, provincial and district offices, institutions and extension services systemically trained to implement climate-sensitive policies and plans	3.2.1. Undertake a comprehensive training programme for provincial climate change officers	Provincial Climate Change Officers / focal points (3.2.1.), NCCC (3.2.4.)	88,000
	3.2.2. Facilitate the utilisation of funding mechanisms such as the infrastructure tax credit schemes available to communities through trainings and provincial workshops.		42,500
	3.2.3. Disseminate regular policy briefs to inform high-level policy makers on climate change-related risk reduction and adaptation processes in support of the CCDS.		20,000
	3.2.4. Facilitate the inter-ministerial dialogue on climate change resilient development		52,500
Total Output 3.2			203,000
Total Component / Outcome 3			584,500

Component 4: Awareness raising and knowledge management

Outcome 4: Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at national and sub-national level			
Output	Activities	Implementing Partners	Cost Estimate
4.1 Lessons learned and best practices generated, captured and distributed to other communities, civil society, policy makers in government and globally through appropriate mechanisms	4.1.1. Develop best practice materials for community-led replication of adaptation measures	OCCD, CBOs and local NGOs (such as Turubu Eco Forestry in Wewak, Saltwater School in Kavieng, WCS in New Ireland Province and Manus)	143,000
	4.1.2. Establish a national web-based adaptation platform focussed on support to community-level adaptation initiatives		10,000
	4.1.3. Extract lessons learnt from the implementation of the programme and contribute to knowledge platforms including regional and international forums and meetings		23,000
Total Output 4.1			176,000
4.2 Climate change awareness and education programmes carried out to build next generations' resilience to climate change	4.2.1. Facilitate national-level round-table discussions with community and NGO representatives, youth & women organisations as well as institutions and government agencies in the area of education.	Department of Education, Local and national NGOs , Universities	68,000
	4.2.2. Coordinate the integration of climate change and adaptation into school curricula and university programmees		40,500
	4.2.3. Develop materials and guidance document for schools, teachers, trainers, village leaders and academics		39,000
	4.2.4. Attract corporate social responsibility contributions and sponsorships for the continuation of activities and replication of sucessful community-based adaptation measures, including resources for the early warning systems' expansion and related activities		30,000
Total Output 4.2			177,500
Total Component / Outcome 4			353,500

Programme Execution

Output	Activities	Implementing Partners	Cost Estimate
PMU established and operational	Project staff Procure office furniture, equipment and stationary PMU operation costs	OCCD	434,027
Project monitoring and evaluation	(as per the details presented in Section C above)		83,000
Total Programme Execution Cost			517,027

D. Include a results framework for the programme proposal, including milestones, targets and indicators.

The development of the Strategic Results Framework laid out on the following pages was based on the consultations as outlined in the previous sections as well as Annex 6 to this document. The consultative process ensured that programme activities will be undertaken by or in collaboration with the relevant departments while respective needs in terms of capacity building and technical support will be addressed. It further enabled the OCCD to draw on the existing initiatives and

lessons learnt, which have served as a vital basis for the identification of baselines and means for verifying the achievement of the desired outputs and outcomes of the programme.

Strategic Results Framework

For this programme, gender considerations are relevant at the activity-level (for example adequate involvement of women in the decision making regarding community adaptation projects). As such, gender considerations are addressed by specific milestones that have been integrated into the programme implementation schedule (Annex 4).

Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Objective Strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations	Number of risk-exposed coastal communities protected through adaptation measures	In the current scenario, risk-exposed communities are to a large extent unable to adapt to climate change due to a lack of resources, capacity, knowledge and the necessary support through provincial and national institutions as well as policy frameworks.	By the end of the project at least 8 coastal communities are protected through adaptation measures against coastal flooding scenarios, with attention to the special concerns of women as participants and beneficiaries.	Project reports Minutes from the ATWG & PSC Provincial policy documents, development plans Disaster preparedness and response plans, project monitoring and evaluation reports Gender-disaggregated data reflecting participation of women and in terms of project impacts	Political stability and commitment to climate compatible development is maintained Political will and commitment by senior government officials to integrate climate change and adaptation Strong coordination amongst climate change stakeholders in the country, especially at provincial level Strong community leadership, cooperation and support for project activities. Financial resources are allocated from government budgets and cofinanciers to address climate-related risks
	Number of risk-exposed riverine communities protected through adaptation measures	With the scale of adaptation measures planned for implementation the total population in the 16 targeted communities would be an estimated 32,000	Eight (8) riverine communities are protected through adaptation measures against inland flooding, with attention to the special concerns of women as participants and beneficiaries		
	Number of provinces with improved climate-related planning and policy frameworks to increase resilience		At the end of the programme, adaptation to climate change is managed, monitored and planned at the provincial level in the targeted provinces and supported by a framework of policies and plans including disaster preparedness and response plans, coastal zone management plans.		
Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands	Number of communities benefitting from improved protection from coastal floods	The vast majority of communities exposed to coastal flooding is inadequately equipped with resources, capacity and support to adapt to the heightened risks from climate change The total number of inhabitants in the 8 target coastal communities that are vulnerable to coastal flooding is estimated at	By the end of the project, 8 communities are protected from coastal flooding through adaptation measures that were put in place in a community-led way with the agreements/compacts agreed on by communities to preserve the mangrove forests	<i>Project reports, monitoring & evaluation reports,</i> <i>Minutes from the ATWG, project reports, verification through reports from local CBOs and NGOs</i> <i>Procurement records of relevant agencies</i> <i>Site plans for</i>	<i>There is a strong commitment from the communities and their leadership throughout the time of the project</i> <i>PNGNWS remains committed to expand and manage their weather monitoring and forecasting activities and is adequately funded through government resources to allow for maintenance and further expansion after the project.</i>

Region.		16,000. An additional population of 120,000 in the cities of Lae, Wewak and Madang will benefit from the programme's implementation		<p><i>establishment of AWS.</i></p> <p><i>Progress reports from PNGNWS</i></p> <p><i>Distributed weather information reports</i></p>	<p><i>There is strong support from district and provincial level officials that ensure the continued cooperation among communities, districts and provinces</i></p>
	<p>Number of AWS and voluntary weather stations in operation</p> <p>Number of communities covered by the improved coastal warning system and weather information</p>	There is lack of equipment and capacity of the PNGNWS, hence, the forecasting of disasters and extreme weather events is severely limited.	<p>At least 6 tidal gauges and at least 6 AWS and 10 voluntary weather stations established at strategic locations, meet WMO standards and contribute to the monitoring and early warning system.</p> <p>One AWS will have been installed in each target 8 communities.</p>	<p><i>Provincial policies, disaster management plan, project reports</i></p> <p><i>Feasibility studies, provincial coastal infrastructure development plans</i></p>	<p><i>Provincial governments are supportive in expanding the role and resources for the climate change officers/focal points</i></p> <p><i>Landowners allowing their land to be used to establish the AWS and voluntary weather recorders are committed and consistently recording data.</i></p>
	Number of provinces with comprehensive disaster preparedness and response plans for coastal flooding in place	The provincial and national-level disaster management frameworks are evidently inadequate to address the risks	At least four provinces will have a comprehensive disaster preparedness and response plans for coastal flooding in place and will have conducted dry run tests.		<p><i>The provincial administrations support the identified coastal engineering measures and adopt them in their development plans</i></p>
	Number of provincial capitals with assessed engineering measures for adaptation	No effort has been done on this aspect in the target provincial capitals.	For three provincial capitals of Lae, Madang and Wewak suitable coastal engineering measures for adaptation are identified and addressed through respective planning and funding. For three provincial capitals of Lae, Madang and Wewak suitable coastal engineering measures for adaptation are identified and addressed through respective planning and funding.		<p><i>Financial resources are allocated from government budgets and cofinanciers to address climate-related risks</i></p>
	Number of community-led mangrove projects benefitting from support system for mangrove projects	Community-based mangrove projects are undertaken ad-hoc and largely without sufficient expertise and support	33 community-led mangrove conservation and/or reforestation projects, covering about 100 hectares are supported through the support network and nurseries	<p>Project reports, monitoring and evaluation reports</p> <p>Annual reports from the nurseries</p> <p>Government budgets at</p>	<p><i>The mangrove-focussed training concept will translate into new community-driven mangrove rehabilitation and conservation initiatives as indicated by feedback from the consultation</i></p>

	<p>Number of mangrove nurseries established and sustainably operating</p> <p>Resources allocated for continued operations of the nurseries</p>	None	<p>Eight (8) regional nurseries operate sustainably supplying the requirements of the target sites and replication areas</p> <p>Before the end of the project, sufficient resources are allocated by government for the continued operations of the nurseries beyond the life of the project.</p>	local and national levels indicating allocation for operation of nurseries	
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Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 2: Reduced exposure and increased adaptive capacity of 8 riverine communities in 4 provinces	Number of communities benefitting from improved protection from inland flooding	<p>The vast majority of communities exposed to inland flooding risk is inadequately equipped with resources, capacity and support to adapt to the changed scenario</p> <p>The total number of inhabitants in the 8 target riverine communities that are vulnerable to coastal flooding is estimated at a minimum 32000 people.</p>	By the end of the project, eight communities are protected from inland flooding through adaptation measures that were put in place in a community-led way.	<p>Project reports, monitoring & evaluation reports,</p> <p>Minutes from the ATWG, project reports, verification through reports from local CBOs and NGOs</p> <p>Procurement records</p> <p>Site plans for establishment of AWS.</p>	<p>There is a strong commitment from the communities and their leadership throughout the time of the project</p> <p>PNGNWS remains committed to expand and manage their weather monitoring and forecasting activities and is adequately funded through government resources to allow for maintenance and further expansion after the project.</p>
	<p>Number of communities covered by the improved warning system and weather information</p> <p>Number of AWS and voluntary weather stations in operation</p>	<p>Disaster preparedness is limited by the lack of and state of facilities and plans</p> <p>There is lack of equipment and capacity of the PNGNWS is weak, hence their forecasting of disasters and weather patterns is limited.</p>	<p>At least 6 AWS and at least 20 voluntary weather stations established at strategic locations, meet WMO standards and contribute to the monitoring and early warning system.</p> <p>One AWS will have been installed in each target 8 communities.</p>	<p>Progress reports from PNGNWS</p> <p>Distributed weather information reports</p> <p>Provincial policies, disaster management plan</p>	<p>There is strong support from district and provincial level officials that ensure the continued cooperation among communities, districts and provinces</p> <p>Provincial governments are supportive in expanding the role and resources for the climate change officers/focal points</p>
	Number of provinces with comprehensive disaster preparedness and	The provincial and national-level disaster management frameworks are evidently inadequate	At least four provinces will have a comprehensive disaster preparedness and response plan for inland flooding in place and will have conducted dry run		<p>Landowners allowing their land to be used to establish the AWSs.</p> <p>Voluntary weather recorders are</p>

	response plan for inland flooding		tests.		committed and consistently recording data.
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Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices	Number of national and provincial level policies, strategies, plans and coordinating mechanisms reviewed and incorporating resilience to climate change	Adaptation to the changed climate scenario of the present and future is inadequately considered in national and provincial level policies and planning frameworks	At the end of the project, all major development plans in the targeted provinces reflect climate change and adaptation considerations and coastal zone management policies are developed for the most populated areas (especially Wewak, Kavieng, Madang, Lae)	Development plans, monitoring and evaluation reports Coastal zone management policies and their gazettement Project reports, monitoring and evaluation reports, verification through CBOs and NGOs	Senior officials of the provincial administrations are supportive of the project and the integration of climate change and adaptation in development plans and policies. Climate change officers / focal points at the provincial level are able to utilise trainings and resources to build their own and local capacity for adaptation
	Number of provincial and national-level officers trained in climate adaptation planning and implementation	At the provincial level the lack of resources, capacity and in some cases basic management mechanisms/plans is evident	At the provincial level, there is a strong link between all climate change officers/focal points and the communities in their respective provinces and the officers are equipped with the resources and capacity to identify and manage adaptation needs in the province	Minutes of high-level policy meetings (NEC/NCCC/OCCD, etc)	The Climate Change Act is gazetted and the CEPA is established
	Participation of women in project activities	To be established at project inception	Increased (at least 20%) number of women participating in capacity building activities at national and subnational level	Gender-disaggregated data analysis	The government remains committed to the CCDS
Project Strategy	Indicator	Baseline	Target at end of Project	Sources of Verification	Assumptions
Outcome 4: Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels	% of the risk-affected population exposed to awareness raising activities and materials	Awareness raising efforts to date remain ad-hoc, uncoordinated and often undertaken with insufficient technical basis	75 % of the risk-affected population is exposed to awareness raising activities and materials.	Awareness raising materials, best practice toolkits, monitoring and evaluation reports, Field reports, project monitoring and evaluation reports	Strong community leadership allows for capacity building and awareness raising to translate into community-led replication activities Department of Education remains committed to the integration of climate change in school curricula
	Integration of climate change into the national school curricula and university academic programmes	Only few schools cover climate change in their classes and activities; there is very limited guidance for teachers	The topics of climate change and adaptation are introduced in PNG's school curricula and university academic programmes and teachers are equipped with the required knowledge and material	School curricula documents Training materials and records of trainings MOUs/agreements	The role of corporate social responsibility in PNG gains further momentum and can be tapped for contributions in the area of climate change and adaptation

	Amount of funding mobilized via CSR and sponsorship agreements	CSR funding sources is currently nil.	By the end of the project agreements on continuation of awareness raising and adaptation activities (especially replication) through contributions from Corporate Social Responsibility programmes and private sector participation are reached (including projects under infrastructure tax credit schemes) and make resources available for the community-led adaption in at least 10 further communities (estimated 500,000 USD)		Infrastructure tax credit schemes remain in place
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PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY


- A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT³⁶** *Provide the name and position of the government official and indicate date of endorsement. If this is a regional programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional programme:*

<i>Dr. Wari Iamo, Acting Executive Director, Office of Climate Change and Development</i>	<i>Date: 07 February 2012 (refer to attached endorsement letter)</i>
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³⁶ Each Party shall designate and communicate to the Secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

ENDORSEMENT LETTER IS ATTACHED AS A PDF FILE.

B. IMPLEMENTING ENTITY CERTIFICATION *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the programme contact person's name, telephone number and email address*

<p>I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this programme.</p>	
<div style="text-align: center;">  </div> <p>Yannick Glemarec Director, Environmental Finance, UNDP</p>	
<p>Date: February 8, 2012</p>	<p>Tel. and email: +1-212-906-6843; yannick.glemarec@undp.org</p>
<p>Programme Contact Person: Jose Erez Padilla (LECRDS)</p>	
<p>Tel. And Email: jose.padilla@undp.org; +6623049100 ext 2730</p>	

ANNEX 1 - UNDP Environmental Finance – Specialized Technical Services

The implementing entity fee will be utilized by UNDP to cover its indirect costs in the provision of general management support and specialized technical support services. The table below provides an indicative breakdown of the estimated costs of providing these services. If the national entity carrying out the project requests additional Implementation Support Services (ISS), an additional fee will apply in accordance with UNDP fee policy regarding ISS and would be charged directly to the project budget.

Stage	Specialized Technical Services Provided*	Estimated Costs of Providing Services**
Identification, Sourcing and Screening of Ideas	Provide information on substantive issues and specialized funding opportunities (SOFs)	25,580
	Verify soundness and potential eligibility of identified idea	
Feasibility Assessment / Due Diligence Review	Technical support: provide up-front guidance; sourcing of technical expertise; verification of technical reports and project conceptualization; guidance on SOF expectations and requirements	76,740
	Provide detailed screening against technical, financial, social and risk criteria and provide statement of likely eligibility against identified SOF	
	Assist in identifying technical partners; Validate partner technical abilities.	
	Obtain clearances – SOF	
Development & Preparation	Technical support, backstopping and troubleshooting	102,320
	Technical support: sourcing of technical expertise; verification of technical reports and project conceptualization; guidance on SOF expectations and requirements	
	Verify technical soundness, quality of preparation, and match with SOF expectations	
	Negotiate and obtain clearances by SOF	
	Respond to information requests, arrange revisions etc.	
	Verify technical soundness, quality of preparation, and match with SOF expectations	
Implementation	Technical and SOF Oversight and support	230,216
	Technical support in preparing TOR and verifying expertise for technical positions. Verification of technical validity / match with SOF expectations of inception report. Participate in Inception Workshop	
	Technical information and support as needed	
	Technical support, participation as necessary	
	Advisory services as required	
	Allocation of ASLs	
	Technical support and troubleshooting, Support missions as necessary.	
	Project visits – at least one technical support visit per year.	
	Technical support, validation, quality assurance	

Stage	Specialized Technical Services Provided*	Estimated Costs of Providing Services**
	Return of unspent funds	
Evaluation and Reporting	Technical support, progress monitoring, validation, quality assurance	76,740
	Technical support, participation as necessary	
	Technical support in preparing TOR and verifying expertise for technical positions. Verification of technical validity / match with SOF expectations of inception report. Participate in briefing / debriefing	
	Technical analysis, compilation of lessons, validation of results	
	Dissemination of technical findings	
	Total	511,596

** This is an indicative list only. Actual services provided may vary and may include additional services not listed here. The level and volume of services provided varies according to need.

** The breakdown of estimated costs is indicative only.

Service standards:

1. initial response to communication within 2 working days
2. full response to communication (with the exception of a response requiring travel) within 10 working days

ANNEX 2 - List of Abbreviations

ADB	Asian Development Bank
AF	Adaptation Fund
AFB	Adapation Fund Board
ALM	Adaptation Learning Mechanism
AusAID	Australian Agency for International Development
AWS	Automated Weather Station
CBA	Community-based Adaptation
CBO	Community based Organization
CCDS	Climate-Compatible Development Strategy
CEPA	Conservation and Environment Protection Authority
CEWS	Coastal Early Warning System
CSR	Corporate Social Responsibility
DAL	Department of Agriculture and Livestock
DEC	Department of Environment and Conservation
DRM	Disaster Risk Management
EE	Executing Entity
ENSO	El Nino Southern Oscillation Events
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GIZ/GTZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoPNG	Government of Papua New Guinea's
IE	Implementing Entity
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
JDPBPC	Joint District Planning and Budget Priority Committee
JPPBPC	Joint Provincial Planning and Priority Committee
LLG	Local-Level Government
M&E	Monitoring & Evaluation
MDG	Millenium Development Goals
MIRC	Motupore Island Research Centre
MIE	Multilateral Implementing Entity
MoU	Memorandum of Understanding
NARI	National Agriculture Research Institute
NCCC	National Climate Change Committee
NDC	National Disaster Centre
NEX	National Execution
NGO	Non-Governmental Organisation

NIE	National Implementing Entity
NPM	National Programme Manager
NPD	National Programme Director
OCCD	Office Of Climate Change and Development
PAC	Programme Appraisal Committee
PACC	Pacific Adaptation to Climate Change Project
PCCC	Provincial Climate Change Committee
PIC	Pacific Island Centre (formally named the South Pacific Economic Exchange Support Centre)
PMU	Programme Managment Unit
PNG	Papua New Guinea
PNGNWS	Papua New Guinea National Weather Service
POPP	Programmes and Operations Policies and Procedures (of the UNDP)
PPCR	Pilot Programme on Climate Resilience
PPP	Public-Private Partnership
PPR	Programme Progress Report
REDD	Reducing Emissions from Deforestation and Forest Degradation
SGP	Small Grants Programme
SOPAC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
TWG	Technical Working Group
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN HABITAT	United Nations Human Settlements Programme
USP	Univeristy of the South Pacific
WB	World Bank
WCS	Wildlife Conservation Society
WWF	Worldwide Fund for Nature

ANNEX 3 - Project Execution Costs

Function	Profile	monthly cost	year I	year II	year III	year IV	total
National Programme Director (NPD)	Designated OCCD Director		-	-	-	-	-
National Programme Manager (NPM)	Int'l experience, min. Master, min. 7 years experience	5,175.00	62,100.00	62,100.00	62,100.00	62,100.00	248,400.00
Technical Expert Support (<i>First 6 month, capacity building for PMU</i>)	Seconded from Int'l Organisation (Public/Private/NGO)	7,500.00	45,000.00				45,000.00
Programme Associate	Local, Uni degree, 2-3 years experience	1,214.06	14,568.66	14,568.66	14,568.66	14,568.66	58,274.64
Administrative & finance support	Local, professional, min. 3 years experience	1,124.13	13,489.50	13,489.50	13,489.50	13,489.50	53,958.00
7.0% Overheads (equipment, communication)	AF team housed at OCCD		9,461.07	6,311.07	6,311.07	6,311.07	28,394.28
Monitoring & Evaluation	As per breakdown below and		13,500.00	26,500.00	6,500.00	36,500.00	83,000.00

Total Programme Execution Cost USD 517,026.92

M&E breakdown by year	Year I	Year II	Year III	Year IV	Totals
Inception workshop	5,000.00				5,000.00
Inception report	2,000.00				2,000.00
Quarterly reports					
Annual technical monitoring report	3,000.00	3,000.00	3,000.00	3,000.00	12,000.00
Meetings of National Project Steering Committee	250.00	250.00	250.00	250.00	1,000.00
Meetings of Provincial Climate Change Steering Committee	250.00	250.00	250.00	250.00	1,000.00
Meeting of National Climate Change Country Team		-	-		
Mid-Term Evaluation		20,000.00			20,000.00
Final Project Evaluation		-		30,000.00	30,000.00
Project Terminal Report	-	-	-	-	-
Audits	3,000.00	3,000.00	3,000.00	3,000.00	12,000.00
Totals	13,500.00	26,500.00	6,500.00	36,500.00	83,000.00

ANNEX 4 - Project Implementation Schedule / Gantt Chart

◆ = milestone

◆ = gender disaggregated milestone

		Year I				Year II				Year III				Year IV			
	Output / Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Programme Execution																
	Inception Workshop																
1.1	Coastal early warning systems established for observation, data collection and information management and dissemination.																
	1.1.1. Assess and map coastal flooding hazards with areas of major population as higher priority																
	Map and hazard assessment is completed and disseminated			◆													
	The assessment includes a gender-disaggregated analysis on the impacts from the hazards			◆													
	1.1.2. Train and equip the PNGNWS / NDC / Digicel with the necessary systems (weather stations, gauges, operations centre) and capacity.																
	Installation works completed and stakeholders trained						◆										
	Scheduled maintenance conducted under guidance and with targeted training support										◆						
	Scheduled maintenance conducted by stakeholders														◆		
	1.1.3. Establish a central database on coastal flooding hazards as basis for the monitoring of respective weather scenarios																
	Database established						◆										
	1.1.4. Train PNGNWS / NDC / Digicel in monitoring and analysis of weather data and especially the identification of indicators and scenarios relevant to triggering early warning messages and processes.																
	Training series completed and stakeholders demonstrate capacity to monitor and analyse data and identify hazard triggers								◆								
	1.1.5. Facilitate the integration of the operation and maintenance of the early warning systems under this programme (incl. the system under output 2.1.) in recurrent government allocations by 2014																
	Minimum 50% of costs for operation and maintenance are derived from recurrent government allocations or other long-term agreements								◆								
	100% of costs for operation and maintenance are derived from recurrent government allocations or other long-term agreements																◆
1.2	Coastal flood preparedness and response plan and systems established																
	1.2.1. Develop a model disaster preparedness and response plans for coastal flooding in East Sepik Province and New Ireland Province																
	Disaster preparedness plans fully established		◆														
	Disaster preparedness plans are gender sensitized		◆														

		Year I				Year II				Year III				Year IV			
	Output / Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	1.2.2. Establish local flood management committees with clear communication channels to the provincial-level disaster coordination bodies.																
	Flood management committees established in flood-affected communities of East Sepik and New Ireland Provinces and linked with provincial disaster coordination bodies							♦									
	Women are adequately represented in the flood management committees							♦									
	1.2.3. Expand the water storage and evacuation centre facilities in East Sepik Province and New Ireland Province																
	Installation and construction works completed								♦								
	1.2.4. Facilitate the integration of the coastal flooding early warning system into the national and provincial DRM plans																
	Integration of early warning system into provincial DRM plans						♦										
	Integration of early warning system into national DRM plans									♦							
	1.2.5. Provide cross-provincial training and support for the implementation of the provincial disaster preparedness and response plan and measures in the remaining provinces of the North Coast Region and Islands Region																
	Provincial DRM plans established in remaining provinces														♦		
1.3	Support system for community-led mangrove reforestation and conservation projects																
	1.3.1. Training of trainers for community leaders, CBOs, NGOs on best practices for mangrove reforestation and conservation (includes dissemination and application of mangrove toolkit in target sites and replication areasand nationally)																
	1.3.2. Establish regional mangrove nurseries and conduct training and support centres to serve target sites and replication areas and commit resources for their operation beyond the life of the project.																
	1.3.3. Integrate mangrove reforestation and conservation in local development plans and formulation/signing of community mangrove forestry agreements/compacts (no separate budget allocation as this will be coordinated by the Programme Management Unit)																
	First community-driven mangrove reforestation and conservation projects are established/initiated			♦													
	Community-driven mangrove reforestation and conservation projects are established throughout the programme's target area and agreements/compacts signed																♦
	Mangrove nurseries established		♦														
	MOU with PNGNFA formulated for planting of tree species as compensatory sources of timber and fuelwood		♦														
	Commitment of resources for the continued operation of the mangrove nurseries beyond the life of the project to serve replication sites through budgetary allocations to cover around 200 hectares of additional area.																
	All community-managed conservation projects reflect adequate involvement of women				♦												♦
1.4	Integrated coastal adaptation measures implemented to protect communities in East Sepik Province, Oro Province and New Ireland Province																

		Year I				Year II				Year III				Year IV			
	Output / Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	1.4.1. Adapt four coastal communities to coastal flooding in the context of land-use plans that will be prepared and through support to community-led best practice adaptation measures in the most affected areas of East Sepik Province, Oro Province and New Ireland Province.																
	Land-use plans prepared for four communities and the required adaptation measures are identified				♦												
	Four coastal communities are flood adapted												♦				
	1.4.2. Support for best practice adaptation measures in additional four communities of East Sepik Province, Oro Province and New Ireland Province																
	Support is established and communicated					♦											
	The assessment of communities include the documentation of women's involvement in the communities' decision making processes regarding the community-led adaptation project					♦											
	1.4.3. Document/capture and develop trainings and implementation materials on best practice adaptation measures to coastal flooding in support of community-led initiatives																
	Suitable best practice measures are identified and training materials made available or updated	♦				♦			♦				♦				♦
	Training materials include aspects on gender and how to ensure adequate involvement		♦														
	Each funding cycle is accompanied by a training and support programme				♦				♦								
2.1	Inland flooding early warning systems established for observation, data collection and information management and dissemination.																
	2.1.1. Assess and map coastal flooding hazards with areas of major population as higher priority																
	Map and hazard assessment is completed and disseminated			♦													
	The assessment includes a gender-disaggregated analysis on the impacts from the hazards			♦													
	2.1.2. Train and equip the PNGNWS / NDC / Digicel with the necessary systems (weather stations, gauges, operations equipment) and capacity.																
	Installation works completed and stakeholders trained					♦											
	Scheduled maintenance conducted under guidance and with targeted training support										♦						
	2.1.3. Establish a central database on inland flooding hazards as basis for the monitoring of respective weather scenarios																
	Database established								♦								
	2.1.4. Train PNGNWS / NDC / Digicel in monitoring and analysis of weather data and especially the identification of indicators and scenarios relevant to triggering early warning messages and processes.																
	Training series completed and stakeholders demonstrate capacity to monitor and analyse data and identify hazard triggers								♦								
2.2	Inland flood preparedness and response plan and systems established in Oro Province																
	2.2.1. Develop a model disaster preparedness and response plan for inland flooding in Oro Province																

		Year I				Year II				Year III				Year IV			
	Output / Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Disaster preparedness plans fully established		♦														
	Disaster preparedness plans are gender sensitized		♦														
	2.2.2. Establish local flood management committees with clear communication channels to the provincial level disaster coordinators.																
	Flood management committees established in flood-affected communities of East Sepik and New Ireland Provinces and linked with provincial disaster coordination bodies							♦									
	Women are adequately represented in the flood management committees							♦									
	2.2.3. Expand the water storage and evacuation centre facilities in Oro Province.																
	Installation and construction works completed								♦								
	2.2.4. Facilitate the integration of the flood early warning system into the national and provincial DRM plans.																
	Integration of early warning system into provincial and national DRM plans									♦							
	2.2.5. Provide cross-provincial training and support for the implementation of the provincial disaster preparedness and response plan and measures in the remaining provinces of the North Coast																
	Provincial DRM plans established in remaining provinces														♦		
2.3	Integrated riverbank protection measures implemented to protect communities in East Sepik Province, Oro Province and Morobe and Madang Provinces.																
	2.3.1. Flood adapt four communities in the context of land-use plans that will be prepared and through support to community-led adaptation measures in the most affected areas of East Sepik Province, Oro Province and Morobe and Madang Provinces.																
	Land use plans prepared for four communities and the required adaptation measures are identified				♦												
	Four coastal communities are flood adapted												♦				
	2.3.2. Facilitate a cross-community learning exchange on the adaptation measures to inland flooding and their management with support of provincial authorities in the four provinces																
	Begin of a series of exchanges focussed on replicating and improving adaptation measures													♦			
	2.3.3. Support for best practice adaptation measures in additional four communities of East Sepik Province, Oro Province and New Ireland Province																
	Support is established and communicated					♦											
	The assessment of sites include the documentation of women's involvement in the communities' decision making processes regarding the community-led adaptation project					♦											
	2.3.4. Documentation/capture and develop trainings and implementation materials on best practice adaptation measures to inland flooding in support of further community-led initiatives																
	Suitable best practice measures are identified and training materials made available or updated	♦				♦			♦				♦				♦
	Training materials include aspects on gender and how to ensure adequate involvement		♦														
	Each funding cycle is accompanied by a training and support programme				♦				♦								

		Year I				Year II				Year III				Year IV			
	Output / Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3.1	Climate change-related risks and resilience to coastal and inland flooding integrated into coastal zone management related policies, legal and planning frameworks at the national and sub-national levels																
	3.1.1. Comprehensive review of coastal zone management policies and related legal and planning frameworks and identification of climate change related gaps																
	Review completed and disseminated to stakeholder						♦										
	3.1.2. Coordinate the mainstreaming of climate change issues according to the needs identified in 3.1.1. and in accordance with the Climate Change Act (currently being developed).																
	Gaps are addressed in relevant policies								♦								
	3.1.3. Trainings for the Conservation and Environment Protection Authority (CEPA - being established) with the focus on building capacity for identifying non-adherence to climate change related policies, laws and regulations as well as respective enforcement.																
	Comprehensive training series completed, capacity demonstrated.															♦	
3.2	Policy makers and planners at the national, provincial and district offices, institutions and extension services systemically trained to implement climate-sensitive policies and plans, including integrated land-use plans																
	3.2.1. Undertake a comprehensive training programme for provincial climate change officers																
	3.2.2. Facilitate the utilisation of funding mechanisms such as the infrastructure tax credit schemes available to communities through trainings and provincial workshops.																
	Training of trainers completed				♦												
	Adequate representation of women in the Training of trainers of system				♦												
	Support system for trainers and community projects implemented					♦											
	3.2.3. Disseminate regular policy briefs to inform high-level policy makers on climate change-related risk reduction and adaptation processes in support of the CCDS.																
	3.2.4. Facilitate the inter-ministerial dialogue on climate change resilient development																
	Policy briefs and dialogue sessions for high-level policy makers				♦				♦				♦			♦	
4.1	Lessons learned and best practices generated, captured and distributed to other communities, civil society, policy makers in government and globally through targeted mechanisms																
	4.1.1. Develop best practice materials for community-led replication of adaptation measures																
	Materials produced and disseminated with information on support for replication										♦						
	4.1.2. Establish a national web-based adaptation platform focussed on support to community-level adaptation initiatives																
	Platform goes online								♦								
	4.1.3. Extract lessons learnt from the implementation of the programme and contribute to knowledge platforms including regional and international forums and meetings																
4.2	Climate change awareness and education programmes carried out to build next generations' resilience to climate change																
	4.2.1. Facilitate national-level round-table discussions with community and NGO representatives, youth & women organisations as well as institutions and government agencies in the area of education																
	Annual round-table			♦				♦				♦				♦	

		Year I				Year II				Year III				Year IV			
	Output / Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	4.2.2. Coordinate the integration of climate change and adaptation into school curricula and university programmes																
	4.2.3. Develop materials and guidance document for schools, teachers, trainers, village leaders and academics																
	Review of policies and curricula completed						♦										
	Curricula reflect climate change and adaptation								♦								
	Materials and guidance documents for produced											♦					
	4.2.4. Attract corporate social responsibility contributions and sponsorships for the continuation of activities and replication of successful community-based adaptation measures, including resources for the early warning systems' expansion and related activities																
	Private sector engagement events											♦			♦		
	Programme Execution																
	PMU established and operational																
	Project staff recruited																
	Equipment procured, office established																
	PMU operational and managing programme implementation																
	Project Monitoring and Evaluation																
	Inception report																
	Quarterly reports																
	Annual technical monitoring report																
	Meetings of National Project Steering Committee																
	Meetings of Provincial Climate Change Steering Committee																
	Meeting of National Climate Change Country Team																
	Mid-Term Evaluation																
	Final Project Evaluation																
	Project Terminal Report																
	Audits																

Annex 5 Total Budget and Work Plan

Award ID:	PIMS 4452 Atlas Proposal ID: 00057405, Project ID: 00070900
Business Unit:	PNG10
Project Title:	Enhancing adaptive capacity of communities to climate change-related floods in the North Coast and Islands Region of Papua New Guinea
Implementing Partner (Executing Agency)	Office of Climate Change and Development (OCCD)

GEF Outcome/Atlas Activity	Implementation	Fund ID	Donor Name	Atlas Budgetary Code	ATLAS Budget Description	Amount (USD) Year 1	Amount (USD) Year 2	Amount (USD) Year3	Amount (USD) Year 4	Total (USD)
OUTCOME1: Adaptation to coastal flooding-related risks and hazards for North Coast and Islands Region communities	UNDP - NEX	62040	AF	71200	Int'l Consultants	140,000	30,000	30,000	0	200,000
	UNDP - NEX	62040	AF	71300	Local Consultants	50,000	75,000	62,250	38,750	226,000
	UNDP - NEX	62040	AF	71600	Travel	64,500	73,000	60,500	35,000	233,000
	UNDP - NEX	62040	AF	72100	Contractual Services-Companies	0	271,500	340,000	170,000	781,500
	UNDP - NEX	62040	AF	72200	Equipment	154,000	228,500	12,000	8,750	403,250
	UNDP - NEX	62040	AF	72300	Materials and Supplies	97,000	99,000	66,000	24,000	286,000
	UNDP - NEX	62040	AF	75700	Training, workshops and Conference	68,500	162,500	75,000	51,500	357,500
	Total Outcome 1					574,000	939,500	645,750	328,000	2,487,250
OUTCOME 2: Adaptation to inland flooding-related risks and hazards for river communities in East Sepik Province, Oro Province and Morobe and Madang Provinces.	UNDP - NEX	62040	AF	71200	Int'l Consultants	165,000	45,000	30,000	0	240,000
	UNDP - NEX	62040	AF	71300	Local Consultants	20,000	60,000	62,500	40,000	182,500
	UNDP - NEX	62040	AF	71600	Travel	72,000	75,500	57,500	60,000	265,000
	UNDP - NEX	62040	AF	72100	Contractual Services-Companies	0	256,500	320,000	170,000	746,500
	UNDP - NEX	62040	AF	72200	Equipment and Furniture	253,500	84,500	0	0	338,000
	UNDP - NEX	62040	AF	72300	Materials and supplies	7,000	0	0	4,000	11,000

	UNDP - NEX	62040	AF	75700	Training, Workshops and Conference	32,500	145,000	57,000	59,000	293,500
	Total Outcome 2					550,000	666,500	527,000	333,000	2,076,500
OUTCOME 3: Institutional strengthening to support climate- and disaster-resilient policy frameworks	UNDP - NEX	62040	AF	71200	Int'l Consultants	60,000	75,000	45,000	30,000	210,000
	UNDP - NEX	62040	AF	71300	Local Consultants	28,000	30,000	4,000	4,000	66,000
	UNDP - NEX	62040	AF	71600	Travel	0	32,000	0	7,500	39,500
	UNDP - NEX	62040	AF	72100	Contractual Services- Companies	20,000	5,000	20,000	5,000	50,000
	UNDP - NEX	62040	AF	72300	Materials and supplies	5,500	2,500	4,500	4,500	17,000
	UNDP - NEX	62040	AF	75700	Training, Workshops and Conference	44,500	72,500	40,000	45,000	202,000
	Total Outcome 3					158,000	217,000	113,500	96,000	584,500
OUTCOME 4: Awareness raising and knowledge management	UNDP - NEX	62040	AF	71200	Int'l Consultants	0	30,000	60,000	0	90,000
	UNDP - NEX	62040	AF	71300	Local Consultants	6,000	26,000	31,000	18,000	81,000
	UNDP - NEX	62040	AF	71600	Travel	0	8,000	21,000	10,000	39,000
	UNDP - NEX	62040	AF	72100	Contractual Services- Companies	10,000	20,000	13,500	11,000	54,500
	UNDP - NEX	62040	AF	72300	Materials and supplies	1,000	8,000	38,000	5,000	52,000
	UNDP - NEX	62040	AF	72400	Communication Equipment	0	0	500	500	1,000
	UNDP - NEX	62040	AF	75700	Training, Workshops and Conference	0	7,000	19,000	10,000	36,000
	Total Outcome 4					17,000	99,000	183,000	54,500	353,500
Project management (execution costs)	UNDP - NEX	62040	AF	71200	Int'l Consultants	45,000	20,000	0	30,000	95,000
	UNDP - NEX	62040	AF	71300	Local Consultants	5,000	3,000	3,000	3,000	14,000

	UNDP - NEX	62040	AF	71400	Contractual Services-Individuals	90,158.16	90,158.16	90,158.16	90,158.16	360,633
	UNDP - NEX	62040	AF	72100	Contractual Services-Company	3,000	3,000	3,000	3,000	12,000
	UNDP - NEX	62040	AF	72800	IT Equipment, communication	9,461.07	6,311.07	6,311.07	6,311.07	28,394
	UNDP - NEX	62040	AF	75700	Training, Workshops and Conference	5,500	500	500	500	7,000
	Total Project management (Execution costs)					158,119.23	122,969.23	102,969.23	132,969.23	517,027
	TOTAL					1,457,119.23	2,044,969.23	1,572,219.23	944,469.23	6,018,777

Budget Notes:

Outcome 1: AF resources will be used to undertake comprehensive analysis and mapping of hazard impacts along the coastal area in order to facilitate the development and establishment of a coastal early warning system. The capacity of the National Weather Service and Disaster Centres at different societal levels will be built through trainings and information will be collected communicated in a more effective and timely manner, allowing appropriate preparedness and needed response measures, in case of climate-related hazards. AF resources will support the conservation of mangroves and their protective function, through replanting, establishment of nurseries and support to community-based conservation projects. In addition, funds will be used to flood-adapt 4 communities through small-scale adaptation measures and technical assistance. An additional 4 communities will be coastal flooding-adapted through community led replication based on the earlier demonstration projects. Further funds will be used to ensure the climate-resilience of development plans by conducting expert-led reviews and feasibility studies on planned interventions.

Outcome 2: With the funds made available through the AF a comprehensive analysis and mapping of hazard impacts will be conducted and will be the basis for the implementation of an integrated early warning system for inland flooding. Analogue to the activities under outcome one the required capacity of the PNGNWS and the disaster centers will be built through trainings and the supply of equipment. Funds will be used to adapt 4 communities to inland flooding through small-scale adaptation measures and the provision of technical assistance. Further 4 communities will be adapted through community led replication based on the earlier demonstration projects.

Outcome 3: AF resources will support a systematic review and analysis of the policies and institutional capacities related to disaster preparedness and response, coastal zone management and development planning in flood-prone areas as well as legal frameworks at the different levels. This will serve to support the mainstreaming of climate and disaster risks into policies at the national, provincial and local levels. This will be conducted by facilitating dialogue and providing trainings to relevant line institutions (In particular: OCCD, DEC, DAL, NARI, DCD, NDC, National Weather Service) while continuously informing higher level policy makers through regular policy briefs..

Outcome 4: The AF resources are utilized for capacity building and technical assistance as well as the development and dissemination of required materials , which will enable to implement appropriate adaptation measures. The programme will support the active outreach to and engagement of local communities through climate change awareness raising and information exchange activities while harnessing a range of media, tailored to local cultural context. In addition,

the OCCD as executing agency will provide the channels for the lessons learnt and best practices generated to be fed back into the policy-making processes on the provincial and national levels. The introduction of the produced knowledge materials (case studies, photo stories, brochures) in school activities and curricula will ensure a mechanism for longer term impact and replication of experiences and climate resilience. AF resources will also support the sharing of experiences more broadly at the national, regional and global levels through the establishment of knowledge sharing platforms and presentations at regional events.

Remark: Training, workshops and Conference budget is covered learning, air ticket, DSA other expenses i.e rental IT equipment for trainings, conference room rental, meet package costs and misc. cost related to training, brainstorming, project monitoring, working discussion or expert conference.

Annex 5a – Disbursement schedule

	Upon Agreement signature		One Year after Project Start ^{a/}	Year 2 ^{b/}	Year 3	Year 4 ^{c/}	Total
Scheduled Date	April 2012		Oct 2013	Oct 2014	Oct 2015	End 2016	
Project Funds		1,457,119	2,044,969	1,572,219	944,470		6,018,777
Implementing Entity Fee	204,638	74,313	104,293	80,183	48,169		511,596
Total	204,638	1,531,432	2,149,262	1,652,402	992,639		6,530,373

^{a/}Use projected start date to approximate first year disbursement

^{b/}Subsequent dates will follow the year anniversary of project start

^{c/}Add columns for years as needed

Annex 6 – Overview of Consultations in Preparation of this Proposal

Consultation type and time	Main points discussed / raised
<p>Dedicated Stakeholder Consultation on this AF Proposal in New Ireland Province (Island Scenario)</p> <p>June 2011</p> <p>Stakeholders involved:</p> <ul style="list-style-type: none"> - Provincial Climate Change Officer - Representatives from the Provincial Administration - Provincial Planner - Provincial Disaster Coordinator - Representatives from WCS - Emirau Island village committee - Representatives from local CBO Saltwater School - Ward Councillors and community representatives from communities in Wards 14 & 15 	<ul style="list-style-type: none"> - The Climate Change Officer and his colleague gave the team a comprehensive overview of the climate change impact in the province, which was confirmed and expanded upon with other meetings and observations: - The hazards are manifold and widely distributed here: <ul style="list-style-type: none"> - Coastal flooding if especially frequent on the East coast of New Ireland - Occasional occurrences of inland flooding on the less populated rivers in the southern part of the Island - King tides overflowing smaller islands of the province and cases of climate refugees (settling on larger islands or the “mainland”) - Food security is impacted through drought and lack of fresh water sources on some smaller islands - No major infrastructure and larger areas of population at critical risk. However, smaller seawalls at the waterfront in Kavieng are improperly built and have a very short lifetime, very little effect. <p>Adaptation to this point is based largely on stand-alone, ad hoc measures, which are mostly initiated by the communities:</p> <ul style="list-style-type: none"> - In villages outside of Kavieng, the provincial capital small patches of mangroves are planted by communities to attract fish (breeding grounds) and later (while other patches are being grown) as source for construction wood thus taking pressure of the natural mangrove areas nearby. - The Emirau Island village committee presented their case as well and demonstrated a high level of awareness and initiative. The island is heavily affected by droughts as well as floods: People starting to move to the mainland, there is little action from government and provincial agencies. The committee and youth action was initiated to rally support from provincial administration and has handed proposals to Provincial Disaster Coordinator, which is being forwarded to NDC. - Awareness on climate change impacts is generally high - Knowledge on the right adaptation measures and techniques appears to be lacking. - Problems seem to stem from institutional weaknesses, lack of coordination, will and resources (CC office has basically zero resources) from the provincial administration (somewhat disconnected)
<p>Dedicated Stakeholder Consultation on this AF Proposal in East Sepik Province (North Coast Scenario)</p> <p>June 2011</p> <ul style="list-style-type: none"> - Representatives from the provincial and district levels: 	<p>The consultation in Wewak and the active participation of the 28 participants representing communities, districts, the provincial administration as well as local CBOs was resourceful in assessing the scenario of climate change hazards in the province and in the area of Wewak in particular.</p> <p>Communities presented their cases and the constraints they were facing in regards to adaptation to the hazards faced. Awareness was generally very high and one of the major findings was the insufficient coordination and exchange between provincial agencies and the communities.</p> <p>Further specific input was received regarding the most heavily impacted areas and the most vulnerable communities (Wom Beach, Moem area, Meni village. Another concrete outcome was the consensus on the need for the provincial administration to establish a local climate change office with strong links to the affected communities. This case was put</p>

Consultation type and time	Main points discussed / raised
Provincial Planner, District Administrator, Provincial Disaster Coordinator - Ward councillors and members from the wards of Murik Lakes, Wom, Wewak, Mewi, Kairu Island and Mushu Island - Local CBOs (Floriculture Club, Turubu EcoForestry)	forward to the representatives from the Provincial Administration present at the consultation. The prioritised adaptation measures identified included the building of small-scale seawall, mangrove reforestation after the root causes of mangrove dying were addressed such as inadequate development planning (e.g. road building with insufficient culverts affecting the required exchange of fresh and saltwater in the mangrove areas).
Mangrove Workshop undertaken by OCCD May 2011 Stakeholders involved: - OCCD, PNGFA, FRI - WCS, TNC, WWF - Community members and representatives from CBOs - Academics from UPNG	- Sharing of knowledge and experience from local and international mangrove planting efforts - Stock-take of current mangrove rehabilitation efforts - Identification of issues facing rehabilitation efforts and generation of solutions - Outlined likely roles and responsibilities of stakeholders under a national mangrove planting initiative The workshop provided essential guidance and input for the mangrove planting, reforestation and conservation toolkit that is currently being developed under the guidance of the OCCD.
Manus Province: Provincial Consultations on climate change, adaptation and mitigation undertaken by OCCD as part of the ongoing national consultation process Involved Stakeholders: Besides extensive participation from local stakeholders (see description), the OCCD was supported by PNGFA, DAL, National Fisheries Authority, and Disaster Environment Management Unit as well as NGOs like WCS, TNC and WWF	In Manus Province the OCCD team undertook a combination of awareness raising and consultation. An open forum was organized at the Lorengau Market for the public during the first day. with video show and an evening Talk-back Show at the Radio Manus Maus bilong Chauka reaching more than 20,000 people in the rural area. The second day was spent with the local leaders during their summit which included the Provincial Governor, Honorable Michael Sapau, Open Member and Minister for Inter-Government Relation, Honourable Job Pomat, Administrator, Mr. Kule-en Hamou, twelve (12) Local Level Government Presidents, one hundred twenty seven (127) ward members and more than twenty (>20) Manus Provincial Administration staff. During the break-out sessions with the provincial leaders set questionnaires on low carbon growth and adaptation were given to the leaders. The objective of the questionnaires was to get the leaders to identify in their respective wards and local level government the climate change impact areas, how they were coping with it and how they would want to see the government helping out with the mitigation of these impacts. Out from the one hundred twenty eight (128) filled questionnaires received 80 percent (%) say they experienced the King Tide of 2008, 35% say that their atolls and islands are sinking, and 84% say Malaria is a real problem. On the support side 87% say they need immediate technical advice while 95% needed immediate funding.
West Sepik Province: Provincial Consultations on climate change, adaptation and mitigation undertaken by OCCD as part of the ongoing	In west Sepik, the adaptation-focussed sessions resulted in a clear assessment of the situation in regards to coastal flooding & sea-level Rise as well as adaptation measures taken to date. Coastal flooding: Based on the group discussion, areas in West Sepik province that are especially prone to this hazard are:

Consultation type and time	Main points discussed / raised
<p>national consultation process</p> <p>Involved Stakeholders: Representatives from the Provincial Administration and the Provincial Planner as well as community members and representatives from local CBOs and NGOs</p>	<ul style="list-style-type: none"> - The coastline from Wutung to Matapau (Vanimo, Aitape) - Small islands (Ali, Seleo, Tumleo, Angel) - Barapu, Sissano, Malol (affected by Tsunami in 2008, July 17) <p>In West Sepik province, the following actions have been taken to address the issue:</p> <ul style="list-style-type: none"> - Drafted a Provincial Disaster Plan - Relocation of affected families - Provision of basic materials for rebuilding <p>Other adaptation measures against the impact of coastal flooding and sea-level rise that might help improve the situation are sea wall building, mangrove and other tree planting and resettlement. Moving forward to address the issue, West Sepik province would need support from Provincial Disaster Committee, government departments, NGOs as well as donor agencies specifically for technical support.</p> <p>Inland flooding Based on the group discussion, areas in West Sepik province that are especially prone to this hazard are:</p> <ul style="list-style-type: none"> - Inland District; Telefomin, Vanimo Green - Aitape; Yalinge river floods the main highway from Aitape to Vanimo and Raihu river used to flood over the road to the Raihu hospital, St Ignatius Secondary school and the disable centre for disabilities. <p>Other damages being caused include the food gardens, roads and bridges. The following actions have been taken to address the issue:</p> <ul style="list-style-type: none"> - Drafted a Provincial Disaster Plan - Build fences made from tree branches to minimize flood impact - Raihu hospital buildings has now been elevated with high post
<p>East New Britain: Provincial Consultations on climate change, adaptation and mitigation undertaken by OCCD as part of the ongoing national consultation process</p> <p>Stakeholders involved: The road show brought together different stakeholders such as non-government organisations, community based organisations, developing partners and government agencies that are responsible for the climate</p>	<p>The consultation in East New Britain took the form of a New Guinea Islands road show that involved representatives from 5 Island provinces during the 2-4 of November 2010. The main outcome was an assessment of the situation in regards to climat change hazards faced in the provinces and the status of adaptation and response measures.</p> <p><i>Bougainville:</i> Rising sea level has caused coastal erosion, islands to sink and king tide damage to the province. The communities that are prone to sea level rise are the Carteret and Mortlock islands. The provincial government has been relocating the Carteret Islanders to mainland Bougainville in collaboration with Tulelei Peisa, a local NGO, there has been building of sea walls and mangrove planting to reduce the impact from rising sea level. The province needs the support from the national government and international donors to relocate islanders, funding stakeholders involved in climate change at provincial level and conducting workshops at provincial level.</p> <p><i>Manus</i> Rising sea level has caused coastal erosion, sinking islands, king tide damage, salt water flooding of agricultural lands, salt water contamination of drinking water. The areas highly prone to rising sea level are all the coastal and island communities in the province are affected. The communities have built houses on elevated grounds, people are moving to higher ground, awareness on climate change is increasing and mangroves are replanted on a small scale in 2-3 communities with the assistance of NGOs. It is necessary to supply water tanks of 1000 liters to all wards/LLG's for emergency provisions. The</p>

Consultation type and time	Main points discussed / raised
<p>change issue. New Guinea Islands comprises of 5 provinces; Manus, New Ireland, West New Britain, East New Britain and Bougainville.</p>	<p>other issues that might improve the situation in Manus province includes the improving of water systems as alternative to water tanks as well as mangrove and reef conservation measures and building of sea walls. The provincial government has a climate change office to develop plans to address the issue, they also need technical/financial support but are conducting an awareness drive in all LLGs.</p> <p><i>New Ireland</i> Rising sea level have caused coastal erosion, sinking islands, king tide damage, saltwater flooding of agricultural lands and salt water contamination of drinking water. Atolls and coastal land areas have been affected, they have build sea walls and more trees have been planted along the beach and moving to higher grounds. They need more awareness and resources from the government and donors.</p> <p><i>West New Britain</i> Rising sea level has caused coastal erosion, sinking islands, king tide damage and salt water contamination of drinking water. The areas prone to the rising sea levels are Hoskins, Bali, Vitu and other small Islands in the Kove area (Glouster District). As far as the participants are concerned, nothing has been done to address the issue. Replanting of mangroves was envisioned as adaptation measure as it worked in other provinces to prevent erosion. In order for the province to move forward, more awareness and a strengthened link between communities and provincial authorities is needed..</p> <p><i>East New Britain</i> Rising sea level had caused coastal erosion, sinking islands, king tide damage, salt water flooding of agricultural lands and salt water contamination of drinking water. The areas affected include Duke of York Islands, coastal areas, North coast road, Lau Mauna and Baraman, and Vudal beach. The communities located next to the sea have moved in 100 meters, awareness has been carried out on the issue, land filling in Raluana village but often been washed off and open air warning to move to higher grounds. To improve situation in the province, trees/ mangroves are to be planted along coastal areas, reef systems are to be protected, new buildings built elevated and water tanks should be installed. To move forward, the province needs financial support, more awareness, especially in the rural areas, provincial officers to work closely with NGOs.</p>
<p>Consultations with the Adaptation Technical Working Group</p> <p>Stakeholders represented in the ATWG: Key Government Agencies, NGOs, private Sector representatives as outlined in the description.</p>	<p>This proposal has also been reviewed by and received valuable contributions from the OCCD's Technical Working Group on Adaptation (ATWG), which meets every 2-3 weeks. The TWGs comprise the OCCD Director for Adaptation and representatives of other government agencies, civil society and the private sector. A final consultation with the Adaptation Technical Working Group took place in mid June 2011 and was aimed at receiving input into the finalisation of the project document and the endorsement for the submission of the full proposal after previous comments had been addressed.</p> <p>Stakeholders represented in the ATWG: key Government agencies (PNG National Weather Service, Department of Mineral Policy and Geo-hazard Management, Office of Urbanization, Department of National Planning and Monitoring, Treasury Department, Office of Climate Change and Development, PNG Forest Authority, National Maritime Safety Authority, National Disaster Centre); NGOs (WWF, Conservation International, University of PNG, The Nature Conservancy, Wildlife Conservation Society) Private sector (Digicel); The ATWG held monthly meetings over the course of the programme development as per standard ATWG schedule Development partners (World Bank, AusAID, UNDP);</p>
<p>Interviews and exchanges</p>	<p>The intervention strategy of the proposed programme was developed with further contributions from a range of</p>

Consultation type and time	Main points discussed / raised
<p>with individual key stakeholders</p> <p>Throughout the development phase of this proposal</p>	<p>stakeholders which include the following national agencies and organizations:</p> <ul style="list-style-type: none"> Department of Environment and Conservation Department of Agriculture and Livestock Department of Health Department of National Planning and Monitoring Department of Provincial and Local Level Development Affairs National Forest Authority Papua New Guinea National Weather Office National and sub-national level Disaster Risk Centres National Agricultural Research Institute Provincial level authorities

Annex 7 – Alignment of Project Objectives/Outcomes with Adaptation Fund Results Framework

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator
Strengthened ability of coastal and riverine communities in Papua New Guinea to make informed decisions about and to undertake concrete actions to adapt to climate change-driven hazards affecting their specific locations	Number of risk-exposed coastal communities protected through adaptation measures	Outcome 1: Reduced exposure at national level to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis
	Number of risk-exposed riverine communities protected through adaptation measures	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses
			3.2. Modification in behavior of targeted population
	Number of provinces with improved climate-related planning and policy frameworks to increase resilience	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress
		Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks
		Outcome 7: Improved policies and regulations that promote and enforce resilience measures	2.2. Number of people with reduced risk to extreme weather events
			7. Climate change priorities are integrated into national development strategy
Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator
Outcome 1: Reduced exposure and increased adaptive capacity of coastal communities to flood-related risks and hazards in 8 communities and three cities of the 11 provinces of the North Coast and Islands Region.	Number of communities benefitting from improved protection from coastal floods	Output 1: Risk and vulnerability assessments conducted and updated at a national level	1.1. No. and type of projects that conduct and update risk and vulnerability assessments
	Number of AWS and voluntary weather stations in operation	Output 2.1: Strengthened capacity of national and regional centres and networks to respond rapidly to extreme weather events	1.2. Development of early warning systems
	Number of communities covered by the improved coastal warning system and weather information	Output 2.2: Targeted population groups covered by adequate risk reduction systems	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events 2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased
	Number of provinces with comprehensive disaster preparedness and response plans for coastal flooding in place	Output 5: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	2.2.1. Percentage of population covered by adequate risk-reduction systems 2.2.2. No. of people affected by climate variability
	Number of community-led		5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)

	<p>mangrove projects benefitting from support systems for mangrove projects</p> <p>Number of mangrove nurseries established and sustainably operating</p>		
<p>Outcome 2: Reduced exposure and increased adaptive capacity of 8 riverine communities in 4 provinces</p>	<p>Number of communities benefitting from improved protection from inland flooding</p> <p>Number of communities covered by the improved warning system and weather information</p> <p>Number of AWS and voluntary weather stations in operation</p> <p>Number of provinces with comprehensive disaster preparedness and response plan for inland flooding</p>	<p><i>Output 1:</i> Risk and vulnerability assessments conducted and updated at a national level</p> <p><i>Output 2.1:</i> Strengthened capacity of national and regional centres and networks to respond rapidly to extreme weather events</p> <p><i>Output 2.2:</i> Targeted population groups covered by adequate risk reduction systems</p>	<p>1.1. No. and type of projects that conduct and update risk and vulnerability assessments</p> <p>1.2. Development of early warning systems</p> <p>2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events</p> <p>2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased</p> <p>2.2.1. Percentage of population covered by adequate risk-reduction systems</p> <p>2.2.2. No. of people affected by climate variability</p>
<p>Outcome 3: Strengthened institutional capacity at national and sub-national levels to integrate climate change-related risks into sectoral policies and management practices</p>	<p>Number of national and provincial level policies, strategies, plans and coordinating mechanisms reviewed and incorporating resilience to climate change</p> <p>Number of provincial and national-level officers trained in climate adaptation planning and implementation</p>	<p>Output 7: Improved integration of climate-resilience strategies into country development plans</p>	<p>7.1. No., type, and sector of policies introduced or adjusted to address climate change risks</p> <p>7.2. No. or targeted development strategies with incorporated climate change priorities enforced</p>
<p>Outcome 4: Strengthened awareness and ownership of adaptation and climate change-related risk reduction processes at national and sub-national levels</p>	<p>% of the risk-affected population exposed to awareness raising activities and materials</p> <p>Integration of climate change into the national school curricula and university academic programmes</p>	<p>Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities</p>	<p>3.1.1 No. and type of risk reduction actions or strategies introduced at local level</p>

Annex 8 – Preliminary Guidelines (Best Practices) in Mangrove Reforestation to be Applied in the Project

The OCCD's mangrove planting programme will follow local and international best practices, making sure that all planting efforts in project sites meet a set of natural and social suitability criteria. These best practices will be employed by the project. Best practices all over the world will be tracked for implementation in the project.

For a site to be considered naturally suitable, it should be evident that mangroves would grow at the site were it not for anthropogenic stresses. The type of sites under consideration would primarily be known former mangrove areas that are degraded, but could also be gaps within non-degraded stands or mudflats. Ground-truthing would determine whether potential sites demonstrate appropriate characteristics such as signs of secondary growth or sparse vegetation; not being submerged by more than 1.5 m of salt water; has limited or no exposure to strong waves, currents and wind; is not a sea grass beds and though hard to avoid entirely, has relatively few pests such as crabs and barnacles.

The ground-truthing team would also verify the socio-economic suitability of the site. It would be reasonably expected that people and property of the community will be better protected against coastal flooding after mangroves have been rehabilitated; rehabilitation will not conflict with existing or future land-use and/or development needs; a clear majority of the community and its leaders support mangrove planting in the proposed area and no individual community members have a claim to the mangrove area and oppose rehabilitation

To maximize the chances of success, the OCCD's planting programme will follow the following 5 steps from initial awareness to ensuring survival.

Step 1 – Awareness and training:

Awareness activities on the benefits of mangroves and risks from climate related coastal flooding will be carried out in the communities. Training courses will be arranged for community project leaders in cooperation with local NGOs and mangrove experts.

Step 2 - Planning and site analysis

A basic project plan will be developed by the community in conjunction with expert partners selected by the OCCD. The community and experts will conduct a detailed site assessment and then refine the project workplan, which would be reviewed and approved by the OCCD before allocating funds and commencing implementation activities.

Step 3 - Implementation activities

International and local practices for successful planting and endorsed by local mangrove experts and NGOs will guide community project groups through seed selection, nursery construction and management, site preparation and planting. These successful practices will be encapsulated in a step-by-step guide available to all project groups.

Special consideration will be given to factors that will increase effectiveness of the mangroves as barriers against storm surges:

- Use a mix of species

- No single species can be used as a response to all natural disturbances in coastal areas. Some species are more wave resistant but some that are less resistant are needed to accelerate the ecosystem regeneration process.
- A complex of various species would be desirable as different species have different types and sizes of leaves, trunks and roots that together provide a more complete barrier offering greater protection.
- Emphasis on planting mangroves with pneumatophores, such as Rhizophora, as they create greater friction to waves than species without pneumatophores.
- Plant mangroves between a maximum strand depth of 100m and a minimum of 20m.
- Increase the planting density of seedlings to provide adequate protection before mangroves mature, after which the strands would be thinned out natural density.

Step 4 - Ensuring survival

To improve the long-term sustainability of the rehabilitation efforts, communities will be required to perform and document regular monitoring and maintenance activities. The OCCD will capture the reported information and use it to evaluate and improve the operations of projects and the overall programme. The OCCD will also work with the communities, local experts and NGOs to develop possible alternative livelihoods and/or create protected areas of the sites.

Source: OCCD Mangroves Toolkit (work in progress)